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Estimating Relative Juvenile Abundance of Ecologically Important Finfish and Invertebrates in the Virginia Portion of Chesapeake Bay (Project No. NA03NMF4570378) July 2004–June 2005

Marcel M. Montaine
Virginia Institute of Marine Science

Wendy A. Lowery
Virginia Institute of Marine Science

ANNUAL REPORT

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Prepared by

Marcel M. Montane
Wendy A. Lowery

School of Marine Science, College of William and Mary

Virginia Institute of Marine Science

Gloucester Point, Virginia 23062

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DISCLAIMER

Some of the results contained in this report have recently been completed and may contain some errors and/or need further refinement. In particular, information pertaining to gear conversions and the longer time series they provide (1955-2004) should be used with some caution until further evaluation.

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EXECUTIVE SUMMARY

The fisheries trawl survey conducted by the Virginia Institute of Marine Science (VIMS) is the oldest continuing monitoring program (50 years) for marine and estuarine fishes in the United States. This survey provides a monthly baseline assessment of abundance of juvenile marine and estuarine fishes and invertebrates in the tidal and mainstem Chesapeake Bay. The survey provides crucial, real time data to various state, regional and national fisheries management agencies, including the Virginia Marine Resources Commission (VMRC), the Atlantic States Marine Fisheries Commission (ASMFC), the Mid-Atlantic Fisheries Management Council (MAFMC), and the National Marine Fisheries Service (NMFS). For example, the VIMS Trawl Survey provides the ASMFC with the only spot index available on the East Coast and was the cornerstone for the 2003 ASMFC Spot FMP. The MAFMC recognizes the VIMS Trawl Survey as the only available predictor of summer flounder recruitment.

In the Virginia portion of Chesapeake Bay, several annual indices of juvenile abundance have been generated from trawl survey data for species of key ecological, commercial and recreational importance. These include spot, Atlantic croaker, weakfish, summer flounder, black sea bass, scup, striped bass, white perch, catfishes (white, channel and blue), northern puffer, silver perch, blue crab, American eel and bay anchovy.

Four different estimates of relative abundance have been developed for juvenile finfish. The Bay and River index (BRI) is only for the historic fixed station transects of the tributaries and the Bay survey established in 1988. Two indices are presented, one from the tributaries only (RO; 1979 to present) and the other for both the Bay and rivers (BRI; 1988 to present). Both converted indices (random stratified converted index - RSCI) and unconverted indices (random stratified index - RSI) for the target species discussed have been created for the half century time series.

In recent years, juvenile indices for most species have declined, most often a result of overfishing, degradation of their estuarine nursery habitats, and year class failure due to natural environmental variation. For example, spot RSCI indices have declined greatly over the past 50 years, with their 1955-1978 index twice the 1979-2004 index. Croaker show the greatest interannual variability of the key species discussed, with fluctuations weather related. There was an increasing trend in weakfish converted indices since 1994, while summer flounder have remained low, most probably due to overfishing and year class failure, which were revealed in the very low 1987 trawl index. The black sea bass index had increased since 1997, but decreased in 2002 and 2003 to the lowest level in decades. The scup index has been highly variable and decreased in 2003. Striped bass indices were very low during the 1970's and early 1980's, rebounded in the early 1990's and have decreased and remained low since 2001. White perch YOY and age 1+ indices decreased in 2005 from the previous year. White catfish YOY and age 1+ indices decreased from 2004, as did the channel catfish YOY index, while the channel catfish age 1+ index increased slightly in 2004. Blue catfish indices have increased since 2001. Since 1988, northern puffer indices experienced a rapid and continuous decline. The silver perch index has remained consistently low since 1972. Both age 1+ and adult female blue crab indices exhibited significant declines. Both American eel and bay anchovy indices have decreased since the early 1980’s. The Chesapeake Bay is a major nursery area for many coastal migratory fish species and an integral part of multistate management efforts along the Atlantic Coast of the United States.

INTRODUCTION

A key element in the management of the Atlantic States' coastal fishery resources is the use of juvenile abundance estimates (indices) of important finfish and invertebrates. Relative interannual abundance estimates of early juvenile (age 0) fish and crustaceans (i.e., blue crab, *Callinectes sapidus*) generated from scientific (fishery-independent) survey programs provide a reliable and early estimator of future year class strength (Goodyear, 1985; Lipcius and Van Engel, 1990), and may be used to validate management actions. The Chesapeake Bay Stock Assessment Committee (CBSAC), a federal/state committee sponsored and funded by the National Oceanic and Atmospheric Administration (NOAA) reviewed previously available indices of juvenile abundance for important fishery resource species in the Chesapeake Bay (hereafter referred to as "Bay") and recommended that "a unified, consistent trawl program should be one of the primary monitoring tools for finfish and crab stock assessment" (Chesapeake Bay Program Stock Assessment Plan, Chesapeake Executive Council, 1988). Subsequently, CBSAC supported pilot studies directed at developing a comprehensive trawl survey for Chesapeake Bay. The primary focus of this support in the Virginia portion of the Bay was the initiation (1988) of a monthly trawl survey of the mainstem lower Bay. This effort complimented and expanded the monthly trawl surveys of the major Virginia tributaries (James, York and Rappahannock Rivers), which had been conducted by the Virginia Institute of Marine Science (VIMS) as part of a long-term monitoring effort to assess the condition of fishery stocks in the lower Chesapeake Bay and its tributaries.

The present sampling program, which includes the Bay and its tributaries, is vital in insuring that data are of sufficient geographic resolution for the generation of annual relative estimates of recruitment success of ecologically, commercially and recreationally important finfish and crustacean species. The National Marine Fisheries Service (NMFS) Marine Recreational Fisheries Statistics Survey (MRFSS) 2004 survey for Virginia marine recreational catches were dominated by Atlantic croaker (*Micropogonias undulatus*), summer flounder flounder (*Paralichthys dentatus*), spot (*Leiostomus xanthurus*), striped bass (*Morone saxatilis*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), pigfish (*Orthopristis chrysoptera*), weakfish (*Cynoscion regalis*), and kingfishes (*Menticirrhus* spp.; Anon., 2004; see Table 1). These are the top species landed by catch (89% of the total catch) and weight (84% of the total weight; Table 1). These species depend upon the lower Chesapeake Bay and its tributaries as a nursery area, with all but bluefish highly vulnerable to bottom trawls. In addition to the key species above, past survey results indicate other species of recreational interest, including scup (*Stenotomus chrysops*), white perch (*Morone americana*), silver perch *(Bairdiella chrysoura)*, and freshwater catfishes (white, *Ictalurus catus*, channel, *I. punctatus*, and blue, *Ictalurus furcatus*), are taken with sufficient regularity during trawling operations to provide datasets suitable for the generation of juvenile abundance indices. Although generation of annual juvenile (young-of-year or YOY) indices is the primary focus of this project, survey results can be used to address other aspects of finfish population biology, such as habitat utilization, early growth and survival, climate and pollutant interactions, or disease prevalence. For example, climate effects such as hurricanes affect recruitment of shelf spawning species such as Atlantic croaker (Montane and Austin, 2005). Additionally, a high level of hurricane activity is predicted for the Chesapeake Bay for the next 10-40 years (Goldenberg et al., 2001), likely impacting different species abundance and distribution, and consequently multispecies interactions.

The development of juvenile indices requires a continuous time series of data to determine the proper area-time sequences best used in index calculations. Provisional annual juvenile abundance indices were developed for spot, weakfish, Atlantic croaker, summer flounder, and black sea bass (Colvocoresses and Geer, 1991), followed by scup (Colvocoresses et al., 1992), and then white perch and striped bass (Geer et al., 1994). Indices for white and channel catfish, silver perch and northern puffer *(Sphoeroides maculatus)* followed (Geer and Austin, 1994). Blue catfish, blue crab, American eel (*Anguilla rostrata*) and bay anchovy (*Anchoa mitchelli*) indices have been recently developed also. A time series back to 1955 with the use of gear conversions and post stratification has also been produced for most species, if appropriate (Geer and Austin, 1997).

Many species of interest are captured in significant numbers across several year classes. As a result, both YOY and age 1+ indices were created for white perch, white catfish, channel catfish, blue catfish and blue crabs. For Atlantic croaker, in addition to a Fall YOY index, a recruit or Spring index (returning YOY) was created.

METHODS

Field Sampling

Sampling protocol is described in detail in Lowery et al., (2000). In brief, a lined 30' (9.14m) semi-balloon otter trawl, with 1.5" (38.1mm) stretched mesh and 0.25" (6.35mm) cod liner, is towed along the bottom for five minutes during daylight hours. Marinovich Net Company (Biloxi, MS) supplied trawl nets for the survey for over thirty years before going out of business. Trawl nets were then built to survey specifications by Glavan Trawl Manufacturing Company (also of Biloxi, MS) which was recently destroyed by Hurricane *Katrina*.

Sampling in the Bay occurs monthly except during January and March, when few target species are available. Sampling in the tributaries also occurs monthly, at both the random stratified stations and the historical fixed mid-channel stations. The stratification system is based on depth and latitudinal regions in the Bay, or depth and longitudinal regions in the rivers. Each Bay region is 15 latitudinal miles and consists of six strata; western and eastern shore shallow (4-12 ft.), western and eastern shoal (12-30 ft.), central plain (30- 42 ft.), and deep channel ($\geq$ 42 ft.)(Table 2). Each tributary is divided into four regions of approximately ten longitudinal miles, with four depth strata in each (4-12 ft., 12-30 ft., 30-42 ft., and $\geq$ 42 ft.) (Tables 3 - 5; Figure 1). Strata are collapsed in areas where certain depths are limited. The fixed stations have been assigned a stratum according to their location and depth.

Due to funding restrictions, exploratory monitoring of secondary water systems (Pocomoke Sound, Mobjack Bay, Piankatank and Great Wicomico Rivers) which began in 1998, was discontinued in 2001. Each system was sampled quarterly, with a rotation to assure that over a three year period, each system would have sampling events during different times of the year. A random stratified design (RSD) similar to the primary survey was used. When compared to the mainstem Bay, James, York and Rappahannock Rivers, some of these systems have shown higher catch rates of summer flounder, spot and silver perch (Geer and Austin, 2000).

With the exception of the fixed river stations, trawling sites within strata are selected randomly from the National Ocean Service's Chesapeake Bay bathymetric grid, a database containing depth records measured or calculated at 15 cartographic second intervals. Two to four trawling sites are randomly selected for each Bay strata per month, the number chosen varying seasonally according to observed changes in distribution, with sampling intensity being highest in the most heavily utilized strata. Exceptions include the shallow water strata where one to two stations have been occupied for each month's survey. For each river strata, one to two stations are selected per month. The number of potential sites for the RSD of the Bay and tributaries with the approximate areas of each strata, are shown in Tables 2 - 5. The RSD of the York River which began in June 1991, has been altered slightly to make depth strata similar to the James, Rappahannock, and mainstem Bay. Earlier investigations (Geer et al., 1994) proposed that for the tributaries, all depths ≥ 30 ft. be included in one stratum, and this was modified in January 1996, to create depth strata of 30-42 ft. and ≥ 42 ft. (Geer and Austin, 1996a). Since these random stratified tributary data were considered conditional until all three tributaries were sampled (March 1996), previous samples were assigned to the appropriate strata established January 1996.

Earlier reports listed results dating back to only 1979 due to gear and sampling changes which made earlier data difficult to use in the present sampling format. With gear and vessel conversions now available for most target species, indices can be calculated for the pre-1979 data. Survey stations before 1979 have also been post-stratified to the present sampling scheme. Although the stratification of the mainstem Bay has not changed, that of the initial random stratified surveys of the rivers has.

The fixed channel sites on the tributaries are spaced at approximately 5 mile intervals from the river mouths up to nearly the freshwater interface. The fixed stations have been sampled monthly (nearly continuously) since 1980. From the mid-1950's (York River) and early-1960's (James and Rappahannock Rivers) to 1972, the fixed stations were sampled monthly using an unlined 30' trawl (Gear U_N_3B_SW, gear code 010). During 1973-79, semi-annual random stratified sampling was performed by the VIMS Ichthyology Department while the

VIMS Crustaceology Department continued monitoring the fixed tributary stations on a limited monthly basis (May - November). Areal weightings for the tributaries have been previously assigned by dividing each river into two approximately equal length "strata" by assuming that the stations in each strata are representative of the channel areas in those reaches (Table 6; see also Lowery and Geer, 2000). With all three tributaries now being sampled with a random stratified design, the fixed stations have been assigned to a stratum based on location and depth. The present tributary survey (combining fixed and random stations) provides larger spatial coverage, a long-term historical reference, and is more statistically sound.

Beginning May 1998, data were collected on habitat or substrate type (Table 7). Fish distribution and abundance may be influenced by various substrates such as shell, sponge, hydroids, and sea squirts. Three dimensional structure may be used by different species for spawning, shelter, or feeding. Categories of substrates are measured at each trawling site based upon the quantity (volume in a standard container) observed in the net. Maps of substrate distribution can be developed and compared to catch rates and fish species distribution. Gelatinous zooplankton volumetric measurements are also collected at each trawl station.

Gear Calibration Studies

Gear calibration analyses were completed and methods and statistical analyses applied (Hata, 1997). Conversion values were applied to the historical data sets providing a converted catch for each observation, in most cases extending the individual species time series back to 1955.

Juvenile Index Computations

Many key target species of this study are migratory and abundance measurement presents special difficulties, particularly if the timing and duration of migration is not constant from year to year. Juvenile fishes which use estuarine nursery areas are especially vulnerable to the vagaries of climate, as many rely upon climatically dependent wind driven and tidal circulation patterns for semi-passive transport into the estuaries as larvae and early juveniles (Norcross, 1983; Bodolus, 1994; Wood, 2000) and later key their outward migration from the nursery areas on annually variable environmental cues (e.g. temperature changes). Ideally the abundance of a juvenile marine species population should be measured at that point when it is most fully recruited to the nursery area being monitored. However, in practice, this can only be accomplished if the time of maximal abundance and size of recruitment to the gear can be predicted (and surveys timed accordingly), or if surveys can be conducted on such an intense periodicity over the season of potential maximal abundance as to be certain of reasonable temporal coincidence. Neither of these two approaches is practical for this survey. The period of recruitable maximal abundance and the scope of the area being surveyed has proven to be variable between years and species. This, coupled with multi-specific monitoring objectives precludes temporally intense surveys in the face of finite resources. The multispecies nature of this program, also makes survey timing difficult to adjust in order to maximize the usefulness of the data to include all species. Consequently, the survey continues to be conducted on a regular periodicity and juvenile indices constructed as best possible.

Juvenile index calculation uses the following approach. A standard monthly cutoff value is applied to the length frequency information collected for each target species to separate the data into either young-of-year or older components. Cutoff values vary among months for each species and are based on modal analyses of historical composite monthly length frequency data and reviews of ageing studies for each species (Colvocoresses and Geer, 1991). For the earlier months of the biological year, cutoff values are usually arbitrary and fall between completely discrete modal size ranges. In the latter part of the biological year, when early spawned, rapidly growing individuals of the most recent year class may overtake late spawned, and slowly growing individuals of the previous year class, cutoff values are selected to preserve the correct numeric proportionality between year classes despite the misclassification of individuals (Table 8). The extent of the zone of overlapping lengths and the proportion within that range attributable to each year class is estimated based on the shapes of each modal curve during the months prior to the occurrence of overlap. A length value is then selected from within that range which will result in the appropriate proportional separation. Although this process involves considerable subjectivity and ignores possible interannual variability in average growth rates, the likelihood of significant error is small, since only a very small fraction of the total number of young-of-year individuals fall within the zone of overlap and most of the data used to construct juvenile indices is drawn from months when no overlap is present. Furthermore, any error should be constant from year to year. Fish length was recorded as fork length (FL), total length (TL), or total length centerline (TLC) depending on individual species meristics.

After partitioning out non young-of-year individuals, monthly catch rates of target species are map-plotted and strata-specific abundances and occurrence rates calculated. Numbers of individuals caught are logarithmetically transformed (ln(n+1)) prior to abundance calculations, since the log transform best normalizes collection data for contiguously distributed organisms such as fishes (Taylor, 1953) and has been verified as the best suited transformation for Chesapeake Bay trawl collections (Chittenden, 1991). Resultant average catch rates (and the 95% confidence intervals as estimated by $\pm$ 2 standard errors) are then back-transformed to the geometric means. Coefficient of variation is expressed as the log transformed mean catch, EY_{st}

divided by the standard deviation, EY_{st} / STD (Cochran, 1977). Plots and data matrices are then examined for area-time combinations which provide the best basis for juvenile index calculations. Criteria applied during the selection process include identification of maximal abundance levels, uniformity of distribution, minimization of overall variance, and avoidance of periods in which distribution patterns indicate migratory behavior is occurring. Although identification of areas most suitable for index calculations (primary nursery zones) is generally clear, selection of appropriate time windows is more complex. Surveys are timed on regular monthly intervals which may or may not coincide with periods of maximal recruitment to the nursery areas. The use of a single (maximal) month's survey results is inappropriate, since using a very limited portion of the overall dataset would decrease sample size, increase confidence intervals, and increase the risk of sampling artifacts. Conversely, the temporal series of data incorporated into index calculations should not be longer than necessary to capture the period of maximal juvenile utilization of the nursery area, since indices calculated over longer time periods risk confounding temporal persistence on the nursery area with maximal utilization levels. With this approach, we can identify three or four month periods which provide realistic abundance data for the species examined (see Table 8; note one exception is bay anchovy where six months are used for the index).

After area-time combinations are selected, annual juvenile indices are calculated as weighted geometric mean catch per tow. Strata-specific means and variances are calculated and then combined and weighed by stratum areas (Cochran, 1977). Since stratum areas are quite variable, a weighted mean provides an index that more closely mirrors actual population sizes.

The following indices are produced for each species, if appropriate: the original index based on the present Bay strata and the fixed mid-channel tributary stations (Bay & River Index -

BRI and River Only - RO, 1979 to present); a post-stratified gear and/or vessel converted index using all spatially appropriate data (Random Stratified Converted Index - RSCI, 1955 to present); and an unconverted post-stratified index, also based on all spatially appropriate data (Random Stratified Index - RSI, 1955 to present). These multiple indices are presented for completeness, but usually only the RSCI and the Original Index (BRI and/or RO) will be described in detail in this report. Results from the longer time series must be considered provisional, since concerns about missing data and conversion factors are continually being addressed. Index regressions are presented to exhibit trends over time, though fishery dependent time series data, as with any time series data with successive observations, are usually not independent and are often autocorrelated (Chatfield, 1994).

In this report, we briefly discuss the potential effect of Hurricane *Isabel* (September 2003) and other past hurricanes on recruitment of certain species, particularly the shelf (i.e., Atlantic croaker, spot and summer flounder) and Bay spawners (i.e. blue crab) in the Chesapeake Bay.

Monthly size frequencies for selected species are included in the report as they indicate when a species first recruits to the survey gear. Additionally, in collaboration with the Chesapeake Bay Trophic Interaction Laboratory at VIMS, Atlantic croaker, weakfish, blue catfish, striped bass, summer flounder and silver perch were collected from the James, York and Rappahannock Rivers for stomach analyses (see Parthree, 2005 for methods) and blue catfish prey items are discussed briefly. Though this project produces indices for multiple species, we are only beginning to investigate multispecies interactions in an effort to better understand the Chesapeake Bay fishery ecosystem and report on interactions between the catfishes. The VIMS

Trawl Survey also plays an important role responding to numerous advisory service requests (for examples, see Appendix Table 1).

RESULTS

Our objective was to develop and produce timely annual estimates of recruitment success for important finfish and invertebrate species for the major Virginia nursery areas of Chesapeake Bay. A summary of samples collected from 1955 through June 2005 (Table 9) gives a brief synopsis of the sampling conducted since the start of the survey. For the 2004-2005 project year (July through June), 1224 stations were sampled, resulting in approximately 417,000 fishes and invertebrates identified and enumerated from 112 species collected (Table 10). The overall catch was dominated by bay anchovy and Atlantic croaker (Table 10).

Indices were calculated and described for species such as: spot, Atlantic croaker, weakfish, summer flounder, black sea bass, scup, striped bass, white perch, white catfish, channel catfish, blue catfish, northern puffer, silver perch, blue crab, American eel and bay anchovy. For each species, detailed analyses and spatial distribution plots follow. VIMS Trawl Survey indices are also available on the survey website at http://www.fisheries.vims.edu/trawlseine/mainpage.htm.

Spot (*L. xanthurus*) - Spot has often been the most abundant of the recreational species caught by the survey, however in recent years their numbers have declined. Their distribution is wide and consistent throughout the sampling area (Figure 4, bottom). Juveniles first recruit to the gear in April and their abundance remains consistently high until December, peaking between July and October (Figure 5). The RSCI (1955-2004), BRI (1988-2004) and RO (1979-2004) for spot all showed significant decreases (r^2 = 0.13, P = 0.011, r^2 = 0.51, P = 0.001, and r^2

= 0.32, P = 0.003 respectively; see Table 11 and Figure 4, top). While the longer time series have shown great fluctuations, all indices show a dramatic and consistent decline from 1992 to the present (Figure 4, top). Highest abundance of spot are usually found during the index months of July through October, though a lot of small (<40 mm YOY) were collected in May 2005 (Figure 5). Initial investigation into effects of hurricanes on spot recruitment show that increased hurricane activity may have an inverse relationship to recruitment of spot to the Chesapeake Bay (Montane, unpublished).

Atlantic Croaker (*M. undulatus*). Croaker display high abundance in the survey catches but present a complex pattern of recruitment and distribution (Figure 6, top and bottom). Spawning takes place over a more protracted period than other species considered, and small early juveniles (<30 mm TL) can be present in catches year-round (Norcross, 1983; Colvocoresses and Geer, 1991; Colvocoresses et al., 1992; Geer et al., 1994; 1995; Land et al., 1995). During some years, peak abundance occurs in the fall with croaker less than 100 mm TL, but in other years the peak occurs the following spring and includes croaker either overwintering or recruiting from offshore waters. To separate these size cohorts, two estimates are generated: a juvenile Fall (Oct. - Dec.) index based just on the tributaries; and a Spring recruit (May - Aug.) index (Bay and tributaries combined).

Successful spawning events are evident from the very successful year classes in the fall of 1984, 1985, 1989 and 2003 (Table 12, Figure 6, top). The spike in the Fall 2003 YOY croaker index was caused by Hurricane *Isabel* which struck Chesapeake Bay from 18-19 September (Montane and Austin, 2005), and produced prolonged onshore winds for many days prior (NOAA, 2003). The 2003 fall croaker index was 15 times greater than the 2002 index and eight times greater than the 2004 index. However, these successful spawning events often did not result in comparably successful recruitment the following spring (Table 13 and Figure 7, top and Figure 8). There was no significant relationship between the fall YOY and spring recruit indices.

The Fall YOY RSCI (1956-2004) and RO (1979-2004) and Spring Recruit RSCI (1955-2004), BRI (1988-2004) and RO (1979-2004) for croaker were analyzed for annual trends. Only the Fall YOY RSCI (1956-2004) showed significant increases ($r^2 = 0.14$, $P = 0.008$; see Table 12 and Figure 6, top).

The Spring Recruit RO index has been extremely variable since 1979 (Figure 7, top and Table 13) with major peaks in 1991, 1993, and a minor peak in 1997. The 2004 Spring Recruit RO index was sixteen times greater than the 2003 index. Large numbers of YOY Atlantic croaker were captured by the survey gear in September 2004, though greatest numbers of YOY are usually collected during the index months of October through December (Figure 8).

Weakfish (*C. regalis*) - Weakfish are less abundant than spot and croaker, but are still one of the dominant species in the survey, and are found throughout the Bay and tributaries, though were rare in the upper portion of the James River (Figure 9, bottom). Juveniles have occasionally first occurred in catches as early as late May and June, with June taken as the beginning of the biological year, but during this project period, most new recruitment to the nursery areas occurred July, August and September (Figure 10). Weakfish indices have been highly variable, with a slight increasing trend from 1994 to the present in the RSCI index (Figure 9 top, Table 14). The most striking observation of the weakfish time series is the poor recruitment between 1972 and 1977 (which were years of high precipitation in Chesapeake Bay), though before and after this period, there was successful recruitment (1970 and 1978; Figure 9, top and Table 14). Weakfish recruitment began in July 2004, though a majority of the smaller fish did not recruit until August and September (Figure 10).

Summer Flounder (*P. dentatus*) **–** Summer flounder spawn during the offshore migration from late summer to midwinter (September through January) on the continental shelf with the peak occurring in October and November (Murdy et al., 1997; Able and Fahay, 1998). Flounder larvae enter the Bay and other Virginia estuaries from October through May with juveniles utilizing shallow fine substrate habitat adjacent to seagrass beds (Murdy et al., 1997; Norcross and Wyanski, 1994; Weinstein and Brooks, 1983; Wyanski, 1990). Low water temperatures can have significant effects on early demersal individuals that enter the estuary in the winter (Able and Fahay, 1998). Juvenile summer flounder can first appear in catches as early as late March, which is used as the beginning of the biological year, but in past years were not taken in appreciable numbers until June. YOY summer flounder abundance continues to increase steadily throughout the summer and early fall to a late fall peak, and then shows evidence of emigration during December. September, October, and November usually encompass the three months of greatest abundance. Historically during this period, juvenile flounder are broadly distributed across the mainstem Bay and are found in the lower rivers, but only rarely appear in catches in the upper rivers. During this project period, flounder were absent from the upper James and upper Rappahannock Rivers (Figure 11, bottom). Index calculations therefore include all Bay and the lower river strata during these three months.

The RSCI (1955-2004), BRI (1988-2004) and the RO (1979-2004) were analyzed for annual trends (Table 15). Only the RO showed a significant decrease ($r^2 = 0.40$, $P < 0.0005$) while the BRI exhibited a decreasing trend. The RO index peaked in 1980 (mean = 1.6) and is presently (2004) at 1.17. Annual index values (RSCI and RO) were high in 1980 and 1983, and 2004 was the highest flounder index for the past ten years for the RSCI and BRI indices. Minor peaks occurred in the early nineties (1990, 1991 and 1994), but the last few years have been consistently low. Small YOY flounder first appeared in July 2004, decreased in August and peaked again in September and October 2004 (Figure 12). Because of the long and late season spawning period of summer flounder, hurricanes may have a neutral effect on their recruitment to Chesapeake Bay (Montane, unpublished).

Black Sea Bass (*C. striata*) - Black sea bass are seldom taken in large numbers but regularly occur in survey catches. Juveniles first appear in low numbers in August. When present, young-of-year black sea bass occur throughout the Bay strata but do not appear in the tributaries on a regular basis except the lower James River (Figure 13, bottom). Index calculations have been based on all Bay strata and the lower James stratum. Although some early juveniles appear in the Bay during their first summer and fall and then emigrate with the onset of winter, more young-of-year enter the estuary during the following spring. Black sea bass spawn in the Mid Atlantic Bight beginning in April, peaking in August, and continuing through October (Murdy et al., 1997; Able and Fahay, 1998). Though not investigated yet, their spawning history and location suggest that hurricane activity may affect their recruitment to Chesapeake Bay. For instance, during some years there is virtually no recruitment to the Chesapeake Bay by early juveniles spawned the same calendar year. Since abundances are higher and distribution much more consistent during the following late spring and early summer, juvenile index calculations are based on May through July, historically encompassing the three months of highest abundance (though in 2005, slightly more black sea bass were collected in April than June, see Figure 14). Since this index is calculated from the middle portion of the calendar year but the very end of the biological year, the resultant index is for the year class spawned the previous calendar year (i.e., the 2003 index is for the 2002 year class). When the RSCI (1954-2003), BRI (1987-2003) and the RO (1978-2003) were analyzed for annual trends, the RSCI increased significantly (r^2 = 0.12, P = 0.016) with the BRI exhibiting a strong significant increase (r^2 = 0.29, P = 0.026; Figure 13, top; Table 16). The 2003 RSCI index was the lowest since 1979 (Figure 13, top)

Scup (*S. chrysops*) - Scup is primarily a marine and summer spawning species and utilizes the Chesapeake Bay the same as black sea bass. The estuary is rarely used as a nursery area by early juveniles but many older juveniles can be found there during their second summer. Early juvenile scup (25-40 mm FL) occasionally appear in survey catches in June, but usually rapidly disappear thereafter. Older scup first appear in catches in May, and by June range from 50 to 215 mm FL. The original length cutoff criteria were based on ageing studies (Morse, 1978), with the collective trawl data indicating three size or year classes (age 0, age 1 and age 2+). Since the age 0 is annually variable and not persistent, and the age 2+ is only taken in very small numbers, index calculations are performed on age 1 individuals. This year class clearly remains present in the Bay and available to the gear for the remainder of the summer and early fall. While the data collected are not amenable to construction of a true YOY juvenile index, the abundance of juvenile scup just as they enter their second year can be assessed. The term, "age 1" scup was often used in earlier reports, when in actuality data were lagged one year (year - 1), referring to YOY measured in their second year. Although there has been some discussion whether animals captured in Chesapeake Bay are YOY or early age 1, based on studies along the Virginia coast, trawl catches in these size ranges represent mainly age 1 individuals (Campbell et al., unpublished manuscript).

The early age 1 nursery area is largely restricted to the two lower mainstem Bay segments (Figure 15, bottom). Catch rates for scup usually peak in July, and essentially show a July-August dome. Since sizable numbers of late juveniles have also been collected during June and September, these months were chosen as the temporal basis for index calculation.

A regression of year vs. index for RSCI (1954-2003) was not significant, but the BRI (1987 - 2003) decreased significantly (r^2 = 0.41, P = 0.006; Figure 15, top and Table 17). Scup indices have been consistently low since 1993, but showed a slight increase in 2000 and 2002. Most scup were collected from July through September 2004 and June 2005 with most of the younger year class collected in June (Figure 16).

Striped Bass (*M. saxatilis*) - Striped bass use the upper tributaries for spawning and nursery grounds, spawning from early to mid-April through the end of May, in tidal freshwater areas just above the salt wedge. Young-of-year striped bass often appear in catches in May to July in size classes less than 50 mm FL during years of greater abundance, but then diminish in abundance until the following winter. A second, stronger, and more consistent period of abundance occurs in December and continues through to February the following year in the upper regions of the rivers. YOY striped bass are found exclusively in the rivers (Figure 17, bottom). This is probably due to their local migration into deeper waters in colder weather.

When the RSCI (1956-2004) and RO (1982-2004) were analyzed for annual trends, only the RSCI decreased significantly (r^2 = 0.21, P = 0.001; Figure 17, top and Table 18), particularly since 1987 (r^2 = 0.38, P = 0.006). However, both the RSCI and the RO index have been highly variable since 1982, having very low abundances through the 1970's. The 2000 RSCI and RO indices were the highest since 1993, and have substantially decreased through 2004. Though decent numbers of the smallest YOY were collected in Summer 2004, index values are constructed with the December through February YOY collected (Figure 18).

White Perch (*M. americana*) - Spawning occurs in the upper tributaries from March to July with a peak occurring from late April to early May. Since white perch populations from various tributaries can exhibit significantly different growth rates (Bowen, 1987; Setzler-

Hamilton, 1991a; Seaver et al., 1996), and those separations are not presently clear, for this analysis all specimens were categorized as either age 0 or age 1+. Examination of distributional data (Figures 19 and 21, bottom), reveals neither white perch cohort are found in the mainstem Bay, with the highest abundances found in upper portions of each tributary. Therefore, index calculations are confined to the upper strata of each tributary. Index months include December to February for YOY and November to February for age 1+, though periodically some age 1+ are caught in March, and YOY caught in November and March (Figure 20).

The RSCI (1956-2004) and RO (1979-2004) indices for YOY showed no significant annual trends, while only the RSCI for the age 1+ during the same period decreased significantly (r^2 = 0.22, P = 0.001; Figures 19 and 21, top and Tables 19 and 20). The age 1+ RSCI index was fairly high from 1960-1964, and then decreased significantly. The age 1+ RSCI index from 1979 to present also decreased significantly (r^2 = 0.24, P = 0.012) and decreased from 19.13 in 2003 to 6.84 in 2004 (Figure 21, top).

White catfish *(I. catus)* and **Channel catfish** *(I. punctatus)* - White and channel catfish are found in relatively high abundance in the upper portions of the tributaries (Figures 22, 24, 25, and 27, bottom). Although each river system is unique, spawning typically occurs in late May through early July in Virginia (Fewlass, 1980; Menzel, 1945); consequently June was selected as the start of the biological year. The survey typically catches both species up to 600 mm FL with juveniles 50 mm FL first recruiting to the gear in June. In summer 2004, small white catfish appeared in July, and small channel catfish in August (Figures 23 and 26). The temporal component seems very clear for the juveniles occurring from January to April for both species in the upriver strata only. The age 1+ index often indicates a higher, more stable trend than the juvenile index. Sampling is over several year classes which aids in stabilizing the index.

The YOY RSCI (1954-2004) and RO (1983-2004) white catfish indices decreased significantly (r^2 = 0.11, P = 0.018 and r^2 = 0.19, P = 0.041, respectively; see Tables 21-22). Both the 1+ RSCI (1954-2004) and RO (1983-2004) white catfish indices decreased significantly (r^2 = 0.11, P = 0.020 and r^2 = 0.23, P = 0.024, respectively). Both white catfish YOY and age 1+ have exhibited extremely low indices from 1998 to the present, though there was a slight increase in the 2003 indices. White catfish are collected throughout the year, and although not apparent in 2005, most YOY are usually present from January through April (Figure 23).

The 1+ RSCI (1954-2004) and RO (1983-2004) channel catfish indices increased (r^2 = 0.11, P = 0.021) and decreased significantly (r^2 = 0.44, P = 0.001), respectively (Tables 23-24). Channel catfish YOY indices were extremely low from 1997 – 2002, increased in 2003 and then decreased in 2004 (Figure 25, top). The channel catfish age 1+ RSCI 2001 index was the lowest since 1976, peaked in 1991, and the 2004 index was slightly greater than 2003 (Figure 27, bottom).

The channel catfish was introduced to Virginia in the late 1800's (Jenkins and Burkhead, 1994), and their population trends may be a result of the species becoming established and forming natural cycles as they become integrated into the ecosystem. The YOY declined dramatically since the late 1980's (with the exception of the 1989 year class), and decreased in 2004 (Table 23 and Figure 25, top), possibly due to competition with another introduced catfish, the blue catfish (*I. furcatus*). Older age classes are now beginning to reflect the decline in juveniles (Tables 23- 24 and Figures 25 and 27, top). Most channel catfish YOY were collected in January 2005, though the index includes January through April (Figure 26).

Blue Catfish (*I. furcatus*)- The blue catfish is one of Virginia's largest freshwater or anadromous fishes (Jenkins and Burkhead, 1993). It was introduced to the Chesapeake Bay as a sportfish in the James, Rappahannock and Mattaponi Rivers from 1974 through 1989 (Virginia Department of Game and Inland Fisheries, 1989 as reported by Connelly, 2001) and inhabits main channels and backwaters of medium to large size rivers (Murdy et al., 1997). The blue catfish is a carnivorous bottom feeder that preys on fishes, insects, crayfish, clams, and mussels (Murdy et al., 1997). Both the YOY RSCI (1983-2004) and RO (1983-2004) blue catfish indices increased significantly (r^2 = 0.31, P = 0.008; r^2 = 0.38, P = 0.002, respectively, Tables 25 and 26, Figures 28 and 30, top). Similarly both the 1+ RSCI (1983-2004) and RO (1983-2004) blue catfish index increased significantly (r^2 = 0.44, P = 0.001; r^2 = 0.48, P < 0.0005). The 2004 YOY RSCI index was second only to the 1997 index, and the RO index was the highest in survey history. The 2004 age 1+ blue catfish RSCI index was the highest since 1997 and RO indices were the highest since the start of the survey (Figure 30, top and Table 26). The two blue catfish age classes are noticeable with those less than 165-175 mm FL belonging to the age 0 year class (Figure 29). Most YOY were collected in April 2005, though both age classes were collected throughout the year (Figure 29).

Blue catfish indices have increased dramatically since 2001 and the ecosystem effects of such an increase are unknown. However, with the increase in the age 1+ blue catfish index, both the age 1+ white and channel catfish indices decreased (the channel catfish decrease was nearly significant). From March 2004 to April 2005, invertebrates (mostly amphipods) dominated the diets of blue catfish from 48 to 255 mm FL, while larger blue catfish (258-595 mm FL) were piscivorous eating mostly menhaden (*Brevoortia tyrannus*) and gizzard shad (*Dorosoma cepedianum*)(Parthree, 2005). There is a possibility that the other catfishes (white and channel) are competing with the introduced blue catfish for the same resources.

Northern Puffer *(S. maculatus)* - The puffer is captured in small numbers almost exclusively in the mainstem Bay (Figure 31, bottom). Spawning occurs from May to August in nearshore waters (Murdy et al., 1997), with peak spawning in June and July (Laroche and Davis, 1973). June is the start of the biological year with puffer less than 50 mm TL collected. Puffer is first caught in the Bay in May and peaks during late summer/early fall (July to October).

When the RSCI (1955-2004) and the BRI (1988-2004) indices were analyzed for annual trends, only the BRI decreased significantly (r^2 = 0.49, P = 0.002; Figure 31, top and Table 27). Since 1988, northern puffer indices experienced a rapid and continuous decline until 1992, and although variable, have shown a decreasing trend in recent years (Figure 31, top). During the survey, highest abundance of puffer occurred in September (Figure 32).

Silver Perch *(B. chrysoura)* - Silver perch is found in all strata, but the York River often dominates catches (Figure 33, bottom). Spawning occurs in the deep waters of the Bay and offshore from May to July, and juveniles (100 mm TL) begin recruiting to the fishing gear by July (Chao and Musick, 1977; Rhodes, 1971). September to November had the highest catch rates for all years of the expanded survey except 1991, when August had slightly higher values. When the RSCI (1955-2004), BRI (1988-2004) and RO (1979-2004) indices were analyzed for annual trends, the RSCI significantly decreased (r^2 = 0.23, P = 0.001) while the RO significantly increased (r^2 = 0.25, P = 0.009; Figure 33, top and Table 28). Highest abundances of YOY silver perch were collected from September through November 2004 (Figure 34).

Blue Crab (*C. sapidus*) - After mating in the oligohaline and mesohaline portions of estuaries, adult female blue crabs migrate to the mouths of estuaries or nearshore coastal waters to overwinter and then spawn the following spring (Van Engel, 1958; Tagatz, 1968). Spawning occurs from May to September, with a minor peak in June and a major peak in July-August in temperate regions (Dittel and Epifanio, 1982; McConaugha et al., 1983).

Newly-hatched zoea larvae are advected out of the estuary in the net surface outflow (Dittel and Epifanio, 1982; Epifanio et al., 1984), and larval development proceeds in coastal waters to the postlarval stage, the megalopa (Costlow and Bookhout, 1959). Megalopae reinvade the estuary from coastal waters. The dynamics of reinvasion are not yet fully understood, but tidally-timed vertical migration appears important once megalopae reach the mouths of estuaries (Epifanio et al., 1984; Epifanio, 1988). Influx of megalopae appears associated with the neap-spring tidal cycle (van Montfrans et al., 1990) and with downwelling wind events (Goodrich et al., 1989; Little and Epifanio, 1991). Megalopae then settle into shallow water habitats and metamorphose to the first juvenile instar (Orth and van Montfrans, 1987; Mense and Wenner, 1989). Growth is rapid from spring through fall (Lippson, 1971), but blue crabs are inactive during winter. Cold winters adversely affect blue crabs in Chesapeake Bay, with highest mortality occurring in larger crabs (Sharov et al., 2003). Maturity is usually attained after one year of residence in the estuary.

Since 1968, age 1+ blue crabs (crabs greater than 60 mm carapace width or cw) and adult females have significantly decreased ($r^2 = 0.11$, $P = 0.050$ and $r^2 = 0.17$, $P = 0.012$, respectively; Figure 35, top and Table 29). The age 0 (crabs less than 60 mm cw) and age 1+ crabs appear to exhibit a near decadal periodicity, with the age 1+ crab index significantly related to the age 0 crab index ($r^2 = 0.30$, $P < 0.0005$). This periodicity may be related to decadal oscillations in temperature, river discharge and surface winds which occur in Chesapeake Bay and may affect blue crab recruitment (Austin, 2002). The age 0 index tripled in 2003 compared to 2002, but decreased in 2004 (Figure 35, top and Table 29). It is possible that Hurricane *Isabel* aided in the transport of megalopae into the Bay (Montane and Austin, 2005). The adult female index has remained low since 1991, while the age 0 and age 1+ indices have steadily decreased since 1995 and 1997, respectively (Figure 35, top).

Highest concentrations of age 0 blue crabs are usually found in the tributaries (Figure 36). Age 1+ crabs (> 60 mm cw) predominate in the tributaries, but can also be found in the mainstem Bay (Figure 37, top). Crabs greater than 120 mm cw are either larger males or adult females as few females greater than 120 mm cw are still juveniles. Adult females are usually concentrated in the Bay mainstem (especially during fall and winter; Figure 37, bottom), but can be found in the mid to upper reaches of tributaries during periods of little freshwater inflow (i.e.,droughts). Age 2+ males (> 120 mm cw) usually reside exclusively in the tributaries. The 2004 Fall YOY index was about half of the 2003 index (Table 29). Large pulses of YOY crabs were present in September 2004 (Figure 38). These crabs were likely the result of the typical large spawning event which routinely occurs in June, followed by a smaller spawning event later in the summer. Adult female catch is highest from July through October (Figure 39), as they travel to the lower Chesapeake Bay and Bay mouth to spawn.

American Eel (*A. rostrata*) - The American eel is a catadromous species, present along the Atlantic and Gulf coasts of North America and inland in the St. Lawrence Seaway and Great Lakes (Murdy et al., 1997). The species is panmictic and supported throughout its range by a single spawning population (Haro et al., 2000; Meister and Flagg, 1997). Spawning takes place during winter to early spring in the Sargasso Sea. The eggs hatch into leaf-shaped ribbon-like larvae called leptocephali, which are transported by the ocean currents (over 9-12 months) in a generally northwesterly direction. Within a year, metamorphosis into the next life stage (glass eel) occurs in the Western Atlantic near the East Coast of North America. Coastal currents and active migration transport the glass eels into rivers and estuaries from February to June in Virginia and Maryland. As growth continues, the eel becomes pigmented (elver stage) and within 12 –14 months acquires a dark color with underlying yellow (yellow eel stage; Facey and Van Den Avyle, 1987). Many eels migrate upriver into freshwater rivers, streams, lakes, and ponds, while others remain in estuaries. Most of the eel's life is spent in these habitats as a yellow eel. Age at maturity varies greatly with location and latitude, and in Chesapeake Bay may range from 8 to 24 years, with most being less than ten years old (Owens and Geer, 2003). *A. rostrata* from Chesapeake Bay mature and migrate at an earlier age than eels from northern areas (Hedgepeth, 1983). Upon maturity, eels migrate back to the Sargasso Sea to spawn and die (Haro et al., 2000). Metamorphosis into the silver eel stage occurs during the seaward migration that occurs from late summer through autumn.

The current American eel index is composed of all size eels collected in the upper half of each of the major tributaries (JA 3 and 4, YK 3 and 4, and RA 3 and 4) during the months of April through June. The overall eel RSI CPUE (1955-2005, see Table 30) exhibits an increasing trend, but the index values since 1983 show a sharp significant decline ($r^2 = 0.64$, $P < 0.0005$; Figure 40, top). American eel are collected by the trawl exclusively in the tributaries (Figure 40, bottom). Most eels were collected July to September 2004 and April to June 2005 (Figure 41).

Bay Anchovy (*A. mitchilli*)- The bay anchovy is the most abundant finfish throughout Chesapeake Bay and its tributaries found in salinities ranging from 1-33 psu (Murdy et al., 1997). Bay anchovy feed mostly on zooplankton and is an important food source for many other Bay fishes (Murdy et al., 1997). In years of "normal" freshwater inflow (i.e.,1997-2000), Atlantic menhaden, bay anchovy and Atlantic croaker often dominate fish biomass in Chesapeake Bay (Jung, 2002). The overall bay anchovy RSI index (1955-2004) has increased slightly, while the RO index (1979-2004) has exhibited a slight decreasing trend (Table 31; Figure 42, top). The 2004 bay anchovy indices were slightly greater than the 2003 indices. Bay anchovy are ubiquitous in the trawl survey catches (Figure 42, bottom).

DISCUSSION

Chesapeake Bay constitutes a major nursery area for most of the species examined and is one of several along the Atlantic seaboard. With the exception of weakfish and the anadromous species, all of the juveniles recruited to the Chesapeake Bay nursery areas result from spawning activities which take place outside of the Bay. Early juveniles of the four sciaenid species are thought to be estuarine dependent, but black sea bass young-of-year also utilize nearshore continental shelf waters (Musick and Mercer, 1977) and juvenile summer flounder also frequent shallow, high salinity coastal lagoons (Wyanski, 1989). Scup do not appear in the Bay in appreciable numbers until they are nearing one year old. Conceivably, Chesapeake Bay nursery zone abundances may well be reflective of overall reproductive success.

Four estimates of relative abundance were developed for juvenile finfish and blue crabs. The values reported as the Bay and River index (BRI) were only for the historic fixed stations transects of the tributaries and the Bay survey established in 1988. Two indices were presented, one from the tributaries only (RO; 1979 to present) and the other for both the Bay and rivers (BRI; 1988 to present). The long time-series have produced converted indices (random stratified converted index - RSCI) and unconverted indices (random stratified index - RSI) for the target species discussed.

Efforts continue on validating older data, and comparing these historical values against data presently being collected, and creating new indices for species of emerging ecological importance such as the bay anchovy and the blue catfish. Additionally, the now fully implemented random stratified survey of the tributaries has enhanced the ability to produce reliable estimates of juvenile abundance. These surveys have complimented and correlated with the fixed mid-channel transects quite well since their inception in June 1991 (Geer and Austin, 1996a; Geer and Austin, 1999).

Juvenile indices collected by the VIMS trawl survey are instrumental in helping to forecast year class strength, avoid stock collapse and verify management strategies. It is imperative that any early warning signs of stock decline are recognized before commercial landings reflect the declines. For instance, the current Interstate Fisheries Management Plan for striped bass relies heavily on juvenile abundance estimates to determine action levels for the intensification or relaxation of harvest restrictions. Low year classes during much of the 1970's and mid-1980's led to a striped bass moratorium in 1985, which lasted until 1990 (Seltzer-Hamilton, 1991b). Evidence of a very poor year class of summer flounder was first detected by the VIMS Trawl Survey, was recognized by the Mid-Atlantic Fisheries Management Council (MAFMC) as the only available index of summer flounder recruitment and was instrumental in shaping more protective harvest regulations in Virginia. The VIMS Trawl Survey spot index is the only spot index available on the East Coast and was essential for the 2004 ASMFC Spot FMP Review (ASMFC, 2004). Though the trawl is not the preferred gear to catch American eel, VIMS Trawl eel indices will likely play an important role in both the upcoming 2005 ASMFC American Eel FMP and the U.S. Fish and Wildlife Services American Eel Status Review. Assessment of annual recruitment success for coastal Atlantic finfish populations should involve multi-state monitoring efforts, and would validate area-specific juvenile indices.

The trawl survey is also important for monitoring interfamily interactions. For example, annual catch rates of channel catfish and white catfish have declined since 1991, while those of blue catfish (*I. furcatus*), which was introduced in Virginia during the 1970's and 1980's, to enhance sportfishing, have increased dramatically (Connelly, 2001; this report). Additionally current bistate FMP's utilize trawl survey blue crab data as the foundation for understanding blue crab population dynamics in the Chesapeake Bay, and were used to construct the blue crab sanctuary corridor.

Declines in catches of the aforementioned important recreational species are most often due to degradation of their estuarine nursery habitats, overfishing and year class failure (Murdy et al., 1997). Spot indices have declined greatly over the past 50 years, with the RSCI 1955-1978 index twice that of the 1979-2004 index. Spot are oceanic spawners and their year class strength appears to be controlled by environmental factors occurring outside the Bay (Homer and Mihursky, 1991; Bodolus, 1994). Croaker show the greatest interannual variability of the key species discussed, with fluctuations most probably weather related, with particular correlations to hurricane activity (Montane and Austin, 2005). The timing of croaker recruitment to the Bay (August-December) corresponds with normal peak hurricane activity to the region. Norcross (1983) and Murdy et al., (1997) suggest cold winters cause increased mortality in overwintering YOY croaker and during some years may cause the spawning population to be pushed further south, preventing the postlarval fish access to Bay nursery areas. Larger blue crabs may also exhibit increased mortality during colder winters in Chesapeake Bay (Sharov et al., 2003). Weakfish are a prized recreational species, but their indices have remained low since the mid-1990's, and their decline may be attributed to both habitat degradation and overfishing (Murdy et al., 1997). Declines in summer flounder have been due to overfishing and year class failure

(Murdy et al., 1997), and these were apparent in the very low 1987 trawl index. The black sea bass index had increased since 1997, and has been highly variable over the duration of the survey, but decreased in 2002 an in 2003 was the lowest since 1979. The scup index has been highly variable over the duration of the survey, but low since 1993.

Striped bass and white perch indices were very low during the 1970's and early 1980's. Striped bass display great recruitment variability and one or two strong year classes may dominate the population (Murdy et al., 1997). After closure of the fishery in the mid to late 1980's due to overfishing, poor recruitment and low stock abundance (Seltzer-Hamilton, 1991b), the index had increased, peaked in 1987 and significantly decreased thereafter. White and channel catfish indices while variable, have decreased dramatically over the past 13-14 years, most probably due to overfishing, though some increases occurred in 2003.

The VIMS Trawl Survey is a key element for future management of fishery resources that use the Chesapeake Bay as spawning and nursery grounds. Because the Chesapeake Bay constitutes a major nursery area for many coastal migratory fish species, monitoring annual recruitment success is a key element in multi-state management efforts along the Atlantic Coast. These data will continue to provide managers with valuable predictive tools for assessing the success of present management measures.

LITERATURE CITED

Anonymous. 2004. National Marine Fisheries Service, Fisheries Statistics and Economics Division Homepage. http://www.st.nmfs.gov/st1/recreational/queries/catch/snapshot.html.

ASMFC, 2004. Review for the Fisheries Management Plan for Spot, *Leiostomus xanthurus*, Spot Plan Review Team (H. Austin, J. Schoolfied, H. Speir and N. Wallace). 9 p.

Barbieri., L. R. M. E. Chittenden Jr., and C. M. Jones. 1994. Age, growth, and mortality of Atlantic croaker, *Micropogonias undulatus*, in the Chesapeake Bay region, with discussion of apparent geographic changes in population dynamics. Fish. Bull. 92:1-12.

Bodolus, D. A. 1994. Mechanisms of larval spot transport and recruitment to the Chesapeake Bay. Ph. D Dissertation. College of William and Mary, Williamsburg, VA, 226 p.

Bonzek, C. F., P. J. Geer, J. A. Colvocoresses and R.E. Harris, Jr. 1991. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1990. Va. Inst. Mar. Sci. Spec.Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 206 p.

Bonzek, C. F., P. J. Geer, J. A. Colvocoresses and R. E. Harris, Jr. 1992. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1991. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 213 p.

Bonzek, C. F., P. J. Geer, J. A. Colvocoresses and R. E. Harris, Jr. 1993. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1992. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 206 p.

Bonzek, C. F., P. J. Geer, and H. M. Austin. 1995. VIMS juvenile fish trawl survey. Juvenile indices 1979-1994. Virginia Sea Grant Marine Resource Advisory No. 57. Virginia Sea Grant Marine Advisory Program, College of William and Mary, VIMS/SMS, Gloucester Pt., VA. 23062. 15 p.

Bowen, B.W. 1987. Population structure of the white perch, *Morone americanus*, in the lower Chesapeake Bay as inferred from mitochondrial DNA restriction analysis. Master's Thesis. College of William and Mary, Williamsburg, VA. 33 p.

Campbell, M. J., J. A. Penttila, and B. B. Nichy. Growth of scup, (*Stenotomus chrysops*). Unpublished manuscript. NOAA/NMFS, Woods Hole, Massachusetts. 9 p.

Chao, L. N. and J. A. Musick. 1977. Life history, feeding habits, and functional morphology of juvenile sciaenid fishes in the York River estuary, Virginia. Fish. Bull. 75(4):657-702

Chatfield, C. 1994. The Analysis of Time Series: An Introduction. 4th Edition. Chapman and

Hall, London. 241 p.

Chesapeake Executive Council. 1988. Chesapeake Bay Program Stock Assessment Plan. Agreement Commitment Report. Annapolis, MD. 66 p.

Chittenden, M. E., Jr. 1989. Initiation of trawl surveys for a cooperative research / assessment program in the Chesapeake Bay. Final report to Chesapeake Bay Stock Assessment Committee & NOAA/NMFS. Virginia Institute of Marine Science, Gloucester Pt., VA. 123 p.

Chittenden, M. E., Jr. 1991. Evaluation of spatial/temporal sources of variation in nekton catch and the efficacy of stratified sampling in the Chesapeake Bay. Final report to Chesapeake Bay Stock Assessment Committee & NOAA/NMFS. Virginia Institute of Marine Science, Gloucester Pt., VA. 254 p.

Cochran, W. G. 1977. Sampling techniques. John Wiley & Sons. New York, NY. 428 p.

Colvocoresses, J. A. and P. J. Geer. 1991. Estimation of relative juvenile abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R1. July 1990 to June 1991. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 64 p.

Colvocoresses, J. A., P. J. Geer and C. F. Bonzek. 1992. Estimation of relative juvenile abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104-2. July 1991 to June 1992. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 53 p.

Connelly, W. J. 2001. Growth patterns of three species of catfish (*Ictaluridae*) from three Virginia tributaries of the Chesapeake Bay. Master's Thesis. College of William and Mary, Williamsburg, VA. 153 p.

Costlow, J. D. Jr., and C. G. Bookout. 1959. The larval development of *Callinectes sapidus* reared in the laboratory. Biol. Bull. 116:373-396.

Dittel, A. T. and C. E. Epifanio. 1982. Seasonal abundance and distribution of crab larvae in Delaware Bay. Estuaries 5:197-202.

Epifanio, C. E., C. C. Valenti and A. E. Pembroke. 1984. Dispersal and recruitment of blue crab larvae in Delaware Bay, U.S.A. Estuarine, Coastal and Shelf Sci. 18:1-12.

Facey, D. E. and M. J. Van Den Avyle. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic)—Americen eel. U. S. Fish Wildl. Serv. Biol. Rep. 82(11.74). U. S. Army Corps of Engineers, TR EL-82-4. 28 p.

Geer, P. J. 1998. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1997. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 290 p.

Geer, P. J. 1999. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1998. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 322 p.

Geer, P. J. 2001. Assessing essential fish habitat for federally managed species inhabiting Virginia's waters. Virginia Marine Resource Report VMRR 2001-03. Prepared for the National Marine Fisheries Service Coastal Ecology Branch.

Geer, P. J. 2003. Distribution, relative abundance, and habitat use of American eel *Anguilla rostrata* in the Virginia portion of the Chesapeake Bay. Pages 101-115 *in* D. A. Dixon (Editor). Biology, Management and Protection of Catadromous Eels. American Fisheries Society, Sympoium 33, Bethesda, MD, USA.

Geer, P. J. and H. M. Austin. 1994. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R4. July 1993 to June 1994. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 85 p.

Geer, P. J. and H. M. Austin. 1996a. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R6. July 1995 to June 1996. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 135 p. and attachment.

Geer, P. J. and H. M Austin. 1996b. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1995. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 298 p .

Geer, P. J. and H. M. Austin. 1997. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R7. July 1996 to June 1997. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 153 p and 3 attachments.

Geer, P. J. and H. M. Austin. 1999. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R9. July 1998 to June 1999. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 139 p.

Geer, P. J., H. M Austin, and C. F. Bonzek. 1997. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume

1996. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 275 p.

Geer, P. J., H. M. Austin, and D. N. Hata. 1995. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Annual report to VMRC/USFWS Sportfish Restoration Project F104R5. July 1994 to June 1995. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 171 p.

Geer, P. J., C. F. Bonzek, and H. M. Austin. 1994. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1993. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 212 p.

Geer, P. J., C. F. Bonzek, J. A. Colvocoresses and R. E. Harris, Jr. 1990. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1989. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 211 p.

Geer, P. J., J. A. Colvocoresses, H. M. Austin, and C. F. Bonzek. 1994. Estimation of relative abundance of recreationally important finfish in the Virginia portion of Chesapeake Bay. Revised Edition - April 1994. Annual report to VMRC/USFWS. July 1992 to June 1993 Sportfish Restoration Project F104R3. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 106 p.

Goldenberg, S. B., C. W. Landsea, A. M. Mestas-Nunez and W. M. Gray. 2001. The recent increase in Atlantic Hurricane activity: causes and implications. Science 293:474-479.

Goodrich, D. M., J. van Montfrans and R. J. Orth. 1989. Blue crab megalopal influx to Chesapeake Bay: Evidence for a wind-driven mechanism. Estuarine, Coastal and Shelf Science. 29:247-260.

Goodyear, C. P. 1985. Relationship between reported commercial landings and abundance of young striped bass in Chesapeake Bay, Maryland. Trans. Amer. Fish. Soc. 114(1): 92-96.

Haro, A., W. Richkus, K. Whalen, W.-Dieter Busch, S. Lary, T. Brush, and D. Dixon. 2000. Population decline of the American eel: Implications for Research and Management. Fisheries 25(9): 7-16.

Hata, D. N. 1997. Comparison of gears and vessels used in the Virginia Institute of Marine Science juvenile finfish trawl survey. Special Report in Applied Marine Science and Ocean Engineering No. 343. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 244 p.

Hedgepeth, M.Y. 1983. Age, growth and reproduction of American eels, *Anguilla rostrata* (Lesueur), from the Chesapeake Bay area. Masters Thesis. College of William and

Mary. 61 p.

Homer, M. L. and J. A. Mihursky. 1991. Spot. Pp. 11.1-11.19. *In* S.L. Funderburk, J.A. Mihursky, S.J. Jordan, and D. Reiley (Eds.). Habitat requirements for Chesapeake Bay Living Resources, 2nd Edition. Living Resources Subcommittee, Chesapeake Bay Program. Annapolis, MD.

Jenkins, R. E. and N. M. Burkhead. 1993. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, MD. 1079 p.

Jung, S. 2002. Fish community structure and the spatial and temporal variability in recruitment and biomass production in Chesapeake Bay. Ph. D Dissertation. University of Maryland, College Park. 349 p.

Land, M. F. P. J. Geer, C. F. Bonzek, and H. M. Austin. 1994. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1988. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 243 p.

Land, M. F. P. J. Geer, C. F. Bonzek, and H. M. Austin. 1995. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1994. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062. 211 p.

Laroche, J. L. and J. Davis. 1973. Age, growth, and reproduction of the northern puffer, *Sphoeroides maculatus* Fish. Bull. 71(4): 955-963.

Lipcius, R. N. and W. A. Van Engel. 1988. Blue crab population dynamics in Chesapeake Bay:variation in abundance (York River, 1972-1988) and stock-recruit functions. Bull. Mar. Sci. 46(1): 180-194.

Little, K. T. and C. E. Epifanio. 1991. Mechanism of re-invasion of an estuary by two species of brachyuran megalopae. Mar. Ecol. Prog. Ser. 68:235-242.

Lowery, W. A. and P. J. Geer. 2000. Juvenile finfish and blue crab stock assessment program bottom trawl survey annual data summary report series. Volume 1999. Va. Inst. Mar. Sci. Spec. Sci. Rpt. No. 124. Virginia Institute of Marine Science, Gloucester Pt. VA 23062.

Lowery-Barbieri, S. K., M. E. Chittenden, and L. R. Barbieri. 1995. Age and growth of weakfish, *Cynoscion regalis*, in Chesapeake Bay region with discussion of historical changes in maximum size. Fish. Bull. 93: 646-656.

Mangum, C. and D. Towle. 1977. Physiological adaption to unstable environments. Amer. Sci. 65:67-75.

McConaugha, J. R., D. F. Johnson, A. J. Provenzano and R. C. Maris. 1983. Seasonal distribution of larvae of *Callinectes sapidus* (Crustacea: decapoda) in the waters adjacent to Chesapeake Bay. J. Crust. Biol. 3:582-591.

Menzel. R.W. 1945. The catfishery of Virginia. Trans. Am. Fish. Soc. 73: 364-372.

Mense, D. J. and E. L. Wenner. 1989. Distribution and abundance of early life history stages of the blue crab, *Callinectes sapidus*, in tidal marsh creeks near Charleston, South Carolina. Estuaries 12(3):157-168.

Montane, M. M. and H. M. Austin. 2005. Effects of hurricanes on Atlantic croaker (*Micropogonias undulatus*) recruitment to Chesapeake Bay. Pp. 185-192. *In* Hurricane *Isabel* in Perspective. K. Sellner, ed. Chesapeake Research Consortium, CRC Publication 05-160, Edgewater, MD.

Montane, M. M., H. M. Austin, P. J. Geer and W. A. Lowery. 2003. Estimation of relative abundance of recreationally important juvenile finfish in the Virginia portion of Chesapeake Bay. Annual Report to VMRC Marine Recreational Fishing Advisory Board. Project Numbers RF02-11 and RF03-07. Virginia Institute of Marine Science, Gloucester Pt. VA 23602. 100 p.

Morse, W. W. 1978. Biological and fisheries data on scup, *Stenotomus chrysops* (Linnaeus). National Marine Fisheries Service, Sandy Hook Laboratory, Tech. Series Rept. No. 12. 41 p.

Murdy, E. O., R. S. Birdsong and J. A. Musick. 1997. Fishes of Chesapeake Bay. Smithsonian Institution Press. 324 p.

Musick, J. A. and L. P. Mercer. 1977. Seasonal distribution of black sea bass, *Centropristis striata*, in the Mid-Atlantic Bight with comments on the ecology and fisheries of the species. Trans. Amer. Fish. Soc. 106(1): 12-25.

NOAA, 2003. (http://www.erh.noaa.gov/er/akq/climate/climate.htm).

Norcross, B. L. 1983. Climate scale environmental factors affecting year-class fluctuations of Atlantic croaker, *Micropogonias undulatus* in the Chesapeake Bay, VA. Ph.D Dissertation. College of William and Mary, Williamsburg, VA, 388 p.

Orth, R. J. and J. van Montfrans. 1987. Utilization of a seagrass meadow and tidal marsh creek by blue crabs *Callinectes sapidus*. I. Seasonal and annual variations in abundance with emphasis on post-settlement juveniles. Mar. Ecol. Prog. Ser. 41:283-294.

Owens, S. J. and P. J. Geer. 2003. Size and age structure of American eels in tributaries of the Virginia portion of the Chesapeake Bay. Pages 117-124. *In* D. A. Dixon (Editor), Biology, Management and Protection of Catadromous Eels. American Fisheries Society Symposium Series 33, Bethesda, Maryland, USA.

Parthree, D. J. 2005. Diet analysis of Atlantic croaker (*Micropogonias undulatus*), weakfish (*Cynoscion regalis*), blue catfish (*Ictalurus furcatus*), striped bass (*Morone saxatilis*), summer flounder (*Paralichthys dentatus*), and silver perch (*Bairdiella chrysoura*) in the James, York, and Rappahannock Rivers, VA, March 2004 to April 2005. Report prepared for the VIMS Trawl Survey. Chesapeake Bay Trophic Interactions Laboratory Services. VIMS, Gloucester Point, VA. 27 p.

Rhodes, S. F. 1971. Age and growth of the silver perch *Bairdiella chrysoura*. Master's Thesis. College of William & Mary. Williamsburg, VA. 18 p.

Seaver, D. M., H. M. Austin, and D. A. Bodolus. 1996. Age and growth of white perch, *Morone americana*, from three tributaries of Chesapeake Bay. Presented at the 76th Annual meeting of the American Society of Ichthyologists and Herpetologists, June 13-19, 1996. New Orleans, Louisiana.

Setzler-Hamilton, E. M. 1991a. White Perch. Pp. 12.1-12.19. *In* S.L. Funderburk, J.A. Mihursky, S.J. Jordan, and D. Reiley (Eds.). Habitat requirements for Chesapeake Bay Living Resources, 2nd Edition. Living Resources Subcommittee, Chesapeake Bay Program. Annapolis, MD.

Setzler-Hamilton, E. M. 1991b. Striped Bass. Pp. 13.1-13.31. *In* S.L. Funderburk, J.A. Mihursky, S.J. Jordan, and D. Reiley (Eds.). Habitat requirements for Chesapeake Bay Living Resources, 2nd Edition. Living Resources Subcommittee, Chesapeake Bay Program. Annapolis, MD.

Sharov, A. F., J. H. Volstad, G. R. Davis, B. K. Davis, R. N. Lipcius and M. M. Montane. 2003. Abundance and exploitation rate of the blue crab (*Callinectes sapidus*) in Chesapeake Bay. Bull. Mar. Sci. 72(2):543-565.

Sibunka, J. D. and A. L. Pacheco. 1981. Biological and fisheries data on northern puffer. *Sphoeroides maculatus*. Technical Series Report No. 26. Sandy Hook Laboratory, Northeast Fisheries Center, NMFS/NOAA, U.S. Department of Commerce. 56 p.

Tagatz, M. E. 1968. Biology of the blue crab, *Callinectes sapidus* Rathbun, in the St. Johns River, Florida. U. S. Fish Wildl. Serv., Fish. Bull. 67: 17-33.

Taylor, C. C. 1953. Nature of variability in trawl catches. Fish. Bull. 54: 142-166.

Terwilliger, M. R. and T. A. Munroe. 1999. Age, growth, longevity, and mortality of blackcheek tonguefish, *Symphurus plagius* (Cynoglossidae: Pleuronectiformes), in Chesapeake Bay, Virginia. Fish. Bull. 97(2): 340-361.

Van Engel, W. A. 1958. The blue crab and its fishery in the Chesapeake Bay. Part 1: Reproduction, early development, growth, and migration. Comm. Fish. Rev. 20(6): 6-17.

van Montfrans, J., C. A. Peery and R. J. Orth. 1990. Daily, monthly and annual settlement patterns by *Callinectes sapidus* and *Neopanope sayi* megalopae on artificial collectors deployed in the York River, Virginia:1985-1988. Bull. Mar. Sci. 46:214-229.

Wood, R. J. 2000. Synoptic scale climatic forcing of multispecies recruitment patterns in Chesapeake Bay. Doctoral dissertation. School of Marine Science, College of William and Mary, Gloucester Point, VA. 146 p.

Wojcik, F. J. and W. A. Van Engel. 1988. A documentation of Virginia trawl surveys, 1955-1984, listing pertinent variables. Volume II - York River. College of William and Mary, VIMS, Gloucester Pt., VA. 198 p.

Wyanski, D. M. 1989. Depth and substrate characteristics of age-0 summer flounder, (*Paralichthys dentatus*) in Virginia estuaries. Master's Thesis. College of William and Mary. Williamsburg, VA. 54 p.

TABLES

(Note: Annual indices with an * after the year are incomplete)

Table 1. National Marine Fisheries Service's Marine Recreational Fisheries Statistic Survey for Virginia Waters for 2004.

SPECIES	Total Number of Fish (A + B1 + B2)	Rank by Number Caught	Number of Harvested Fish (A + B1)	Weight in kilograms (A + B1)	Rank by Weight
ATLANTIC CROAKER	13,066,549	1	7,283,076	2,632,503	1
SUMMER FLOUNDER	4,072,604	2	571,951	650,820	4
SPOT	3,309,537	3	2,328,726	657,399	3
STRIPED BASS	2,203,872	4	467,389	1,377,208	2
BLACK SEA BASS	1,376,894	5	54,954	32,412	14
BLUEFISH	760,985	6	255,661	165,238	7
PIGFISH	747,232	7	89,964	12,771	18
WEAKFISH	625,415	8	102,556	46,290	13
KINGFISHES	512,808	9	315,109	64,643	10
TOADFISHES	487,632	10	924	256	29
WHITE PERCH	448,955	11	91,814	14,527	15
SPOTTED SEATROUT	363,904	12	72,728	59,151	11
HERRINGS	317,727	13	69,312	219	30
TAUTOG	293,365	14	157,374	275,741	6
SKATES/RAYS	238,101	15	2,822	-	---
OTHER SHARKS	204,582	16	3,121	1,780	25
FRESHWATER CATFISHES	187,525	17	104,354	152,269	9
OTHER FISHES	132,642	18	81,730	160,737	8
SEAROBINS	92,314	19	237	64	32
SCUP	79,360	20	8,942	1,558	26
PUFFERS	76,718	21	8,262	1,521	27
DOGFISH SHARKS	67,361	22	3,095	7,422	20
FLORIDA POMPANO	59,237	23	43,168	6,826	21
RED DRUM	38,123	24	4,975	14,401	16
SPANISH MACKEREL	33,719	25	20,497	12,830	17
OTHER TUNAS/MACKERELS	31,519	26	31,204	292,189	5
SILVER PERCH	30,229	27	9,705	730	28
BLACK DRUM	25,253	28	2,577	4,897	23
PINFISHES	18,250	29	1,872	196	31
DOLPHINS	16,106	30	11,914	49,535	12
EELS	13,991	31	-	-	---
TRIGGERFISHES/FILEFISHES	12,134	32	6,472	5,266	22
ATLANTIC MACKEREL	8,333	33	71	13	33
SHEEPSHEAD	4,800	34	1,104	3,976	24
LITTLE TUNNY/ATLANTIC BONITO	4,640	35	1,814	7,917	19
MULLETS	3,604	36	-	-	---
GREATER AMBERJACK	2,413	37	-	-	---
OTHER FLOUNDERS	2,055	38	2,055	-	---
OTHER CODS/HAKES	1,206	39	-	-	---
SALTWATER CATFISHES	843	40	-	-	---
Total	29,972,537		12,211,529	6,713,305	

A = Caught and Landed

B1 = Caught by Anglers & filleted or released dead

B2 = Caught and released alive

Table 2. Number of potential Chesapeake Bay trawl sites and approximate square miles of sampling strata. '*' indicates areas which are not presently being sampled on a monthly basis with an RSD.

Region	Stratum	Description	No .of Points	Percent of System	% of Total Sampling	Square Miles (NM)
Bottom Bay	001	West. Shoal 12-30'	1740	9.38	7.49	112.33
Region B1	002	East. Shoal 12-30'	863	4.65	3.26	55.72
	003	Central Plain 30-42'	910	4.91	3.44	58.75
	004	Deep Channel ≥42'	386	2.08	1.46	24.92
	S01	West. Shallow 4-12'	216	1.16	0.82	13.94
	S02	East. Shallow 4-12'	58	0.31	0.22	3.74
			4173	22.50	16.69	269.41
Lower Bay	005	West. Shoal 12-30'	1027	5.54	3.88	66.30
Region B2	006	East. Shoal 12-30'	398	2.15	1.50	25.69
	007	Central Plain 30-42'	1756	9.47	6.63	113.37
	008	Deep Channel ≥42'	684	3.69	2.58	44.16
	S05	West. Shallow 4-12'	215	1.16	0.81	13.88
	S06	East. Shallow 4-12'	145	0.78	0.55	9.36
			4225	22.78	15.95	272.77
Upper Bay	009	West. Shoal 12-30'	768	4.14	2.90	49.58
Region B3	010	East. Shoal 12-30'	632	3.41	2.39	40.80
	011	Central Plain 30-42'	2197	11.84	8.30	141.84
	012	Deep Channel ≥42'	844	4.55	3.19	54.49
	S09	West. Shallow 4-12'	209	1.13	0.79	13.49
	S10	East. Shallow 4-12'	216	1.16	0.82	13.94
			4866	26.23	18.39	314.15
Top Bay*	013	West. Shoal 12-30'	404	2.18	1.53	26.08
Region B4	014	East. Shoal 12-30'	1533	8.26	5.79	98.97
	015	Central Plain 30-42'	1315	7.09	4.97	84.90
	016	Deep Channel ≥42'	1273	6.86	4.81	82.18
	S13	West. Shallow 4-12'	164	0.88	0.62	10.59
	S14	East. Shallow 4-12'	597	3.22	2.26	38.54
			5286	28.50	19.98	341.26
Total Bay			18550		71.01	1197.59

Table 3. Number of potential James River trawl sites and approximate square miles of sampling strata. '*' indicates areas which are not presently being sampled with a RSD. The weight factors (No. of Points) have been altered to remove several creeks and rivers.

Region	Stratum	Description	No .of Points	Percent of System	% of Total Sampling	Square Miles (NM)
Bottom James	070	Bottom JA 4-12'	416	16.57	1.57	27.31
Region J1	071	Bottom JA 12-30'	292	11.63	1.10	18.85
	072	Bottom JA 30-42'	68	2.71	0.26	4.39
	073	Bot & Low JA ≥42'	59	2.35	0.22	3.81
	*JH1	Hampton R. 4-12'	5	0.20	0.02	0.32
	*JK1	Chuckatuck R. 4-12'	2	0.08	0.01	0.13
	*JN1	Nansemond R. 4-12'	67	2.67	0.25	4.33
	*JN2	Nansemond R. ≥ 12'	16	0.64	0.06	1.03
			925	36.28	3.49	59.72
Lower James	074	Lower JA 4-12'	389	15.50	1.47	25.11
Region J2	075	Lower JA 12-30'	230	9.16	0.87	14.85
	076	Lower JA 30-42'	25	1.00	0.09	1.61
	*JP1	Pagan R. 4-12'	47	1.87	0.18	3.03
	*JP2	Pagan R. ≥12'	10	0.40	0.04	0.65
	*JW1	Warwick R. 4-12'	50	1.99	0.19	3.23
	*JW2	Warwick R. ≥ 12'	3	0.12	0.01	0.19
			754	30.04	2.85	48.68
Upper James	077	Upper JA 4-12'	178	7.09	0.67	11.49
Region J3	078	Upper JA 12-30'	172	6.85	0.65	11.10
	079	Up & Top JA ≥ 30'	34	1.35	0.13	2.20
	*JS1	Skiffles Cr. 4-12'	25	1.00	0.09	1.61
	*JS2	Skiffles Cr. ≥12'	6	0.24	0.02	0.39
			415	16.53	1.56	26.79
Top James	080	Top JA 4-12'	264	10.52	1.00	17.04
Region J4	081	Top JA 12-30'	152	6.06	0.57	9.81
			416	16.58	1.79	26.86
TOTAL James R.			2510		9.47	162.05

Table 4. Number of potential York River trawl sites and approximate square miles of sampling strata. '*' indicates areas which are not presently being sampled with a RSD.

Region	Stratum	Description	No .of Points	Percent of System	% of Total Sampling	Square Miles (NM)
Bottom York	030	Bottom YK 4-12'	94	12.18	0.36	6.07
Region Y1	031	Bottom YK 12-30'	87	11.27	0.33	5.62
	032	Bottom YK 30-42'	66	8.55	0.25	4.26
	033	Bot & Low YK≥42	71	9.20	0.27	4.58
			318	41.19	1.21	20.53
Lower York	034	Lower YK 4-12'	111	14.38	0.42	7.17
Region Y2	035	Lower YK 12-30'	114	14.77	0.43	7.36
	036	Lower YK 30-42'	28	3.63	0.11	1.81
			253	32.77	0.96	16.33
Upper York	037	Up & Top YK 4-12'	54	6.99	0.20	3.49
Region Y3	038	Upper YK 12-30'	71	9.20	0.27	4.58
	039	Up & Top YK≥30'	29	3.76	0.11	1.87
			154	19.95	0.58	9.94
Top York*	040	Top YK 12-30'	47	6.09	0.18	3.03
Region Y4			47	6.09	0.18	3.03
TOTAL York R.			772		2.93	49.83

Table 5. Number of potential Rappahannock River trawl sites and approximate square miles of sampling strata. '*' indicates areas which are not presently being sampled with a RSD.

Region	Stratum	Description	No .of Points	Percent of System	% of Total Sampling	Square Miles (NM)
Bottom Rappahannock	050	Bottom RA 4-12'	98	7.08	0.37	6.33
Region R1	051	Bottom RA 12-30'	200	14.44	0.76	12.91
	052	Bottom RA 30-42'	66	4.77	0.25	4.26
	053	Bottom RA ≥ 42'	84	6.06	0.32	5.42
			448	32.35	1.70	28.92
Lower Rappahannock	054	Lower RA 4-12'	94	6.79	0.36	6.07
Region R2	055	Lower RA 12-30'	167	12.06	0.63	10.78
	056	Lower RA 30-42'	67	4.84	0.25	4.33
	057	Lower RA ≤ 42'	56	4.04	0.21	3.62
			384	27.73	1.45	24.79
Upper Rappahannock	058	Upper RA 4-12'	233	16.82	0.88	15.04
Region R3	059	Upper RA 12-30'	101	7.29	0.38	6.52
	060	Up & Top RA ≥30'	32	2.31	0.12	2.07
			366	26.43	1.38	23.63
Top Rappahannock	061	Top RA 4-12'	137	9.89	0.52	8.84
Region R4	062	Top RA 12-30'	50	3.61	0.19	3.23
			187	13.50	0.71	12.07
TOTAL Rapp. R.			1385		5.24	89.41
TOTAL SITES			26,474			1498.89

Table 6. Assignment of fixed tributary stations to potential random strata used in the original Bay-River index (BRI) calculations and assignment to strata of the random stratified design surveys. Alternating shaded areas represent the number of points and area used as a weighting factor for the BRI index calculations.

River	River Mile	Depth (ft)	Index Strata	No. Of Points	Sq. Naut. Miles	RSD Strata
James R.	J01	25.0	JA01			071
	J05	20.0	JA01			071
	J13	30.2	JA01			076
	J17	22.0	JA01	**687**	**44.35**	075
	J24	35.0	JA02			079
	J27	28.0	JA02			078
	J35	29.0	JA02			081
	J40	12.0	JA02	364	23.50	081
York R.	Y02	35.0	YK01			032
	Y05	40.0	YK01			032
	Y10	29.9	YK01			035
	Y15	25.0	YK01	**372**	**24.02**	035
	Y20	20.0	YK02			038
	Y25	25.0	YK02			038
	Y30	20.0	YK02			040
	Y35	20.0	YK02			040
	Y40	13.0	YK02	184	11.88	040
Rappahannock R.	R02	60.0	RA01			053
	R10	60.0	RA01			053
	R15	50.0	RA01			057
	R20	50.0	RA01	**283**	**18.27**	057
	R25	29.9	RA02			059
	R30	20.0	RA02			062
	R35	20.0	RA02			062
	R40	12.1	RA02	190	12.26	062

James River: JA01 - Lower ≥ 12ft. JA02 - Upper ≥ 12ft.
York River: YK01 - Lower ≥ 12ft. YK02 - Upper ≥ 12ft.
Rapp. River: RA01 - Lower ≥ 30ft. RA02 - Upper ≥ 12ft.

Table 7. Yearly comparison of substrate (habitat type) from July 1998 – June 2005.

Substrate Description	July 1998 - June 1999		July 1999 - June 2000		July 2000 - June 2001		July 2001 - June 2002		July 2002 - June 2003		July 2003 - June 2004		July 2004 - June 2005	
	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity	Percent of Stations[1]	Maximum Quantity
Artificial	0.67	2.0	4.28	3.0	4.61	2.0	5.85	15.0	6.14	4.0	6.37	7.0	3.35	2.0
Dead man's fingers (Bryozoan)	8.22	5.0	9.01	4.0	7.75	5.0	8.99	6.0	11.83	16.0	9.97	1.0	3.59	0.5
Detritus	30.40	6.0	40.09	10.0	36.12	4.0	36.52	6.0	51.13	7.0	63.64	10.0	64.46	8.0
Hydroids	41.08	5.0	53.81	5.0	36.12	4.0	58.78	10.0	47.79	5.0	60.54	12.0	72.30	5.0
Sea Squirts (*Mogula spp*.)	22.40	5.0	28.90	12.0	20.37	14.0	28.69	18.0	16.26	5.0	21.08	9.0	24.59	8.0
Seaweeds	15.31	4.0	24.55	10.0	24.28	5.0	31.57	30.0	35.23	18.0	41.91	3.0	31.05	4.0
Shell (oyster, clam, or mussel)	19.79	3.0	25.71	4.0	23.24	5.0	29.10	8.0	32.52	4.0	25.57	3.0	20.42	4.0
Sponges	8.29	6.0	9.44	5.0	9.49	5.0	13.36	10.0	13.55	18.0	11.11	3.0	9.15	4.0
Submerged Aquatic Vegetation	5.00	3.0	9.59	1.0	8.88	2.0	5.77	2.0	5.69	1.0	2.86	0.5	6.86	2.0
Worm Tubes	6.57	1.0	10.38	1.0	9.40	1.0	10.47	1.0	11.02	2.0	14.62	2.0	9.56	1.0
Mud[2]	7.17	---	6.75	---	9.23	---	5.19	---	11.56	---	9.15	---	13.89	---
Sand[2]	10.01	---	0.87	---	2.00	---	0.49	---	0.63	---	0.49	---	0.33	---
Unknown[3]	12.32	---	5.45	---	5.05	---	2.06	---	2.62	---	1.06	---	1.06	---
NUMBER OF TRAWLS:	1,339		1,377		1,149		1,213		1,213		1,224		1,224	

1. Based on the number of occurrences of a habitat type divided by the total number of trawls.
2. Sand and Mud are used when verification can be confirmed by direct observation.
3. Unknown is used when none of the categories are found in the trawl.

Abundance is estimated relative to the capacity of a commercial test note (internal dimensions 25.7" x 16.6" x 10", approximately 72 liters).
Categories include: 0.5 = < 1/4 bin, 1 = 1/4 bin, 2 = 1/2 bin, 3 =3/4 bin, 4 = full bin, etc.

Table 8. Spatial, temporal, and length criteria used to calculate indices.

VIMS Trawl Survey - Area / Time / Size Values by Species

Species - Age	VIMS SP. CODE	Strata Used: Bay Bottom	Bay Lower	Bay Upper	James Lower	James Upper	York Lower	York Upper	Rapp Lower	Rapp Upper	January	February	March	April	May	June	July	August	September	October	November	December
											Month — Size Cut-off Values (mm) - Darkened Areas Represent Index Months											
American Eel 1+	0060					X		X		X	---	---	---	**>152**	**>152**	**>152**	---	---	---	---	---	---
Atlantic Croaker Y-O-Y	0005				X	X	X	X	X	X	0-100	0-100	0-100	0-110	0-135	0-160	0-180	0-220	0-50	**0-80**	**0-100**	**0-100**
Atlantic Croaker Recruits	0005	X	X	X	X	X	X	X	X	X	0-100	0-100	0-100	0-110	**0-135**	**0-160**	**0-180**	**0-220**	0-50	0-80	0-100	0-100
Bay Anchovy Y-O-Y	0103	X	X	X	X	X	X	X	X	X	0-77	0-80	0-80	0-80	0-80	0-80	**0-44**	**0-51**	**0-56**	**0-61**	**0-65**	**0-70**
Black Seabass Y-O-Y	0002	X	X	X	X						0-110	0-110	0-110	0-110	**0-110**	**0-150**	**0-175**	0-70	0-85	0-100	0-105	0-110
Blue Catfish Y-O-Y	0314					X		X		X	**0-165**	**0-165**	**0-165**	**0-175**	0-225	0-250	0-250	0-115	0-125	0-140	0-150	0-165
Blue Catfish 1+	0314					X		X		X	**>165**	**>165**	**>165**	**>175**	>225	>250	>250	>115	>125	>140	>150	>165
Blue Crab - Age 0	6141 / 6142				X	X	X	X	X	X	0-60	0-60	0-60	0-60	0-60	0-80	0-90	0-35	**0-50**	**0-60**	**0-60**	0-60
Blue Crab - Age 1+	6141 / 6142				X	X	X	X	X	X	>60	>60	>60	>60	>60	>80	>90	**>35**	**>50**	**>60**	>60	>60
Blue Crab - Adult Female	6143	X	X	X	X		X		X		---	---	---	---	---	---	---	**any**	**size**	**crab**	---	---
Channel Catfish Y-O-Y	0040					X		X		X	**0-130**	**0-130**	**0-130**	**0-140**	0-150	0-50	0-80	0-105	0-120	0-130	0-130	0-130
Channel Catfish 1+	0040					X		X		X	**>130**	**>130**	**>130**	**>140**	>150	>50	>80	>105	>120	>130	>130	>130
Northern Puffer Y-O-Y	0050	X	X	X							0-140	0-140	0-140	0-160	0-185	0-50	**0-85**	**0-120**	**0-130**	**0-135**	0-140	0-140
Scup 1+ (?)	0050	X	X								90-170	90-170	90-170	90-170	35-90	**40-100**	**50-125**	**60-145**	**75-160**	85-170	90-170	90-170
Silver Perch Y-O-Y	0213	X	X	X	X	X	X	X	X	X	0-160	0-160	0-160	0-160	0-165	0-170	0-100	0-130	**0-150**	**0-160**	**0-160**	0-160
Spot Y-O-Y	0033	X	X	X	X	X	X	X	X	X	0-200	0-200	0-50	0-75	0-100	0-135	**0-160**	**0-180**	**0-200**	**0-200**	0-200	0-200
Striped Bass Y-O-Y	0031					X		X		X	**0-200**	**0-200**	0-200	0-200	0-50	0-80	0-100	0-120	0-135	0-150	0-175	**0-190**
Summer Flounder Y-O-Y	0003	X	X	X	X		X		X		0-290	0-290	0-60	0-100	0-140	0-170	0-200	0-225	**0-250**	**0-275**	**0-290**	0-290
Weakfish Y-O-Y	0007	X	X	X	X	X	X	X	X	X	0-200	0-200	0-200	0-225	0-240	0-90	0-120	**0-150**	**0-180**	**0-200**	0-200	0-200
White Catfish Y-O-Y	0039					X		X		X	**0-110**	**0-110**	**0-110**	**0-110**	0-120	0-50	0-65	0-80	0-90	0-100	0-110	0-110
White Catfish 1+	0039					X		X		X	**>110**	**>110**	**>110**	**>110**	>120	>50	>65	>80	>90	>100	>110	>110
White Perch Y-O-Y	0032					X		X		X	**0-85**	**0-85**	0-85	0-95	0-35	0-65	0-73	0-80	0-85	0-85	0-85	**0-85**
White Perch 1+	0032					X		X		X	**86-300**	**86-300**	86-300	96-300	36-300	66-300	74-300	81-300	86-300	85-300	**86-300**	**86-300**

Table 9. Summary of samples collected, 1955 - June 2005. Includes sampling from the recent RSD surveys of the tributaries (June 1991 to present).

KEY

Sample Type:	ALL	All fish species and blue crabs sampled, VIMS code 104
	CRAB	Only blue crabs sampled, VIMS code 102
	FISH	Only fish species sampled, VIMS code 090
System:	CL	Lower Chesapeake Bay (Virginia Portion)
	JA	James River
	PO	Potomac River
	RA	Rappahannock River
	YK	York River
	ZZ	includes: Atlantic Ocean (AT) - 1971, 78-79; Piankatank R. (PK) - 1970-71, 98-00; Mobjack Bay (MB) - 1970-73, 98-01; Pocomoke Sound (CP) -1973-81, 98-01; Great Wicomico R. (GW) - 1998-00.
Vessel:	BR	W.K. Brooks
	FH	Fish Hawk
	JS	Captain John Smith, J1 prior to 1986.
	LA	Langley
	PA	Pathfinder
	RE	Restless
	OT	Includes: Aquarius (AQ) - 1978; Investigator (IN) - 1970; Judith Ann (JA) - 1981; Langley II (LN) - 1985,2001; Sally Jean (SJ) - 1981; Outboard Skiff (SK) - 1970-71; Three Daughters (TD) - 1978; Virginia Lee (VL) - 1955-57; Edith May (EM) - 1984.
Gear Code:	010	Unlined, no tickler chain, 30' bridle, 48"x22" otter board doors, U_N_3B_SW
	033	Lined, no tickler chain, 30' bridle, 48"x22" doors, L_N_3B_SW
	043	Unlined, tickler chain, 30' bridle, 54"x24" doors, U_T_3B_LW
30' Gears	068	Lined, tickler chain, 30' bridle, 54"x24" otter board doors, L_T_3B_LW
	070	Lined, tickler chain, 60' bridle, 54"x24" doors, L_T_6B_LW
	108	Lined, tickler chain, 60' bridle, metal china-v doors, L_T_6B_CV

OT includes 3 configurations of 16 foot nets.

035:	Lined, no tickler chain, 23' bridle, 24"x12" otter board doors, 16L_N_2B_SW. Main Gear used
009:	Unlined, no tickler chain, 16U_N_2B_SW. 19 tows in 1972.
067:	Lined, w/ tickler chain, 16L_T_2B_SW. 60 samples on the Elizabeth River in 1982-83.

Station Type: F - Fixed
R - Random

Tow Type: OT is tow duration in minutes for those not listed.
DIS is distance, always 0.25 nautical miles. Equates well to 5 minute duration.

All Codes found on table from Wojcik and Van Engel, 1988. Appendices A – C

Table 9 (cont.) Sample collection history of the VIMS Trawl Survey, 1955 – June 2005. Codes are on previous page.

YR	TOT	SAMPLE TYPE			MONTH												WATER SYSTEM						RESEARCH VESSEL							GEAR CODE							STAT. TYPE		TOW DURATION/DISTANCE				
		ALL	CRAB	FISH	J	F	M	A	M	J	J	A	S	O	N	D	CL	JA	PO	RA	YK	ZZ	BR	FH	JS	LA	PA	RE	ZZ	10	33	43	68	70	108	OT	F	R	5	7.5	15	OT	DIS
1955	31	0	0	31	0	3	1	3	1	5	14	1	3	0	0	0	6	0	0	0	25	0	0	0	0	0	0	0	31	31	0	0	0	0	0	0	31	0	0	12	17	2	0
1956	135	103	0	32	0	0	0	16	17	0	17	20	17	16	16	16	43	0	0	0	92	0	0	0	0	0	0	0	135	135	0	0	0	0	0	0	135	0	0	6	127	2	0
1957	141	113	0	28	12	16	16	0	12	0	4	16	17	16	16	16	46	0	0	0	95	0	0	0	0	0	85	0	56	141	0	0	0	0	0	0	141	0	0	44	97	0	0
1958	192	167	0	25	16	16	13	16	19	16	15	17	16	16	16	16	56	0	0	0	136	0	0	0	0	0	192	0	0	192	0	0	0	0	0	0	192	0	0	58	134	0	0
1959	117	86	2	29	0	0	0	14	3	16	19	16	16	16	17	0	32	0	0	0	85	0	0	0	0	0	117	0	0	117	0	0	0	0	0	0	117	0	0	34	83	0	0
1960	57	42	0	15	0	0	0	0	16	14	14	13	0	0	0	0	19	0	0	0	38	0	0	0	0	0	57	0	0	57	0	0	0	0	0	0	57	0	0	10	44	3	0
1961	89	19	16	54	6	0	0	4	10	12	8	8	11	12	10	8	15	0	0	0	74	0	0	0	0	0	89	0	0	89	0	0	0	0	0	0	89	0	0	26	63	0	0
1962	116	6	35	75	8	8	8	5	12	19	8	8	11	11	11	7	18	0	0	17	81	0	0	0	0	22	94	0	0	116	0	0	0	0	0	0	116	0	0	31	84	1	0
1963	142	25	45	72	6	8	9	13	16	18	14	9	19	13	9	8	19	0	0	22	101	0	0	0	0	63	79	0	0	142	0	0	0	0	0	0	142	0	0	37	102	3	0
1964	190	104	36	50	23	9	9	12	20	22	18	15	14	19	14	15	24	62	0	0	104	0	0	0	0	75	115	0	0	190	0	0	0	0	0	0	190	0	1	36	149	4	0
1965	189	106	5	78	22	13	17	14	14	14	14	19	14	15	12	21	1	71	0	23	94	0	0	0	0	44	145	0	0	189	0	0	0	0	0	0	189	0	0	38	145	6	0
1966	214	138	3	73	14	21	25	16	17	17	17	23	13	18	16	17	21	70	0	9	114	0	0	0	0	184	30	0	0	214	0	0	0	0	0	0	214	0	0	51	163	0	0
1967	259	195	2	62	15	17	31	17	17	24	23	23	23	23	23	23	23	67	0	61	108	0	0	0	0	16	243	0	0	259	0	0	0	0	0	0	259	0	0	58	192	9	0
1968	262	215	2	45	14	16	16	23	23	23	21	31	23	23	23	26	23	70	0	65	104	0	0	0	0	4	258	0	0	259	3	0	0	0	0	0	262	0	10	66	180	6	0
1969	286	281	1	4	23	23	24	24	24	24	24	24	24	24	24	24	23	72	0	83	108	0	0	0	0	0	286	0	0	286	0	0	0	0	0	0	286	0	1	86	189	10	0
1970	359	276	1	82	17	24	24	24	24	24	51	24	51	23	51	22	23	70	0	80	105	81	14	0	0	0	314	0	31	305	0	0	0	0	0	54	359	0	3	173	177	6	0
1971	804	346	57	401	51	18	51	55	61	63	103	82	74	82	82	82	24	80	0	96	449	155	154	0	0	50	358	234	8	372	0	32	0	0	0	400	572	232	440	172	189	3	0
1972	851	168	97	586	73	73	73	56	56	75	71	85	43	98	94	54	14	86	0	95	545	111	73	0	0	154	193	431	0	246	0	101	0	0	0	504	506	345	657	104	89	1	0
1973	871	179	0	692	54	53	11	56	80	202	91	91	105	105	23	0	88	67	0	80	591	45	126	0	0	64	237	444	0	0	122	179	0	0	0	570	304	567	751	0	0	120	0
1974	748	175	0	573	156	137	75	0	27	26	166	62	55	26	18	0	138	147	73	174	216	0	0	0	0	568	105	75	0	0	498	175	0	0	0	75	478	270	257	0	0	38	453
1975	795	435	7	353	194	128	16	0	18	18	349	18	18	18	18	0	162	148	60	194	231	0	117	0	0	429	176	73	0	0	535	126	0	0	0	134	126	669	471	0	0	2	322
1976	1141	308	0	833	184	141	23	40	40	40	525	40	40	36	32	0	174	340	60	318	249	0	230	0	6	466	262	177	0	0	426	308	0	0	0	407	308	833	816	0	0	0	325
1977	876	182	0	694	0	0	182	0	26	26	493	71	26	26	26	0	113	243	8	284	228	0	172	0	23	269	130	282	0	0	240	182	0	0	0	454	182	694	771	0	0	0	105
1978	1130	208	0	922	94	214	79	0	26	90	396	66	26	26	26	87	171	366	78	220	285	10	22	0	73	544	153	179	159	0	583	181	0	0	0	366	181	949	551	0	16	2	561
1979	810	321	0	489	282	70	124	0	36	41	47	46	37	44	44	39	60	267	63	159	260	1	0	0	43	371	333	63	0	2	461	0	284	0	0	63	285	525	485	0	0	2	323
1980	559	248	0	311	28	48	46	18	49	51	50	50	58	52	52	57	129	145	0	115	170	0	0	0	367	0	192	0	0	0	140	0	0	419	0	0	362	197	558	0	0	1	0
1981	486	243	1	242	41	34	52	17	52	46	52	24	39	42	38	49	52	146	18	97	173	0	0	0	424	0	16	0	46	0	0	0	0	486	0	0	295	191	478	0	0	8	0
1982	580	261	0	319	11	67	80	54	53	40	40	45	50	46	46	48	43	180	37	140	180	0	0	0	580	0	0	0	0	0	0	0	0	538	0	42	364	216	577	0	0	3	0
1983	482	295	0	187	32	54	14	15	40	39	39	38	38	65	50	58	0	162	19	118	183	0	0	0	482	0	0	0	0	0	0	0	0	465	0	17	367	115	478	0	0	4	0
1984	475	261	1	213	19	13	38	45	50	49	47	46	37	49	49	33	0	212	21	95	147	0	0	0	461	0	0	0	14	0	3	0	0	472	0	0	475	0	471	0	0	4	0
1985	335	191	0	144	36	26	26	26	35	12	38	39	27	45	0	25	0	120	17	75	123	0	0	0	285	0	0	0	50	0	0	0	0	335	0	0	335	0	333	0	0	2	0
1986	374	374	0	0	22	24	25	24	37	35	37	37	37	37	36	23	0	135	0	117	122	0	0	0	374	0	0	0	0	0	0	0	0	374	0	0	374	0	374	0	0	0	0
1987	334	334	0	0	23	24	23	24	36	37	33	34	32	34	34	0	0	108	0	108	118	0	0	0	334	0	0	0	0	0	0	0	0	334	0	0	334	0	333	0	0	0	1
1988	889	802	87	0	69	69	62	48	82	82	82	82	82	82	80	69	576	97	0	105	111	0	0	0	889	0	0	0	0	0	0	0	0	889	0	0	313	576	885	0	0	0	4
1989	840	749	91	0	61	61	61	66	76	76	76	76	76	76	76	59	479	108	0	124	129	0	0	0	840	0	0	0	0	0	0	0	0	840	0	0	361	479	840	0	0	0	0
1990	827	739	88	0	61	61	61	61	76	76	77	75	76	69	76	58	473	108	0	119	127	0	0	279	548	0	0	0	0	0	0	0	0	827	0	0	354	473	826	0	0	0	1
1991	930	840	90	0	61	25	61	61	73	94	95	95	97	97	97	74	411	108	0	120	291	0	0	930	0	0	0	0	0	0	0	0	0	0	930	0	357	573	928	0	0	1	1
1992	982	891	91	0	79	47	79	79	97	88	88	88	89	88	88	72	404	110	0	124	344	0	0	982	0	0	0	0	0	0	0	0	0	0	982	0	361	621	975	0	0	7	0
1993	915	824	91	0	40	73	40	71	88	89	88	88	88	88	87	75	370	110	0	126	309	0	0	915	0	0	0	0	0	0	0	0	0	0	915	0	365	550	914	0	0	1	0
1994	911	820	91	0	40	73	40	73	88	88	88	88	88	88	88	69	368	110	0	124	309	0	0	911	0	0	0	0	0	0	0	0	0	0	911	0	363	548	906	0	0	5	0
1995	993	980	13	0	40	73	40	73	92	88	88	88	105	105	99	102	411	96	0	201	285	0	0	993	0	0	0	0	0	0	0	0	0	0	993	0	314	679	984	0	0	9	0
1996	1176	1176	0	0	52	91	71	106	106	107	108	108	107	108	107	105	435	228	0	258	255	0	0	1176	0	0	0	0	0	0	0	0	0	0	1176	0	279	897	1168	0	0	6	2
1997	1220	1220	0	0	68	105	66	98	110	111	111	112	111	112	111	105	425	265	0	264	266	0	0	1220	0	0	0	0	0	0	0	0	0	0	1220	0	302	918	1217	0	0	3	0
1998	1262	1262	0	0	66	105	66	105	111	111	128	59	138	124	130	119	388	265	0	256	264	89	0	1262	0	0	0	0	0	0	0	0	0	0	1262	0	322	940	1261	0	0	1	0
1999	1382	1382	0	0	79	122	80	122	120	118	119	118	122	124	131	127	402	264	0	264	265	187	0	1382	0	0	0	0	0	0	0	0	0	0	1382	0	363	1019	1380	0	0	2	0
2000	1367	1367	0	0	52	129	85	101	158	111	128	125	121	141	111	105	433	250	17	266	265	136	0	1367	0	0	0	0	0	0	0	0	0	0	1367	0	363	1004	1367	0	0	0	0
2001	1122	1122	0	0	30	30	30	75	112	144	111	112	135	136	111	96	384	230	35	230	230	13	0	1017	0	0	0	0	105	0	0	0	0	0	1122	0	277	845	1119	0	0	1	2
2002	1090	1090	0	0	66	90	66	90	96	106	96	97	95	96	96	96	288	264	0	264	264	10	0	1090	0	0	0	0	0	0	0	0	0	0	1090	0	300	790	1089	0	0	1	0
2003	1191	1191	0	0	66	96	66	96	96	111	111	111	111	111	111	105	399	264	0	264	264	0	0	1191	0	0	0	0	0	0	0	0	0	0	1191	0	300	891	1191	0	0	0	0
2004	1224	1224	0	0	66	105	66	105	111	111	111	111	111	111	111	105	432	264	0	264	264	0	0	1224	0	0	0	0	0	0	0	0	0	0	1224	0	300	924	1224	0	0	0	0
2005	564	564	0	0	66	105	66	105	111	111	0	0	0	0	0	0	168	132	0	132	132	0	0	564	0	0	0	0	0	0	0	0	0	0	564	0	150	414	564	0	0	0	0
TOT	33315	24648	953	7714	2538	2758	2237	2166	2770	2960	4563	2774	2766	2832	2636	2315	8806	6707	506	6350	10108	838	908	16503	5729	3323	4259	1958	635	3342	3011	1284	284	5979	12260	3086	14371	18944	23586	1042	2240	279	2100

Table 10. VIMS Trawl Survey Pooled Catch for July 2004 to June 2005.
(Number of Trawls = 1224).

Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker

Species	Number of Fish (All)	Frequency	Percent of Catch	Catch Per Trawl	Adjusted Percent of Catch	Number of Fish YOY	Average Length (mm)	Standard Error (length)	Minimum Length (mm)	Maximum Length (mm)
bay anchovy	255,616	988	61.24	208.84	.	186,427	56	0.08	14	108
Atlantic croaker	39,599	814	9.49	32.35	29.61	34,778	92	0.56	10	440
hogchoker	28,022	635	6.71	22.89	.	6,072	87	0.24	10	191
spot	19,718	566	4.72	16.11	14.74	18,499	117	0.43	17	285
white perch	18,585	416	4.45	15.18	13.9	6,311	121	0.47	17	279
weakfish	12,936	430	3.1	10.57	9.67	11,230	105	0.63	16	392
blue catfish	11,308	263	2.71	9.24	8.45	5,775	175	0.85	19	655
blue crab, male	3,426	563	0.82	2.8	2.56	.	57	0.68	8	185
blue crab, juvenile female	3,054	565	0.73	2.5	2.28	.	46	0.5	8	147
squid spp	2,802	129	0.67	2.29	2.09	.	28	0.26	7	85
kingfish spp	2,387	243	0.57	1.95	1.78	2,289	75	1.01	17	348
striped bass	2,332	209	0.56	1.91	1.74	1,901	138	2.81	16	780
striped anchovy	1,906	118	0.46	1.56	1.43	1,833	88	0.44	39	135
gizzard shad	1,576	137	0.38	1.29	1.18	1,323	165	1.68	65	439
summer flounder	1,348	396	0.32	1.1	1.01	955	234	2.28	35	614
silver perch	1,339	168	0.32	1.09	1	1,014	132	0.87	18	219
spotted hake	1,196	157	0.29	0.98	0.89	1,179	138	1.61	36	340
blueback herring	1,091	102	0.26	0.89	0.82	1,054	88	0.62	64	186
smallmouth flounder	820	161	0.2	0.67	0.61	798	76	0.59	31	147
Atlantic menhaden	807	176	0.19	0.66	0.6	721	86	2.26	27	337
blue crab, adult female	658	235	0.16	0.54	0.49	.	143	0.55	84	189
alewife	590	135	0.14	0.48	0.44	584	102	0.81	48	228
white catfish	515	139	0.12	0.42	0.39	57	203	3.94	37	465
northern searobin	464	128	0.11	0.38	0.35	450	78	1.67	31	195
oyster toadfish	412	120	0.1	0.34	0.31	.	198	3.69	29	394
harvestfish	402	81	0.1	0.33	0.3	375	60	1.81	14	196
blackcheek tonguefish	342	157	0.08	0.28	0.26	249	102	2.16	43	202
butterfish	309	97	0.07	0.25	0.23	204	87	3.21	16	198
channel catfish	307	54	0.07	0.25	0.23	101	166	4.81	43	466
pigfish	242	51	0.06	0.2	0.18	.	140	1.33	71	199
mantis shrimp	222	77	0.05	0.18	0.17	.	71	1.75	25	157
scup	201	65	0.05	0.16	0.15	123	112	2.95	30	193
banded drum	188	41	0.05	0.15	0.14	.	53	1.63	24	149
hickory shad	167	48	0.04	0.14	0.12	.	76	3.46	38	357
spider crab, 6 spine	164	68	0.04	0.13	0.12	.	.	.	.	.
naked goby	163	85	0.04	0.13	0.12	.	39	0.63	23	60
red hake	150	30	0.04	0.12	0.11	.	143	2.68	55	234
American shad	135	64	0.03	0.11	0.1	135	104	1.82	57	165
spottail shiner	130	19	0.03	0.11	0.1	.	83	1.15	43	113
inshore lizardfish	123	59	0.03	0.1	0.09	104	139	4.88	46	269
windowpane	112	71	0.03	0.09	0.08	94	135	6.13	47	318
American eel	111	73	0.03	0.09	0.08	.	317	10.59	145	648
northern pipefish	104	78	0.02	0.08	0.08	.	136	3.57	66	261
Atlantic thread herring	102	23	0.02	0.08	0.08	.	69	3.55	32	181
Atlantic spadefish	100	51	0.02	0.08	0.07	.	78	2.74	27	165
black seabass	98	59	0.02	0.08	0.07	49	125	5.05	40	231
spider crab, common	92	25	0.02	0.08	0.07	.	.	.	.	.
Atlantic silverside	64	27	0.02	0.05	0.05	64	88	2.09	33	113
northern puffer	60	33	0.01	0.05	0.04	47	90	6.49	20	219
striped searobin	52	31	0.01	0.04	0.04	.	107	6.47	28	208
white shrimp	51	27	0.01	0.04	0.04	.	112	4.11	48	164
clearnose skate	51	25	0.01	0.04	0.04	.	373	11.43	96	476
common carp	49	22	0.01	0.04	0.04	.	340	17.31	214	649
bluefish	45	32	0.01	0.04	0.03	.	197	10.73	100	365

Table 10 (cont.)

Adjusted Percent of Catch Excludes Bay Anchovy and Hogchoker

Species	Number of Fish (All)	Frequency	Percent of Catch	Catch Per Trawl	Adjusted Percent of Catch	Number of Fish YOY	Average Length (mm)	Standard Error (length)	Minimum Length (mm)	Maximum Length (mm)
blue crab, sex unknown	45	11	0.01	0.04	0.03	.	14	0.98	8	29
Atlantic herring	41	27	0.01	0.03	0.03	.	107	14.07	34	296
rock crab	39	18	0.01	0.03	0.03	.	51	3.62	16	94
lady crab	33	19	0.01	0.03	0.02	.	.	.	.	.
lined seahorse	31	26	0.01	0.03	0.02	.	69	4.25	34	124
feather blenny	29	18	0.01	0.02	0.02	.	69	3.47	23	104
channel (smooth) whelk	28	21	0.01	0.02	0.02	.	.	.	.	.
eastern silvery minnow	26	7	0.01	0.02	0.02	.	105	1.79	91	127
horseshoe crab	24	13	0.01	0.02	0.02	.	207	8.27	146	302
seaboard goby	21	10	0.01	0.02	0.02	.	34	1.35	23	48
brown shrimp	17	14	0	0.01	0.01	.	122	6.28	76	166
tautog	14	7	0	0.01	0.01	.	333	32.73	143	505
Spanish mackerel	14	6	0	0.01	0.01	.	70	12.2	26	139
longnose gar	13	8	0	0.01	0.01	.	773	39.02	477	975
bluntnose stingray	13	4	0	0.01	0.01	.	470	28.92	213	568
knobbed whelk	10	12	0	0.01	0.01	.	.	.	.	.
skilletfish	10	9	0	0.01	0.01	.	53	3.6	37	72
smooth butterfly ray	10	8	0	0.01	0.01	.	496	52.06	328	850
silver hake	10	3	0	0.01	0.01	.	153	6.06	129	190
brown bullhead	9	8	0	0.01	0.01	.	160	11.59	105	210
tessellated darter	8	7	0	0.01	0.01	.	78	5.75	52	100
round herring	7	3	0	0.01	0.01	.	51	3.54	39	70
green goby	6	6	0	0	0	.	43	2.91	31	50
smooth dogfish	6	6	0	0	0	.	526	44.32	410	674
Atlantic stingray	6	6	0	0	0	.	339	23.17	279	433
spotted seatrout	6	4	0	0	0	.	197	8.79	176	237
lookdown	6	2	0	0	0	.	88	4.9	69	101
irredescent swimming crab	5	5	0	0	0	.	.	.	.	.
Portunid spp	4	5	0	0	0	.	.	.	.	.
red drum	4	4	0	0	0	.	69	11.69	53	103
black drum	4	2	0	0	0	.	218	17.12	187	260
blue runner	4	1	0	0	0	.	155	4.57	142	163
Atlantic moonfish	3	3	0	0	0	.	68	14.31	46	95
northern stargazer	3	3	0	0	0	.	103	46.06	20	179
striped cusk-eel	3	3	0	0	0	.	193	17.65	164	225
sheepshead	3	2	0	0	0	.	421	132.03	157	565
searobin spp	3	1	0	0	0	.	17	0.33	17	18
sea lamprey	2	2	0	0	0	.	177	31.5	145	208
sandbar shark	2	2	0	0	0	.	536	50	486	586
southern stingray	2	2	0	0	0	.	406	164.5	241	570
Atlantic cutlassfish	2	2	0	0	0	.	330	48.5	281	378
chain pipefish	2	2	0	0	0	.	170	41	129	211
pink shrimp	2	2	0	0	0	.	76	4.5	71	80
shelligs blue crab	2	2	0	0	0	.	.	.	.	.
lesser blue crab	2	2	0	0	0	.	.	.	.	.
winter flounder	1	1	0	0	0	.	53	.	53	53
Florida pompano	1	1	0	0	0	.	203	.	203	203
black crappie	1	1	0	0	0	.	49	.	49	49
yellow perch	1	1	0	0	0	.	174	.	174	174
inland silverside	1	1	0	0	0	.	57	.	57	57
bullnose ray	1	1	0	0	0	.	326	.	326	326
conger eel	1	1	0	0	0	.	659	.	659	659
crevalle jack	1	1	0	0	0	.	120	.	120	120
spotted whiff	1	1	0	0	0	.	129	.	129	129
fourspot flounder	1	1	0	0	0	.	32	.	32	32
striped burrfish	1	1	0	0	0	.	129	.	129	129
red goatfish	1	1	0	0	0	.	54	.	54	54
snakefish	1	1	0	0	0	.	94	.	94	94
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All Species Combined	417,390									

Table 11.

SPOT YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	1.58	1.27-1.92	6.61	1.48	1.24-1.75	5.65	17				
1956	98.77	50.85-190.95	7.11	37.41	19.41-71.31	8.67	62				
1957	24.87	6.38-89.67	19.28	8.09	2.22-24.68	23.52	47				
1958	7.22	3.41-14.33	14.78	2.86	1.15-5.93	21.62	56				
1959	13.01	5.14-30.97	15.63	3.23	1.11-7.48	24.10	59				
1960	9.30	0.33-78.52	43.83	4.56	0.21-24.55	44.45	27				
1961	8.81	2.03-30.81	25.75	2.76	0.48-8.52	35.07	27				
1962	191.03	30.41-1172.8	17.22	57.43	6.14-476.82	25.83	20				
1963	13.25	1.02-99.35	36.74	5.67	0.48-29.06	39.70	32				
1964	37.85	17.32-81.36	10.27	10.14	4.71-20.73	13.86	54				
1965	2.20	0.86-4.49	23.24	0.96	0.43-1.7	23.69	52				
1966	37.96	15.86-89.01	11.43	17.80	6.34-47.17	16.04	63				
1967	6.02	1.34-20.08	28.22	2.01	0.4-5.45	34.70	88				
1968	143.77	58.12-353.49	9.00	45.03	16.33-121.25	12.75	87				
1969	52.50	25.53-106.89	8.81	19.38	9.56-38.32	10.90	91				
1970	5.59	0.1-38.52	47.51	2.67	0-14.4	55.07	91				
1971	82.09	56.47-119.15	4.17	24.26	16.42-35.63	5.75	265				
1972	98.08	91.85-104.73	0.71	40.46	37.97-43.12	0.83	211				
1973	13.57	9.87-18.53	5.46	11.19	8.26-15.06	5.51	348				
1974	15.62	6.85-34.21	13.35	9.72	4.12-21.44	15.58	243				
1975	33.24	21.82-50.36	5.74	20.90	13.6-31.83	6.56	334				
1976	14.03	10.06-19.42	5.65	7.41	5.36-10.12	6.55	587				
1977	28.75	20.47-40.23	4.81	15.62	11.39-21.31	5.23	530				
1978	9.79	6.4-14.71	7.91	5.54	3.73-8.05	8.64	413				
1979	49.03	42.94-55.95	1.66	25.68	22.39-29.43	2.00	127			17.29	123
1980	16.46	10.92-24.6	6.68	19.09	13.01-27.83	6.01	158			8.94	146
1981	31.69	25.22-39.76	3.16	44.59	35.32-56.23	2.98	146			31.06	137
1982	58.50	30.94-109.84	7.61	76.95	39.99-147.22	7.38	156			36.52	151
1983	14.99	12.06-18.59	3.65	21.42	17.19-26.65	3.37	151			21.51	151
1984	41.62	22.86-75.15	7.73	56.84	31.93-100.58	6.94	127			50.28	132
1985	11.90	6.98-19.84	9.38	15.97	9.46-26.55	8.55	117			19.59	118
1986	21.07	16.1-27.48	4.12	30.68	23.27-40.35	3.85	144			26.32	144
1987	8.96	7.1-11.24	4.50	12.96	10.32-16.21	3.97	133			20.45	133
1988	50.91	35.51-72.8	4.45	67.01	46.36-96.67	4.29	231	67.45	231	50.20	84
1989	22.46	17.7-28.45	3.60	31.41	24.51-40.18	3.44	252	32.27	252	54.19	84
1990	33.88	24.63-46.46	4.34	44.78	32.34-61.85	4.14	248	45.28	248	53.06	81
1991	16.83	12.78-22.08	4.48	16.83	12.78-22.08	4.48	334	16.56	238	21.44	83
1992	2.02	1.54-2.58	7.78	2.02	1.54-2.58	7.78	301	1.96	238	4.39	82
1993	9.99	7.45-13.3	5.48	9.99	7.45-13.3	5.48	300	9.74	240	11.85	84
1994	9.68	7.28-12.79	5.38	9.68	7.28-12.79	5.38	300	9.07	240	8.88	84
1995	1.81	1.39-2.3	7.87	1.81	1.39-2.3	7.87	352	1.52	248	2.37	92
1996	5.26	4.15-6.60	5.30	5.26	4.15-6.60	5.30	407	4.52	244	4.84	88
1997	11.50	9.11-14.45	4.20	11.50	9.11-14.45	4.20	421	8.63	256	19.68	100
1998	2.51	1.92-3.23	7.36	2.51	1.92-3.23	7.36	374	1.88	214	3.04	96
1999	4.72	3.63-6.07	6.07	4.72	3.63-6.07	6.07	402	3.98	238	6.61	100
2000	3.32	2.57-4.23	6.51	3.32	2.57-4.23	6.51	421	2.70	253	4.94	97
2001	3.09	2.45-3.85	6.06	3.09	2.45-3.85	6.06	432	2.83	264	3.69	100
2002	2.89	2.10-3.88	8.38	2.89	2.10-3.88	8.38	360	2.09	196	3.12	100
2003	2.85	2.25-3.56	6.32	2.85	2.25-3.56	6.32	420	2.58	256	2.32	100
2004	3.96	3.14-4.95	5.68	3.96	3.14-4.95	5.68	420	3.21	255	6.91	99
2005*	.	.	.	.	.	.	.	.	.	.	.

Table 12.

FALL ATLANTIC CROAKER YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955		0			0		0				
1956	2.68	1.22-5.11	19.41	3.98	1.92-7.52	16.68	27				
1957	3.62	1.54-7.4	19.54	4.04	1.98-7.52	16.26	27				
1958	1.32	0.41-2.81	29.54	1.6	0.5-3.5	28.67	27				
1959	2.14	1.15-3.58	16.52	1.11	0.58-1.82	19.45	18				
1960		0			0		0				
1961	1.2	1.02-1.39	5.40	0.77	0.67-0.88	4.94	15				
1962	0.3	0-1.02	83.36	0.3	0-1.02	83.36	12				
1963	0.72	0.06-1.8	45.00	0.81	0.07-2.04	44.14	17				
1964	0.67	0.32-1.11	22.99	0.67	0.33-1.11	22.59	27				
1965	2.17	1.16-3.67	16.71	1.66	0.95-2.64	15.97	43				
1966	2	1.13-3.25	15.73	1.91	1.09-3.05	15.54	42				
1967	0.04	0-0.11	100.00	0.02	0-0.06	100.00	60				
1968	2.1	0.57-5.12	30.01	1.45	0.39-3.32	31.69	60				
1969	27.98	18.79-41.44	5.67	12.75	8.63-18.65	6.80	63				
1970	3.4	1.74-6.05	15.97	1.96	1.03-3.32	17.38	61				
1971	4.7	2.85-7.44	11.29	2.45	1.55-3.68	12.31	177				
1972	6.1	4.59-8.02	6.11	4.94	3.69-6.52	6.63	188				
1973	5.88	4.1-8.27	7.75	3.89	2.69-5.47	8.82	116				
1974	0.87	0.54-1.27	15.46	0.87	0.54-1.27	15.46	44				
1975	7.64	4.82-11.83	9.15	7.64	4.82-11.83	9.15	36				
1976	5.8	3.6-9.05	10.18	9.09	5.57-14.48	9.26	68				
1977	2.97	1.89-4.45	11.49	2.97	1.89-4.45	11.49	52				
1978	6.91	5.32-8.89	5.41	5.17	3.97-6.66	5.93	128				
1979	5.37	3.9-7.27	7.06	3.86	2.81-5.19	7.65	100			4.69	63
1980	3.35	2.33-4.67	9.05	2.01	1.43-2.74	9.76	117			2.53	70
1981	4.78	3.3-6.77	8.44	3.52	2.43-4.96	9.16	122			2.86	75
1982	6.19	4.64-8.15	6.13	4.93	3.72-6.45	6.42	114			3.20	102
1983	8.11	5.24-12.3	8.56	6.37	4.24-9.36	8.52	102			7.32	103
1984	54.69	41.51-71.95	3.36	39.91	30.2-52.64	3.65	83			45.77	86
1985	89.77	72.21-111.54	2.38	71.76	56.56-90.97	2.73	57			74.98	57
1986	20.53	13.76-30.4	6.15	15.94	10.5-23.97	6.85	94			12.63	94
1987	7.21	4.87-10.49	7.98	5.47	3.77-7.76	8.14	68			6.49	68
1988	9.35	5.76-14.84	9.11	7.46	4.68-11.6	9.33	65			9.05	65
1989	60.27	35.47-101.95	6.30	45.95	27.78-75.59	6.36	65			64.78	65
1990	11.68	7.8-17.28	7.20	9.41	6.36-13.74	7.42	60			13.15	60
1991	5.71	3.94-8.1	8.02	5.71	3.94-8.1	8.02	132			9.57	63
1992	10.54	6.95-15.75	7.62	10.54	6.95-15.75	7.62	112			14.60	67
1993	4.54	2.84-7.0	10.72	4.54	2.84-7.0	10.72	113			5.42	69
1994	10.45	6.7-16.04	8.15	10.45	6.7-16.04	8.15	112			13.48	67
1995	12.75	9.61-16.81	4.94	12.75	9.61-16.81	4.94	180			11.79	69
1996	32.46	20.05-52.17	6.60	32.46	20.05-52.17	6.60	191			31.06	69
1997	7.94	5.08-12.12	8.77	7.94	5.08-12.12	8.77	199			10.41	75
1998	24.15	16.74-34.65	5.41	24.15	16.74-34.65	5.41	199			21.26	75
1999	11.27	7.25-17.23	7.90	11.27	7.25-17.23	7.90	198			14.33	75
2000	7.68	5.50-10.60	6.70	7.68	5.50-10.60	6.70	197			5.96	74
2001	5.73	4.05-7.96	7.54	5.73	4.05-7.96	7.54	198			7.05	75
2002	6.84	4.48-10.20	8.68	6.84	4.48-10.20	8.68	198			10.35	75
2003	100.36	68.35-147.16	4.11	100.36	68.35-147.16	4.11	198			96.17	75
2004	12.29	7.56-19.63	8.51	12.29	7.56-19.63	8.51	198			24.18	75
2005*	.	.	.	.	.	.	.			.	.

Table 13.

SPRING ATLANTIC CROAKER INDICES (RECRUITS)

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.31	0.17-0.45	20.15	0.45	0.3-0.61	14.47	20				
1956	3.28	1.2-7.3	22.81	4.92	2.05-10.48	18.66	48				
1957	13.62	0.11-191.83	48.08	11.70	0.15-139.59	47.30	28				
1958	0.30	0-0.88	71.25	0.40	0-1.22	68.83	59				
1959	0.04	0-0.88	46.61	0.04	0.01-0.07	41.19	48				
1960	0.24	0-0.6	57.76	0.35	0-0.97	62.28	54				
1961	0.36	0-1.05	67.92	0.24	0-0.62	63.83	28				
1962	0.79	0.56-1.05	11.74	0.67	0.47-0.91	12.66	28				
1963	0.01	0-0.04	86.67	0.01	0-0.03	70.15	28				
1964	0.35	0.16-0.57	25.21	0.32	0.18-0.48	20.50	55				
1965	4.01	1.98-7.4	16.06	2.93	1.58-4.98	15.33	48				
1966	0.00	0-0.01	.	0.00	0-0.01	.	66				
1967	0.34	0.19-0.5	19.83	0.26	0.15-0.38	19.42	83				
1968	0.11	0.03-0.2	35.79	0.07	0.02-0.14	39.09	87				
1969	0.26	0.15-0.39	20.62	0.18	0.1-0.26	21.44	91				
1970	0.06	0-0.12	52.38	0.03	0-0.06	49.09	92				
1971	0.23	0.12-0.34	21.94	0.15	0.08-0.24	24.38	228				
1972	4.37	0-31.89	53.90	3.63	0-24.42	55.62	210				
1973	0.12	0.09-0.16	14.60	0.09	0.07-0.13	14.98	417				
1974	2.04	1.2-3.19	14.45	1.68	1.03-2.54	14.09	241				
1975	2.63	1.64-3.98	12.28	2.00	1.29-2.94	12.40	334				
1976	1.08	0.84-1.37	8.65	0.78	0.6-0.97	9.00	591				
1977	0.15	0.1-0.2	16.42	0.11	0.06-0.15	20.39	530				
1978	0.08	0.05-0.11	16.61	0.05	0.03-0.07	17.94	413				
1979	2.18	1.44-3.14	11.43	1.30	0.9-1.79	11.44	119			2.06	117
1980	0.52	0.39-0.66	10.98	0.44	0.34-0.55	10.12	152			1.85	137
1981	0.07	0.04-0.1	19.67	0.07	0.04-0.1	20.36	140			0.24	132
1982	0.11	0.07-0.14	14.68	0.11	0.07-0.14	15.05	168			1.23	148
1983	6.59	4.94-8.71	6.06	6.67	4.98-8.84	6.10	156			9.49	156
1984	1.63	0.83-2.77	18.72	1.61	0.83-2.73	18.59	140			1.23	144
1985	4.98	4.18-5.92	4.05	5.33	4.4-6.42	4.31	106			4.07	106
1986	2.97	2.25-3.84	7.18	3.33	2.52-4.32	7.03	142			3.19	142
1987	4.24	3.47-5.14	4.81	4.24	3.47-5.14	4.80	139			5.47	139
1988	0.32	0.21-0.44	15.52	0.36	0.23-0.49	16.05	234	0.38	234	2.22	84
1989	0.60	0.38-0.85	15.51	0.65	0.41-0.93	15.63	252	0.78	252	4.63	84
1990	0.43	0.23-0.67	21.19	0.48	0.26-0.74	20.56	252	0.52	252	2.98	85
1991	4.41	3.08-6.18	8.36	4.41	3.08-6.18	8.36	307	4.35	238	12.87	83
1992	1.28	0.87-1.78	12.10	1.28	0.87-1.78	12.10	309	1.34	240	10.26	84
1993	2.17	1.5-3.02	10.34	2.17	1.5-3.02	10.34	301	2.21	240	19.40	84
1994	0.90	0.6-1.26	13.54	0.90	0.6-1.26	13.54	300	0.95	240	2.98	84
1995	1.06	0.77-1.39	10.40	1.06	0.77-1.39	10.40	306	0.93	246	5.55	90
1996	0.19	0.11-0.28	19.63	0.19	0.11-0.28	19.63	405	0.16	242	0.36	88
1997	1.47	1.15-1.85	7.78	1.47	1.15-1.85	7.78	419	0.87	255	7.78	100
1998	1.19	0.95-1.47	7.51	1.19	0.95-1.47	7.51	374	0.48	214	6.21	96
1999	1.50	1.05-2.05	10.83	1.50	1.05-2.05	10.83	397	1.28	232	4.08	100
2000	0.60	0.42-0.80	12.68	0.60	0.42-0.80	12.68	413	0.44	245	1.39	97
2001	0.37	0.25-0.49	14.38	0.37	0.25-0.49	14.38	420	0.32	256	1.18	100
2002	1.59	1.07-2.22	11.59	1.59	1.07-2.22	11.59	361	1.11	197	4.80	100
2003	0.49	0.28-0.74	19.19	0.49	0.28-0.74	19.19	405	0.52	241	0.28	100
2004	0.96	0.73-1.22	9.34	0.96	0.73-1.22	9.34	420	0.70	255	4.42	99
2005*	0.35	0.25-0.45	12.31	0.35	0.25-0.45	12.31	210	0.17	128	1.31	50

Table 14.

WEAKFISH YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1956	24.49	10.4-56.02	12.43	39.89	17.24-90.67	10.88	47				
1957	23.10	13.45-39.19	8.03	29.32	19.76-43.28	5.55	43				
1958	1.13	0.36-2.32	29.56	2.12	0.91-4.1	21.62	43				
1959	18.34	8.33-39.11	12.31	10.10	1.47-48.79	31.19	42				
1960	1.38	0.76-2.21	17.25	1.91	1.14-2.96	14.45	13				
1961	1.77	0.32-4.81	36.44	3.12	0.79-8.47	29.39	20				
1962	3.58	2.86-4.43	5.59	3.59	2.87-4.44	5.58	13				
1963	6.50	0-88.61	61.59	9.12	0-188.19	63.23	24				
1964	23.60	7.08-73.94	17.39	21.85	6.46-69.03	17.90	39				
1965	4.19	2.74-6.2	9.97	4.47	3.04-6.4	8.91	40				
1966	11.34	3.19-35.34	21.50	11.54	3.61-33.16	19.80	48				
1967	0.49	0.13-0.96	34.48	0.45	0.13-0.86	33.93	66				
1968	6.45	0.81-29.6	35.17	6.97	1.16-28.37	21.41	67				
1969	8.96	3.31-22	18.22	5.02	0.58-21.87	37.22	68				
1970	26.65	24.06-29.51	1.48	18.82	4.93-65.26	20.20	68				
1971	12.10	8.8-16.52	5.64	11.49	6.96-18.61	8.93	183				
1972	0.70	0.58-0.82	6.87	0.51	0.41-0.61	8.06	157				
1973	1.75	1.2-2.43	10.90	1.05	0.71-1.46	12.59	267				
1974	0.31	0.28-0.34	3.73	0.25	0.23-0.28	3.89	102				
1975	0.20	0.04-0.4	40.21	0.20	0.04-0.4	40.21	54				
1976	1.62	1.14-2.2	10.41	1.79	1.3-2.39	9.49	116				
1977	1.47	0.92-2.17	13.82	1.01	0.71-1.37	11.75	114				
1978	32.94	27.14-39.93	2.66	21.94	17.74-27.07	3.22	91				
1979	22.62	20.09-25.44	1.79	22.63	20.1-25.46	1.79	99			7.18	95
1980	6.45	3.53-11.24	12.39	6.43	3.46-11.36	12.70	120			9.87	111
1981	30.34	12.11-73.89	12.64	31.27	12.12-78.36	12.95	104			6.02	99
1982	17.86	8.98-34.63	10.83	18.41	9.46-35	10.42	116			10.95	113
1983	11.18	8.8-14.15	4.36	10.82	8.45-13.77	4.52	112			10.85	112
1984	4.99	3.26-7.44	9.55	4.73	3.1-7.01	9.60	93			6.05	97
1985	30.23	20.04-45.36	5.74	29.23	19.36-43.88	5.79	80			37.04	81
1986	4.95	3.18-7.45	9.86	4.71	3.05-7.05	9.85	108			4.62	108
1987	12.33	9.53-15.88	4.55	12.58	9.83-16.03	4.34	100			17.85	100
1988	8.05	5.31-11.96	8.17	8.13	5.37-12.07	8.12	173	8.89	173	21.72	63
1989	11.91	8.33-16.86	6.34	11.74	8.18-16.88	6.44	189	12.22	189	21.27	63
1990	4.29	2.99-6.03	8.52	4.46	3.1-6.26	8.44	184	4.87	184	30.01	59
1991	3.21	2.38-4.25	7.64	3.21	2.38-4.25	7.64	252	3.56	179	15.32	62
1992	6.78	4.79-9.47	7.21	6.78	4.79-9.47	7.21	226	6.93	178	15.91	61
1993	5.84	4.12-8.15	7.55	5.84	4.12-8.15	7.55	225	6.12	180	15.42	63
1994	2.60	1.84-3.55	9.21	2.60	1.84-3.55	9.21	225	2.67	180	7.04	63
1995	6.62	4.89-8.86	6.34	6.62	4.89-8.86	6.34	275	6.07	186	11.00	69
1996	7.26	5.33-9.78	6.31	7.26	5.33-9.78	6.31	305	7.85	183	7.42	66
1997	6.81	5.26-8.74	5.38	6.81	5.26-8.74	5.38	316	7.15	192	14.82	75
1998	7.60	5.46-10.45	6.65	7.60	5.46-10.45	6.65	269	8.18	150	9.95	71
1999	6.78	5.01-9.06	6.28	6.78	5.01-9.06	6.28	303	7.38	180	16.25	75
2000	8.35	6.34-10.92	5.42	8.35	6.34-10.92	5.42	316	9.39	191	11.09	74
2001	5.09	3.74-6.82	6.93	5.09	3.74-6.82	6.93	327	5.14	200	11.52	75
2002	6.93	4.27-10.94	9.89	6.93	4.27-10.94	9.89	270	6.30	147	8.59	75
2003	9.23	6.72-12.54	6.04	9.23	6.72-12.54	6.04	315	9.34	192	5.42	75
2004	6.66	4.94-8.88	6.24	6.66	4.94-8.88	6.24	315	7.24	192	10.47	75
2005*	.	.	.	.	.	.	.	.	.	.	.

Table 15.

SUMMER FLOUNDER YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.00	0.00	.	0.00	0.00	.	2				
1956	4.44	2.91-6.56	9.76	1.29	0.75-2	16.26	29				
1957	2.14	1.22	15.07	0.69	0.46-0.96	13.88	28				
1958	1.48	0.23-4	38.64	0.42	0.09-0.85	38.03	27				
1959	0.06	0-0.16	75.33	0.03	0-0.06	66.23	27				
1960	.	0.00	.	.	0.00	.	0				
1961	0.19	0-0.61	85.91	0.01	0-0.03	100.00	11				
1962	0.00	0.00	.	0.00	0	.	7				
1963	2.07	24.24	1.09	1.09	0.43-2.05	25.73	12				
1964	0.65	0.55-0.77	6.77	0.39	0.25-0.54	16.05	16				
1965	0.74	0.27-1.39	28.63	0.45	0.16-0.82	30.37	13				
1966	0.00	0.00	.	0.00	0.00	.	17				
1967	0.43	0-1.67	76.12	0.26	0-0.78	74.97	27				
1968	0.14	0-0.37	67.30	0.10	0-0.26	66.24	27				
1969	0.19	0.03-0.037	41.25	0.13	0.02-0.25	40.27	27				
1970	0.03	0-0.07	79.32	0.02	0-0.06	82.08	29				
1971	3.71	3.41-4.03	2.10	2.05	1.9-2.22	2.38	129				
1972	0.85	0.79-0.92	2.72	0.80	0.77-0.82	1.31	84				
1973	1.27	0.77-1.89	14.97	0.99	0.62-1.46	15.20	94				
1974	0.82	0.31-1.51	27.15	0.82	0.31-1.51	27.15	32				
1975	0.14	0-0.3	51.20	0.14	0-0.3	51.20	22				
1976	0.57	0.32-0.86	19.17	0.65	0.41-0.93	15.75	68				
1977	1.67	1.16-2.31	10.81	1.67	1.16-2.31	10.81	36				
1978	1.24	0.47-2.4	25.89	1.24	0.47-2.4	25.89	36				
1979	2.94	2.74-3.15	1.88	2.94	2.74-3.15	1.88	50			1.01	48
1980	10.69	6.49-17.25	9.05	10.25	6.24-16.47	9.09	70			7.60	58
1981	3.97	2.39-6.31	12.00	3.91	2.35-6.21	12.04	67			5.10	61
1982	2.27	1.54-3.21	10.66	2.27	1.54-3.21	10.66	64			4.30	60
1983	5.01	3.62-6.82	7.34	5.01	3.62-6.82	7.34	60			5.21	62
1984	1.58	0.96-2.39	14.50	1.58	0.96-2.4	14.46	41			1.90	45
1985	1.26	0.52-2.37	24.41	1.26	0.52-2.37	24.41	27			1.11	27
1986	1.26	0.77-1.89	15.00	1.26	0.77-1.89	15.00	53			1.27	53
1987	0.39	0.2-0.63	23.05	0.39	0.2-0.63	23.05	52			0.45	52
1988	0.54	0.35-0.75	14.99	0.54	0.35-0.75	14.99	143	0.53	143	0.54	36
1989	1.24	0.94-1.58	8.77	1.24	0.94-1.58	8.77	162	1.23	162	0.96	36
1990	2.54	2.06-3.09	5.73	2.54	2.06-3.09	5.73	162	2.54	162	2.61	36
1991	2.81	2.28-3.41	5.51	2.81	2.28-3.41	5.51	207	2.78	153	1.42	36
1992	0.92	0.7-1.16	9.09	0.92	0.7-1.16	9.09	187	0.91	153	0.49	36
1993	0.52	0.37-0.67	11.77	0.52	0.37-0.67	11.77	185	0.53	153	0.49	36
1994	2.50	1.99-3.1	6.30	2.50	1.99-3.1	6.30	186	2.50	153	1.08	36
1995	0.71	0.53	10.21	0.71	0.53-0.91	10.21	218	0.72	149	0.74	36
1996	0.81	0.62-1.02	9.32	0.81	0.62-1.02	9.32	224	0.86	153	0.62	36
1997	0.89	0.69-1.12	8.77	0.89	0.69-1.12	8.77	226	0.97	153	0.70	36
1998	0.73	0.55-0.93	9.92	0.73	0.55-0.93	9.92	226	0.78	153	0.17	36
1999	0.53	0.41-0.67	9.94	0.53	0.41-0.67	9.94	219	0.58	147	0.36	36
2000	0.57	0.43-0.73	10.81	0.57	0.43-0.73	10.81	227	0.62	154	0.52	36
2001	0.47	0.34-0.61	11.84	0.47	0.34-0.61	11.84	236	0.52	161	0.53	36
2002	0.77	0.54-1.04	12.21	0.77	0.54-1.04	12.21	179	0.80	107	0.43	36
2003	0.44	0.33-0.56	10.95	0.44	0.33-0.56	10.95	225	0.43	153	0.50	36
2004	1.30	1.03-1.60	7.5	1.30	1.03-1.60	7.50	225	1.40	153	1.17	36
2005*	.	.	.	.	.	.	.	.	.	.	.

Table 16.

BLACK SEA BASS YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1954	0.11	0-0.36	100.00	0.11	0-0.36	100.00	5				
1955	0.75	0.03-1.95	46.95	0.75	0.03-1.95	46.95	10				
1956	0.15	0.15-0.15	0.00	0.15	0.15-0.15	0.00	5				
1957	0.00	0.00	.	0.00	0.00	.	14				
1958	0.00	0.00	.	0.00	0.00	.	9				
1959	0.16	0-0.34	48.64	0.16	0-0.34	48.64	14				
1960	0.00	0.00	.	0.00	0.00	.	6				
1961	0.48	0-1.66	73.88	0.48	0-1.66	73.88	6				
1962	0.00	0.00	.	0.00	0.00	.	3				
1963	0.83	0-3.85	80.75	0.83	0-3.85	80.75	14				
1964	0.00	0.00	.	0.00	0.00	.	7				
1965	0.29	0-0.78	63.47	0.29	0-0.78	63.47	11				
1966	0.03	0-0.08	100.00	0.03	0-0.08	100.00	13				
1967	0.00	0.00	.	0.00	0.00	.	12				
1968	0.00	0.00	.	0.00	0.00	.	12				
1969	0.23	0-0.74	82.98	0.23	0-0.74	82.98	12				
1970	0.38	0-1.35	81.42	0.38	0-1.35	81.42	14				
1971	0.52	0.45-0.59	5.63	0.52	0.45-0.59	5.63	17				
1972	0.22	0.08-0.37	30.40	0.13	0.05-0.22	30.25	102				
1973	2.31	1.67-3.11	8.98	1.43	1.06-1.87	9.38	93				
1974	0.89	0.49-1.39	18.60	0.55	0.32-0.83	18.77	96				
1975	0.40	0.23-0.6	19.23	0.26	0.15-0.38	19.34	201				
1976	1.57	1.13-2.1	9.88	0.91	0.64-1.21	11.51	182				
1977	0.23	0.08-0.41	31.94	0.14	0.05-0.25	31.82	160				
1978	2.75	0.35-9.41	38.61	2.75	0.35-9.41	38.61	16			0.86	16
1979	0.11	0-0.24	56.90	0.11	0-0.24	56.90	34			0.15	23
1980	1.48	0.87-2.31	15.73	1.48	0.87-2.31	15.73	31			0.31	23
1981	0.29	0.14-0.45	23.47	0.29	0.14-0.45	23.47	42			0.30	22
1982	0.46	0.16-0.83	30.13	0.46	0.16-0.83	30.13	25			0.40	25
1983	0.67	0.12-1.49	38.63	0.67	0.12-1.49	38.63	16			0.44	16
1984	1.29	0.63-2.21	20.63	1.29	0.63-2.21	20.63	12			0.73	12
1985	2.04	0.95-3.75	20.01	2.04	0.95-3.75	20.01	18			1.19	18
1986	0.61	0.39-0.88	15.68	0.61	0.39-0.88	15.68	18			0.27	18
1987	1.58	1.08-2.2	11.43	1.58	1.08-2.2	11.43	124	1.58	124	0.95	12
1988	0.84	0.59-1.13	11.89	0.84	0.59-1.13	11.89	138	0.83	138	1.04	12
1989	2.36	1.7-3.17	8.93	2.36	1.7-3.17	8.93	138	2.36	138	1.52	12
1990	1.12	0.78-1.53	11.63	1.12	0.78-1.53	11.63	128	1.12	128	0.50	12
1991	1.28	0.91-1.72	10.76	1.28	0.91-1.72	10.76	129	1.29	129	2.35	12
1992	0.22	0.13-0.32	18.86	0.22	0.13-0.32	18.86	129	0.22	129	0.19	12
1993	1.05	0.74-1.42	11.46	1.05	0.74-1.42	11.46	129	1.04	129	0.76	12
1994	1.06	0.74-1.45	11.85	1.06	0.74-1.45	11.85	129	1.06	129	0.60	12
1995	0.50	0.33-0.69	14.47	0.50	0.33-0.69	14.47	151	0.54	127	0.62	12
1996	0.36	0.22-0.52	17.99	0.36	0.22-0.52	17.99	152	0.35	128	0.38	12
1997	0.46	0.31-0.63	14.63	0.46	0.31-0.63	14.63	153	0.47	129	0.23	12
1998	0.57	0.35-0.82	16.40	0.57	0.35-0.82	16.40	135	0.59	111	0.32	12
1999	0.58	0.41-0.77	12.22	0.58	0.41-0.77	12.22	146	0.60	122	0.48	12
2000	0.74	0.50-1.02	13.39	0.74	0.50-1.02	13.39	153	0.78	129	0.93	12
2001	1.29	0.85-1.84	12.89	1.29	0.85-1.84	12.89	108	1.33	84	1.31	12
2002	0.64	0.41-0.90	15.16	0.64	0.41-0.90	15.16	138	0.69	114	0.57	12
2003	0.12	0.06-0.18	25.11	0.12	0.06-0.18	25.11	153	0.11	129	0.12	12
2004*	0.08	0.02-0.14	37.22	0.08	0.02-0.14	37.22	102	0.07	86	0.00	8
2005*	.	.	.	.	.	.	.	.	.	.	.

Table 17.

SCUP YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	1.44	0.72-2.46	19.55	1.44	0.72-2.46	19.55	18				
1956	2.17	1.02-3.98	19.50	2.17	1.02-3.98	19.50	15				
1957	0.07	0-0.14	49.70	0.07	0-0.14	49.70	19				
1958	0.01	0-0.03	100.00	0.01	0-0.03	100.00	19				
1959	1.21	0.23-2.98	36.97	1.21	0.23-2.98	36.97	14				
1960	2.15	0.18-7.39	42.80	2.15	0.18-7.39	42.80	7				
1961	0.75	0-4.36	100.00	0.75	0-4.36	100.00	6				
1962	38.44	15.14-95.36	12.15	38.44	15.14-95.36	12.15	6				
1963	0.70	0-3.95	100.00	0.70	0-3.95	100.00	9				
1964							0				
1965	3.54	0.67-11.34	33.06	3.54	0.67-11.34	33.06	8				
1966	0.00	0		0.00	0		8				
1967	0.52	0.11-1.1	38.14	0.52	0.11-1.1	38.14	8				
1968	0.96	0-3.56	62.53	0.96	0-3.56	62.53	8				
1969	0.25	0-0.64	59.29	0.25	0-0.64	59.29	8				
1970	0.08	0-0.2	68.09	0.08	0-0.2	68.09	8				
1971	0.00	0		0.00	0		4				
1972	0.00	0		0.00	0		58				
1973	4.67	2.8-7.45	11.51	4.67	2.8-7.45	11.51	61				
1974	0.00	0		0.00	0		53				
1975	1.78	0.79-3.32	21.52	1.78	0.79-3.32	21.52	70				
1976	0.64	0.25-1.16	27.55	0.64	0.25-1.16	27.55	52				
1977	0.00	0		0.00	0		73				
1978	1.65	0-17.52	100.00	1.65	0-17.52	100.00	2				
1979	0.74	0.11-1.72	40.43	0.74	0.11-1.72	40.43	15				
1980	5.60	4.4-7.07	5.31	5.60	4.4-7.07	5.31	6				
1981	0.75	0.21-1.52	32.96	0.75	0.21-1.52	32.96	7				
1982							0				
1983							0				
1984							0				
1985							0				
1986							0				
1987	2.07	1.24-3.21	14.10	2.07	1.24-3.21	14.10	92	2.07	92		
1988	3.06	2.05-4.41	10.20	3.06	2.05-4.41	10.20	112	3.06	112		
1989	4.92	3.14-7.45	10.03	4.92	3.14-7.45	10.03	112	4.92	112		
1990	1.90	1.11-2.99	14.99	1.90	1.11-2.99	14.99	103	1.90	103		
1991	0.65	0.41-0.93	15.67	0.65	0.41-0.93	15.67	104	0.65	104		
1992	3.36	2.16-5.01	10.90	3.36	2.16-5.01	10.90	104	3.36	104		
1993	0.90	0.53-1.35	16.67	0.90	0.53-1.35	16.67	104	0.90	104		
1994	0.39	0.21-0.59	21.36	0.39	0.21-0.59	21.36	104	0.39	104		
1995	0.54	0.29-0.83	20.37	0.54	0.29-0.83	20.37	104	0.54	104		
1996	0.21	0.09-0.35	28.00	0.21	0.09-0.35	28.00	104	0.21	104		
1997	0.50	0.27-0.75	19.83	0.50	0.27-0.75	19.83	79	0.50	79		
1998	0.27	0.06-0.52	37.91	0.27	0.06-0.52	37.91	88	0.27	88		
1999	0.13	0.02-0.25	41.14	0.13	0.02-0.25	41.14	105	0.13	105		
2000	1.34	0.88-1.90	12.80	1.34	0.88-1.90	12.80	111	1.33	111		
2001	0.24	0.11-0.37	24.52	0.24	0.11-0.37	24.52	64	0.24	64		
2002	0.96	0.58-1.42	15.89	0.96	0.58-1.42	15.89	104	0.96	104		
2003	0.46	0.28-0.67	17.38	0.46	0.28-0.67	17.38	104	0.46	104		
2004*	0.58	0.24-1.02	26.39	0.58	0.24-1.02	26.39	26	0.58	26		
2005*	.	.	.	.	.	.	.	.	.		

Table 18.

STRIPED BASS YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1956	1.47	0.03-4.95	48.65	1.55	0.06-5.14	46.94	13				
1957	2.75	1.56-4.49	14.45	2.85	1.62-4.68	14.38	15				
1958	6.06	2.02-15.53	21.76	6.53	1.84-18.95	21.14	5				
1959							0				
1960	2.79	1.74-4.25	12.16	2.79	1.74-4.25	12.16	4				
1961	1.98	0.43-5.25	33.78	2.12	0.47-5.63	33.16	9				
1962	1.21	0.27-2.84	35.04	1.21	0.27-2.84	35.04	8				
1963	6.71	4.92-9.03	6.45	7.27	5.23-9.99	6.72	20				
1964	1.25	0.51-2.36	24.62	1.26	0.52-2.38	24.50	23				
1965	3.23	1.19-7.15	22.80	3.29	1.22-7.27	22.58	31				
1966	2.13	1.41-3.07	11.50	2.14	1.41-3.08	11.51	26				
1967	3.10	1.33-6.21	19.98	4.92	2.19-9.96	17.35	26				
1968	1.78	1.16-2.58	12.40	2.92	1.78-4.53	12.54	39				
1969	1.08	0.79-1.42	10.30	1.53	1.01-2.18	12.30	36				
1970	2.04	1.02-3.59	18.48	2.75	1.42-4.8	16.56	35				
1971	0.44	0.26-0.65	18.21	0.72	0.44-1.05	16.24	54				
1972	0.28	0-1.04	96.90	0.28	0-1.04	96.90	50				
1973	0.08	0.01-0.15	42.86	0.08	0.01-0.15	42.86	49				
1974	0.02	0-0.05	100.00	0.02	0-0.05	100.00	53				
1975	0.21	0.04-0.41	40.02	0.21	0.04-0.41	40.02	53				
1976							0				
1977	0.15	0.05-0.27	32.98	0.15	0.05-0.27	32.98	42				
1978	0.34	0.13-0.58	28.54	0.34	0.14-0.58	28.36	109				
1979	0.17	0.04-0.32	36.64	0.17	0.04-0.32	36.64	43				
1980	0.42	0.18-0.71	26.35	0.42	0.18-0.71	26.35	48				
1981	1.33	0.5-2.56	25.80	1.33	0.51-2.59	25.63	51				
1982	0.79	0.11-1.9	41.36	0.79	0.11-1.9	41.36	38			0.37	7
1983	1.50	0.36-3.57	33.01	1.50	0.36-3.57	33.01	25			1.41	27
1984	0.43	0.25-0.64	19.16	0.43	0.25-0.64	19.16	33			0.75	34
1985	0.53	0.04-1.24	44.90	0.53	0.04-1.24	44.90	32			0.54	32
1986	0.08	0-0.19	59.02	0.08	0-0.19	59.02	33			0.17	33
1987	3.34	1.82-5.68	14.71	3.34	1.82-5.68	14.71	21			3.63	20
1988	1.24	0.65-2.06	19.19	1.24	0.65-2.06	19.19	35			1.93	35
1989	1.65	1.12-2.32	11.51	1.65	1.12-2.32	11.51	37			1.59	37
1990	1.06	0.49-1.84	22.33	1.06	0.49-1.84	22.33	36			1.14	36
1991	0.97	0.29-2	31.00	0.97	0.29-2	31.00	51			1.02	36
1992	1.28	0.83-1.83	13.18	1.28	0.83-1.83	13.18	51			2.15	39
1993	2.69	1.23-5.1	19.32	2.69	1.23-5.1	19.32	53			3.30	41
1994	1.33	0.88-1.88	12.58	1.33	0.88-1.88	12.58	51			1.07	39
1995	0.61	0.33-0.96	20.19	0.61	0.33-0.96	20.19	75			1.22	39
1996	0.61	0.32-0.95	20.56	0.61	0.32-0.95	20.56	90			1.19	40
1997	0.55	0.25-0.93	24.75	0.55	0.25-0.93	24.75	90			0.41	39
1998	0.89	0.44-1.47	21.30	0.89	0.44-1.47	21.30	90			1.22	39
1999	0.21	0-0.47	51.55	0.21	0-0.47	51.55	84			0.26	39
2000	1.54	0.76-2.67	19.70	1.54	0.76-2.67	19.70	90			2.72	39
2001	0.53	0.27-0.85	21.84	0.53	0.27-0.85	21.84	90			1.94	39
2002	0.71	0.42-1.07	17.34	0.71	0.42-1.07	17.34	90			1.68	39
2003	0.63	0.24-1.13	27.59	0.63	0.24-1.13	27.59	90			1.01	39
2004	0.33	0.17-0.52	22.68	0.33	0.17-0.52	22.68	90			0.45	39
2005*	.	.	.	.	.	.	.			.	.

Table 19.

WHITE PERCH YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1956	3.48	1.78-6.22	15.90	3.48	1.78-6.22	15.90	13				
1957	15.46	9.07-25.91	8.77	15.46	9.07-25.91	8.77	15				
1958	39.04	13.84-107.07	13.45	39.04	13.84-107.07	13.45	5				
1959							0				
1960	0.00	0		0.00	0		4				
1961	2.72	0.3-9.63	39.91	2.72	0.3-9.63	39.91	9				
1962	3.75	0.09-19.66	47.15	3.75	0.09-19.66	47.15	8				
1963	19.57	11.86-31.92	7.77	19.57	11.86-31.92	7.77	20				
1964	7.60	4.57-12.27	10.10	7.60	4.57-12.27	10.10	23				
1965	0.70	0.2-1.42	32.95	0.70	0.2-1.42	32.95	31				
1966	9.32	4.73-17.59	12.61	9.32	4.73-17.59	12.61	26				
1967	9.56	5.11-17.25	11.61	9.56	5.11-17.25	11.61	26				
1968	1.66	0.89-2.75	17.45	1.66	0.89-2.75	17.45	39				
1969	4.63	2.46-8.16	14.07	4.63	2.46-8.16	14.07	36				
1970	13.86	6.42-28.75	12.86	13.86	6.42-28.75	12.86	35				
1971	2.47	1.36-4.08	15.42	2.31	1.27-3.83	15.79	54				
1972	1.77	0.76-3.36	22.29	1.24	0.54-2.25	23.04	50				
1973	2.33	1.56-3.33	10.93	1.78	1.18-2.55	11.97	49				
1974	0.78	0.52-1.09	13.73	0.58	0.38-0.81	14.70	53				
1975	1.52	0.81-2.49	17.76	1.03	0.56-1.65	18.76	53				
1976							0				
1977	4.34	2.4-7.4	13.49	2.84	1.6-4.68	14.52	42				
1978	14.22	9.62-20.83	6.62	9.11	6.17-13.26	7.43	109				
1979	9.00	5.73-13.84	8.58	5.59	3.53-8.57	9.90	43				
1980	0.45	0.2-0.74	24.97	0.45	0.2-0.74	24.97	48				
1981	1.01	0.65-1.44	13.98	1.01	0.65-1.44	13.98	51				
1982	4.53	1.53-11.09	22.89	4.53	1.53-11.09	22.89	38			1.22	7
1983	8.61	3.95-17.67	14.66	8.61	3.95-17.67	14.66	25			9.96	27
1984	23.80	14.97-37.53	6.86	23.80	14.97-37.53	6.86	33			13.26	34
1985	2.07	1.23-3.24	14.30	2.07	1.23-3.24	14.30	32			1.86	32
1986	2.81	1.83-4.12	11.12	2.81	1.83-4.12	11.12	33			1.77	33
1987	33.58	18.74-59.57	7.91	42.47	24.73-72.42	6.95	21			42.13	20
1988	6.15	3.68-9.91	10.75	6.15	3.68-9.91	10.75	35			5.29	35
1989	12.93	6.69-24.25	11.29	12.93	6.69-24.25	11.29	37			13.33	37
1990	3.24	1.84-5.32	13.89	3.23	1.84-5.32	13.89	36			3.31	36
1991	3.40	1.17-7.94	23.89	3.40	1.17-7.94	23.89	51			2.30	36
1992	1.54	0.83-2.52	17.56	1.54	0.83-2.52	17.56	51			1.21	39
1993	17.87	5.3-55.51	18.67	17.87	5.3-55.51	18.67	53			17.91	41
1994	12.33	6.84-21.68	10.26	12.33	6.84-21.68	10.26	51			8.43	39
1995	1.92	0.98-3.29	18.01	1.92	0.98-3.29	18.01	75			4.61	39
1996	24.41	12.94-45.29	9.27	24.41	12.94-45.29	9.27	90			21.61	40
1997	9.34	6.04-14.19	8.22	9.34	6.04-14.19	8.22	90			10.00	39
1998	3.84	1.98-6.86	15.38	3.84	1.98-6.86	15.38	90			7.13	39
1999	0.74	0.39-1.19	20.54	0.74	0.39-1.19	20.54	84			2.38	39
2000	8.23	4.01-15.99	13.74	8.23	4.01-15.99	13.74	90			16.90	39
2001	1.93	0.95-3.39	18.83	1.93	0.95-3.39	18.83	90			5.99	39
2002	4.66	3.47-6.16	6.77	4.66	3.47-6.16	6.77	90			9.48	39
2003	21.98	9.91-47.40	11.89	21.98	9.91-47.40	11.89	90			15.70	39
2004	6.52	3.27-12.26	14.05	6.52	3.27-12.26	14.05	90			4.32	39
2005*	.	.	.	.	.	.	.			.	.

Table 20.

WHITE PERCH - 1+ INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1956	33.39	13-83.51	12.70	37.61	15.31-90.42	11.79	18				
1957	50.73	20.87-121.39	10.91	55.62	23.38-130.5	10.44	20				
1958	68.94	22.01-211.64	13.09	68.94	22.01-211.64	13.09	10				
1959	6.17	2.73-12.77	16.56	6.17	2.73-12.77	16.56	5				
1960	170.19	36.71-776.2	14.71	170.19	36.71-776.2	14.71	4				
1961	60.68	20.85-173.14	12.59	65.41	23.3-180.44	11.98	12				
1962	70.46	17.97-268.13	15.53	87.59	24.36-308.52	13.95	11				
1963	92.10	39.25-214.34	9.25	101.93	43.68-236.15	9.01	24				
1964	101.05	83.15-122.75	2.08	102.76	84.48-124.93	2.09	27				
1965	32.32	17.11-60.32	8.70	33.64	17.86-62.6	8.57	38				
1966	16.42	9-29.32	9.70	16.42	9-29.32	9.70	35				
1967	26.62	15.12-46.32	8.11	47.08	32.22-68.61	4.78	39				
1968	23.43	11.86-45.4	10.04	42.17	21.89-80.4	8.42	52				
1969	6.49	4.08-10.05	9.65	14.17	9.21-21.53	7.28	50				
1970	11.69	6.67-19.99	9.90	17.48	9.71-30.9	9.36	48				
1971	4.55	3.03-6.65	9.37	6.40	4.26-9.42	8.54	72				
1972	2.64	1.98-3.45	7.75	2.56	1.92-3.34	7.80	85				
1973	3.00	1.94-4.45	11.14	2.71	1.74-4.03	11.57	60				
1974	2.14	1.38-3.15	12.08	1.95	1.27-2.82	12.05	63				
1975	4.22	2.65-6.46	10.82	3.59	2.33-5.34	10.57	63				
1976	7.24	2.8-16.87	18.35	8.41	2.59-23.67	21.49	12				
1977	4.12	2.74-5.99	9.57	3.74	2.56-5.32	9.21	56				
1978	4.83	3.25-6.99	8.96	4.08	2.76-5.86	9.23	123				
1979	15.78	8.45-28.81	10.18	13.46	7.44-23.77	10.08	59			3.30	16
1980	5.80	3.5-9.26	10.75	5.80	3.5-9.27	10.75	64			15.79	16
1981	24.86	15.15-40.42	7.24	24.86	15.15-40.42	7.24	68			18.88	17
1982	28.78	15.09-54.09	9.06	28.78	15.09-54.09	9.06	56			15.88	25
1983	28.86	18.53-44.63	6.25	28.86	18.53-44.63	6.25	44			26.63	44
1984	25.70	12.22-52.95	10.70	25.70	12.22-52.95	10.70	54			23.84	54
1985	33.19	22.39-48.98	5.37	33.19	22.39-48.98	5.37	32			36.76	32
1986	12.06	6.72-21.1	10.23	12.06	6.72-21.1	10.23	51			9.55	51
1987	16.57	9.21-29.22	9.46	18.96	10.49-33.68	9.22	37			21.88	36
1988	39.57	26.69-58.42	5.15	39.57	26.69-58.42	5.15	46			35.10	46
1989	22.78	16-32.25	5.29	22.78	16-32.25	5.29	46			25.86	46
1990	35.39	21.9-56.83	6.44	35.39	21.9-56.83	6.44	45			31.97	45
1991	32.45	23.82-44.09	4.25	32.45	23.82-44.09	4.25	65			29.49	44
1992	11.17	7.47-16.47	7.24	11.17	7.47-16.47	7.24	64			15.77	48
1993	10.11	4.69-20.69	13.90	10.11	4.69-20.69	13.90	66			15.04	50
1994	21.29	13.52-33.2	6.90	21.29	13.52-33.2	6.90	64			18.77	48
1995	10.76	6.53-17.36	9.04	10.76	6.53-17.36	9.04	98			40.82	48
1996	9.03	5.29-15.00	10.13	9.03	5.29-15.00	10.13	116			12.78	50
1997	19.37	10.56-34.90	9.40	19.37	10.56-34.90	9.40	120			20.25	52
1998	10.89	6.70-17.36	8.78	10.89	6.70-17.36	8.78	120			27.44	52
1999	10.34	5.97-17.46	10.03	10.34	5.97-17.46	10.03	114			22.25	52
2000	7.65	3.79-14.63	13.72	7.65	3.79-14.63	13.72	120			17.31	52
2001	4.62	2.54-7.92	13.36	4.62	2.54-7.92	13.36	120			17.09	52
2002	7.22	4.99-10.28	7.51	7.22	4.99-10.28	7.51	120			20.61	52
2003	19.13	9.95-36.00	10.14	19.13	9.95-36.00	10.14	120			27.35	52
2004	6.84	3.83-11.72	11.76	6.84	3.83-11.72	11.76	120			8.71	52
2005*	.	.	.	.	.	.	.			.	.

Table 21.

WHITE CATFISH YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.82	0.54-1.16	14.20	0.82	0.54-1.16	14.20	5				
1956	1.27	0.46-2.53	26.77	1.27	0.46-2.53	26.77	13				
1957	1.26	0.75-1.93	15.84	1.26	0.75-1.93	15.84	20				
1958	3.31	0.23-14.14	43.03	3.31	0.23-14.14	43.03	5				
1959							0				
1960	4.77	0.72-18.41	34.61	4.77	0.72-18.41	34.61	6				
1961	1.33	0.49-2.66	26.62	1.33	0.49-2.66	26.62	12				
1962	0.67	0-1.88	52.77	0.67	0-1.88	52.77	14				
1963	0.22	0.07-0.39	33.61	0.22	0.07-0.39	33.61	24				
1964	0.55	0.23-0.94	26.22	0.55	0.23-0.94	26.22	33				
1965	0.33	0.11-0.59	31.25	0.33	0.11-0.59	31.25	42				
1966	0.55	0.19-1.02	30.41	0.55	0.19-1.02	30.41	43				
1967	0.82	0.28-1.57	29.11	0.82	0.28-1.57	29.11	34				
1968	0.32	0.14-0.52	26.80	0.32	0.14-0.52	26.80	54				
1969	0.49	0.29-0.72	17.91	0.49	0.29-0.72	17.91	50				
1970	0.41	0.07-0.85	40.00	0.41	0.07-0.85	40.00	50				
1971	2.20	1.34-3.37	13.43	2.20	1.34-3.37	13.43	71				
1972	0.05	0-0.12	60.39	0.05	0-0.12	60.39	53				
1973	0.95	0.31-1.89	29.54	0.95	0.31-1.89	29.54	84				
1974	0.38	0.15-0.65	28.08	0.38	0.15-0.65	28.08	53				
1975	1.41	0.87-2.09	14.23	1.46	0.87-2.09	14.23	70				
1976	0.04	0-0.09	57.65	0.04	0-0.09	57.65	39				
1977	0.14	0.03-0.27	40.50	0.14	0.03-0.27	40.50	59				
1978	2.01	1.41-2.76	10.11	2.01	1.41-2.76	10.11	95				
1979	0.32	0.11-0.58	31.53	0.32	0.11-0.58	31.53	54				
1980	0.12	0.02-0.24	41.75	0.12	0.02-0.24	41.75	50				
1981	0.41	0.1-0.81	36.40	0.41	0.1-0.81	36.43	78				
1982	0.06	0.01-0.11	41.56	0.06	0.01-0.11	41.56	41				
1983	2.47	2.17-2.8	3.64	2.47	2.17-2.8	3.64	46			1.31	49
1984	1.11	0.76-1.52	11.93	1.11	0.76-1.52	11.93	54			1.39	54
1985	0.10	0.01-0.2	44.53	0.10	0.01-0.2	44.53	42			0.14	42
1986	0.95	0.64-1.32	12.96	0.95	0.64-1.32	12.96	44			0.67	44
1987	1.77	0.61-3.76	26.61	1.77	0.61-3.76	26.61	28			1.51	27
1988	0.25	0.11-0.41	26.68	0.25	0.11-0.41	26.68	52			0.61	52
1989	3.63	2.01-6.12	14.03	3.63	2.01-6.12	14.03	51			3.33	52
1990	0.76	0.57-0.97	9.89	0.76	0.57-0.97	9.89	52			0.82	52
1991	0.06	0.02-0.11	34.21	0.06	0.02-0.11	34.21	72			0.19	52
1992	0.74	0.57-0.92	9.04	0.74	0.57-0.92	9.04	68			0.50	52
1993	0.80	0.45-1.23	18.34	0.80	0.45-1.23	18.34	68			1.14	52
1994	0.12	0.06-0.19	25.82	0.12	0.06-0.19	25.82	68			0.34	52
1995	0.21	0.08-0.35	29.33	0.21	0.08-0.35	29.33	109			0.46	52
1996	0.36	0.18-0.55	22.23	0.36	0.18-0.55	22.23	120			1.18	53
1997	0.37	0.23-0.53	17.47	0.37	0.23-0.53	17.47	120			0.94	52
1998	0.07	0.04-0.10	22.96	0.07	0.04-0.10	22.96	120			0.34	52
1999	0.003	0-0.01	100.00	0.003	0-0.01	100.00	114			0.00	52
2000	0.05	0-0.12	58.53	0.05	0-0.12	58.53	120			0.09	52
2001	0.02	0-0.04	73.60	0.02	0-0.04	73.60	120			0.03	52
2002	0.00	0	.	0.00	0	.	120			0.00	52
2003	0.29	0.17-0.42	19.28	0.29	0.17-0.42	19.28	120			0.99	52
2004	0.12	0.04-0.20	33.23	0.12	0.04-0.20	33.23	120			0.19	52
2005*	.	.	.	.	.	.	.			.	.

Table 22.

WHITE CATFISH - 1+ INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	2.12	1.51-2.87	9.54	2.12	1.51-2.87	9.54	5				
1956	1.72	0.81-3.09	20.34	1.72	0.81-3.09	20.34	13				
1957	2.65	1.55-4.21	13.78	2.65	1.55-4.21	13.78	20				
1958	8.43	0.38-63.2	42.75	8.43	0.38-63.2	42.75	5				
1959							0				
1960	9.81	2.31-34.25	24.84	9.81	2.31-34.25	24.84	6				
1961	2.47	1.6-3.63	11.57	2.47	1.6-3.63	11.57	12				
1962	14.14	5.56-33.94	15.40	14.14	5.56-33.94	15.40	14				
1963	1.30	0.67-2.17	19.15	1.30	0.67-2.17	19.15	24				
1964	1.35	0.85-1.98	13.95	1.35	0.85-1.98	13.95	33				
1965	0.69	0.41-1.02	17.00	0.69	0.41-1.02	17.00	42				
1966	1.68	1.1-2.43	12.48	1.68	1.1-2.43	12.48	43				
1967	1.49	0.81-2.41	17.33	1.49	0.81-2.41	17.33	34				
1968	0.64	0.29-1.08	24.04	0.64	0.29-1.08	24.04	54				
1969	0.97	0.57-1.46	16.60	0.97	0.57-1.46	16.60	50				
1970	1.38	0.52-2.72	25.82	1.38	0.52-2.72	25.82	50				
1971	2.12	1.46-2.95	10.47	2.12	1.46-2.95	10.47	71				
1972	1.11	0.49-2.01	23.57	1.11	0.49-2.01	23.57	53				
1973	1.19	0.79-1.67	12.83	1.19	0.79-1.67	12.83	84				
1974	0.71	0.38-1.12	20.24	0.71	0.38-1.12	20.24	53				
1975	0.95	0.64-1.33	13.02	0.94	0.64-1.31	12.96	70				
1976	0.41	0.16-0.71	28.08	0.41	0.16-0.71	28.08	39				
1977	0.50	0.27-0.76	20.28	0.50	0.27-0.76	20.28	59				
1978	0.29	0.14-0.46	24.02	0.29	0.14-0.46	24.02	95				
1979	1.46	0.68-2.59	21.08	1.46	0.68-2.59	21.08	54				
1980	0.54	0.28-0.87	21.91	0.55	0.28-0.88	22.05	50				
1981	1.16	0.7-1.74	15.60	1.16	0.7-1.74	15.59	78				
1982	1.91	0.82-3.65	21.93	1.91	0.82-3.65	21.93	41				
1983	1.62	0.7-3.02	22.30	1.62	0.7-3.02	22.31	46			1.46	49
1984	2.31	1.35-3.67	14.33	2.31	1.35-3.67	14.33	54			3.53	54
1985	2.47	1.02-4.95	21.67	2.47	1.02-4.95	21.67	42			2.14	42
1986	1.77	1.31-2.33	8.99	1.77	1.31-2.33	8.99	44			2.13	44
1987	1.71	0.98-2.71	15.74	1.71	0.98-2.71	15.74	28			2.18	27
1988	1.88	1.29-2.62	10.81	1.88	1.29-2.62	10.81	52			3.16	52
1989	3.23	1.68-5.67	15.78	3.23	1.68-5.67	15.78	51			4.35	52
1990	3.46	2.13-5.34	11.82	3.46	2.13-5.34	11.82	52			6.75	52
1991	2.04	0.9-3.87	21.14	2.04	0.9-3.87	21.14	72			2.31	52
1992	3.77	3.03-4.63	5.34	3.77	3.03-4.63	5.34	68			3.97	52
1993	2.25	1.19-3.82	16.69	2.25	1.19-3.82	16.69	68			1.66	52
1994	1.59	1.09-2.22	11.37	1.59	1.09-2.22	11.37	68			2.72	52
1995	0.94	0.45-1.61	22.21	0.94	0.45-1.61	22.21	109			1.77	52
1996	1.05	0.76-1.40	10.78	1.05	0.76-1.40	10.78	120			3.11	53
1997	1.85	1.32-2.49	9.82	1.85	1.32-2.49	9.82	120			3.45	52
1998	1.21	0.76-1.77	14.40	1.21	0.76-1.77	14.40	120			2.45	52
1999	0.56	0.36-0.79	15.31	0.56	0.36-0.79	15.31	114			1.51	52
2000	0.29	0.15-0.45	22.91	0.29	0.15-0.45	22.91	120			0.66	52
2001	0.29	0.14-0.47	24.65	0.29	0.14-0.47	24.65	120			0.54	52
2002	0.36	0.11-0.66	33.57	0.36	0.11-0.66	33.57	120			0.52	52
2003	0.48	0.26-0.74	20.34	0.48	0.26-0.74	20.34	120			1.13	52
2004	0.28	0.15-0.42	21.66	0.28	0.15-0.42	21.66	120			0.66	52
2005*	.	.	.	.	.	.	.			.	.

Table 23.

CHANNEL CATFISH YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.08	0-0.25	100.00	0.08	0-0.25	100.00	5				
1956	0.03	0-0.1	100.00	0.03	0-0.1	100.00	13				
1957	0.09	0.01-0.17	44.17	0.09	0.01-0.17	44.17	20				
1958	0.00	0		0.00	0		5				
1959							0				
1960	0.00	0		0.00	0		6				
1961	0.46	0.06-1	42.06	0.46	0.06-1	42.06	12				
1962	0.19	0-0.48	63.03	0.19	0-0.48	63.03	14				
1963	0.87	0-4.83	90.76	0.87	0-4.83	90.76	24				
1964	0.34	0.08-0.66	36.52	0.34	0.08-0.66	36.52	33				
1965	0.29	0.06-0.58	38.23	0.29	0.06-0.58	38.23	42				
1966	1.48	0.71-2.6	20.44	1.48	0.71-2.6	20.44	43				
1967	0.12	0-0.33	74.16	0.12	0-0.33	74.16	34				
1968	0.29	0-0.66	49.49	0.29	0-0.66	49.49	54				
1969	0.50	0.21-0.84	25.85	0.50	0.21-0.84	25.85	50				
1970	0.31	0-0.75	54.17	0.31	0-0.75	54.17	50				
1971	1.88	1.15-2.86	13.83	1.88	1.15-2.86	13.83	71				
1972	0.00	0		0.00	0		53				
1973	1.18	0.79-1.65	12.65	1.18	0.79-1.65	12.65	84				
1974	0.13	0.01-0.28	46.73	0.13	0.01-0.28	46.73	53				
1975	0.65	0.28-1.12	25.17	0.79	0.4-1.29	21.34	70				
1976	0.00	0		0.00	0		39				
1977	0.06	0-0.11	47.28	0.06	0-0.11	47.28	59				
1978	0.63	0.41-0.89	15.15	0.63	0.41-0.89	15.15	95				
1979	0.71	0.21-1.41	31.96	0.71	0.21-1.41	31.96	54				
1980	0.14	0.02-0.28	42.99	0.14	0.02-0.28	42.99	50				
1981	0.16	0.08-0.24	24.59	0.16	0.08-0.24	24.59	78				
1982	0.10	0.01-0.19	43.47	0.10	0.01-0.19	43.47	41				
1983	0.33	0.17-0.51	22.71	0.33	0.17-0.51	22.71	46			0.16	49
1984	0.33	0.1-0.6	32.67	0.33	0.1-0.6	32.67	54			0.43	54
1985	0.04	0-0.13	100.00	0.04	0-0.13	100.00	42			0.04	42
1986	0.08	0.04-0.12	26.20	0.08	0.04-0.12	26.20	44			0.08	44
1987	0.09	0-0.25	79.59	0.09	0-0.25	79.59	28			0.15	27
1988	0.02	0-0.06	85.43	0.02	0-0.06	85.43	52			0.03	52
1989	1.92	1.03-3.22	17.10	1.92	1.03-3.22	17.10	51			1.27	52
1990	0.04	0-0.01	72.68	0.04	0-0.01	72.68	52			0.09	52
1991	0.03	0-0.08	100.00	0.03	0-0.08	100.00	72			0.02	52
1992	0.00	0		0.00	0		68			0.00	52
1993	0.04	0-0.12	77.30	0.04	0-0.12	77.30	68			0.08	52
1994	0.05	0-0.11	58.60	0.05	0-0.11	58.60	68			0.09	52
1995	0.22	0.07-0.40	33.76	0.22	0.07-0.40	33.76	109			0.40	52
1996	0.13	0.02-0.26	43.48	0.13	0.02-0.26	43.48	120			0.24	53
1997	0.05	0-0.12	63.47	0.05	0-0.12	63.47	120			0.03	52
1998	0.06	0-0.12	49.85	0.06	0-0.12	49.85	120			0.04	52
1999	0.00	0		0.00	0		114			0.00	52
2000	0.01	0-0.02	42.25	0.01	0-0.02	42.25	120			0.04	52
2001	0.00	0-0.01	100.00	0.00	0-0.01	100.00	120			0.00	52
2002	0.00	0-0.01	100.00	0.00	0-0.01	100.00	120			0.00	52
2003	0.32	0.16-0.50	23.67	0.32	0.16-0.50	23.67	120			0.83	52
2004	0.19	0.08-0.32	28.85	0.19	0.08-0.32	28.85	120			0.39	52
2005*	.	.	.	.	.	.	.			.	.

Table 24.

CHANNEL CATFISH - 1+ INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.00	0		0.00	0		5				
1956	0.00	0		0.00	0		13				
1957	0.11	0.01-0.22	45.47	0.11	0.01-0.22	45.47	20				
1958	0.00	0		0.00	0		5				
1959							0				
1960	0.00	0		0.00	0		6				
1961	0.86	0.16-1.97	37.79	0.86	0.16-1.97	37.79	12				
1962	0.26	0-0.66	61.69	0.26	0-0.66	61.69	14				
1963	0.07	0-0.18	67.11	0.07	0-0.18	67.11	24				
1964	0.67	0.34-1.08	21.40	0.67	0.34-1.08	21.40	33				
1965	0.29	0.15-0.45	22.93	0.29	0.15-0.45	22.93	42				
1966	0.60	0.13-1.26	36.87	0.60	0.13-1.26	36.87	43				
1967	0.40	0.08-0.81	38.24	0.40	0.08-0.81	38.24	34				
1968	0.27	0.05-0.54	39.70	0.27	0.05-0.54	39.70	54				
1969	0.50	0.26-0.79	21.78	0.50	0.26-0.79	21.78	50				
1970	1.27	0.76-1.92	15.57	1.27	0.76-1.92	15.57	50				
1971	0.48	0.19-0.85	27.91	0.48	0.19-0.85	27.91	71				
1972	0.00	0		0.00	0		53				
1973	1.54	1.09-2.1	10.56	1.54	1.09-2.1	10.56	84				
1974	0.33	0.14-0.55	26.87	0.33	0.14-0.55	26.87	53				
1975	1.03	0.56-1.64	18.45	0.98	0.53-1.57	18.87	70				
1976	0.00	0		0.00	0		39				
1977	0.38	0.18-0.62	24.65	0.38	0.18-0.62	24.65	59				
1978	0.94	0.65-1.28	12.05	0.94	0.65-1.28	12.05	95				
1979	1.96	0.82-3.81	22.42	1.96	0.82-3.82	22.39	54				
1980	1.89	1.33-2.59	10.21	1.89	1.33-2.59	10.21	50				
1981	0.54	0.26-0.88	23.22	0.54	0.26-0.88	23.22	78				
1982	0.40	0-1.08	59.47	0.40	0-1.08	59.47	41				
1983	1.97	1.36-2.75	10.70	1.97	1.36-2.75	10.70	46			0.91	49
1984	2.37	1.32-3.88	15.30	2.37	1.32-3.88	15.30	54			1.69	54
1985	2.92	1.82-4.45	12.03	2.92	1.82-4.45	12.03	42			1.81	42
1986	1.53	1.29-1.79	5.30	1.53	1.29-1.79	5.30	44			0.84	44
1987	0.94	0.36-1.77	26.61	0.94	0.36-1.77	26.61	28			0.85	27
1988	1.41	1.05-1.82	9.09	1.41	1.05-1.82	9.09	52			0.91	52
1989	1.10	0.52-1.91	21.82	1.10	0.52-1.91	21.82	51			1.20	52
1990	2.67	1.79-3.83	10.56	2.67	1.79-3.83	10.56	52			1.52	52
1991	3.37	2.27-4.82	9.78	3.37	2.27-4.82	9.78	72			1.73	52
1992	1.87	1.30-2.58	10.47	1.87	1.30-2.58	10.47	68			1.48	52
1993	0.83	0.20-1.80	35.01	0.83	0.20-1.80	35.01	68			1.15	52
1994	0.81	0.48-1.22	17.04	0.81	0.48-1.22	17.04	68			1.49	52
1995	0.69	0.39-1.05	18.45	0.69	0.39-1.05	18.45	109			0.58	52
1996	1.08	0.60-1.71	17.84	1.08	0.60-1.71	17.84	120			1.17	53
1997	0.84	0.47-1.30	18.21	0.84	0.47-1.30	18.21	120			1.06	52
1998	0.79	0.46-1.19	17.60	0.79	0.46-1.19	17.60	120			0.68	52
1999	0.33	0.13-0.56	28.23	0.33	0.13-0.56	28.23	114			0.77	52
2000	0.25	0.11-0.41	26.84	0.25	0.11-0.41	26.84	120			0.31	52
2001	0.17	0.04-0.33	38.79	0.17	0.04-0.33	38.79	120			0.16	52
2002	0.37	0.16-0.61	26.31	0.37	0.16-0.61	26.31	120			0.36	52
2003	0.28	0.15-0.44	22.78	0.28	0.15-0.44	22.78	120			0.37	52
2004	0.32	0.14-0.53	26.58	0.32	0.14-0.53	26.58	120			0.54	52
2005*	.	.	.	.	.	.	.			.	.

Table 25.

BLUE CATFISH - YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1983	0.00	0.00	.	0.00	0.00	.	46			0.00	49
1984	0.05	0.0-0.14	100.00	0.05	0.0-0.14	100.00	54			0.02	54
1985	0.00	0.00	.	0.00	0.00	.	42			0.00	42
1986	0.00	0.00	.	0.00	0.00	.	44			0.00	44
1987	0.00	0.00	.	0.00	0.00	.	28			0.00	27
1988	0.00	0.00-0.01	100.00	0.00	0.00-0.01	100.00	52			0.01	52
1989	0.43	0.00-1.24	61.91	0.43	0.00-1.24	61.91	51			0.25	52
1990	0.14	0.02-0.28	42.14	0.14	0.02-0.28	42.14	52			0.29	52
1991	0.37	0.25-0.50	14.11	0.37	0.25-0.50	14.11	72			0.19	52
1992	0.33	0.15-0.54	24.87	0.33	0.15-0.54	24.87	68			0.26	52
1993	0.18	0.07-0.30	28.51	0.18	0.07-0.30	28.51	68			0.45	52
1994	0.16	0.03-0.32	40.81	0.16	0.03-0.32	40.81	68			0.38	52
1995	0.64	0.34-1.00	20.18	0.64	0.34-1.00	20.18	109			0.91	52
1996	0.92	0.40-1.63	24.21	0.92	0.40-1.63	24.21	120			1.24	53
1997	2.40	1.55-3.54	11.81	2.40	1.55-3.54	11.81	120			2.33	52
1998	0.31	0.14-0.52	26.57	0.31	0.14-0.52	26.57	120			0.54	52
1999	0.14	0.04-0.25	36.47	0.14	0.04-0.25	36.47	114			0.30	52
2000	0.22	0.00-0.60	66.93	0.22	0.00-0.60	66.93	120			0.10	52
2001	0.02	0.00-0.04	67.15	0.02	0.00-0.04	67.15	120			0.02	52
2002	0.61	0.14-1.28	36.48	0.61	0.14-1.28	36.48	120			0.50	52
2003	1.33	0.75-2.10	16.88	1.33	0.75-2.10	16.88	120			2.50	52
2004	1.82	0.83-3.35	20.95	1.82	0.83-3.35	20.95	120			3.34	52

Table 26.

BLUE CATFISH - 1+ INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1983	0.00	0.00	.	0.00	0.00	.	46			0.00	49
1984	0.12	0.00-0.26	53.80	0.12	0.00-0.26	53.80	54			0.06	54
1985	0.01	0.00-0.04	100.00	0.01	0.00-0.04	100.00	42			0.03	42
1986	0.00	0.00	.	0.00	0.00	.	44			0.00	44
1987	0.00	0.00	.	0.00	0.00	.	28			0.00	27
1988	0.02	0.00-0.05	100.00	0.02	0.00-0.05	100.00	52			0.05	52
1989	0.10	0.00-0.28	82.29	0.10	0.00-0.28	82.29	51			0.10	52
1990	0.26	0.10-0.45	29.18	0.26	0.10-0.45	29.18	52			0.61	52
1991	0.80	0.48-1.19	16.69	0.80	0.48-1.19	16.69	72			0.42	52
1992	1.09	0.65-1.66	16.17	1.09	0.65-1.66	16.17	68			0.84	52
1993	0.47	0.06-1.03	42.59	0.47	0.06-1.03	42.59	68			0.57	52
1994	0.50	0.15-0.95	32.59	0.50	0.15-0.95	32.59	68			1.03	52
1995	0.48	0.14-0.93	33.56	0.48	0.14-0.93	33.56	109			0.62	52
1996	1.38	0.62-2.49	22.11	1.38	0.62-2.49	22.11	120			2.32	53
1997	3.85	2.41-5.89	11.17	3.85	2.41-5.89	11.17	120			4.41	52
1998	1.99	0.95-3.59	19.57	1.99	0.95-3.59	19.57	120			3.34	52
1999	1.06	0.54-1.75	19.96	1.06	0.54-1.75	19.96	114			1.73	52
2000	0.88	0.33-1.65	27.38	0.88	0.33-1.65	27.38	120			0.89	52
2001	0.55	0.30-0.85	20.39	0.55	0.30-0.85	20.39	120			0.98	52
2002	0.96	0.42-1.70	23.81	0.96	0.42-1.70	23.81	120			0.84	52
2003	1.81	0.94-3.08	18.02	1.81	0.94-3.08	18.02	120			2.38	52
2004	2.62	1.78-3.70	10.23	2.62	1.78-3.70	10.23	120			4.99	52
2005*	.	.	.	.	.	.	.			.	.

Table 27.

NORTHERN PUFFER YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	0.00	0		0.00	0		4				
1956	0.05	0-0.11	53.96	0.05	0-0.11	53.96	23				
1957	0.08	0-0.18	59.03	0.08	0-0.18	59.03	20				
1958	0.00	0		0.00	0		19				
1959	0.00	0		0.00	0		19				
1960	0.02	0-0.07	100.00	0.02	0-0.07	100.00	10				
1961	0.22	0-0.8	100.00	0.22	0-0.8	100.00	7				
1962	0.18	0-0.63	100.00	0.18	0-0.63	100.00	4				
1963	0.21	0-0.53	61.24	0.21	0-0.53	61.24	8				
1964	0.44	0-1.44	72.14	0.44	0-1.44	72.14	8				
1965							0				
1966	0.23	0-0.71	82.25	0.23	0-0.71	82.25	8				
1967	0.18	0-0.44	58.66	0.18	0-0.44	58.66	8				
1968	1.35	0.75-2.14	17.08	1.35	0.75-2.14	17.08	8				
1969	0.42	0-1.04	51.09	0.42	0-1.04	51.09	8				
1970	0.16	0-0.41	69.83	0.16	0-0.41	69.83	8				
1971	0.57	0.12-1.19	37.57	0.57	0.12-1.19	37.57	8				
1972	0.28	0		0.28	0		2				
1973							0				
1974	0.00	0		0.00	0		76				
1975	0.02	0-0.06	71.82	0.02	0-0.06	71.82	74				
1976	0.00	0		0.00	0		90				
1977	0.00	0		0.00	0		68				
1978	0.00	0	100.00	0.00	0	100.00	95				
1979	0.00	0		0.00	0		4				
1980	0.36	0-1.02	65.81	0.36	0-1.02	65.81	15				
1981	0.00	0		0.00	0		9				
1982	0.00	0		0.00	0		5				
1983							0				
1984							0				
1985							0				
1986							0				
1987							0				
1988	0.84	0.58-1.15	12.43	0.84	0.58-1.15	12.43	147	0.84	147		
1989	0.79	0.61-0.99	9.00	0.79	0.61-0.99	9.00	168	0.79	168		
1990	0.68	0.49-0.90	11.83	0.68	0.49-0.90	11.83	167	0.68	167		
1991	0.45	0.32-0.59	12.78	0.45	0.32-0.59	12.78	155	0.45	155		
1992	0.11	0.06-0.17	22.68	0.11	0.06-0.17	22.68	156	0.11	156		
1993	0.17	0.10-0.24	18.28	0.17	0.10-0.24	18.28	156	0.17	156		
1994	0.10	0.05-0.16	26.01	0.10	0.05-0.16	26.01	156	0.1	156		
1995	0.08	0.04-0.12	24.11	0.08	0.04-0.12	24.11	156	0.08	156		
1996	0.14	0.08-0.22	22.94	0.14	0.08-0.22	22.94	156	0.14	156		
1997	0.20	0.12-0.28	18.18	0.20	0.12-0.28	18.18	156	0.2	156		
1998	0.09	0.04-0.14	27.44	0.09	0.04-0.14	27.44	118	0.09	118		
1999	0.25	0.15-0.34	17.59	0.25	0.15-0.34	17.59	138	0.24	138		
2000	0.13	0.08-0.19	18.81	0.13	0.08-0.19	18.81	156	0.13	156		
2001	0.32	0.21-0.44	16.06	0.32	0.21-0.44	16.06	164	0.32	164		
2002	0.16	0.08-0.25	24.26	0.16	0.08-0.25	24.26	96	0.16	96		
2003	0.04	0.01-0.08	34.96	0.04	0.01-0.08	34.96	156	0.04	156		
2004	0.08	0.04-0.13	27.68	0.08	0.04-0.13	27.68	156	0.08	156		
2005*	.	.	.	.	.	.	.	.	.		

Table 28.

SILVER PERCH YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	13.34	0		33.71	0		3				
1956	7.30	2.69-17.67	19.14	18.43	7.62-42.81	13.70	43				
1957	15.59	6.92-33.74	13.16	30.16	15.46-57.99	9.28	43				
1958	2.75	0.54-8.11	33.61	6.60	2-18.22	22.88	42				
1959	5.02	0.42-24.49	40.20	11.74	1.98-53.44	28.53	42				
1960							0				
1961	3.70	0.84-11.01	30.29	12.22	4.48-30.9	17.06	20				
1962	1.29	0.77-1.98	15.67	1.82	1.27-2.5	10.51	13				
1963	29.70	11.61-73.79	13.00	51.20	18.17-141.17	12.67	24				
1964	1.04	0-3.4	54.15	2.02	0.59-4.72	28.91	34				
1965	0.49	0.28-0.73	18.81	1.35	0.87-1.94	13.19	38				
1966	0.47	0-1.28	57.83	1.04	0-3.69	58.13	42				
1967	0.40	0.11-0.75	33.92	0.55	0.2-1.01	29.62	66				
1968	1.45	0-7.86	71.84	2.07	0-13.14	67.96	66				
1969	3.10	0-16.68	51.88	3.80	0-25.02	53.89	69				
1970	11.12	2.62-39.64	24.24	23.53	8.08-65.26	15.53	68				
1971	4.16	3.54-4.86	3.88	8.61	7.26-10.19	3.36	183				
1972	0.69	0.51-0.91	11.14	0.69	0.51-0.91	11.14	161				
1973	0.34	0.23-0.47	15.30	0.34	0.23-0.47	15.30	209				
1974	0.06	0.01-0.11	41.36	0.06	0.01-0.11	41.36	73				
1975	0.05	0-0.11	52.59	0.05	0-0.11	52.59	54				
1976	0.26	0.07-0.48	34.39	0.19	0.07-0.48	34.39	108				
1977	0.03	0-0.06	48.53	0.03	0-0.06	48.53	78				
1978	0.07	0-0.19	76.37	0.07	0-0.19	76.37	78				
1979	0.05	0.02-0.08	27.64	0.05	0.02-0.08	27.64	97			0.17	95
1980	0.06	0-0.17	72.55	0.12	0-0.26	56.21	121			0.07	112
1981	0.00	0	66.82	0.15	0-0.48	88.03	118			0.06	112
1982	0.02	0-0.03	40.87	0.05	0.02-0.09	29.57	118			0.16	114
1983	0.00	0		0.06	0.01-0.1	37.52	113			0.06	113
1984	0.00	0		0.02	0-0.05	73.77	95			0.02	99
1985	0.16	0.06-0.27	31.13	0.34	0.17-0.54	23.50	58			0.68	59
1986	0.10	0.03-0.17	33.23	0.26	0.13-0.4	23.44	107			0.34	107
1987	0.24	0.11-0.37	24.38	0.42	0.25-0.62	18.37	100			0.53	100
1988	0.39	0.22-0.59	20.46	0.61	0.35-0.92	18.30	172	0.65	172	1.02	65
1989	0.28	0.16-0.41	19.62	0.53	0.33-0.76	16.32	189	0.56	189	1.63	63
1990	0.40	0.28-0.54	13.36	0.69	0.49-0.92	11.94	185	0.75	185	4.08	59
1991	0.36	0.22-0.51	17.33	0.36	0.22-0.51	17.33	251	0.40	179	1.47	62
1992	0.80	0.49-1.16	15.80	0.80	0.49-1.16	15.80	226	0.86	178	1.95	61
1993	0.43	0.28-0.61	16.01	0.43	0.28-0.61	16.01	224	0.45	180	0.60	63
1994	0.25	0.12-0.4	25.42	0.25	0.12-0.4	25.42	225	0.26	180	0.37	63
1995	0.62	0.39-0.89	15.65	0.62	0.39-0.89	15.65	291	0.65	180	1.81	67
1996	0.59	0.38-0.84	15.63	0.59	0.38-0.84	15.63	304	0.58	183	1.18	66
1997	0.71	0.50-0.94	12.07	0.71	0.50-0.94	12.07	316	0.79	192	1.43	75
1998	0.24	0.15-0.33	16.77	0.24	0.15-0.33	16.77	316	0.24	192	0.53	75
1999	0.70	0.49-0.94	12.42	0.70	0.49-0.94	12.42	309	0.74	186	2.51	75
2000	0.68	0.46-0.93	13.56	0.68	0.46-0.93	13.56	317	0.76	192	2.12	74
2001	0.70	0.47-0.97	13.77	0.70	0.47-0.97	13.77	327	0.85	200	3.17	75
2002	0.44	0.24-0.67	20.16	0.44	0.24-0.67	20.16	269	0.41	146	1.67	75
2003	0.63	0.40-0.90	15.49	0.63	0.40-0.90	15.49	315	0.66	192	0.71	75
2004	0.34	0.22-0.48	16.50	0.34	0.22-0.48	16.50	315	0.36	192	0.80	75
2005*	.	.	.	.	.	.	.	.	.	.	.

Table 29.

BLUE CRAB INDICES

	BLUE CRAB AGE 0				BLUE CRAB AGE 1+				BLUE CRAB ADULT FEMALES			
	Converted Random Stratified Index (RSCI)				Converted Random Stratified Index (RSCI)				Converted Random Stratified Index (RSCI)			
Year	Geo. Mean	95% C.I.'s	C.V.	N	Geo. Mean	95% C.I.'s	C.V.	N	Geo. Mean	95% C.I.'s	C.V.	N
1968	6.24	3.66-10.25	11.14	60	4.15	2.37-6.87	12.93	53	2.22	1.48-3.17	11.15	25
1969	1.04	0.66-1.50	14.47	63	17.58	10.67-28.57	7.96	63	1.19	0.13-3.24	42.20	27
1970	12.89	8.37-19.59	7.48	60	19.56	15.75-24.23	3.39	61	7.60	6.57-8.76	2.95	24
1971	8.87	6.79-11.49	5.15	93	36.64	27.53-48.67	3.82	94	10.89	8.68-13.60	4.15	50
1972	2.20	1.77-2.69	6.20	81	7.21	5.68-9.10	4.91	64	3.46	3.05-3.90	3.21	36
1973	2.38	1.37-3.81	14.49	75	5.51	4.29-7.00	5.51	78	0.83	0.33-1.52	26.51	36
1974	0.32	0.18-0.48	20.73	70	2.53	1.58-3.84	12.49	78	0.83	0.29-1.60	29.03	36
1975	0.87	0.59-1.19	12.68	54	1.81	1.05-2.86	15.24	54	0.19	0-0.46	56.57	24
1976	1.64	0.96-2.54	15.22	108	2.54	1.94-3.27	7.35	116	0.62	0.38-0.90	16.84	72
1977	5.35	3.38-8.22	10.06	78	8.41	5.83-11.98	7.17	78	1.00	0.15-2.47	39.86	36
1978	4.15	3.18-5.34	6.35	78	10.91	7.95-14.85	5.77	77	2.20	0.83-4.62	24.14	35
1979	0.34	0.20-0.50	18.54	94	7.79	5.73-10.49	6.14	94	4.29	3.16-5.73	7.22	52
1980	11.97	8.39-16.91	6.30	108	15.86	12.41-20.21	4.06	108	3.78	2.48-5.58	10.17	57
1981	11.27	9.08-13.94	3.92	112	27.23	22.41-33.04	2.80	100	4.56	3.17-6.41	8.38	53
1982	5.11	3.39-7.50	9.12	113	14.61	11.31-18.80	4.33	112	3.84	2.44-5.81	10.82	59
1983	10.29	7.11-14.71	6.83	113	18.14	14.97-21.93	3.06	111	4.03	3.11-5.17	6.29	60
1984	3.96	2.92-5.28	7.34	95	12.96	9.91-16.87	4.68	93	1.79	1.07-2.77	14.66	41
1985	5.53	4.19-7.22	6.14	58	12.84	10.61-15.49	3.34	80	2.83	2.01-3.87	9.00	39
1986	3.46	2.52-4.64	7.92	107	6.85	5.44-8.57	4.81	108	2.43	1.63-3.45	10.67	54
1987	3.68	2.37-5.50	10.64	100	7.56	5.20-10.83	7.53	100	3.30	1.76-5.70	15.17	52
1988	3.80	2.46-5.64	10.39	100	11.95	8.61-16.47	5.84	102	4.84	3.45-6.66	7.70	164
1989	17.79	13.04-24.14	4.96	101	12.57	9.71-16.20	4.54	102	4.89	3.78-6.25	5.87	180
1990	12.40	8.99-16.99	5.67	95	29.68	22.86-38.45	3.67	95	8.02	6.13-10.40	5.33	179
1991	7.07	4.88-10.08	7.58	102	9.08	6.89-11.89	5.31	99	2.73	2.05-3.56	7.64	171
1992	4.88	3.20-7.22	9.46	100	8.17	5.92-11.16	6.36	100	0.86	0.60-1.16	11.99	171
1993	5.85	3.91-8.55	8.63	102	3.21	2.30-4.38	8.49	102	1.38	0.94-1.93	11.96	171
1994	2.72	1.82-3.89	10.45	102	2.82	1.98-3.88	9.19	102	0.88	0.64-1.15	10.65	171
1995	11.33	7.49-16.90	7.43	67	6.63	4.99-8.71	5.96	69	0.39	0.27-0.52	13.78	153
1996	5.87	3.43-9.66	11.38	187	8.59	7.20-10.21	3.46	188	1.41	1.08-1.78	8.28	224
1997	4.38	3.33-5.69	6.46	199	9.70	8.12-11.56	3.37	199	0.88	0.63-1.16	11.11	226
1998	8.42	6.21-11.30	5.95	199	5.41	4.22-6.88	5.56	190	0.37	0.23-0.53	17.31	187
1999	2.90	2.35-3.54	5.58	198	6.43	4.83-8.48	6.07	198	0.54	0.37-0.74	13.87	213
2000	3.05	2.30-3.96	7.31	199	3.78	2.67-5.23	8.47	199	0.46	0.32-0.62	13.42	226
2001	2.64	2.07-3.33	6.65	202	4.58	3.36-6.15	7.17	202	0.48	0.34-0.63	12.67	236
2002	2.66	1.96-3.53	8.19	198	4.16	3.42-5.02	4.71	198	0.39	0.26-0.52	14.19	180
2003	8.39	5.89-11.80	6.90	198	5.53	4.61-6.60	4.06	198	0.32	0.21-0.43	14.80	225
2004	4.24	2.73-6.38	10.31	198	4.05	2.93-5.48	7.70	198	0.37	0.26-0.49	13.56	225
2005*	.	.	.	.	.	.	.	.	.	.	.	.

Table 30.

AMERICAN EEL - 1+ INDICES

	Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955	6.55	0.19-46.82	45.65	2				
1956	1.86	0.55-4.26	29.16	10				
1957	0.16	0-0.55	100.00	5				
1958	1.96	1.02-3.34	17.58	17				
1959	0.53	0-1.57	61.08	11				
1960	0.18	0.06-0.33	33.86	10				
1961	1.77	0.44-4.30	31.93	8				
1962	1.10	0.01-3.33	49.03	9				
1963	0.60	0-1.68	54.48	12				
1964	0.84	0-2.89	61.30	17				
1965	0.27	0-1.06	100.00	21				
1966	0.35	0.08-0.68	37.08	27				
1967	0.73	0.11-1.71	40.78	32				
1968	1.36	0.83-2.05	14.84	39				
1969	1.17	0.54-2.04	21.99	42				
1970	0.17	0-0.38	49.36	41				
1971	1.41	0.97-1.94	11.35	42				
1972	0.54	0.3-0.83	19.75	59				
1973	0.80	0.48-1.19	16.76	89				
1974	0.35	0.11-0.64	33.05	29				
1975	0.83	0.19-1.81	35.31	20				
1976	0.42	0.23-0.65	21.04	46				
1977	1.06	0.69-1.51	13.64	28				
1978	0.96	0.61-1.41	14.85	28				
1979	2.14	0.49-5.61	32.59	29			1.55	29
1980	4.76	3.02-7.26	10.26	38			5.09	32
1981	2.15	1.32-3.28	13.33	38			3.46	32
1982	2.44	1.08-4.68	20.28	62			2.67	36
1983	10.00	5.49-17.65	11.01	42			9.63	35
1984	6.67	5.1-8.66	5.65	56			7.25	59
1985	8.19	4.78-13.61	10.45	37			6.36	37
1986	4.83	3.64-6.33	6.47	47			4.90	47
1987	3.91	1.99- 7.05	15.56	45			7.01	45
1988	1.26	0.48-2.46	26.08	18			2.30	18
1989	7.93	4.62-13.18	10.57	31			8.82	31
1990	4.85	3.25-7.04	9.02	30			6.67	31
1991	2.07	0.81-4.21	23.58	37			2.12	31
1992	7.41	5.62-9.69	5.62	46			4.01	31
1993	3.19	2.21-4.47	9.30	43			3.68	31
1994	2.22	1.11-3.90	18.02	43			2.48	31
1995	2.35	1.78-3.03	7.72	45			2.44	33
1996	2.57	1.77-3.59	9.94	84			2.81	33
1997	2.29	1.11-4.13	18.69	90			1.37	39
1998	2.00	1.0-3.51	18.49	90			2.30	39
1999	1.25	0.58-2.19	21.67	90			1.14	39
2000	1.42	0.75-2.35	18.42	90			1.15	38
2001	0.79	0.18-1.72	35.92	90			0.46	39
2002	0.80	0.30-1.52	28.11	90			0.93	39
2003	0.79	0.22-1.61	32.68	90			0.60	39
2004	0.43	0.21-0.68	22.95	90			0.50	39
2005	0.35	0.21-0.51	18.66	90			0.47	39

Table 31.

BAY ANCHOVY YOY INDICES

	Converted Index (RSCI)			Unconverted Index (RSI)				Original Index			
Year	Geo. Mean	95% C.I.'s	C.V.	Geo. Mean	95% C.I.'s	C.V.	N	Bay & River (BRI)	N	River Only	N
1955				0.09	0-0.2	53.87	17				
1956				18.09	4.57-64.50	20.9	90				
1957				23.95	7.26-74.34	17.18	75				
1958				13.53	3.93-41.84	20.2	84				
1959				23.35	6.98-73.31	17.47	73				
1960				1.62	0.66-3.13	23.78	27				
1961				69.42	44.51-107.96	5.13	41				
1962				4.48	0.8-15.72	32.77	33				
1963				3.99	0.3-18.19	41.89	45				
1964				0.49	0.21-0.84	26.03	74				
1965				0.85	0.51-1.27	16.57	81				
1966				1.03	0-3.52	56.62	93				
1967				11.48	6.19-20.66	10.93	132				
1968				3.27	1.55-6.12	17.68	131				
1969				9.61	3.4-24.58	18.63	137				
1970				1.34	0.76-2.11	16.71	135				
1971				2.66	1.51-4.34	14.58	387				
1972				1.91	1.6-2.25	5.2	327				
1973				1.76	1.24-2.41	10.38	371				
1974				1.1	0.51-1.91	22.07	261				
1975				0.26	0.14-0.39	21.88	352				
1976				0.27	0.18-0.36	15.01	619				
1977				0.33	0.26-0.40	9.11	556				
1978				0.28	0.23-0.33	8.43	515				
1979				18.58	7.29-45.27	14.46	198			1.61	155
1980				124.76	83.81-185.48	4.07	254			8.83	181
1981				1.99	0.89-3.71	20.8	233			12.04	174
1982				3.42	2.8-4.15	5.11	232			9.53	214
1983				10.87	7.44-15.70	6.9	217			12.04	218
1984				6.76	3.83-11.45	11.55	174			7.07	181
1985				10.25	5.87-17.44	10.21	141			13.95	142
1986				26.43	17.86-38.90	5.66	202			26.85	202
1987				103.04	70.25-150.92	4.08	167			54.07	167
1988				18.25	12.17-27.15	6.42	346	18.06	346	32.66	128
1989				52.47	36.27-75.71	4.54	374	51.59	374	22.74	128
1990				6.79	4.41-10.22	8.89	369	6.65	369	8.78	124
1991	19.86	13.39-29.23	6.11	19.86	13.39-29.23	6.11	491	22.83	350	33.41	125
1992	35.06	23.92-51.17	5.15	35.06	23.92-51.17	5.15	448	40.79	355	14.53	128
1993	36.83	24.72-54.65	5.31	36.83	24.72-54.65	5.31	449	42.71	360	28.93	132
1994	13.1	8.93-19.02	6.63	13.1	8.93-19.02	6.63	444	14.36	354	19.86	130
1995	13.26	9.48-18.41	5.8	13.26	9.48-18.41	5.8	540	18.52	362	18.57	138
1996	15.31	11.20-20.82	5.21	15.31	11.20-20.82	5.21	607	16.91	363	5.11	135
1997	18.96	13.63-26.23	5.19	18.96	13.63-26.23	5.19	625	17.33	378	12.64	150
1998	30.26	20.75-43.93	5.27	30.26	20.75-43.93	5.27	579	30.47	336	9.7	146
1999	15.47	11.20-21.22	5.35	15.47	11.20-21.22	5.35	606	14.38	360	21.26	150
2000	36.58	26.69-49.99	4.21	36.58	26.69-49.99	4.21	619	40.36	369	16.24	147
2001	9.55	6.93-13.04	6.06	9.55	6.93-13.04	6.06	627	9.23	377	4.56	150
2002	5.51	3.58-8.24	9.36	5.51	3.58-8.24	9.36	540	4.09	294	9.3	150
2003	18.03	13.17-24.56	5.01	18.03	13.17-24.56	5.01	624	20.65	378	3.41	150
2004	23.06	16.17-31.70	4.82	23.06	16.17-31.70	4.82	624	21.45	377	7.02	149
2005*	.	.	.	.	.	.	.	.	.	.	.

FIGURES

Figure 1. The VIMS Trawl Survey random stratified design of the Chesapeake Bay. Transect lines indicate geographic regions as designated below.
(* indicates areas not presently sampled).

Chesapeake Bay	B1	Bottom Bay
	B2	Lower Bay
	B3	Upper Bay
	B4	Top Bay
James River	J1	Bottom James
	J2	Lower James
	J3	Upper James
	J4	Top James
	J5*	Freshwater James 1
	J6*	Freshwater James 2
	JE*	Elizabeth River (sampled for EFH 11/99-5/00)
	JC*	Chickahominy River
York River	Y1	Bottom York
	Y2	Lower York
	Y3	Upper York
	Y4	Top York (lower Pamunkey River)
	PM*	Pamunkey River
	MP1*	Lower Mattaponi
	MP2*	Upper Mattaponi
Rappahannock River	R1	Bottom Rappahannock
	R2	Lower Rappahannock
	R3	Upper Rappahannock
	R4	Top Rappahannock
	R5*	Freshwater Rappahannock
	RC*	Corrotoman River
Potomac River	P1*	Potomac (River Mile 0-10)
	P2*	Potomac (River Mile 10-20)
	P3*	Potomac (River Mile 20-30)
Mobjack Bay	MB*	(re-established July 1998; discontinued 2001)
Atlantic Ocean	AT*	
Piankatank River	PK*	(re-established as of July 1998; discontinued 2001)
Pocomoke Sound	CP*	(re-established as of July 1998; discontinued 2001)
Great Wicomico River	GW*	(as of July 1998; discontinued 2001)

Figure 1 (cont.)

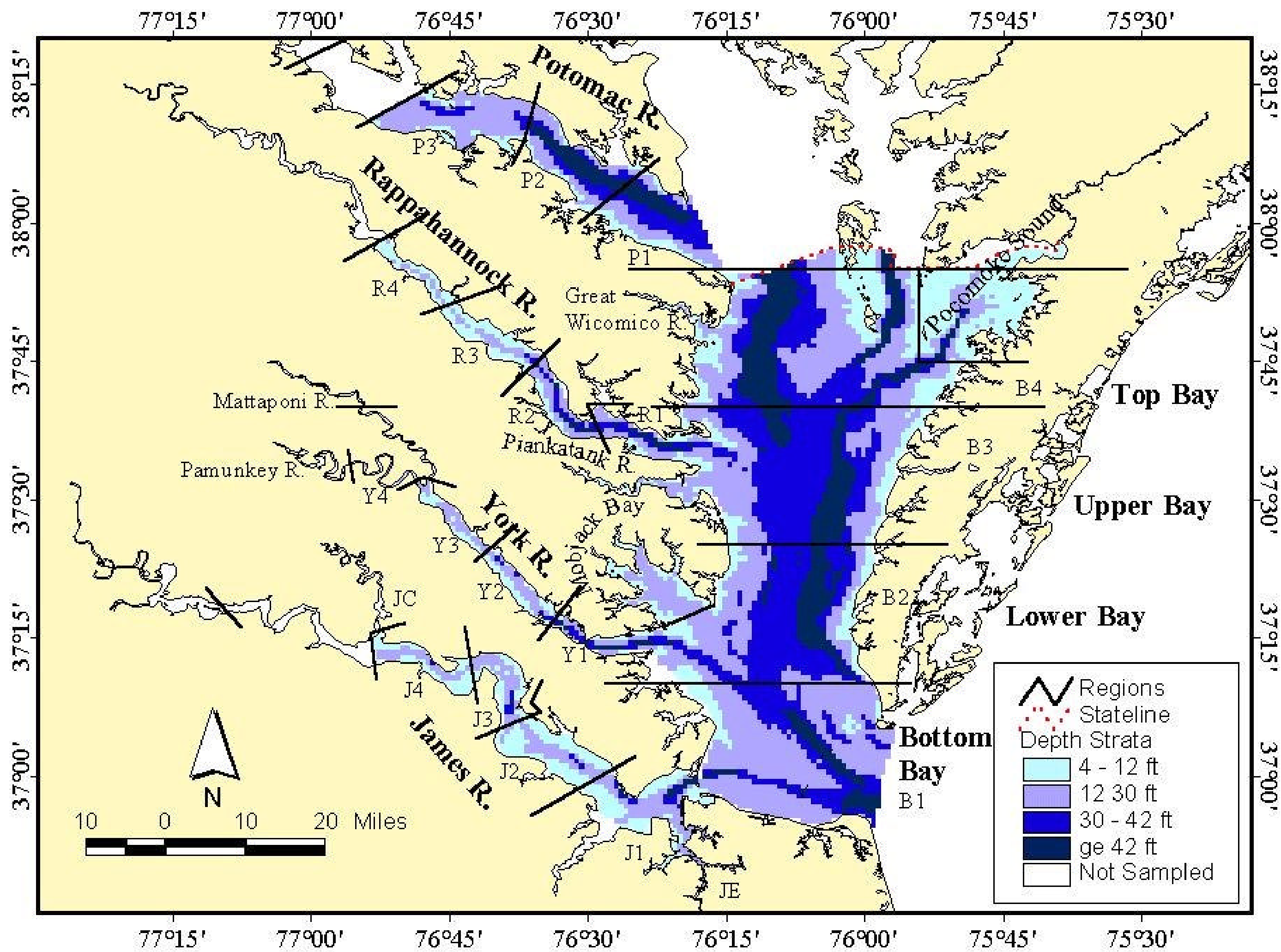


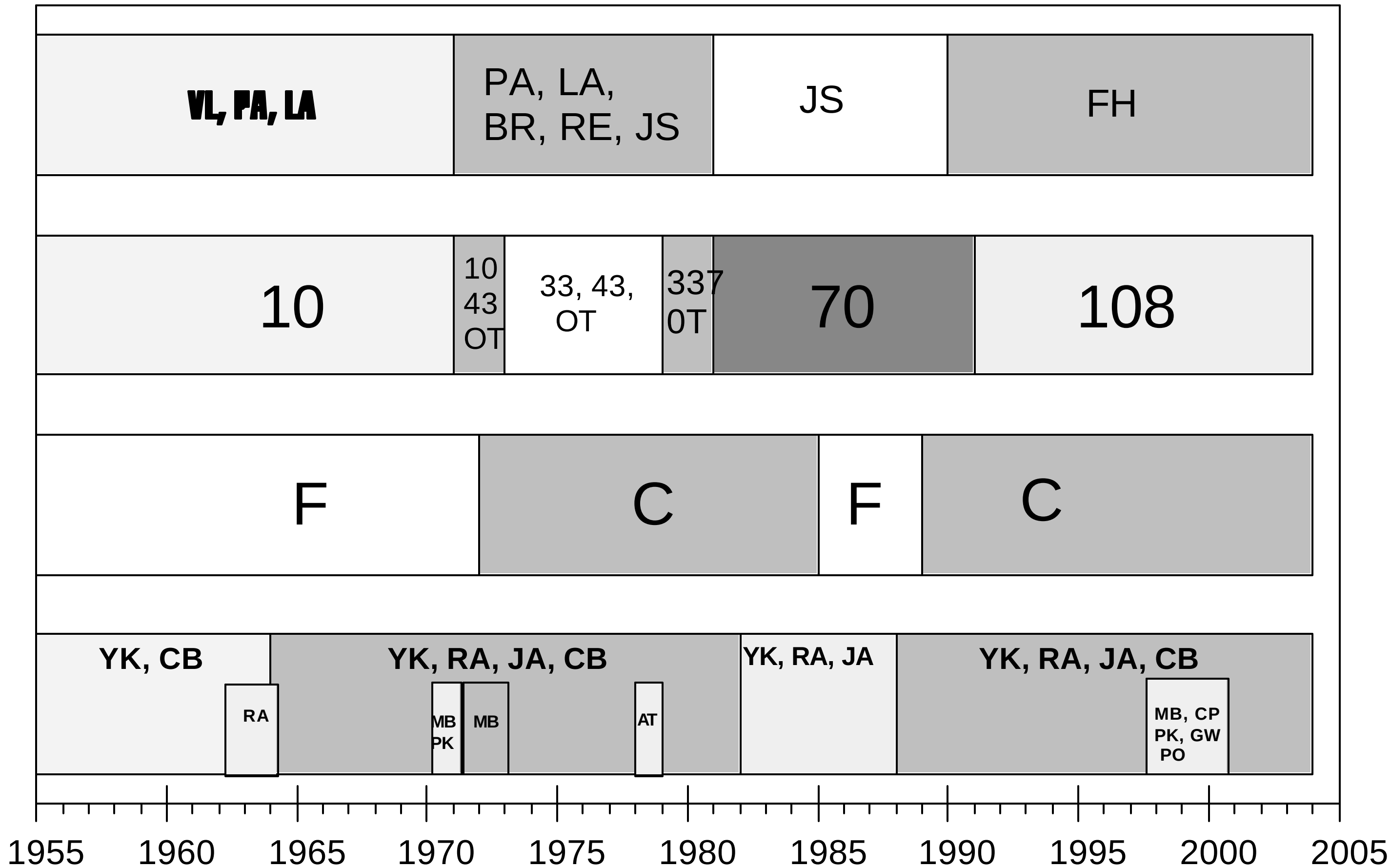
Figure 2. VIMS Juvenile Fish Trawl Survey Sampling Changes (1955-2004)

Vessel
VL = Virginia Lee
PA = Pathfinder
LA = Langley
BR = Brooks
RE = Restless
JS = Capt. John Smith
FH = Fish Hawk

Gear Type
10 = Unlined/No Tickler
33 = Lined/No Tickler
43 = Unlined/Tickler
OT = 16' Nets
70 = Lined/Tickler
108 = Lined/Tickler/China-V

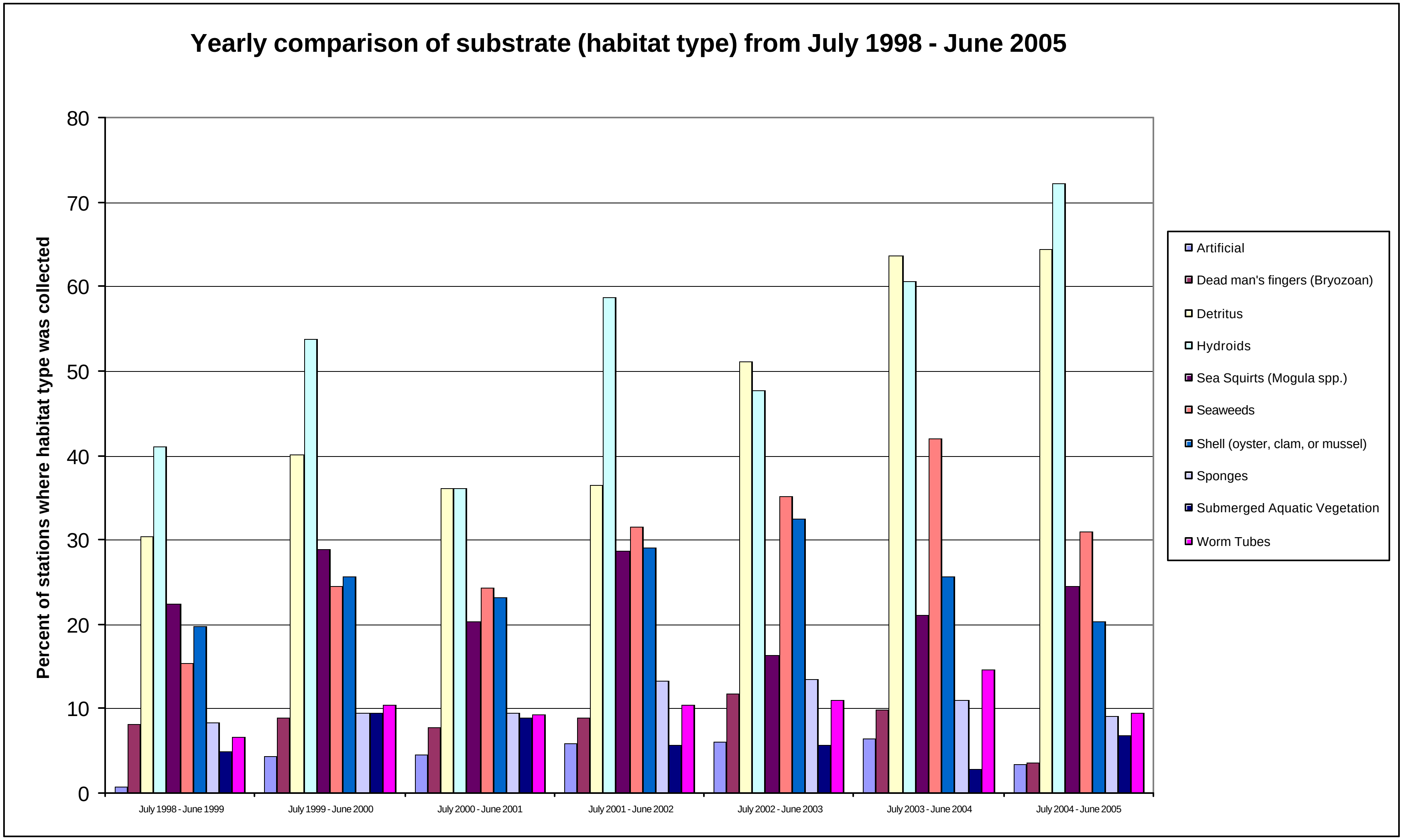
Sampling System
F = Fixed
R = Random
C = Combination

System
YK = York River
RA = Rappahannock River
JA = James River
CB = Chesapeake Bay
MB = Mobjack Bay
PK = Piankatank River
AT = Atlantic Ocean
GW = Great Wicomico River
CP = Pocomoke Sound
PO = Potomac River



Gear Type is 30 foot otter trawl if not specified.

Figure 3.



Yearly comparison of substrate (habitat type) from July 1998 - June 2005
Percent of stations where habitat type was collected
80
70
60
50
40
30
20
10
0
July 1998 - June 1999
July 1999 - June 2000
July 2000 - June 2001
July 2001 - June 2002
July 2002 - June 2003
July 2003 - June 2004
July 2004 - June 2005
Artificial
Dead man's fingers (Bryozoan)
Detritus
Hydroids
Sea Squirts (Mogula spp.)
Seaweeds
Shell (oyster, clam, or mussel)
Sponges
Submerged Aquatic Vegetation
Worm Tubes

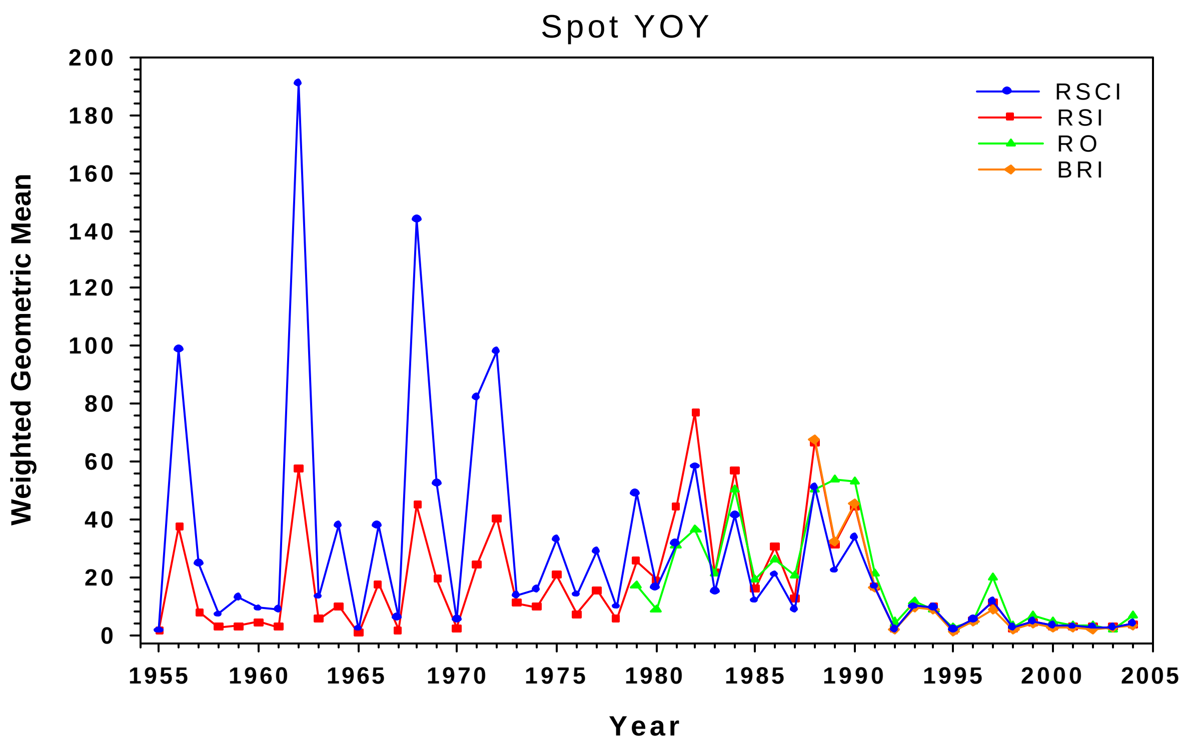


Figure 4. YOY spot random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY spot from July 2004 through June 2005 (**bottom**).

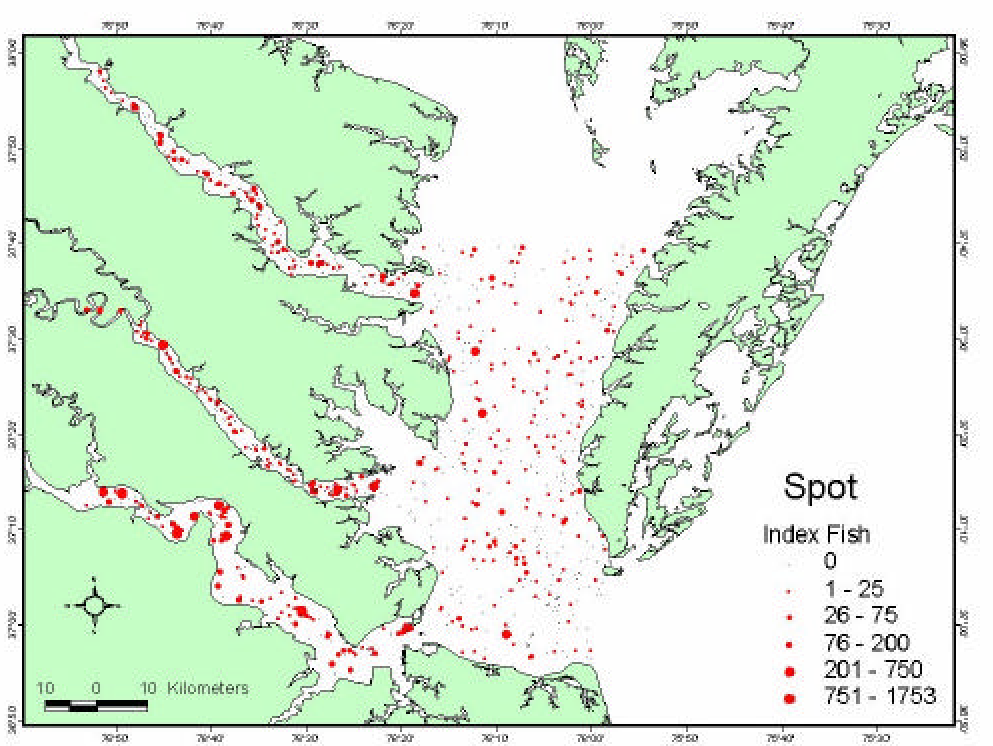
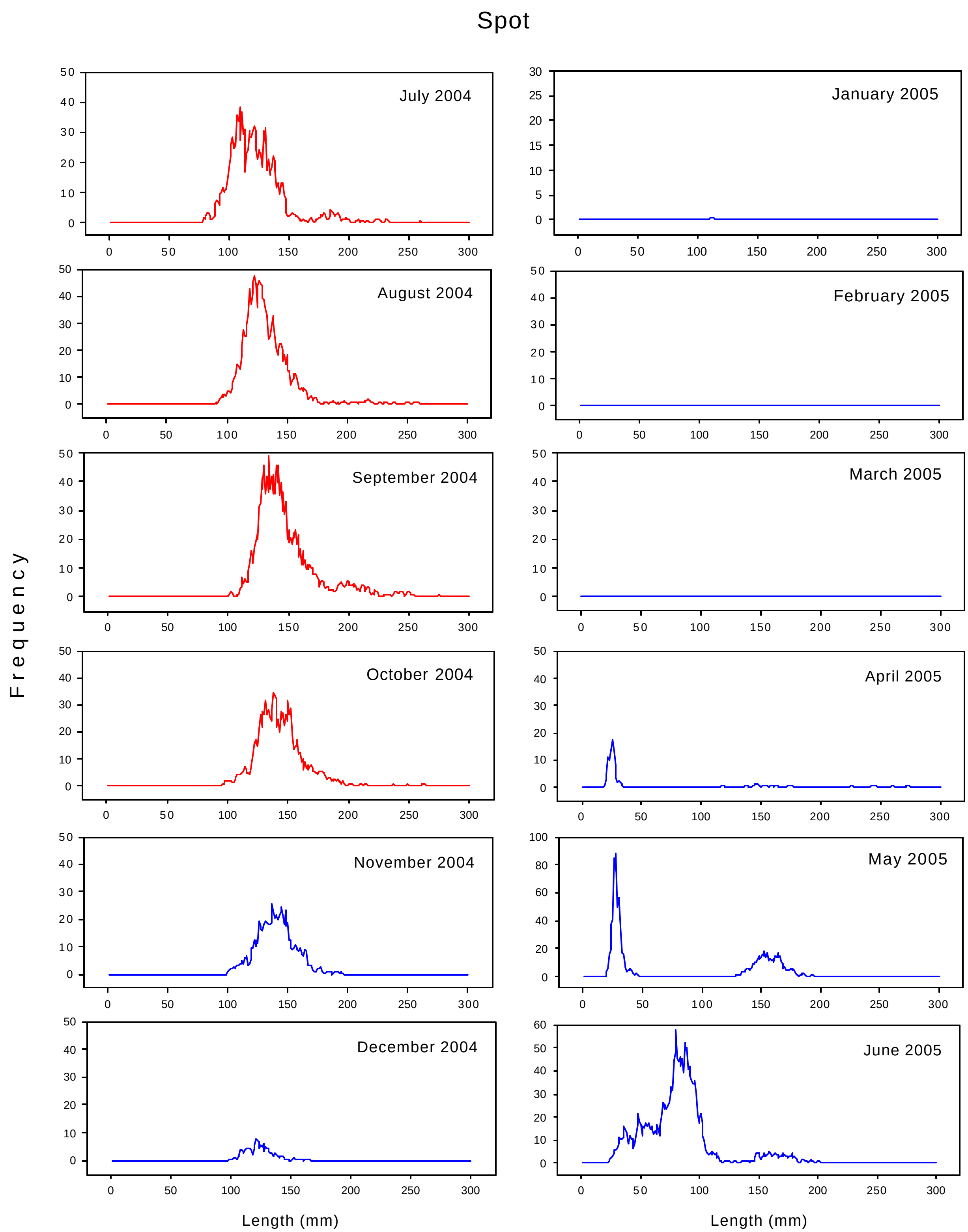


Figure 5. Size frequency of spot by month for July 2004 to June 2005. Index months for spot are shown in red.



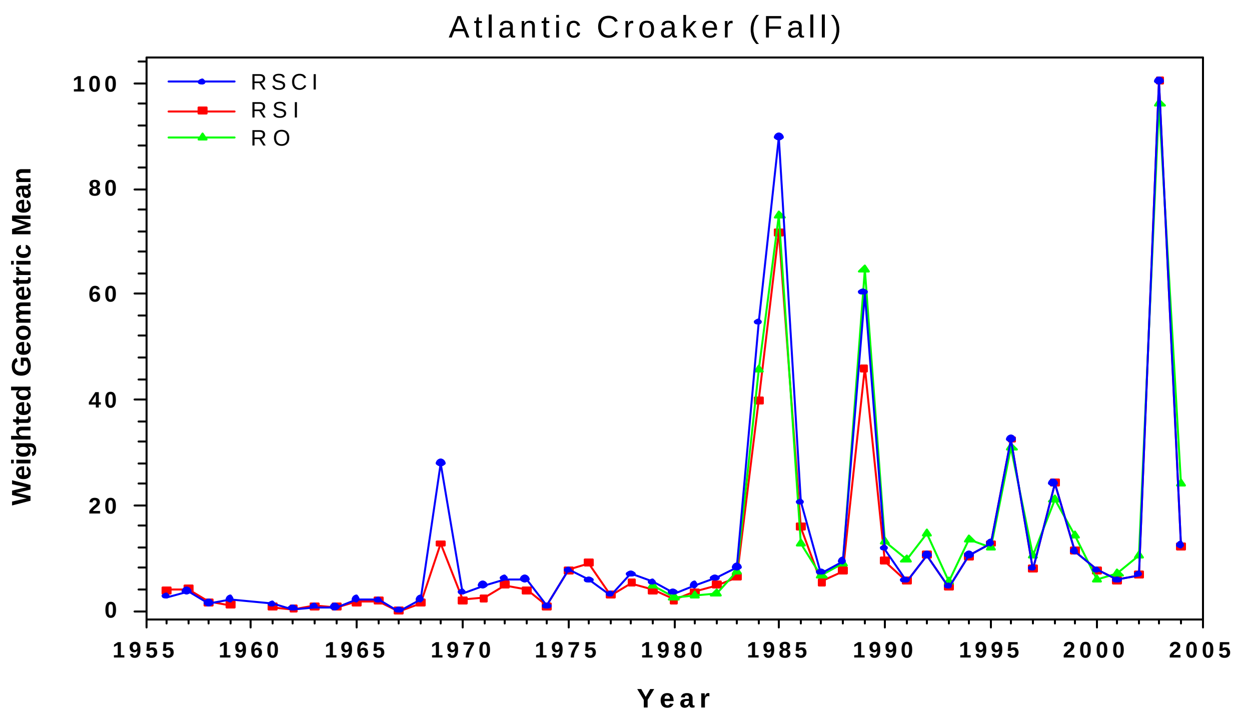
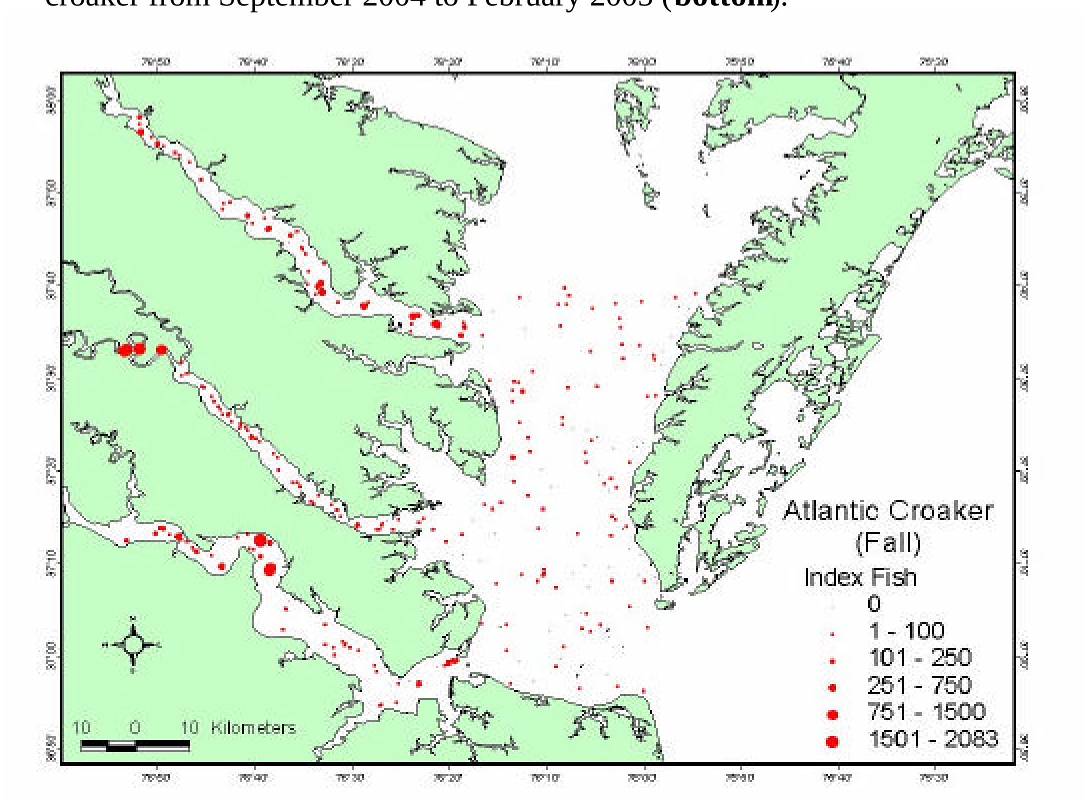


Figure 6. Fall YOY Atlantic croaker random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of fall YOY Atlantic croaker from September 2004 to February 2005 (**bottom**).



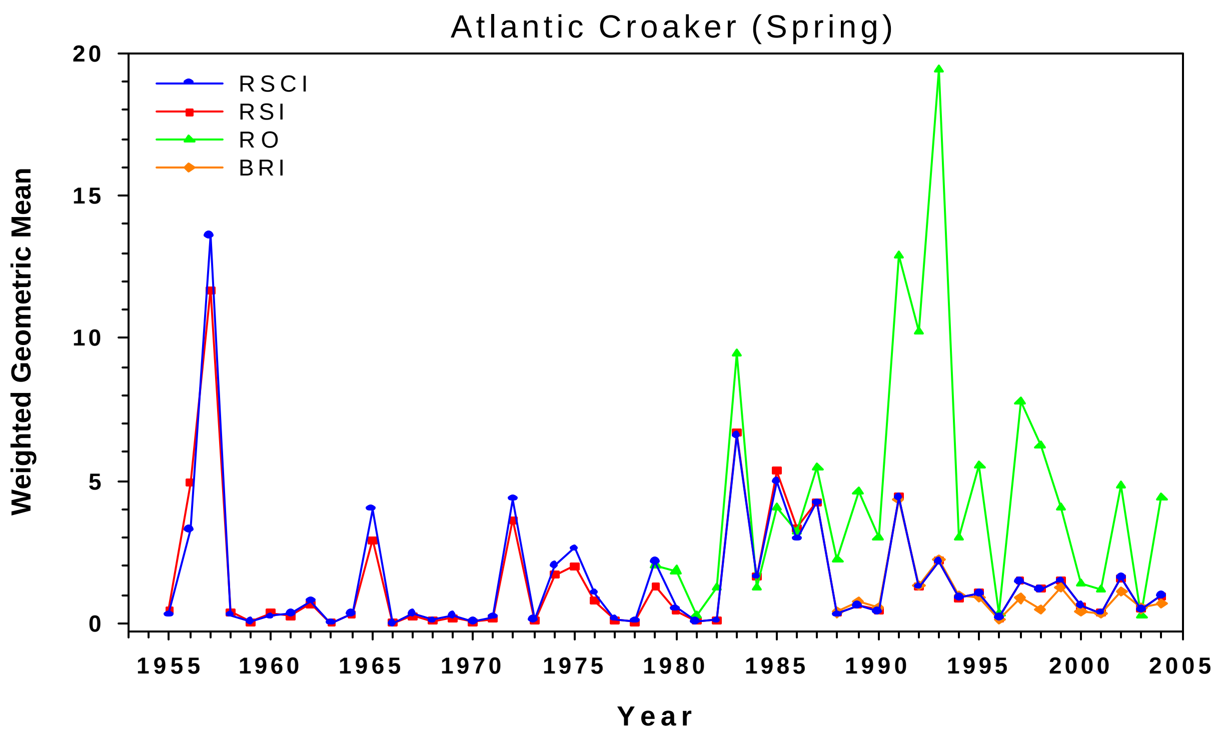


Figure 7. Spring YOY Atlantic croaker random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of spring YOY Atlantic croaker from March 2005 through June 2005 (**bottom**).

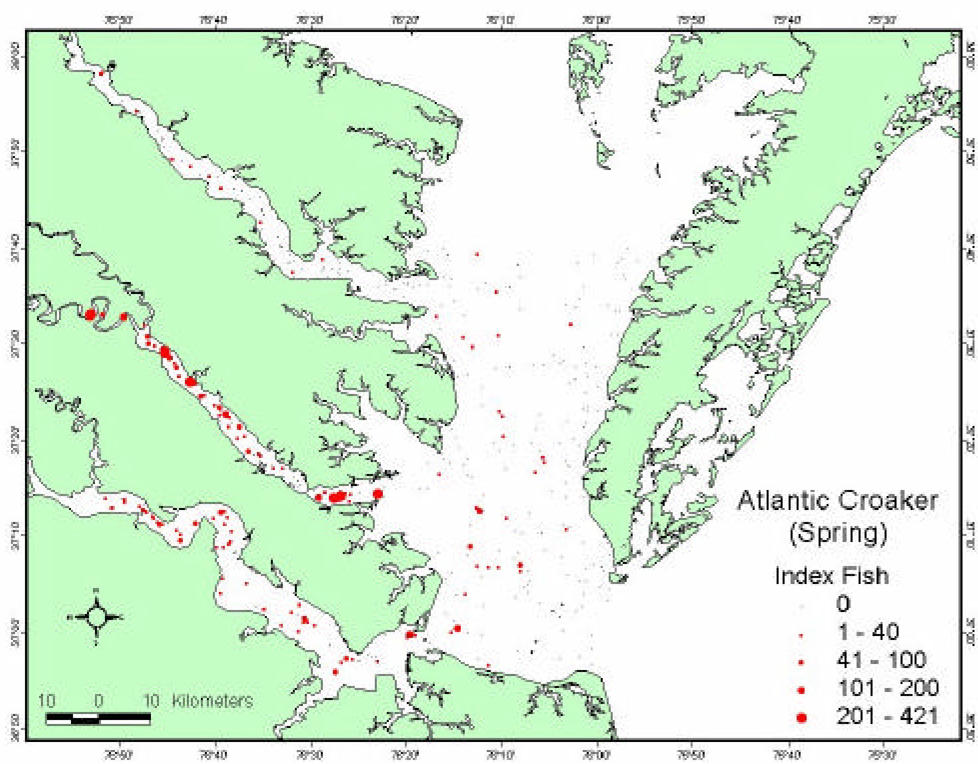
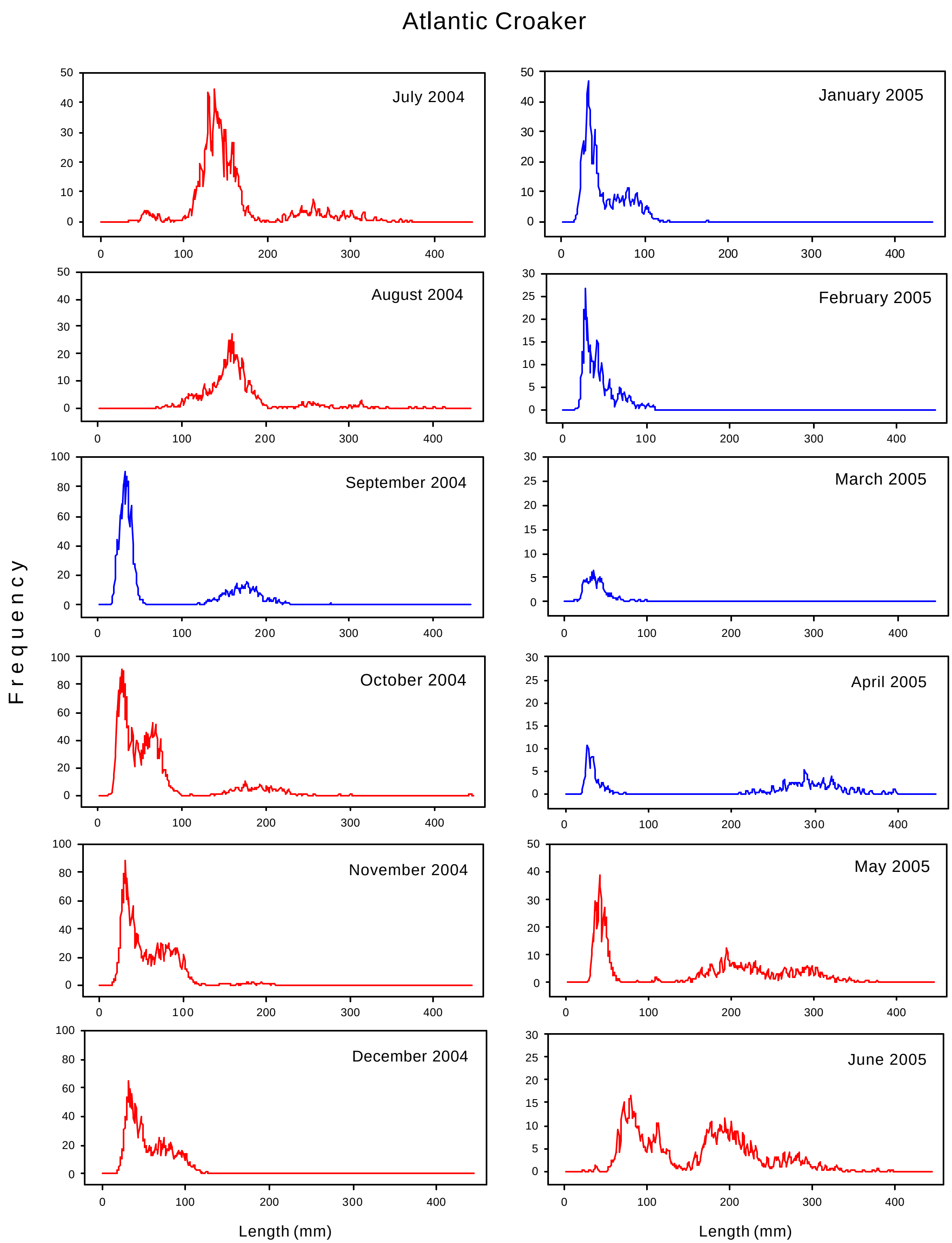


Figure 8. Size frequency of Atlantic croaker by month for July 2004 to June 2005. Index months (fall and spring) are shown in red.



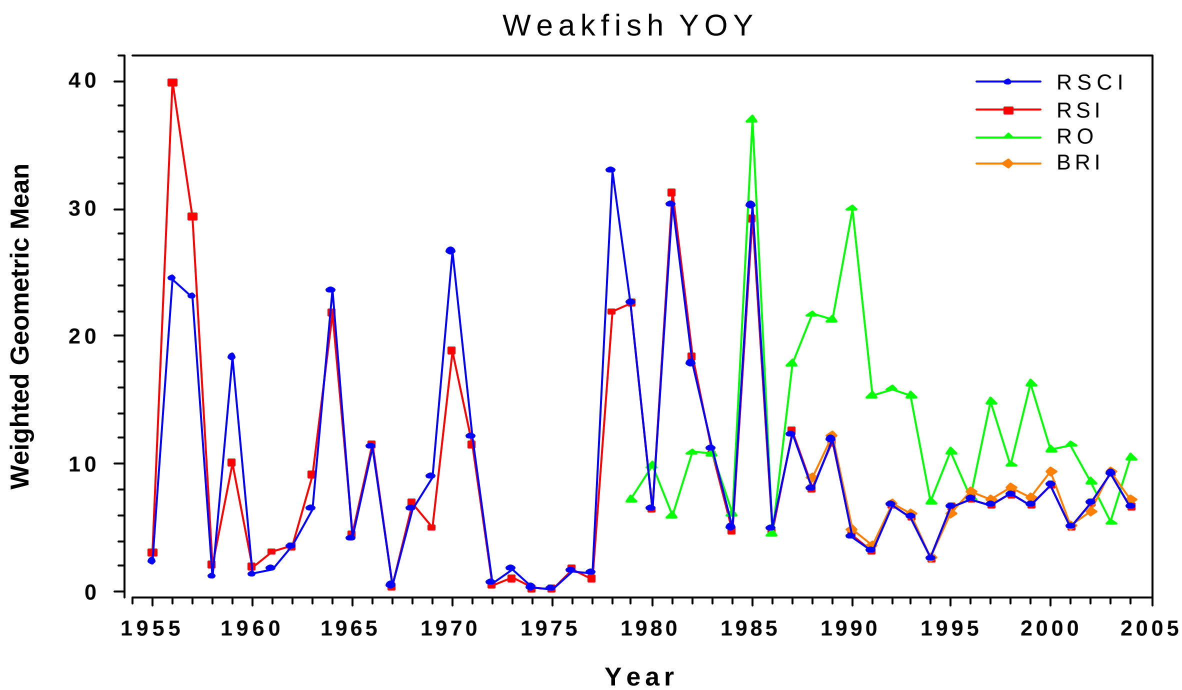


Figure 9. YOY weakfish random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY weakfish from July 2004 through June 2005 (**bottom**).

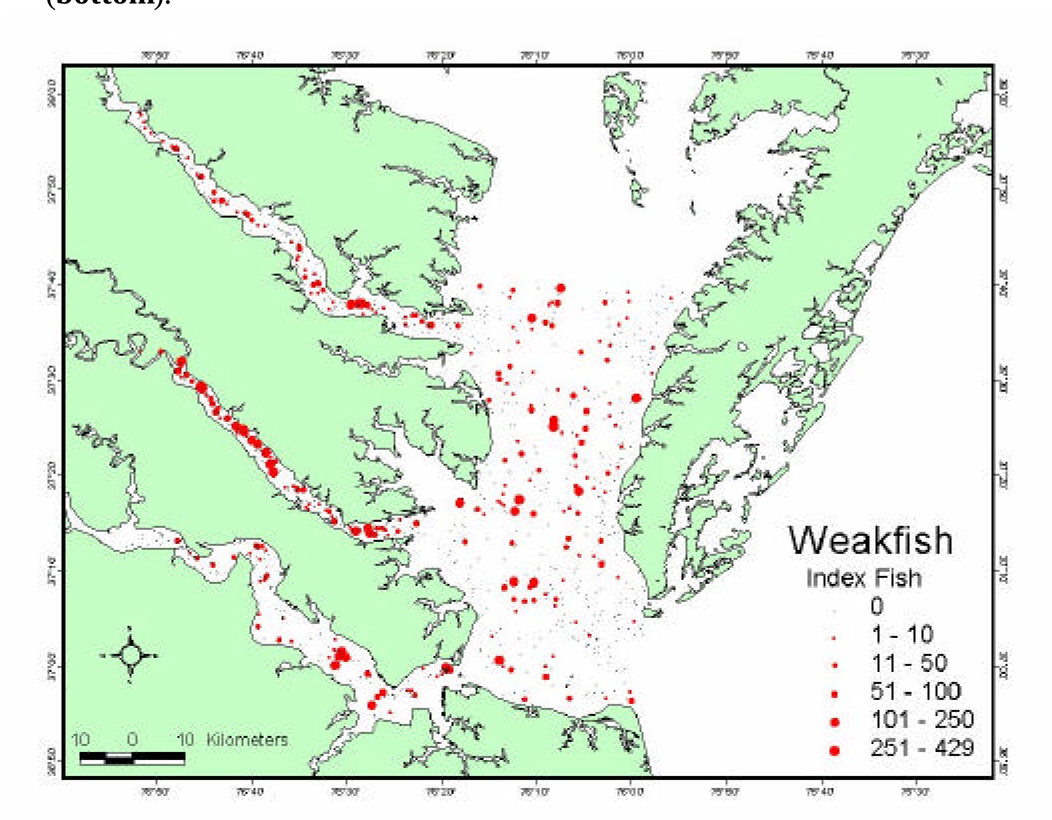
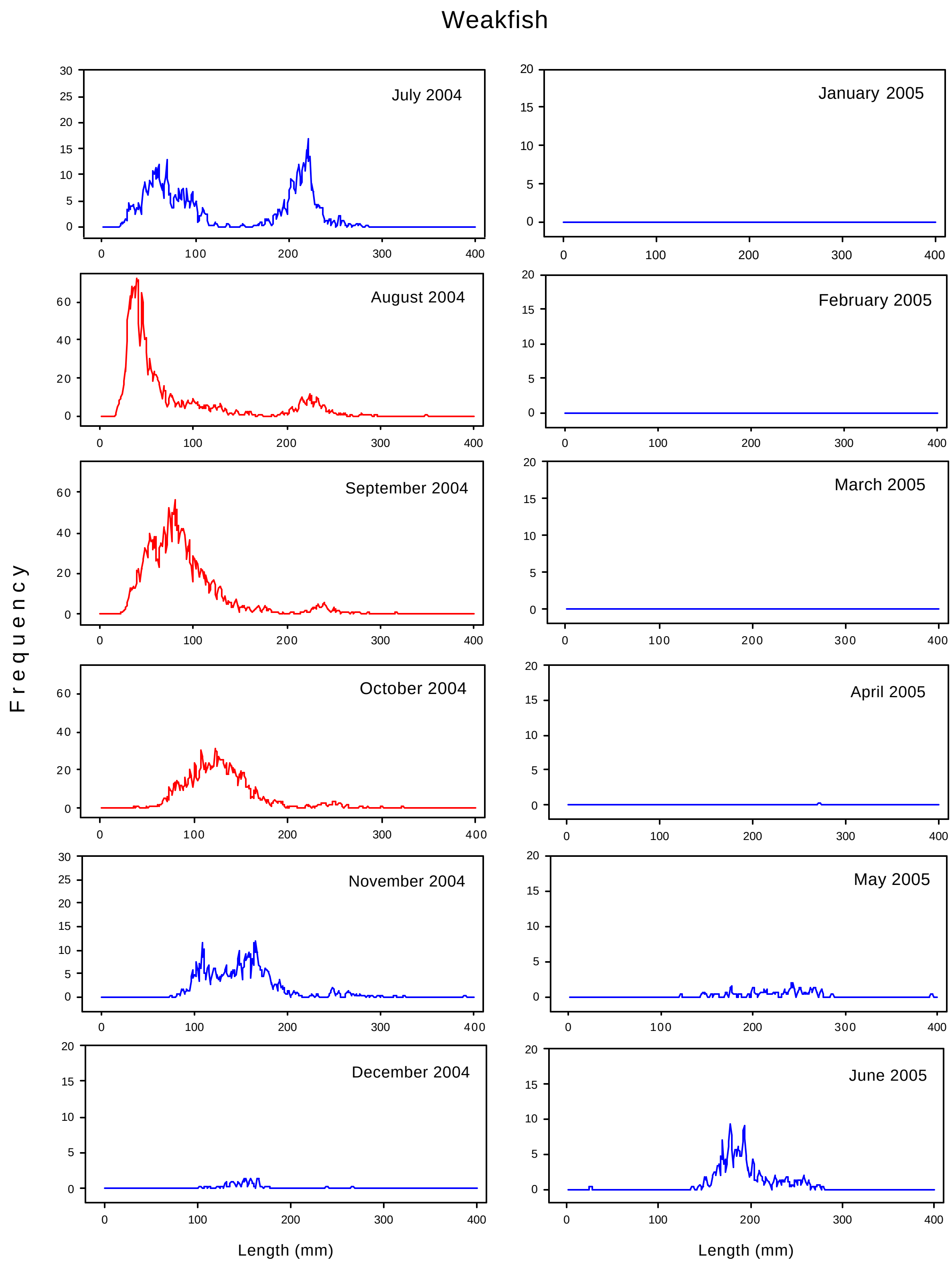


Figure 10. Size frequency of weakfish by month for July 2004 to June 2005. Index months are shown in red.



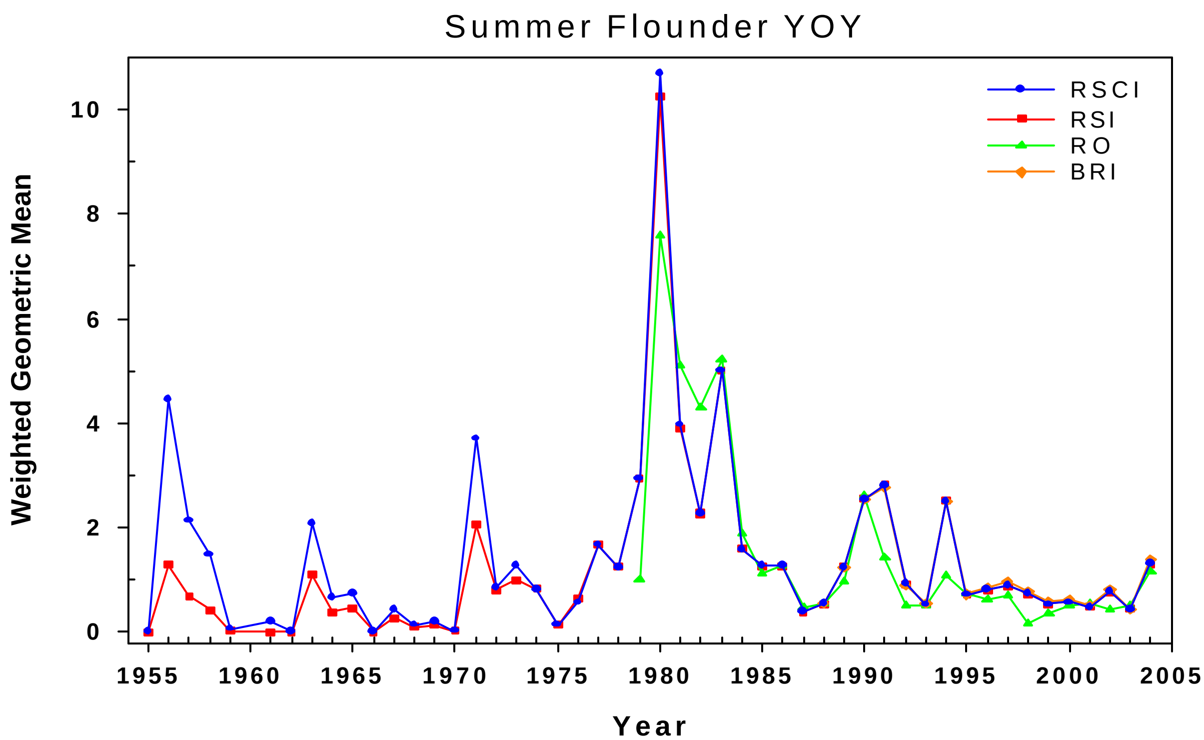


Figure 11. YOY summer flounder random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY summer flounder from July 2004 through June 2005 (**bottom**).

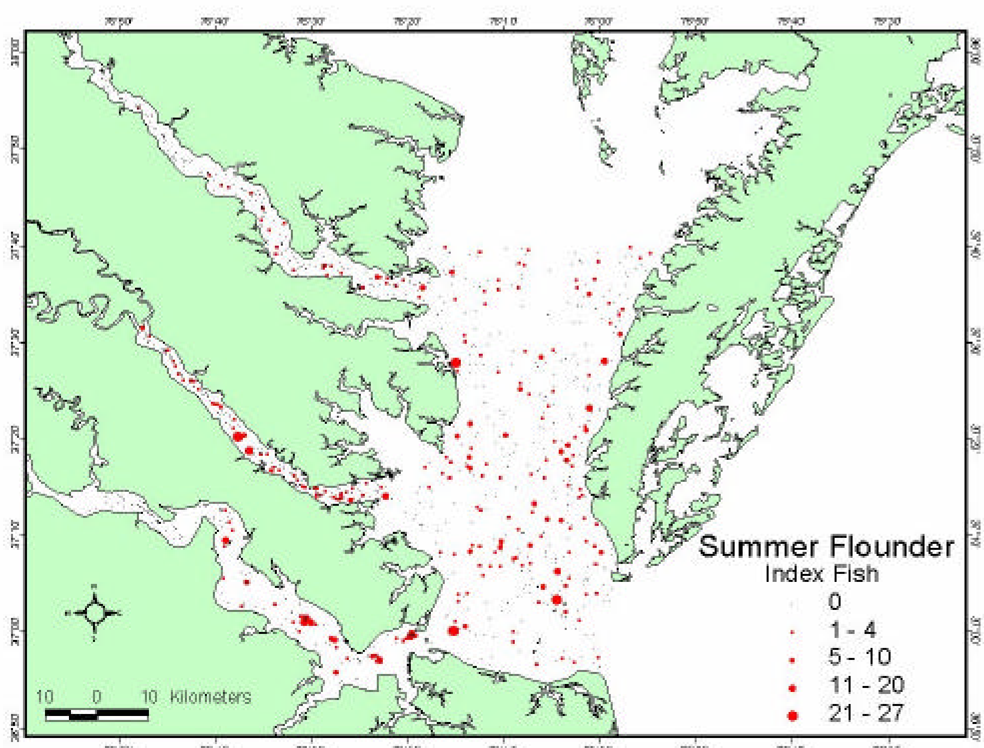
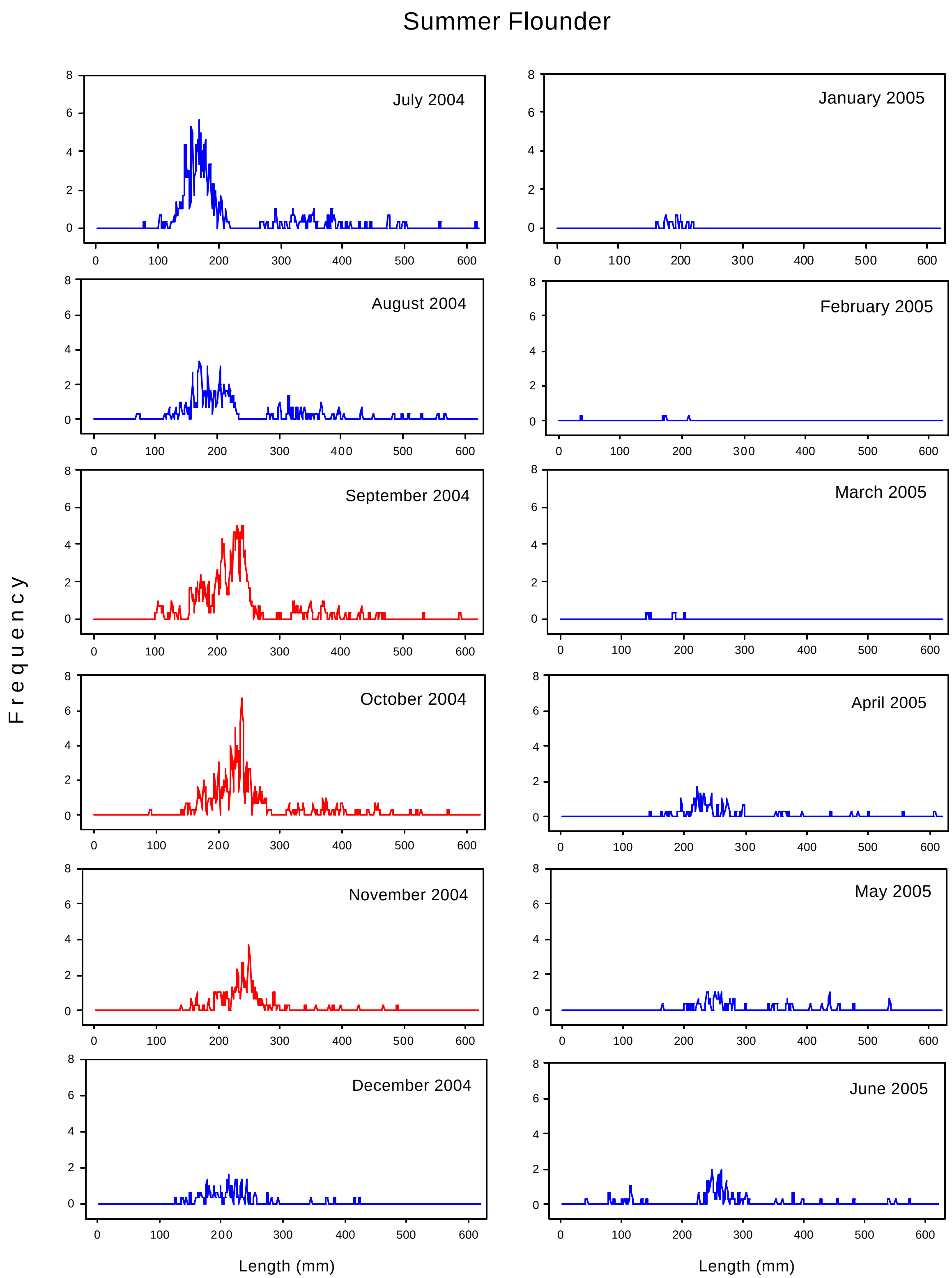


Figure 12. Size frequency of summer flounder by month for July 2004 to June 2005. Index months are shown in red.



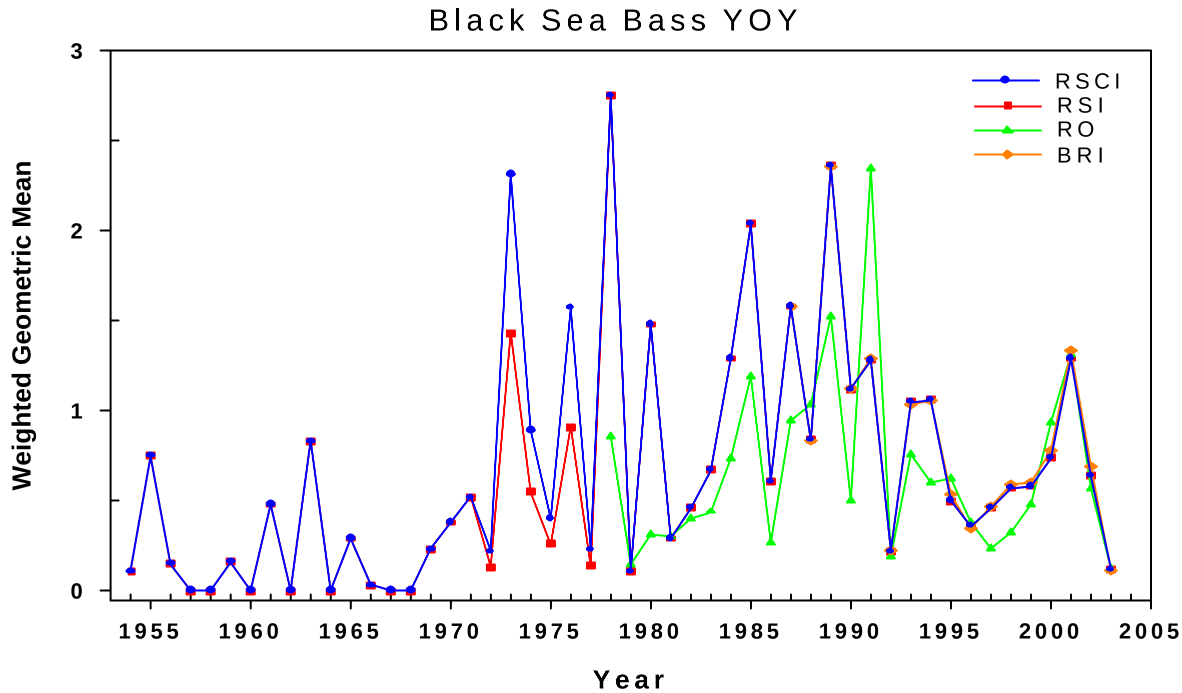


Figure 13. YOY black sea bass random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY black sea bass from July 2004 through June 2005 (**bottom**).

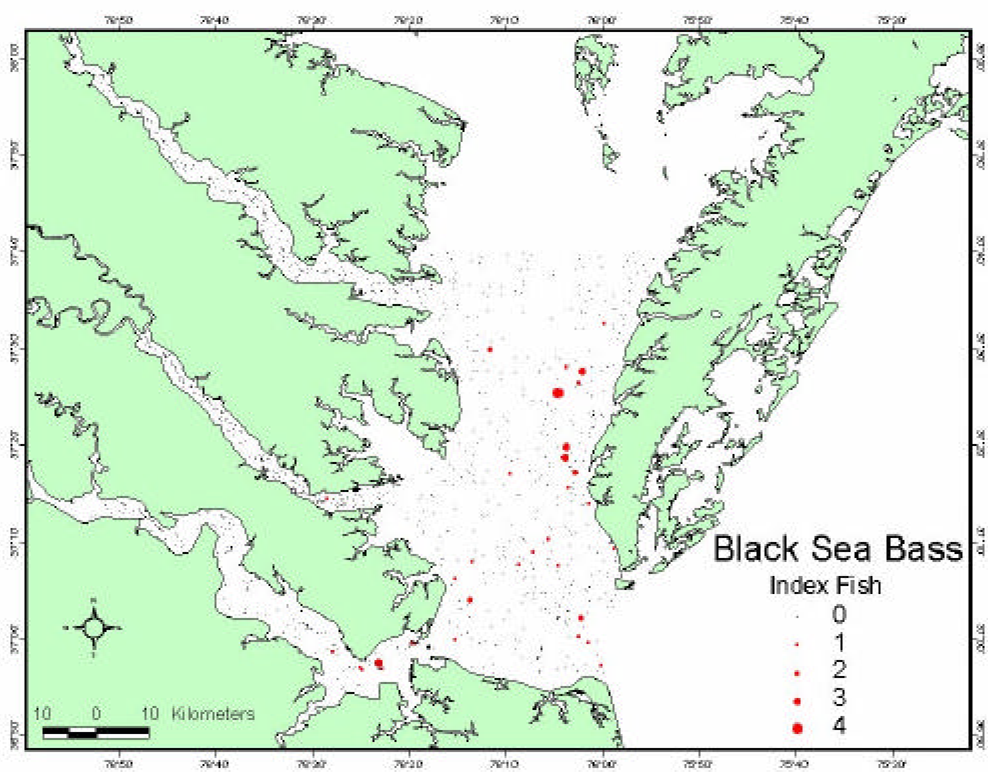
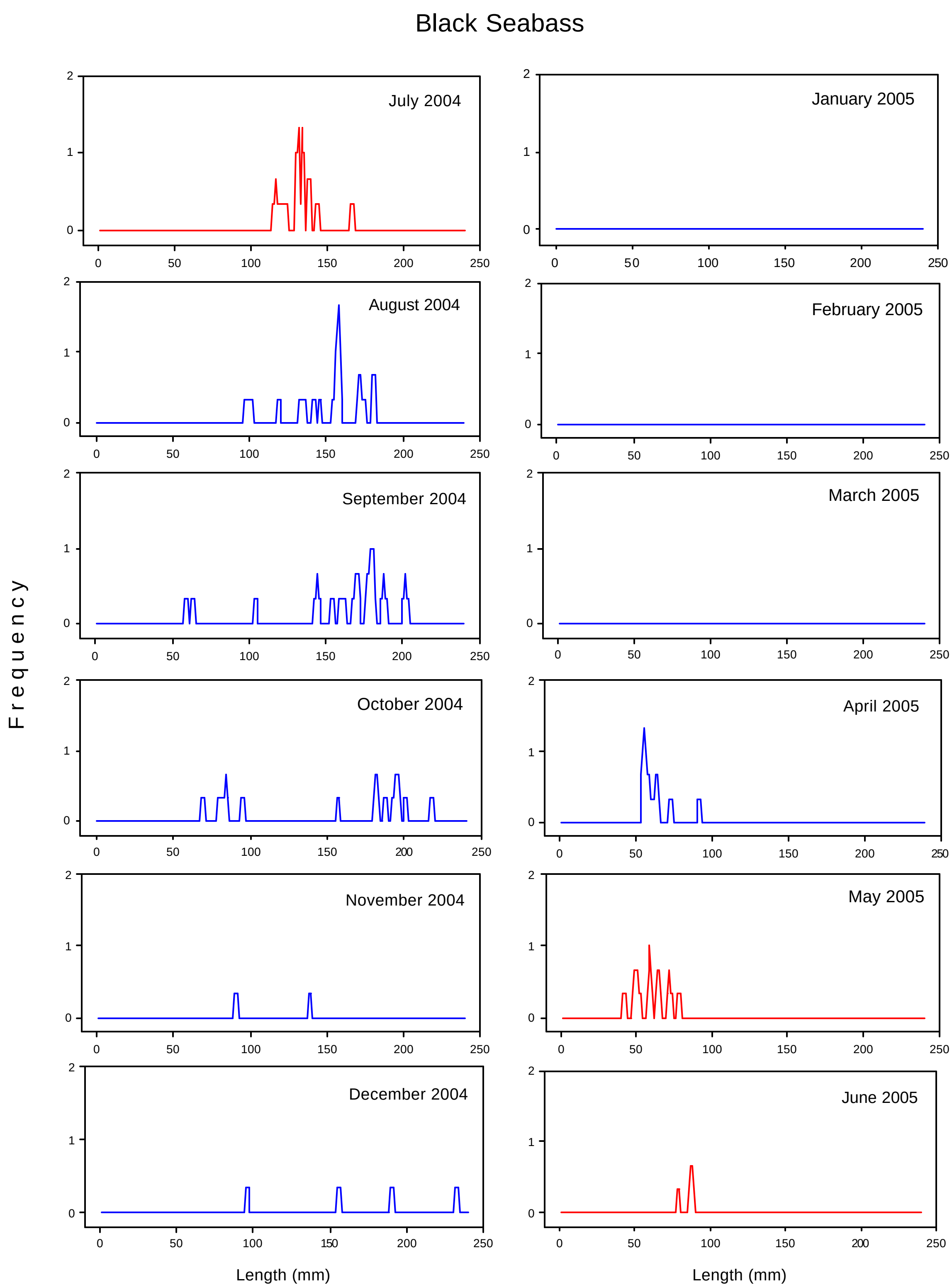


Figure 14. Size frequency of black sea bass by month for July 2004 to June 2005. Index months are shown in red.



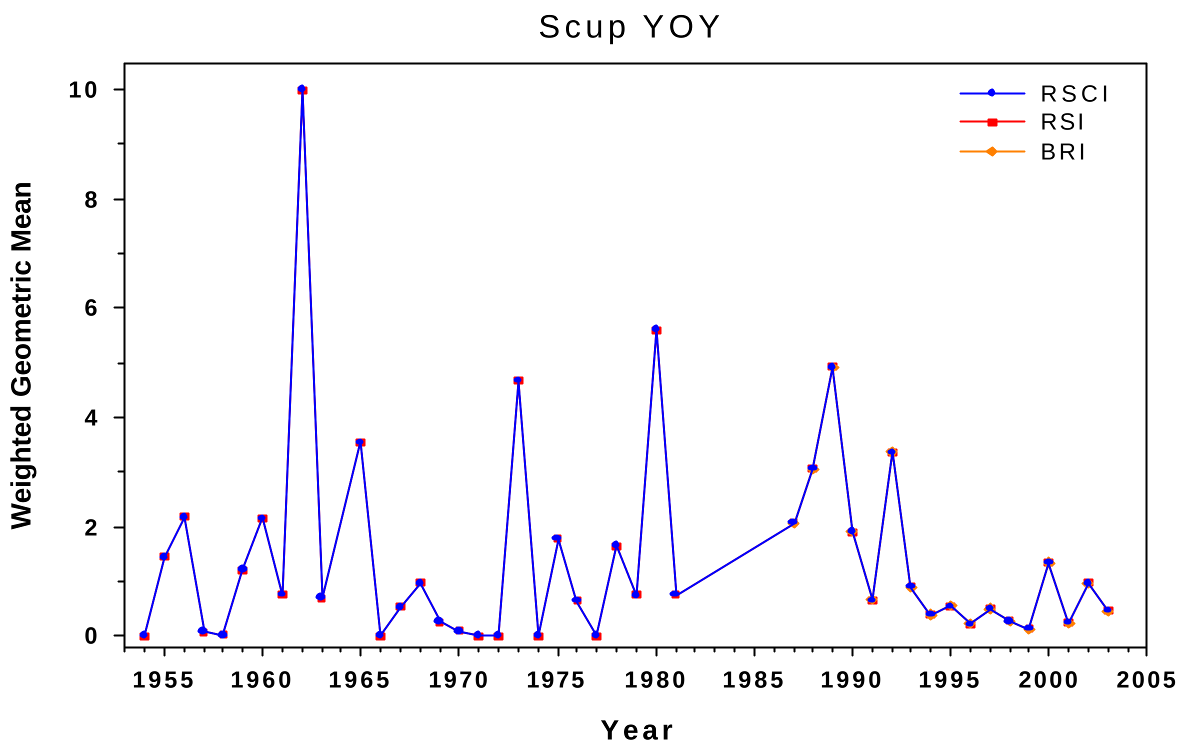


Figure 15. YOY scup random stratified (RSI), random stratified converted (RSCI), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY scup from July 2004 through June 2005 (**bottom**).

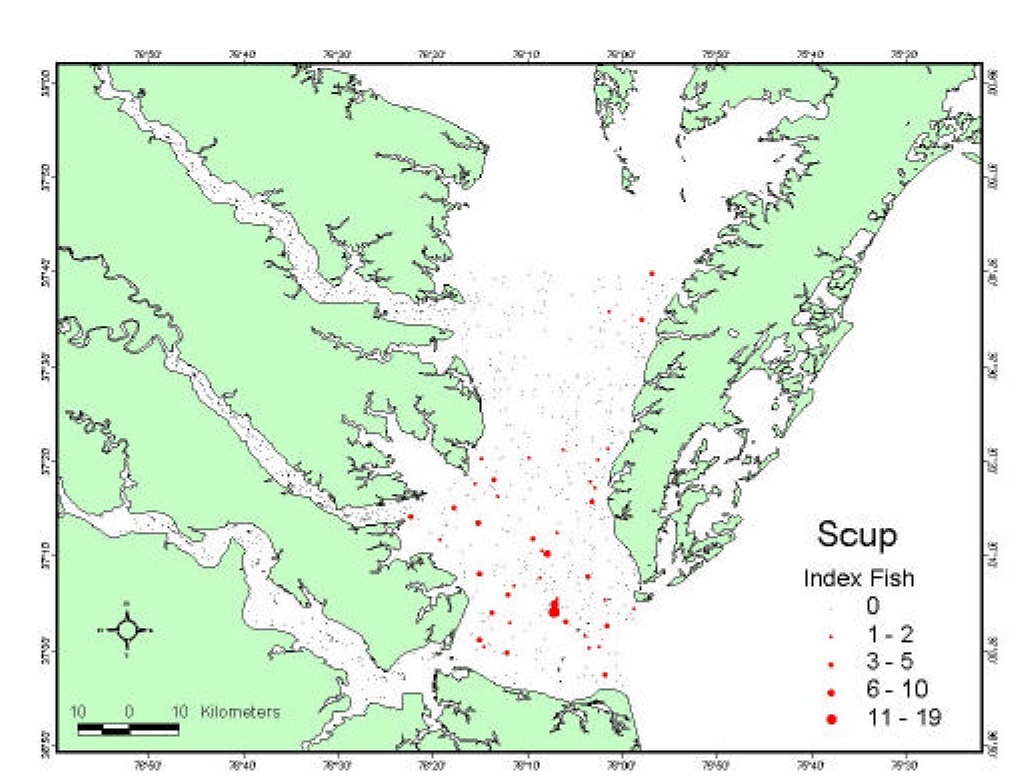
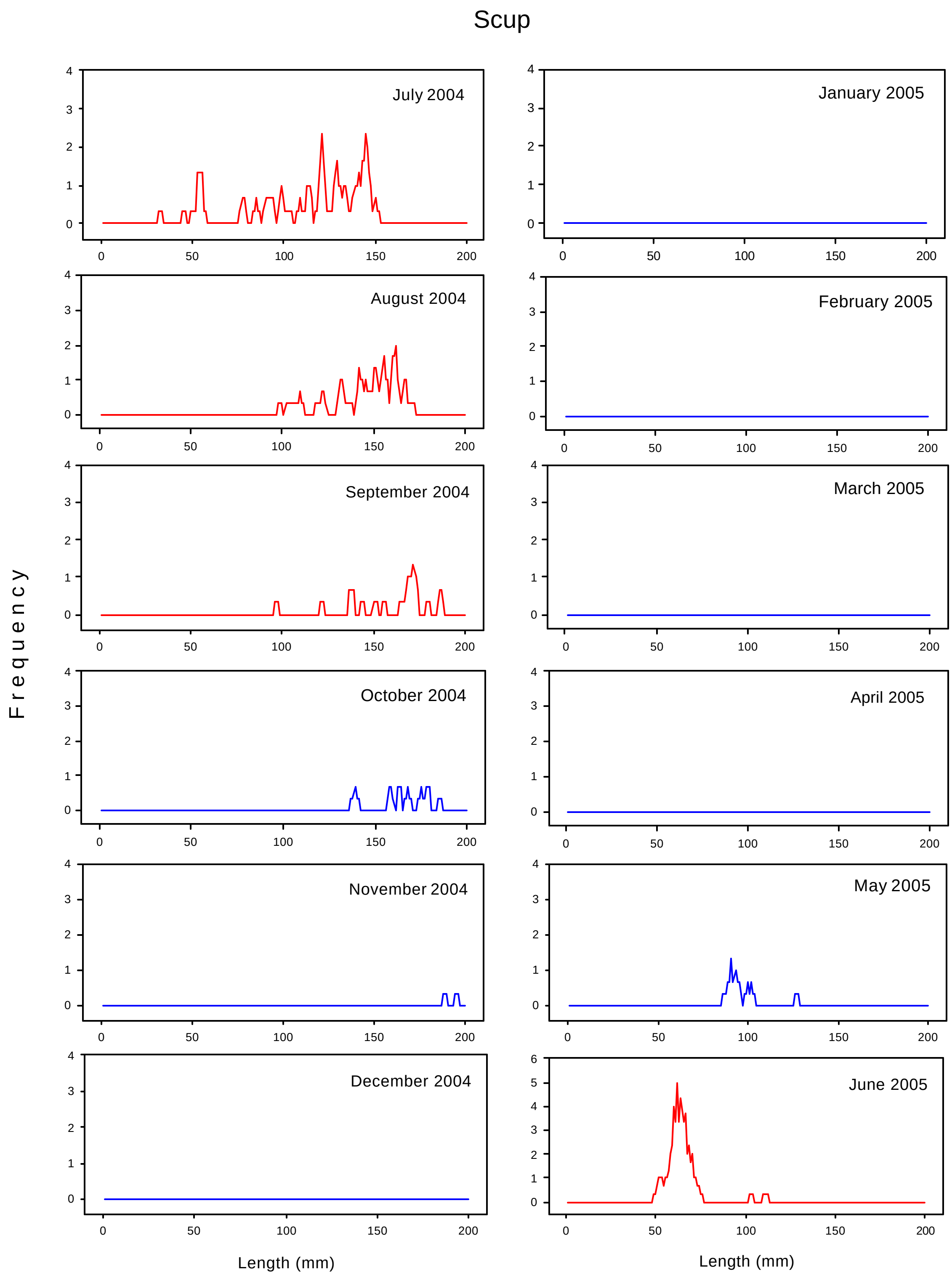


Figure 16. Size frequency of scup by month for July 2004 to June 2005. Index months are shown in red.



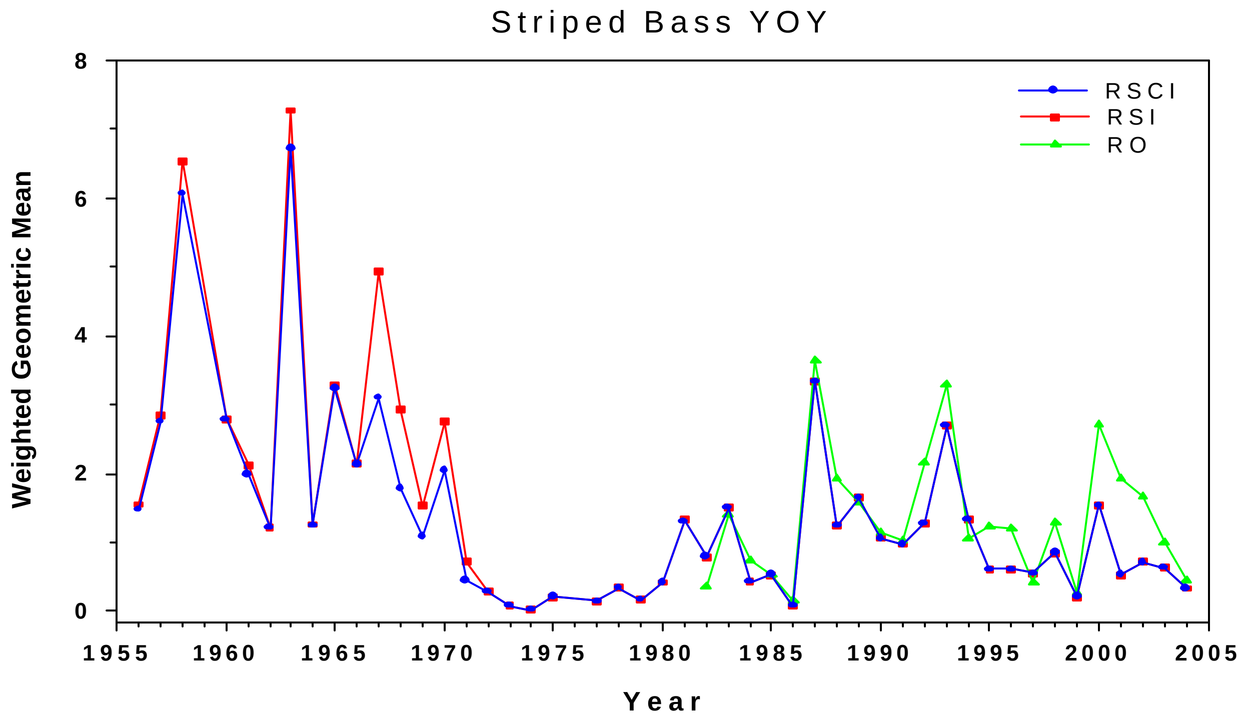


Figure 17. YOY striped bass random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of YOY striped bass from July 2004 through June 2005 (**bottom**).

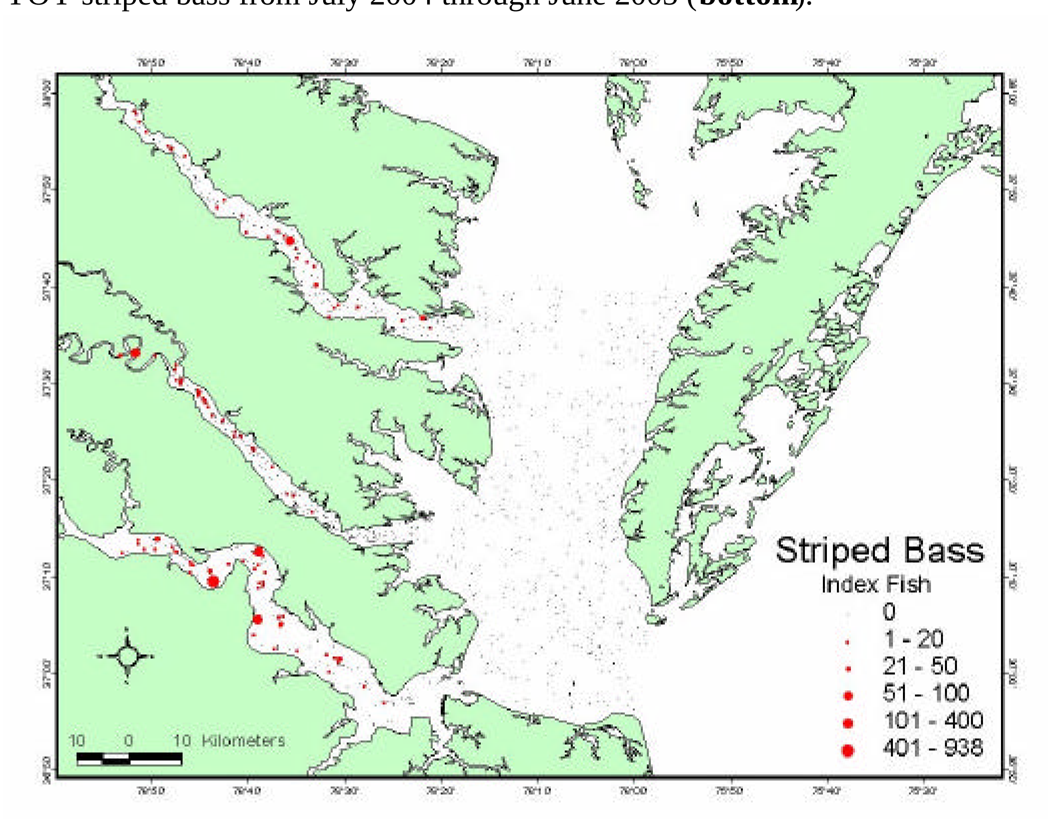
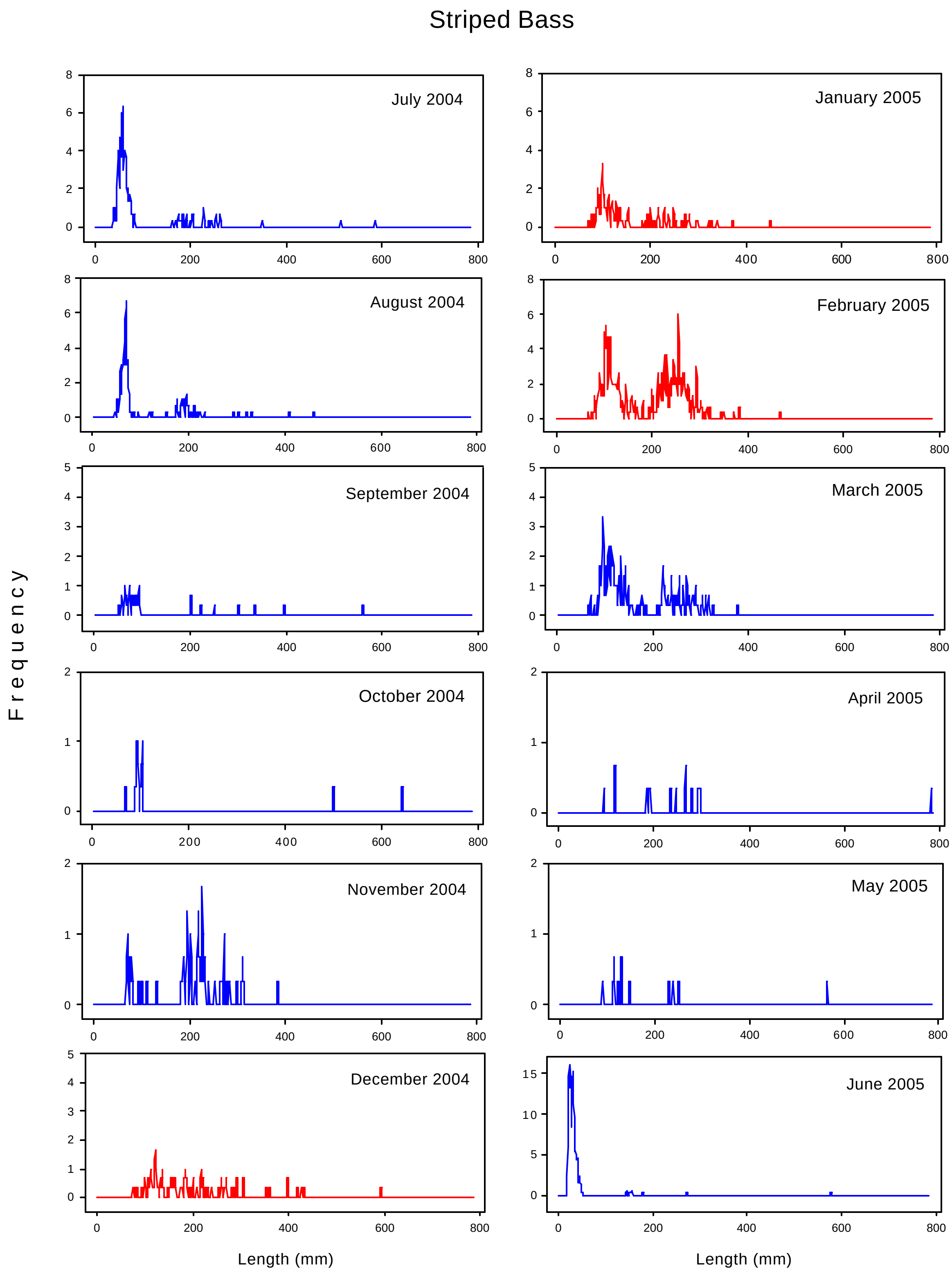


Figure 18. Size frequency of striped bass by month for July 2004 to June 2005. Index months are shown in red.



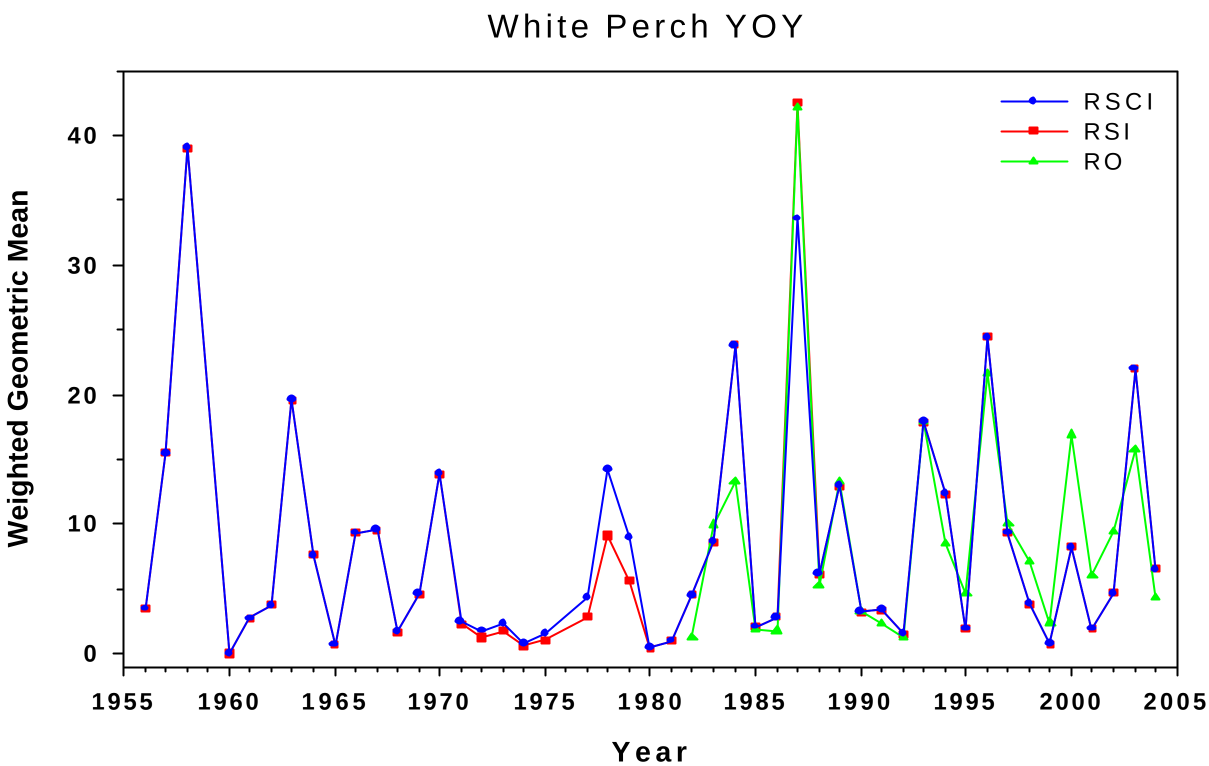


Figure 19. YOY white perch random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of YOY white perch from July 2004 through June 2005 (**bottom**).

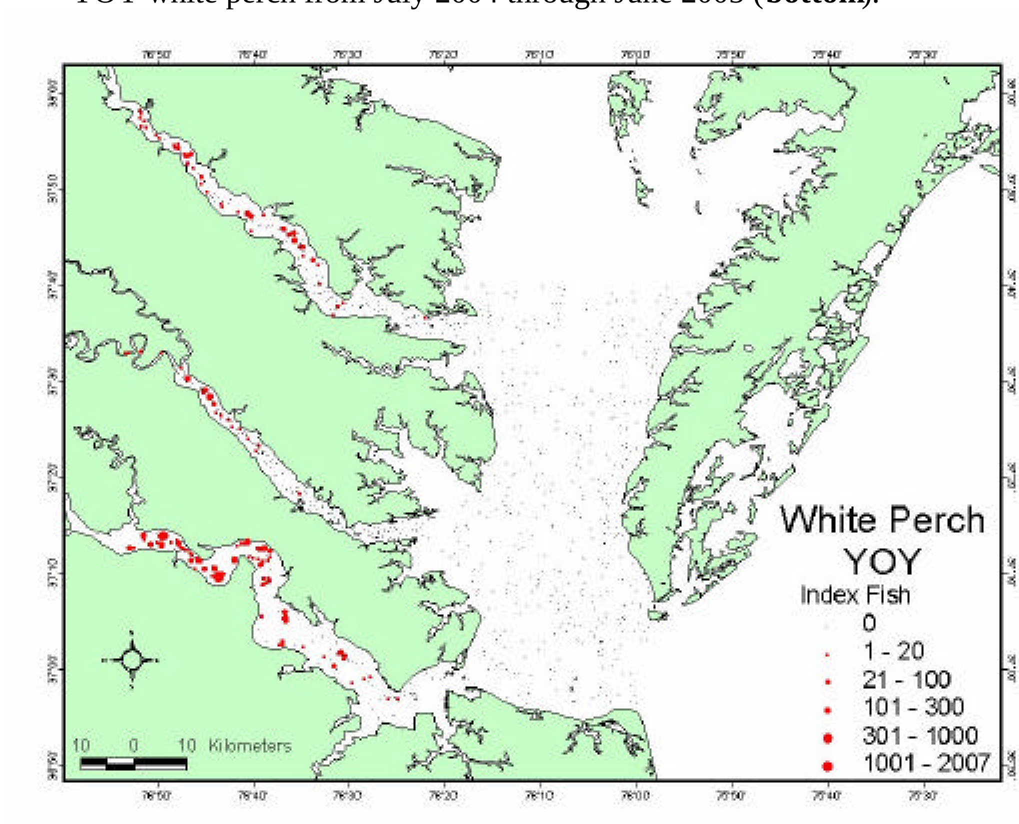
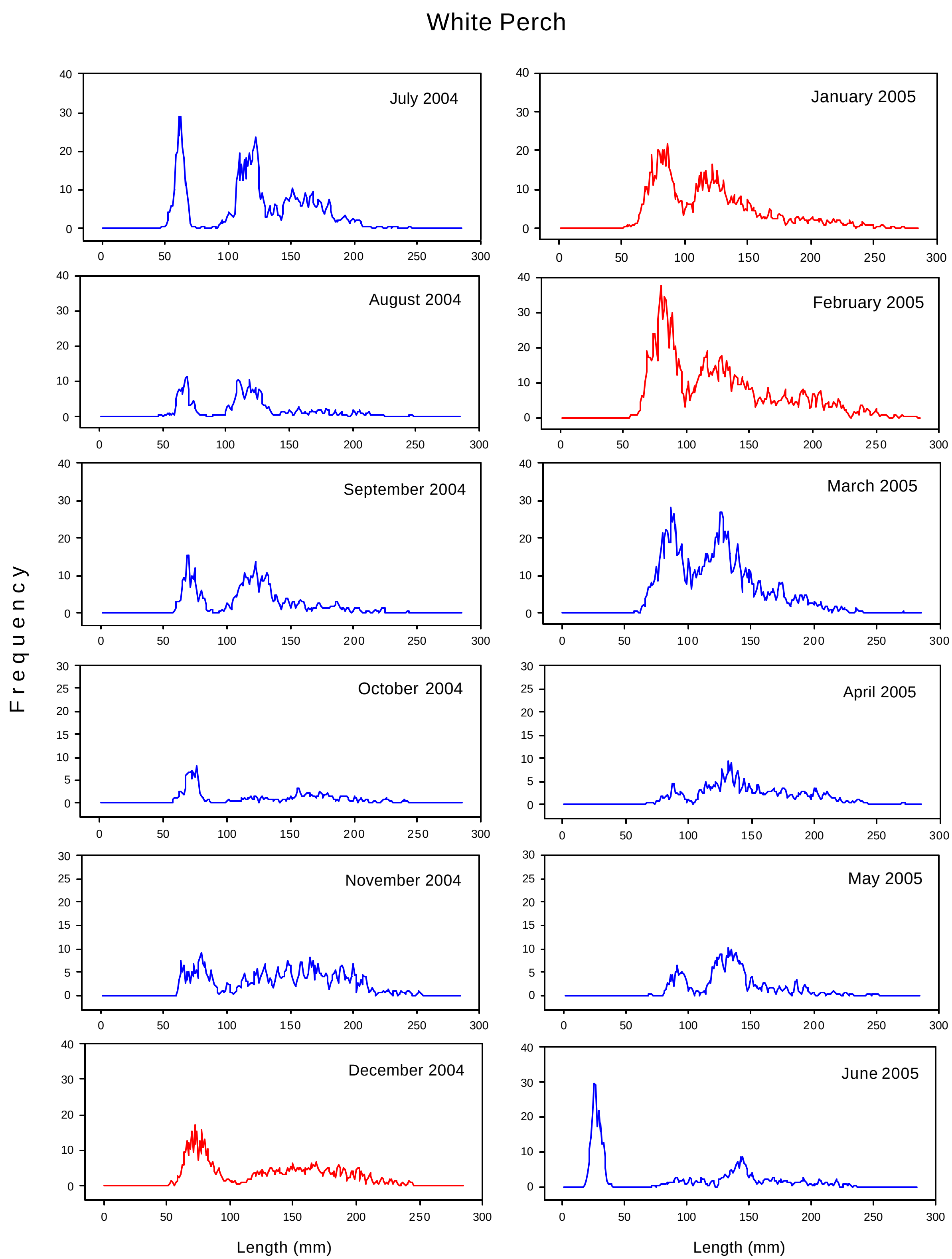


Figure 20. Size frequency of white perch by month for July 2004 to June 2005. Index months are shown in red.



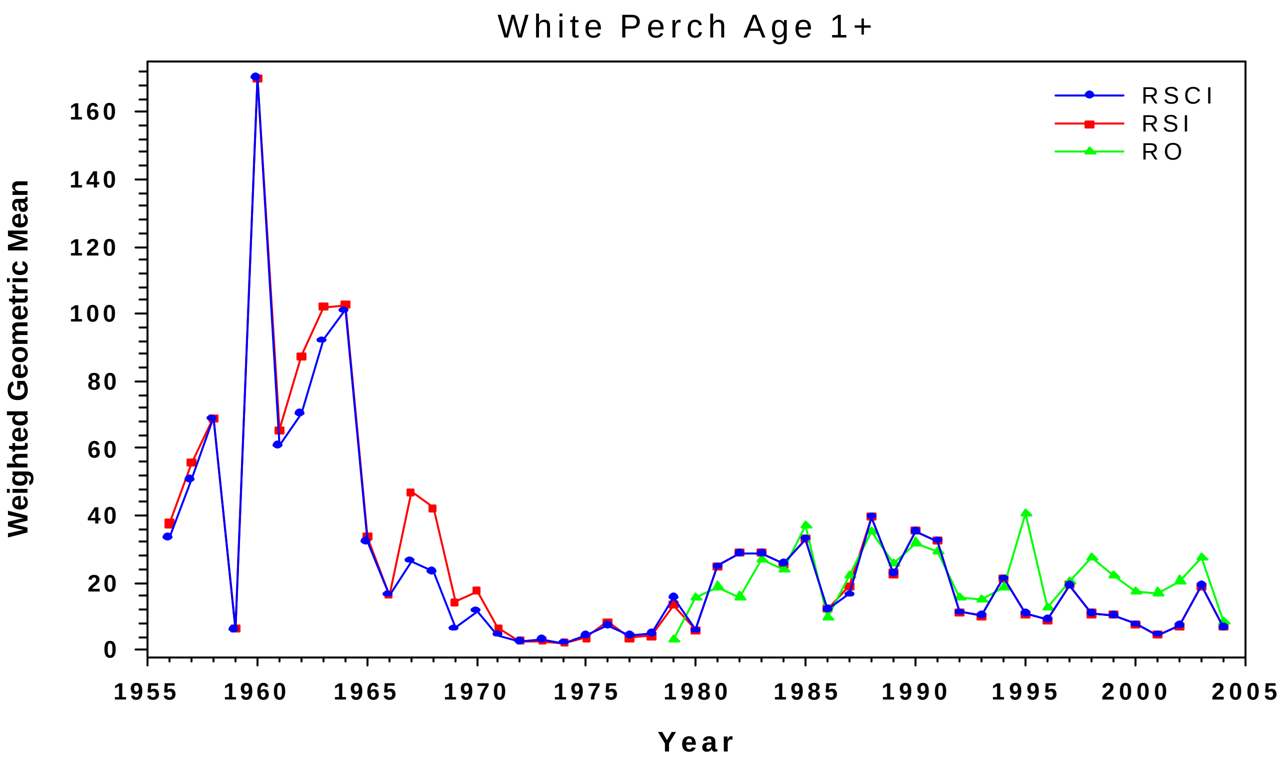
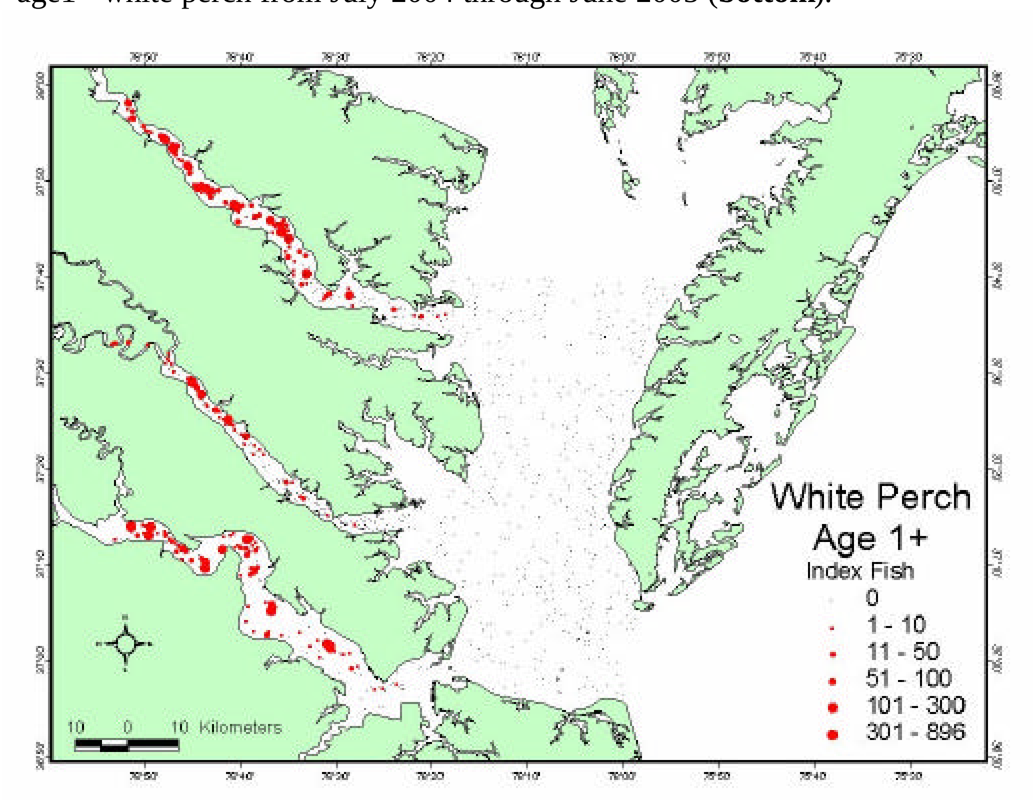


Figure 21. Age 1+ white perch random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of age1+ white perch from July 2004 through June 2005 (**bottom**).



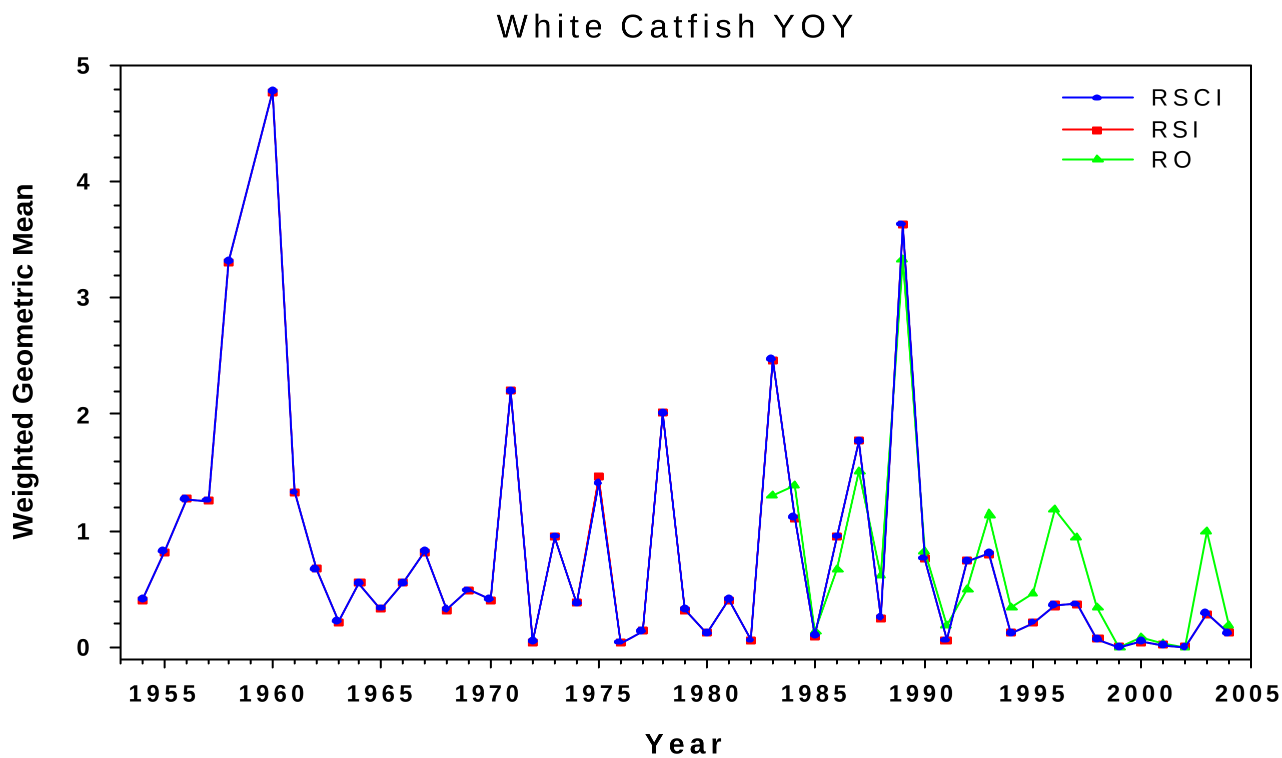


Figure 22. YOY white catfish random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of YOY white catfish from July 2004 through June 2005 (**bottom**).

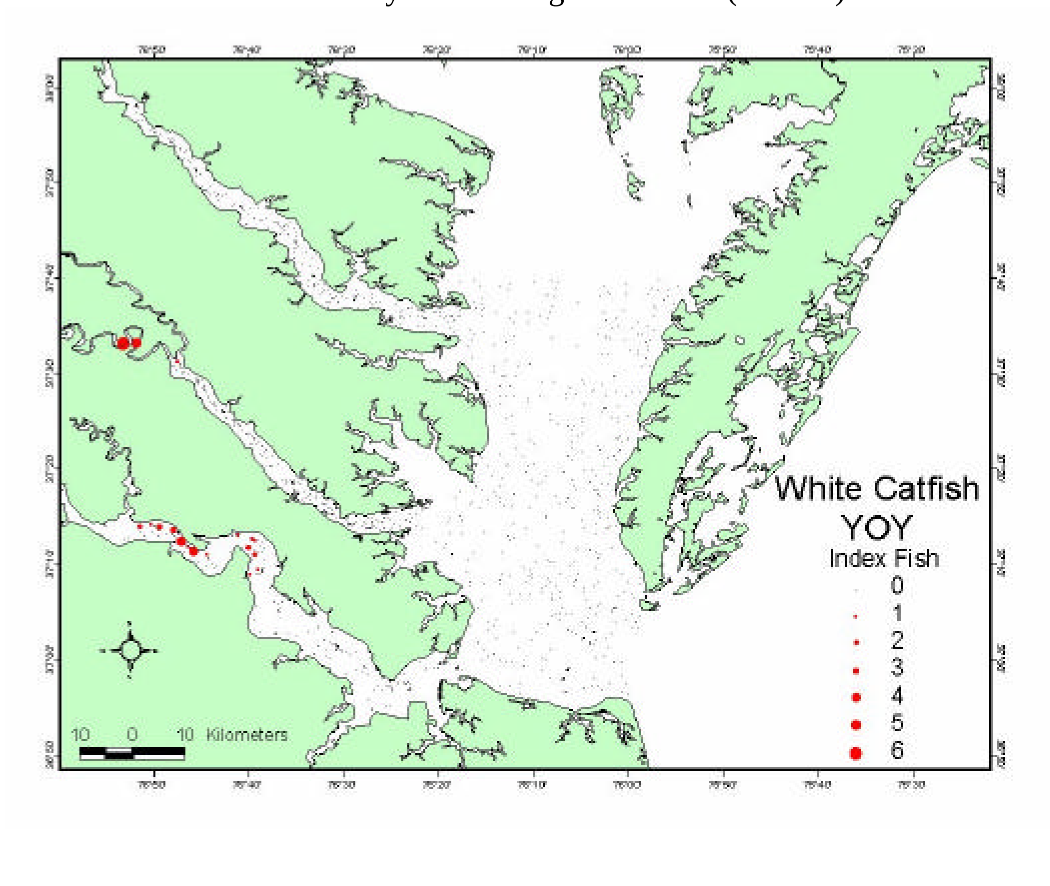
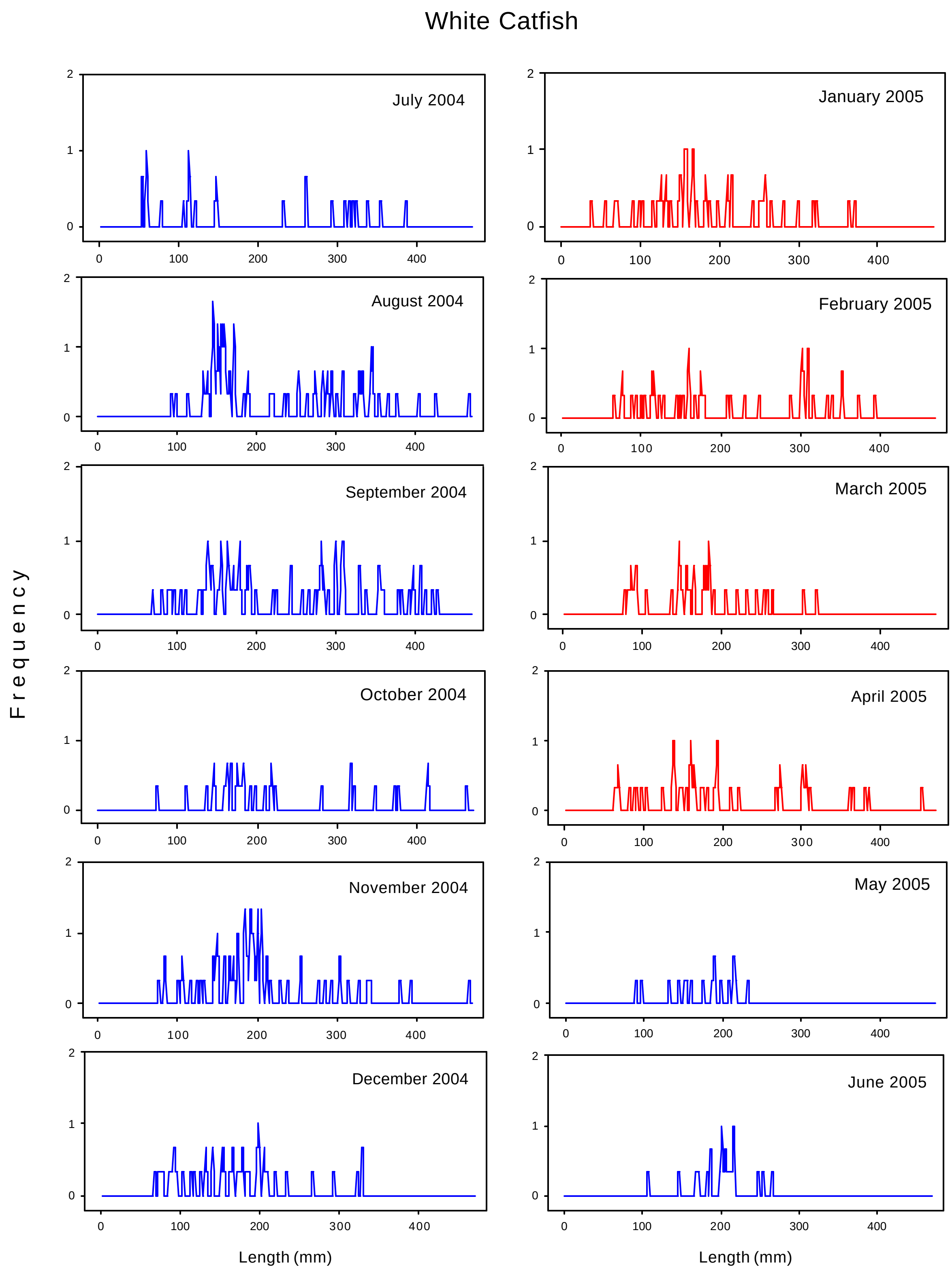


Figure 23. Size frequency of white catfish by month for July 2004 to June 2005. Index months are shown in red.



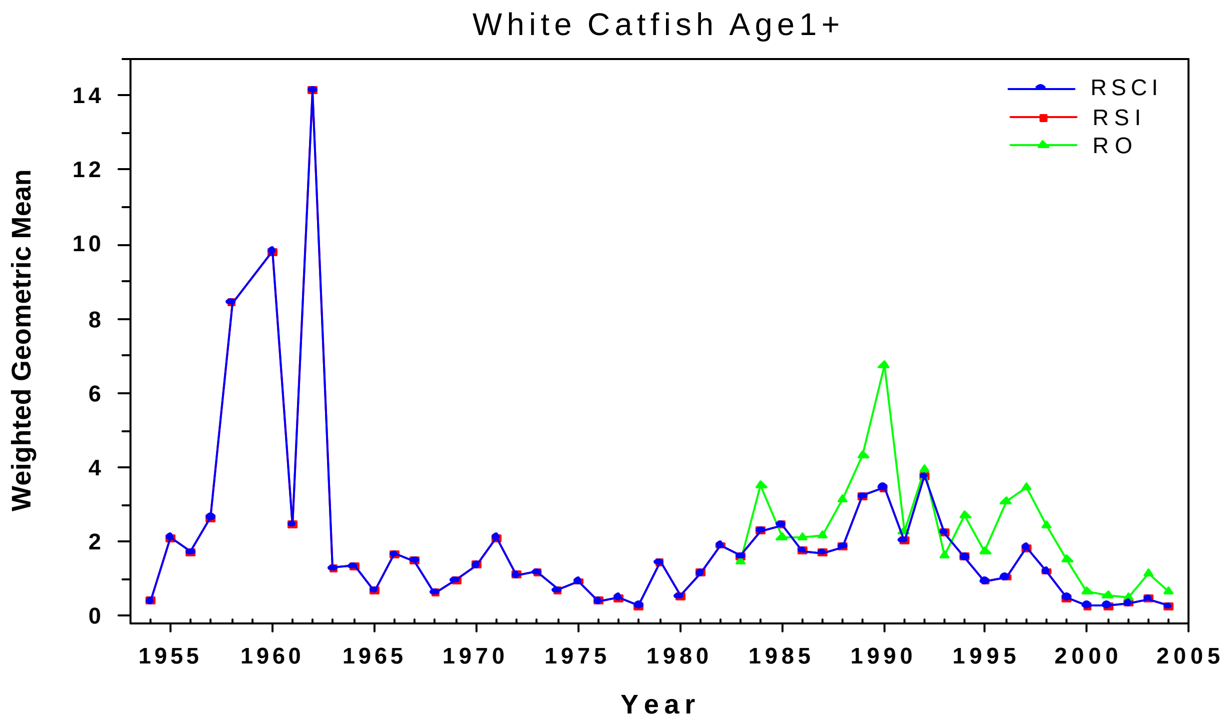
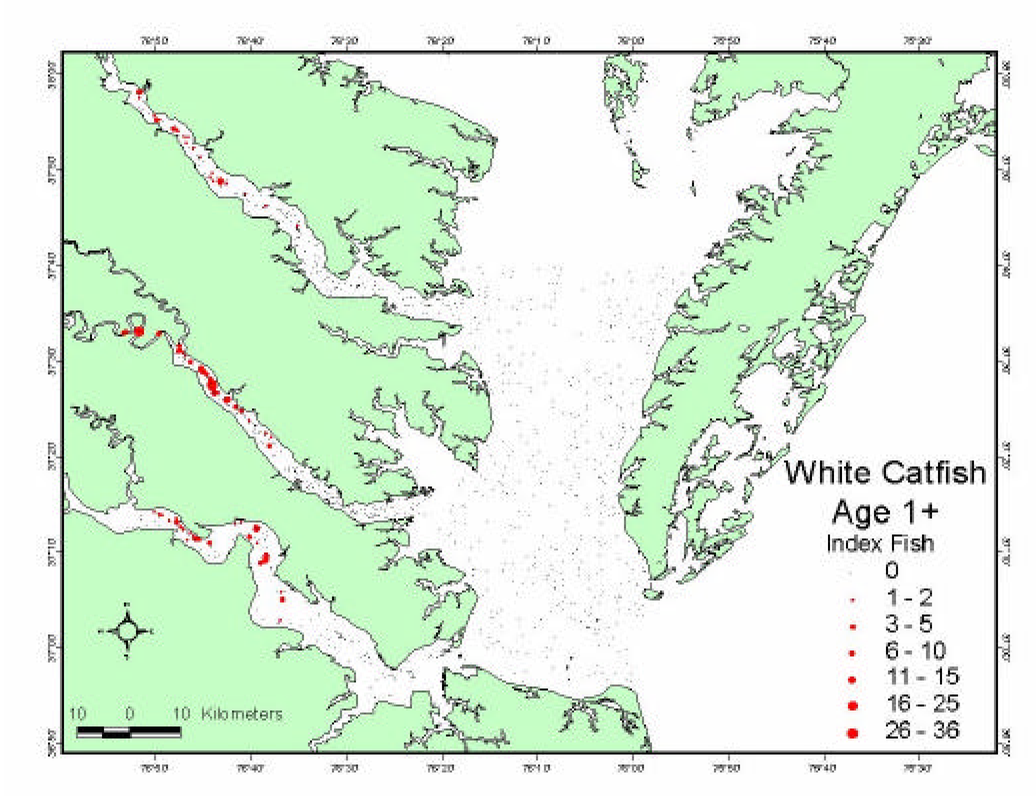


Figure 24. Age 1+ white catfish random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of age 1+ white catfish from July 2004 through June 2005 (**bottom**).



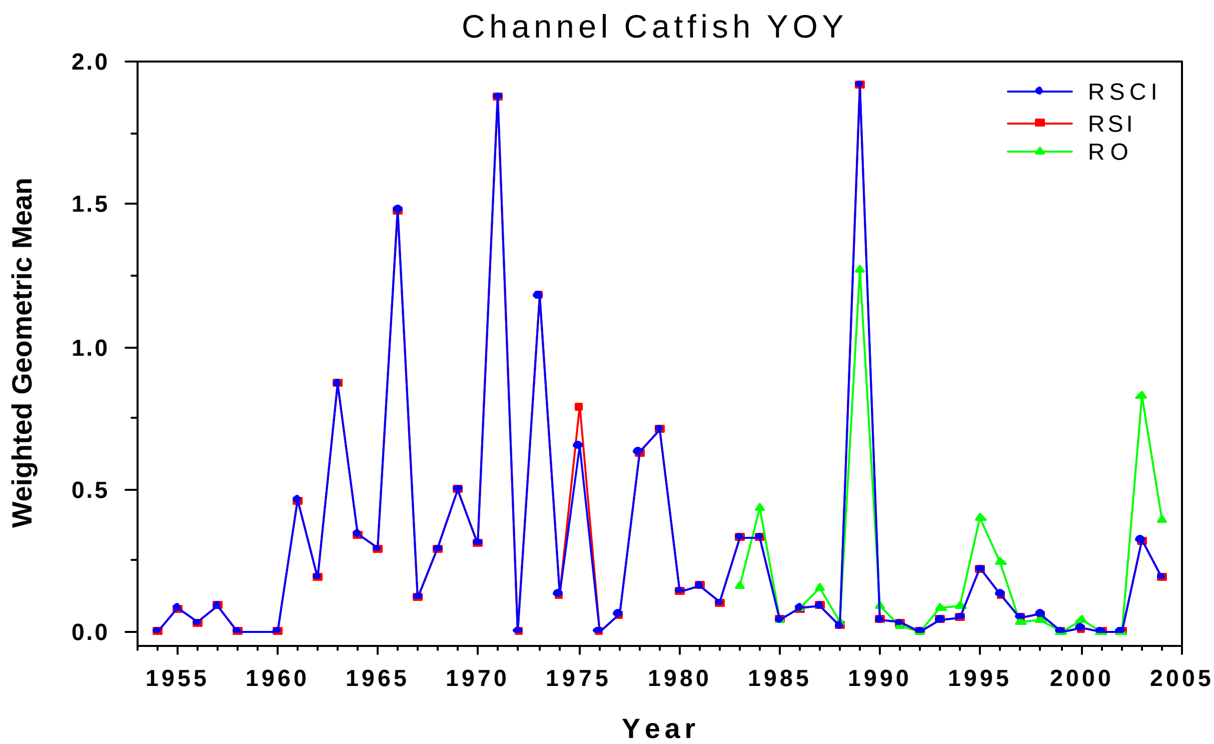


Figure 25. YOY channel catfish random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of YOY channel catfish from July 2004 through June 2005 (**bottom**).

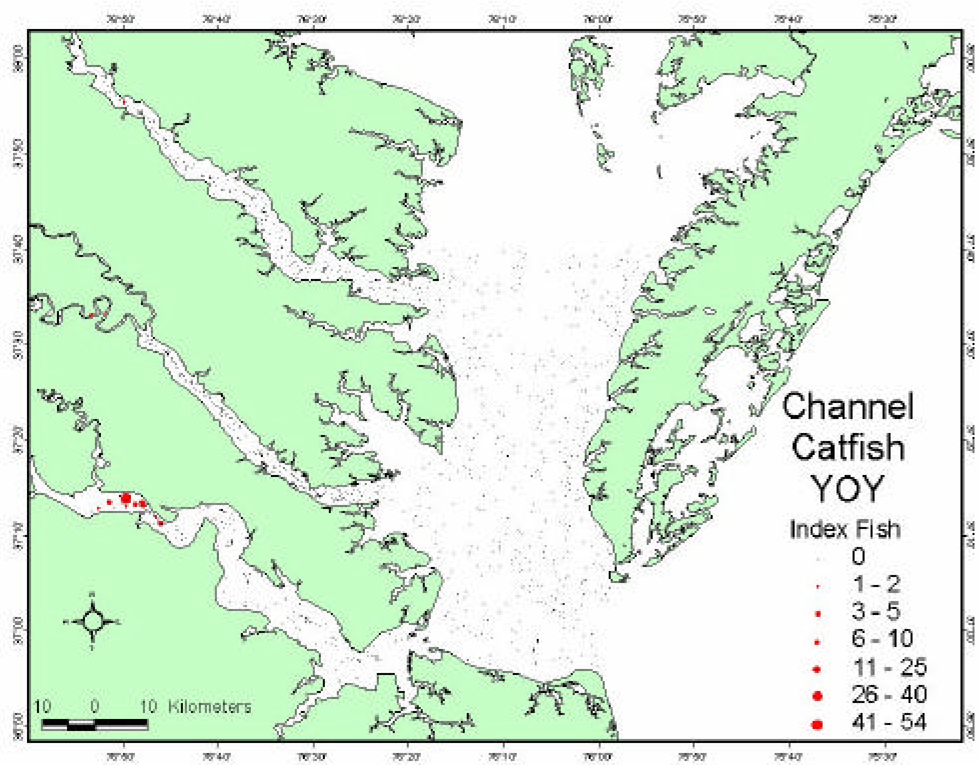
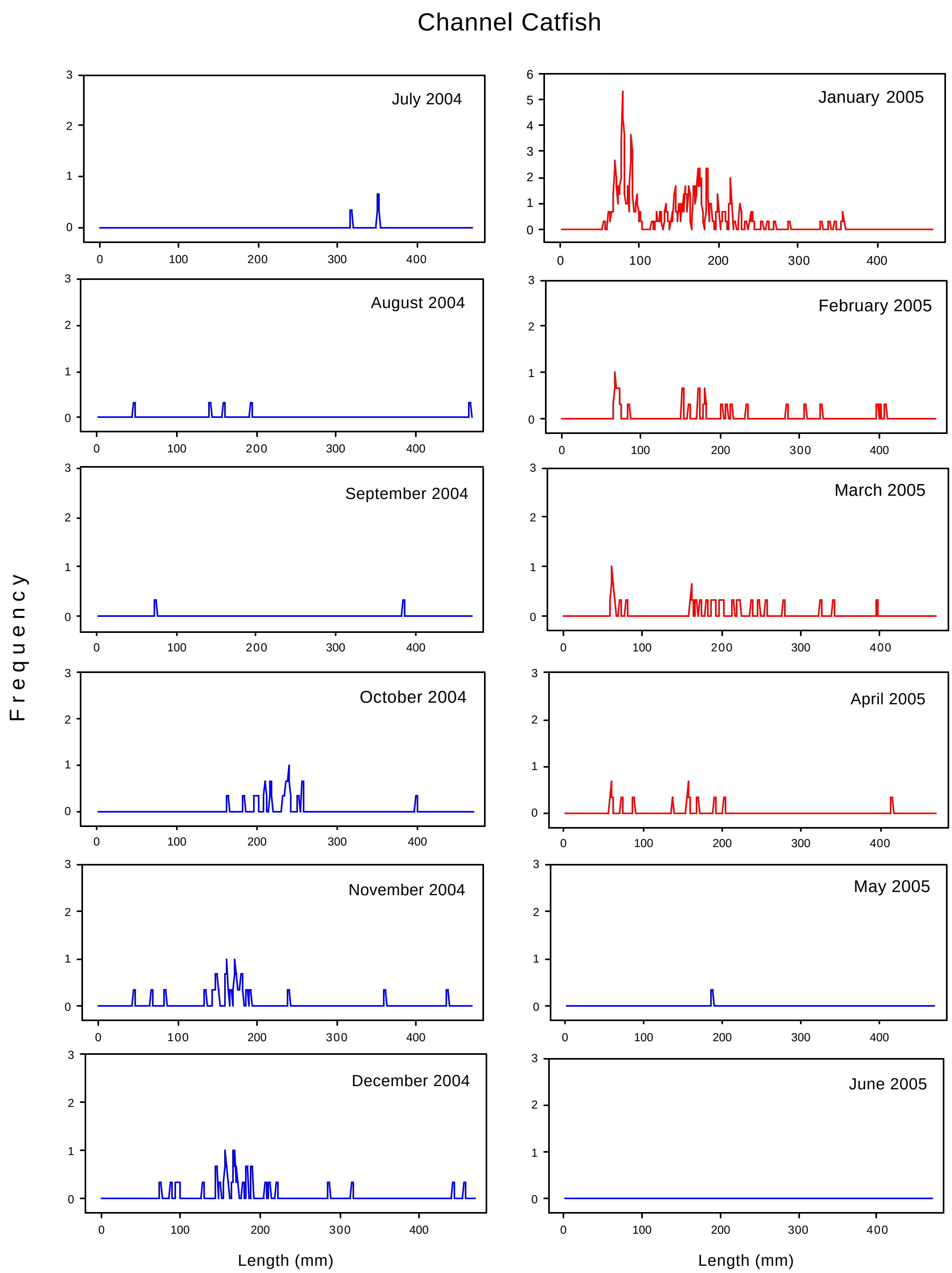


Figure 26. Size frequency of channel catfish by month for July 2004 to June 2005. Index months are shown in red.



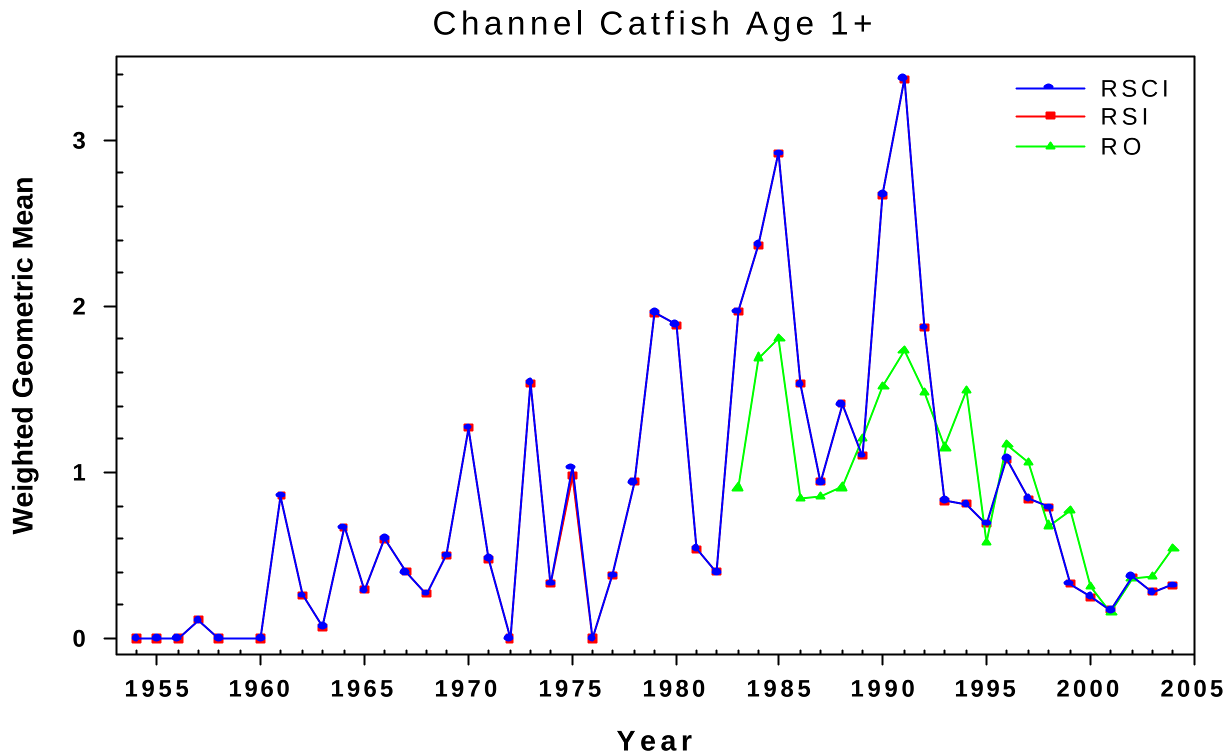
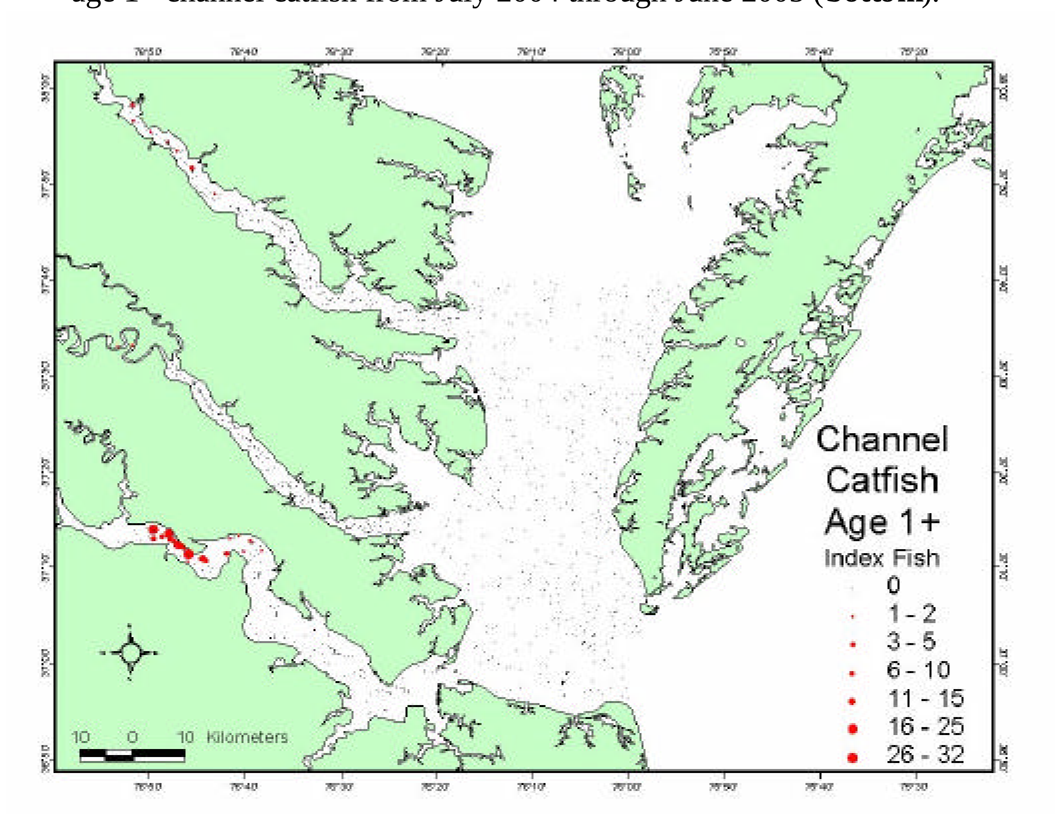


Figure 27. Age 1+ channel catfish random stratified (RSI), random stratified converted (RSCI), and fixed transect (Rivers Only) indices (**top**), and distribution of age 1+ channel catfish from July 2004 through June 2005 (**bottom**).



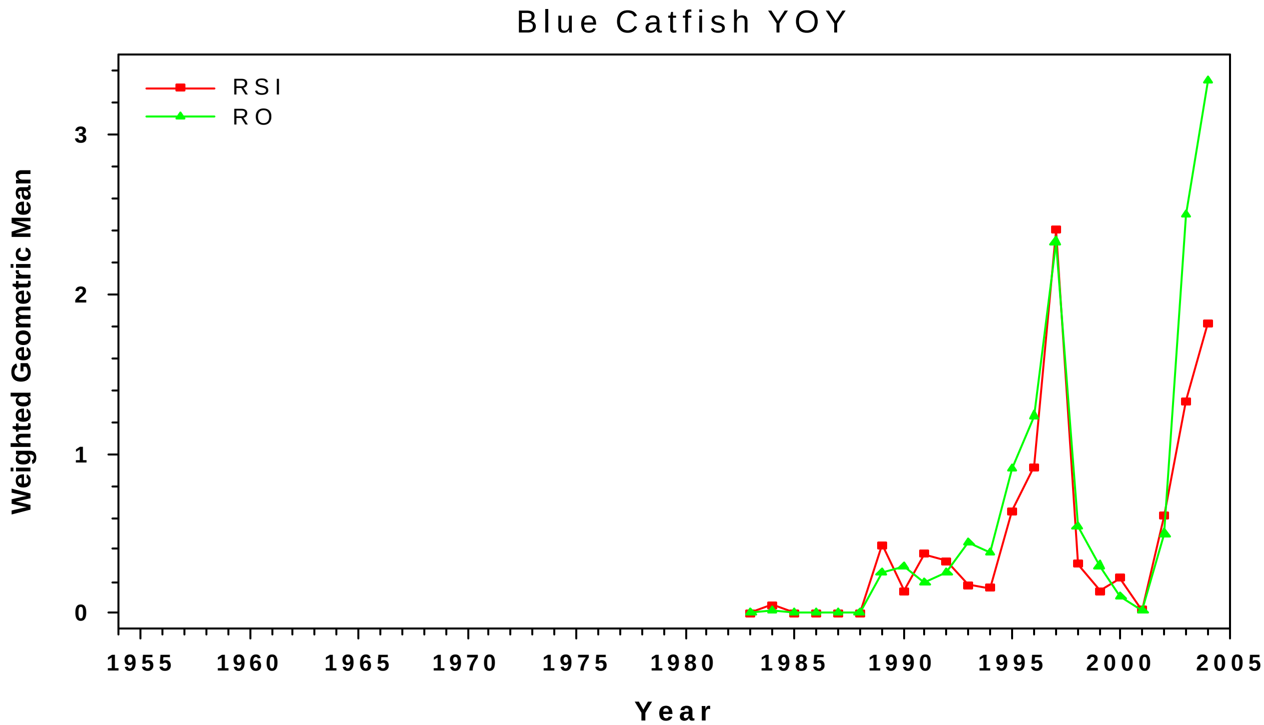


Figure 28. YOY blue catfish random stratified (RSI), and fixed transect (Rivers Only) indices (**top**), and distribution of YOY blue catfish from July 2004 through June 2005 (**bottom**).

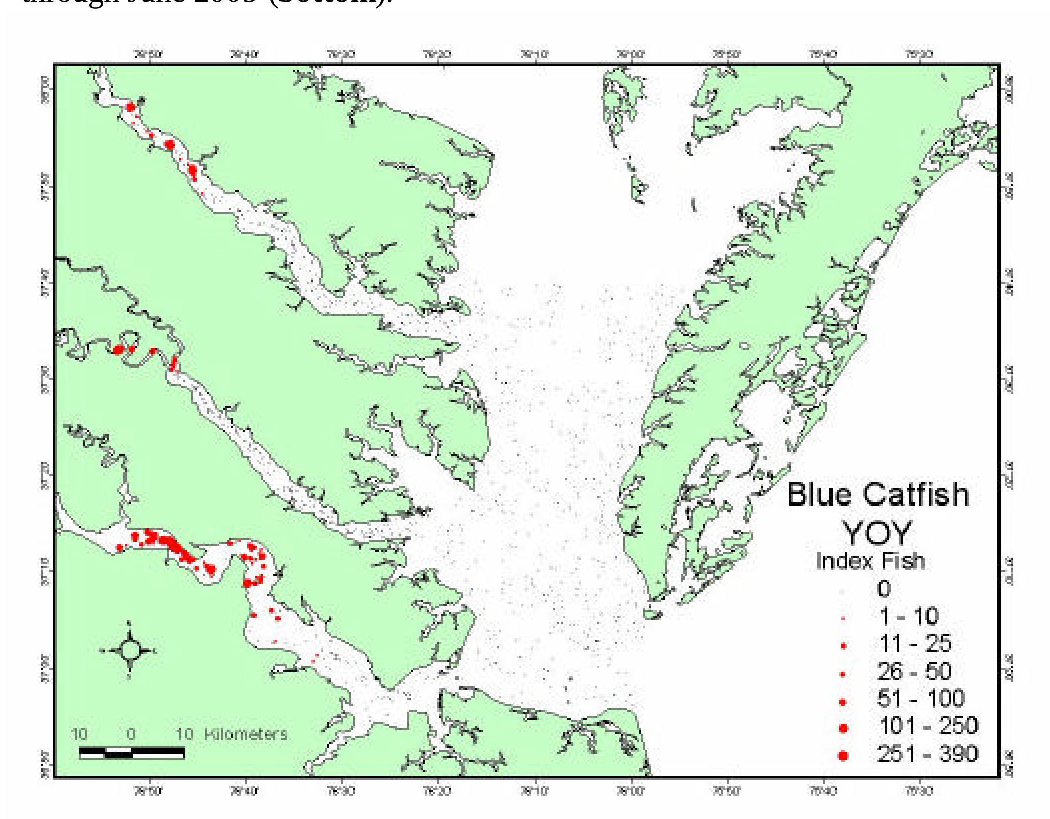
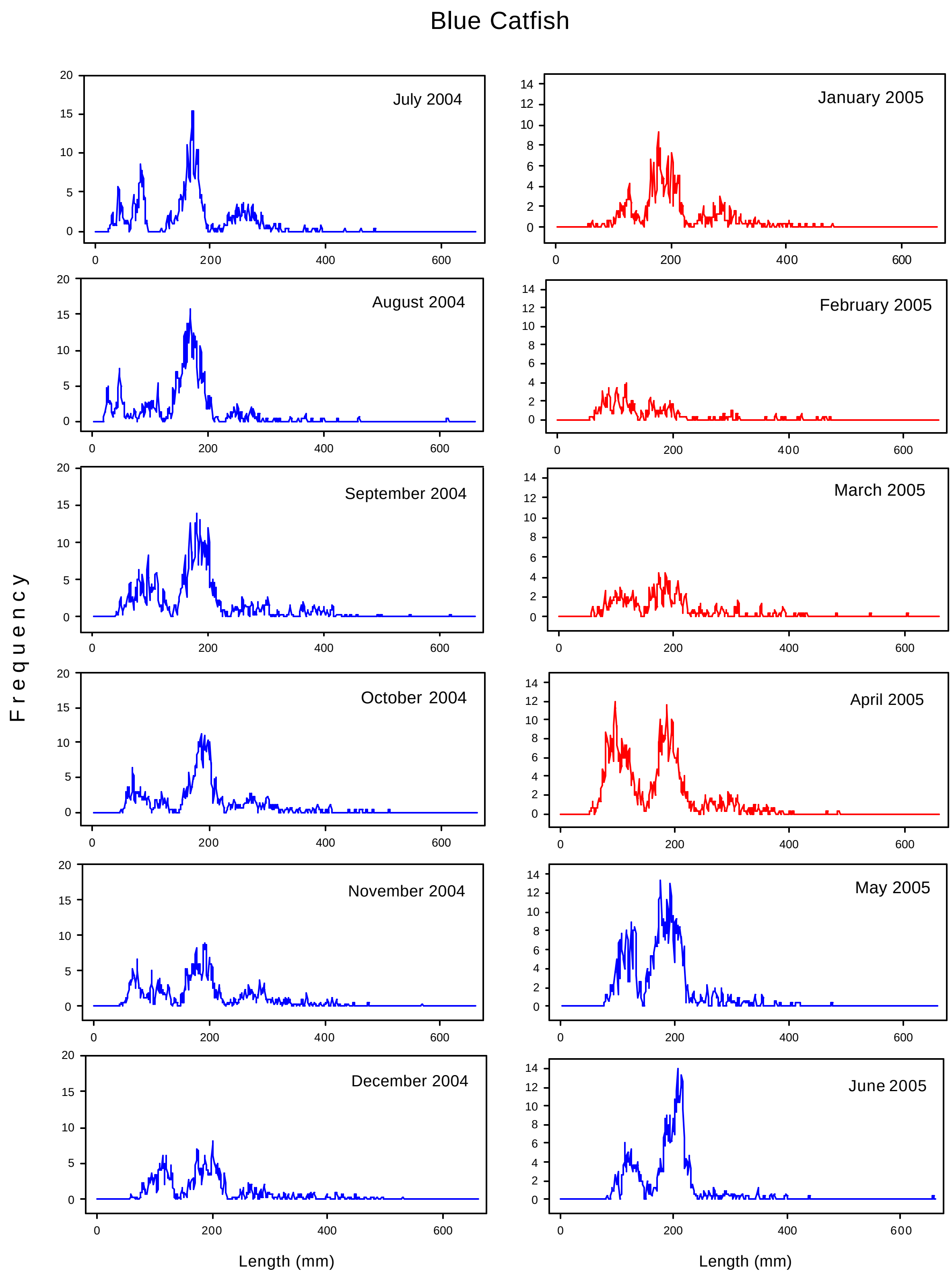


Figure 29. Size frequency of blue catfish by month for July 2004 to June 2005. Index months are shown in red.



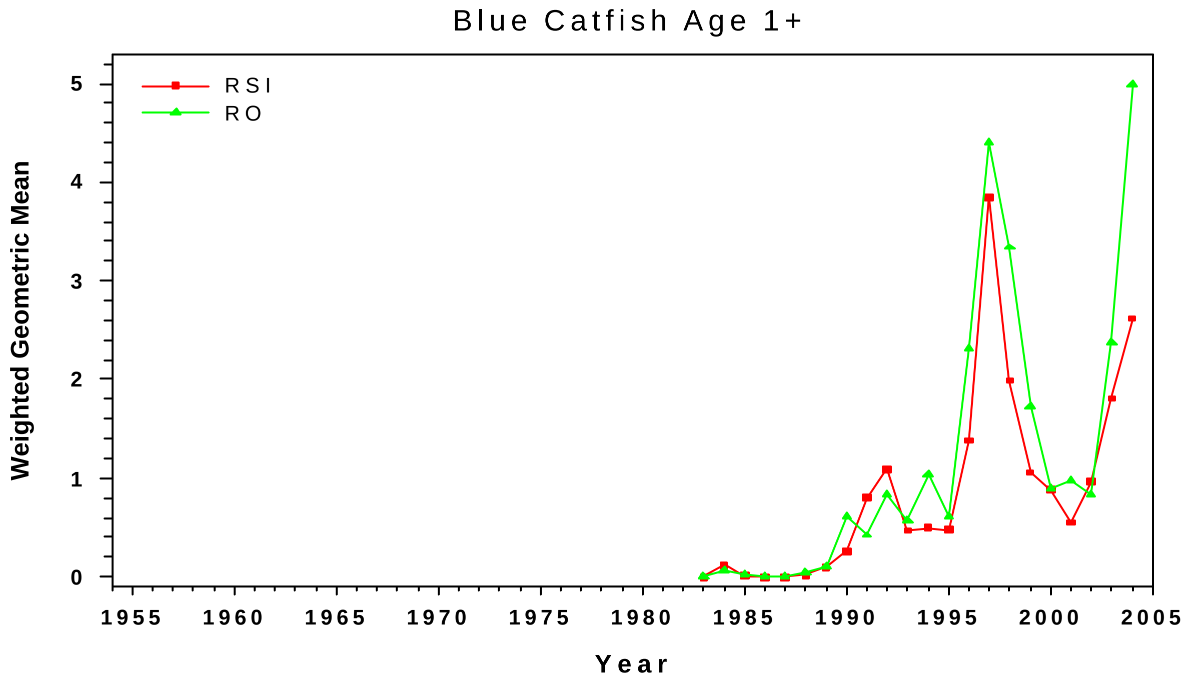
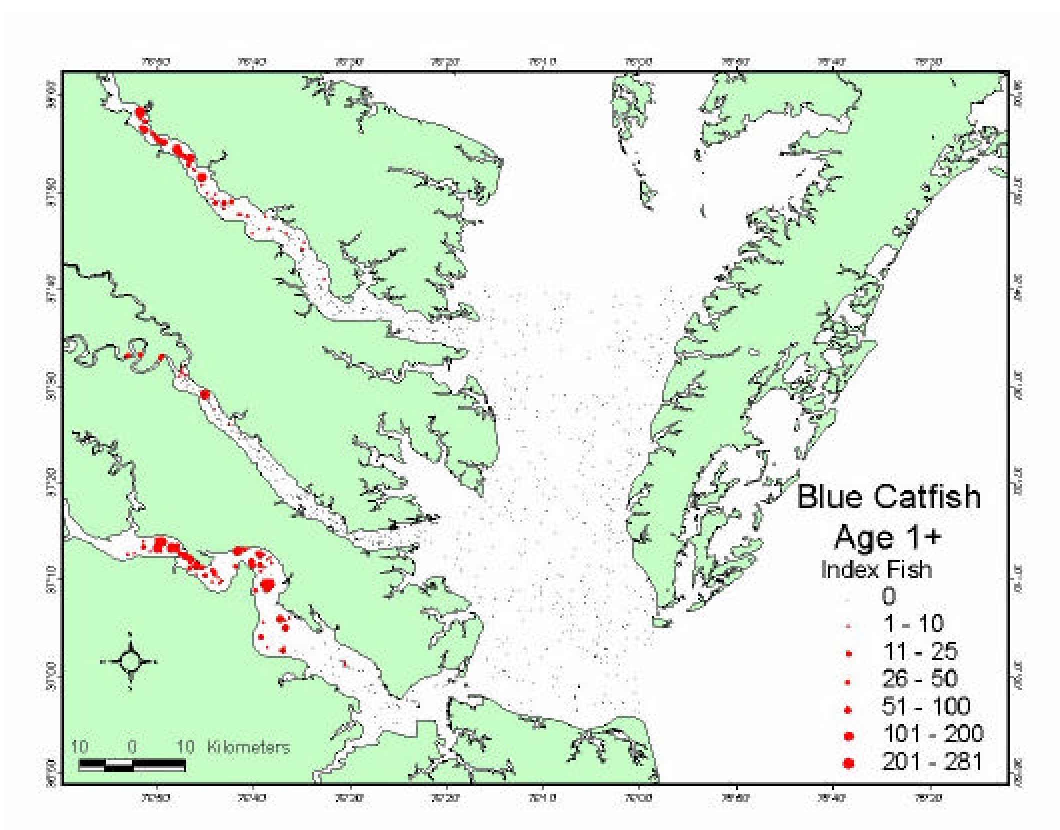


Figure 30. Age 1+ blue catfish random stratified (RSI), and fixed transect (Rivers Only) indices (**top**), and distribution of age 1+ blue catfish from July 2004 through June 2005 (**bottom**).



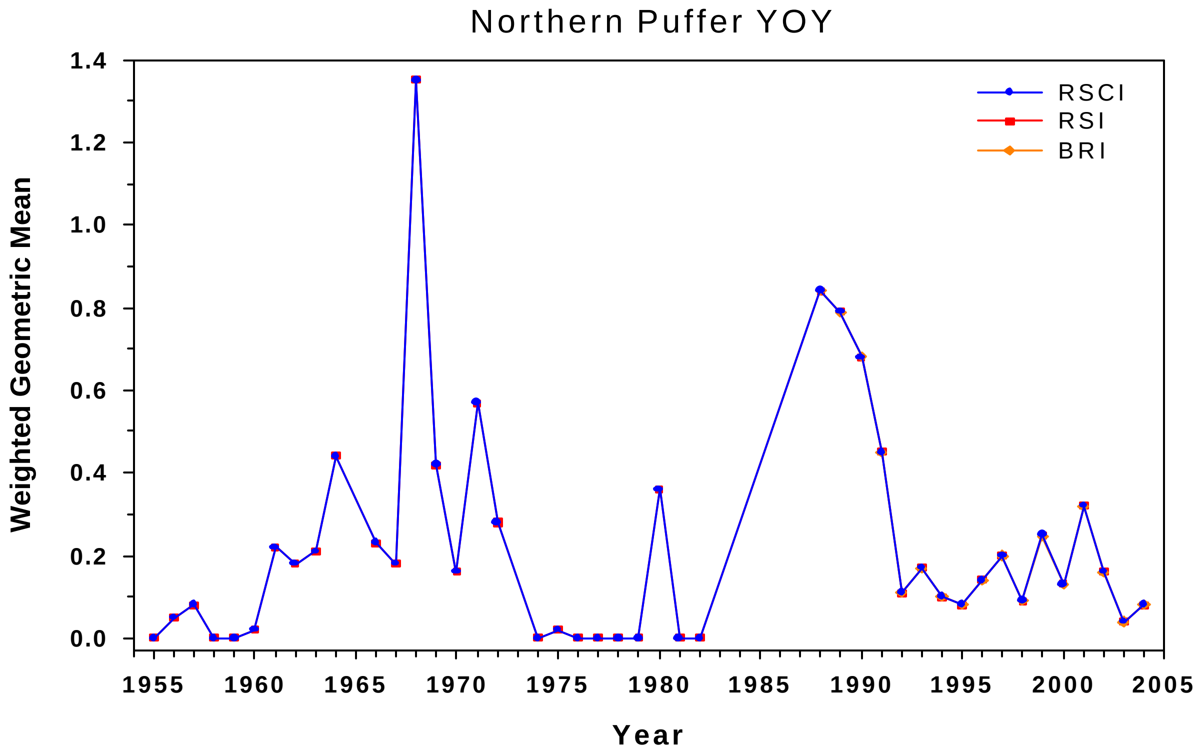


Figure 31. YOY northern puffer random stratified (RSI), random stratified converted (RSCI), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY northern puffer from July 2004 through June 2005 (**bottom**).

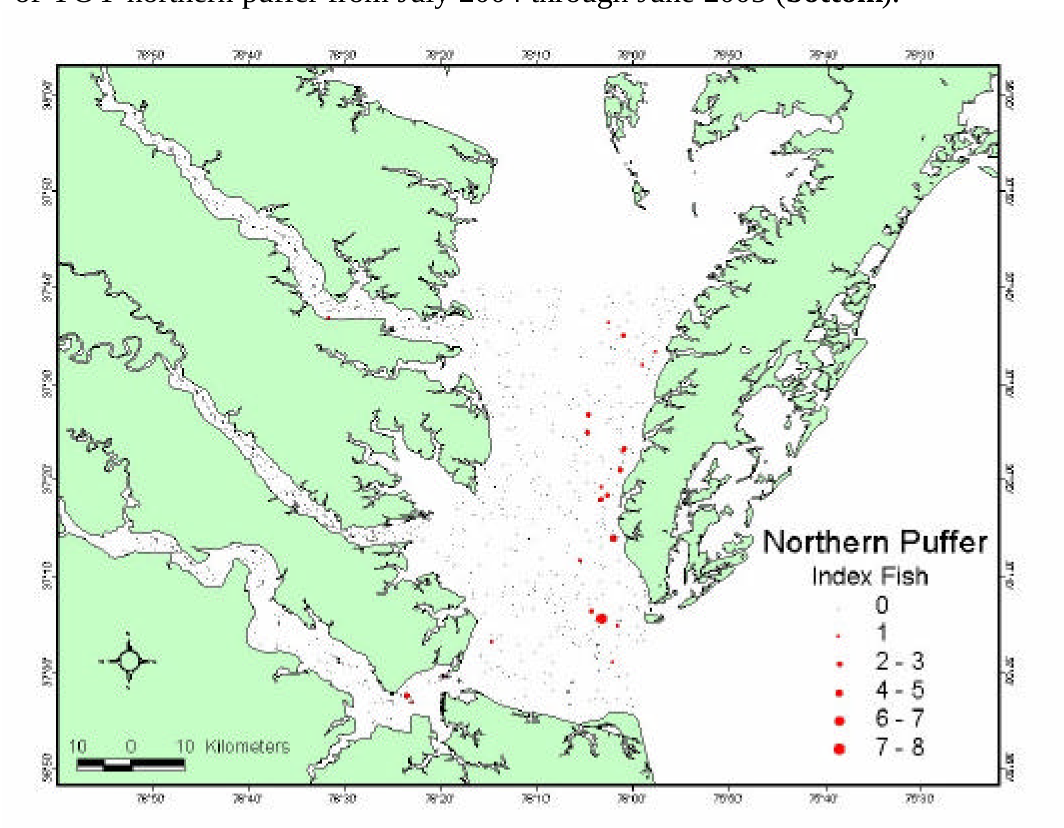
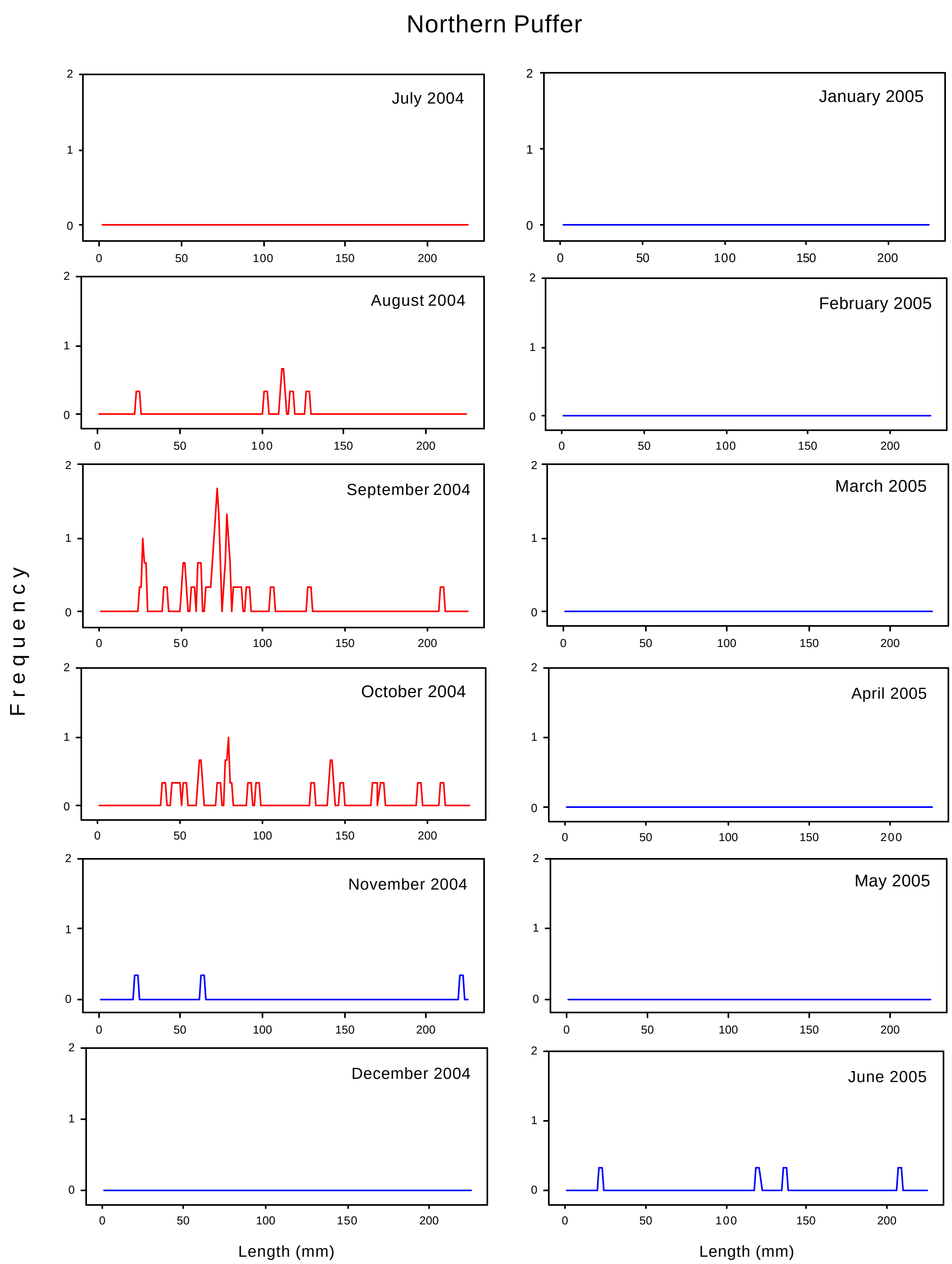


Figure 32. Size frequency of Northern puffer by month for July 2004 to June 2005. Index months are shown in red.



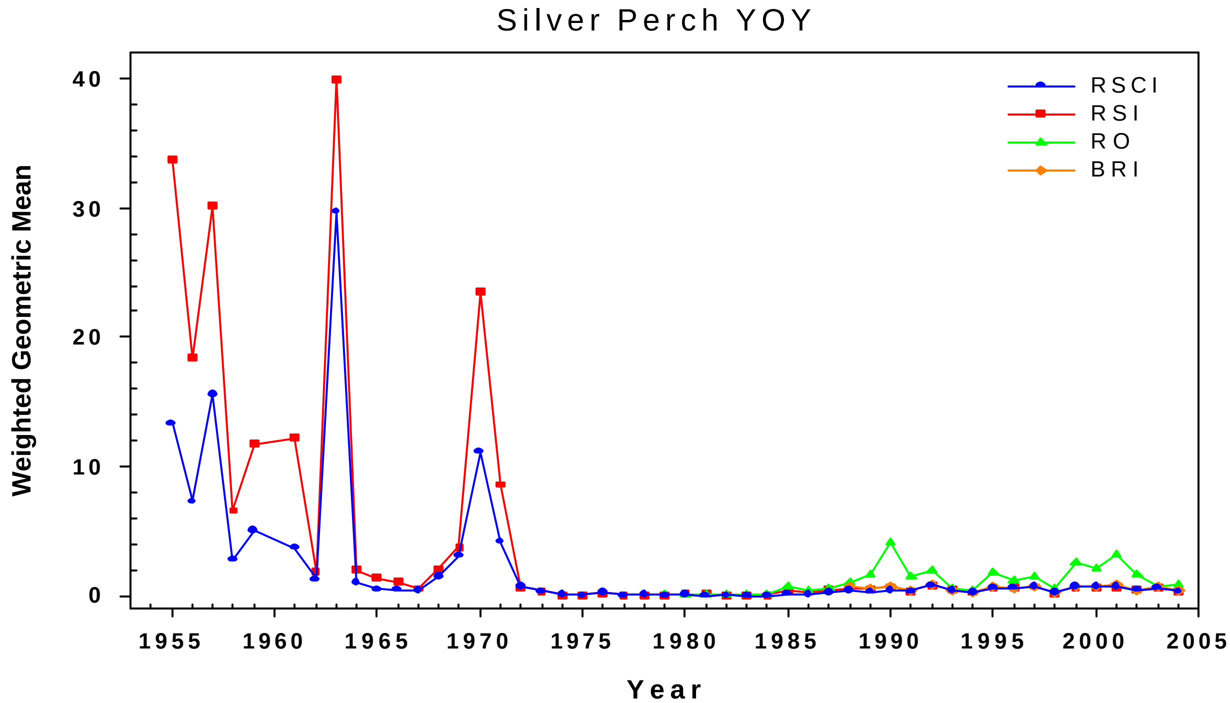


Figure 33. YOY silver perch random stratified (RSI), random stratified converted (RSCI), fixed transect (Rivers Only), and Bay and fixed river station (BRI) indices (**top**), and distribution of YOY silver perch from July 2004 through June 2005 (**bottom**).

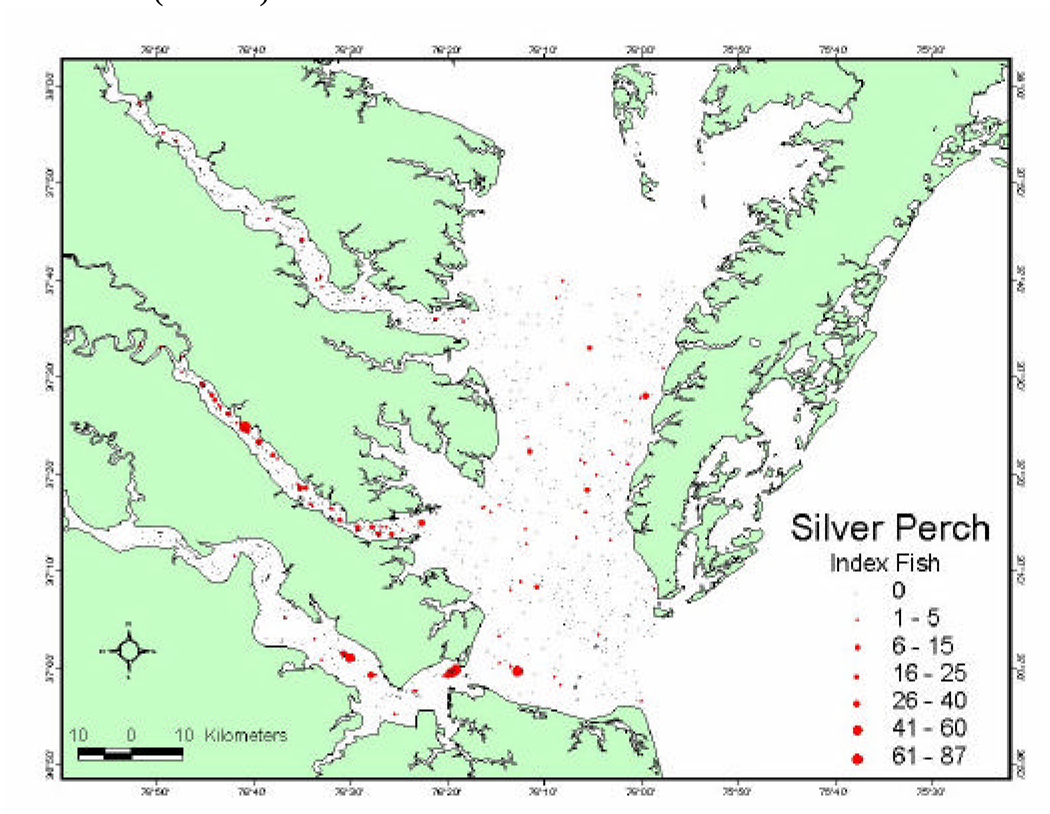
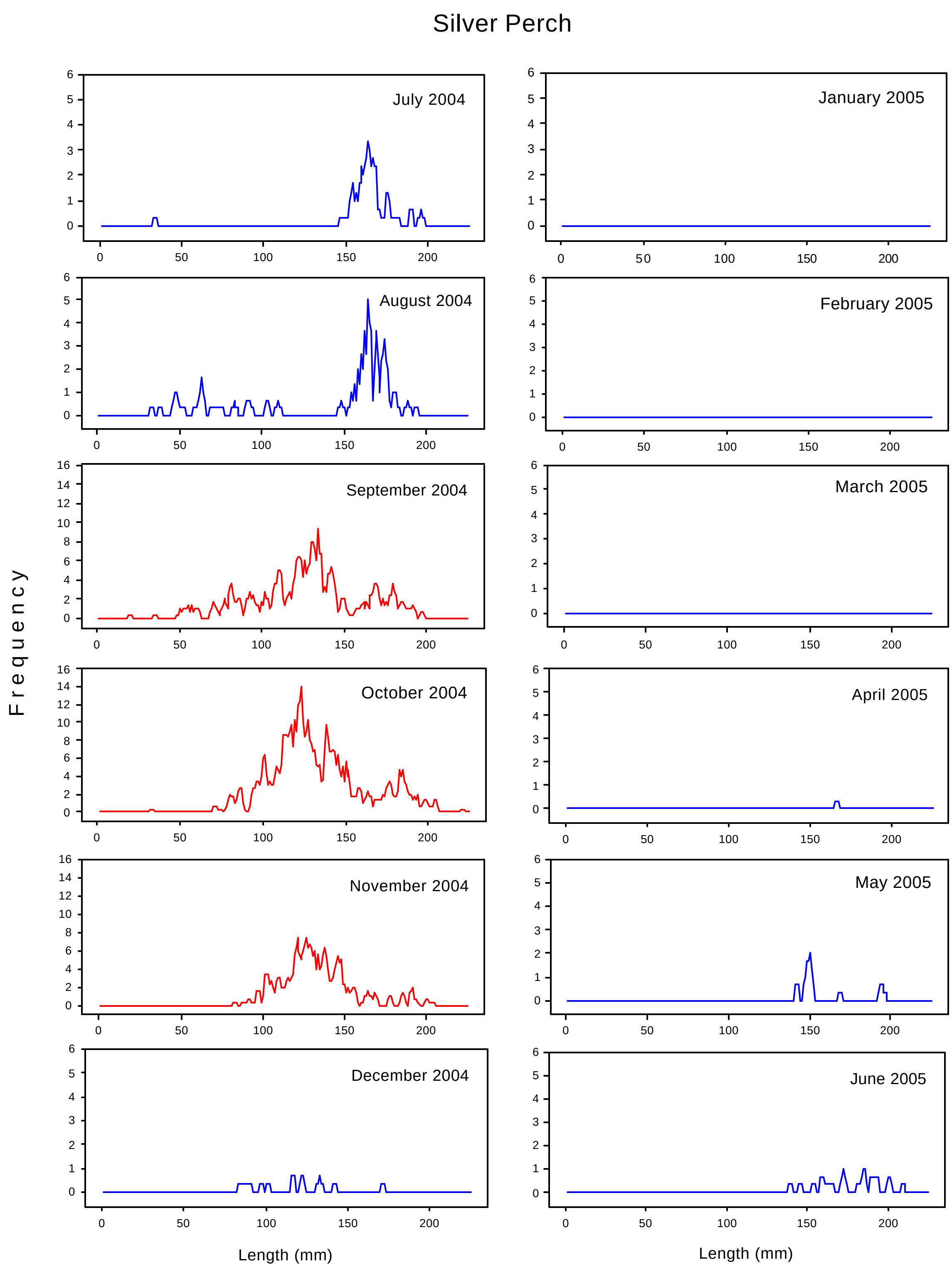


Figure 34. Size frequency of silver perch by month for July 2004 to June 2005. Index months are shown in red.



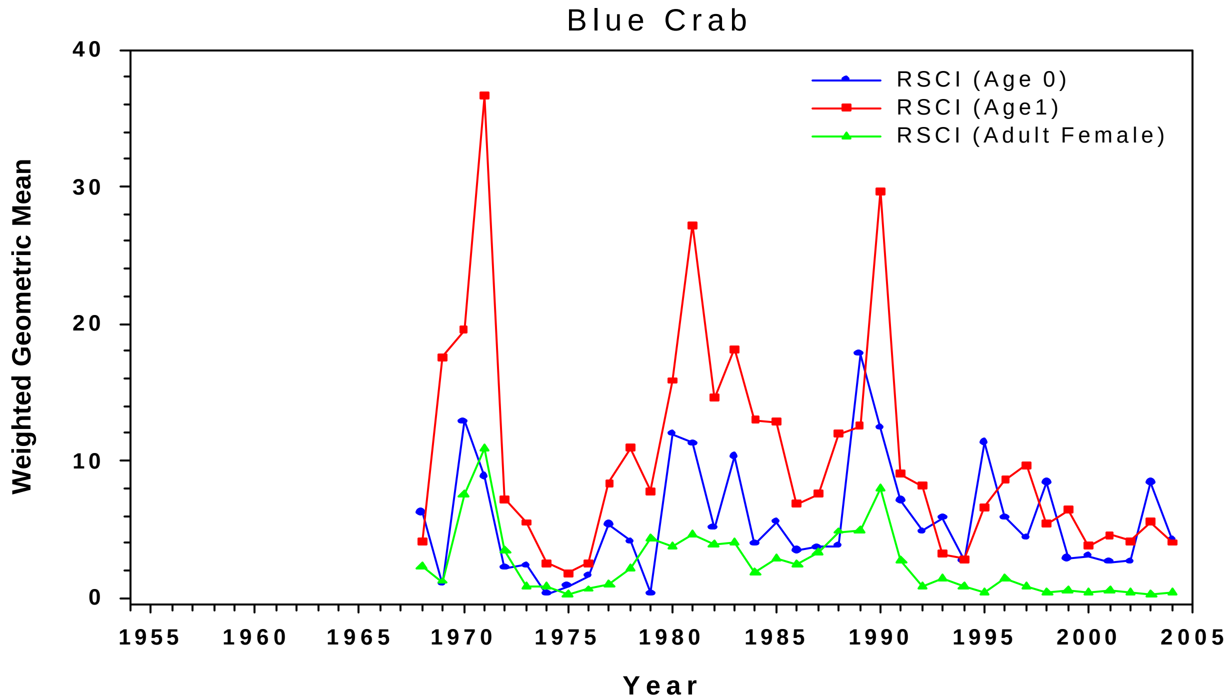


Figure 35. Age 0 (YOY), Age 1+, and adult female blue crab random stratified converted (RSCI) indices.

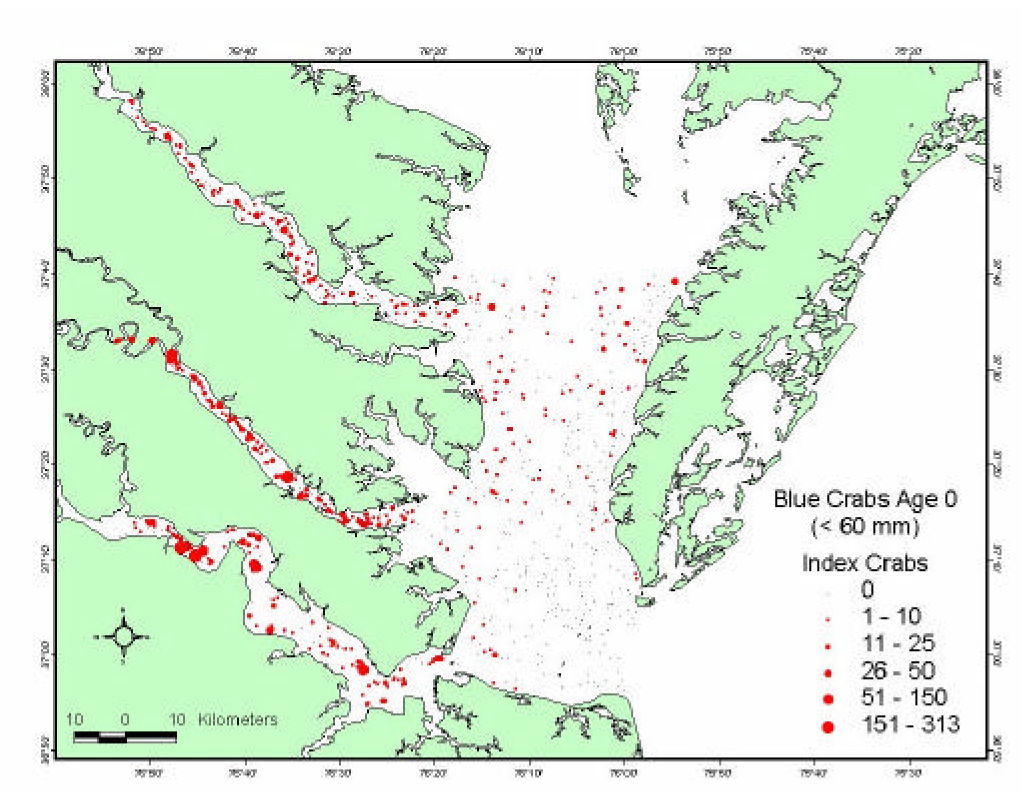
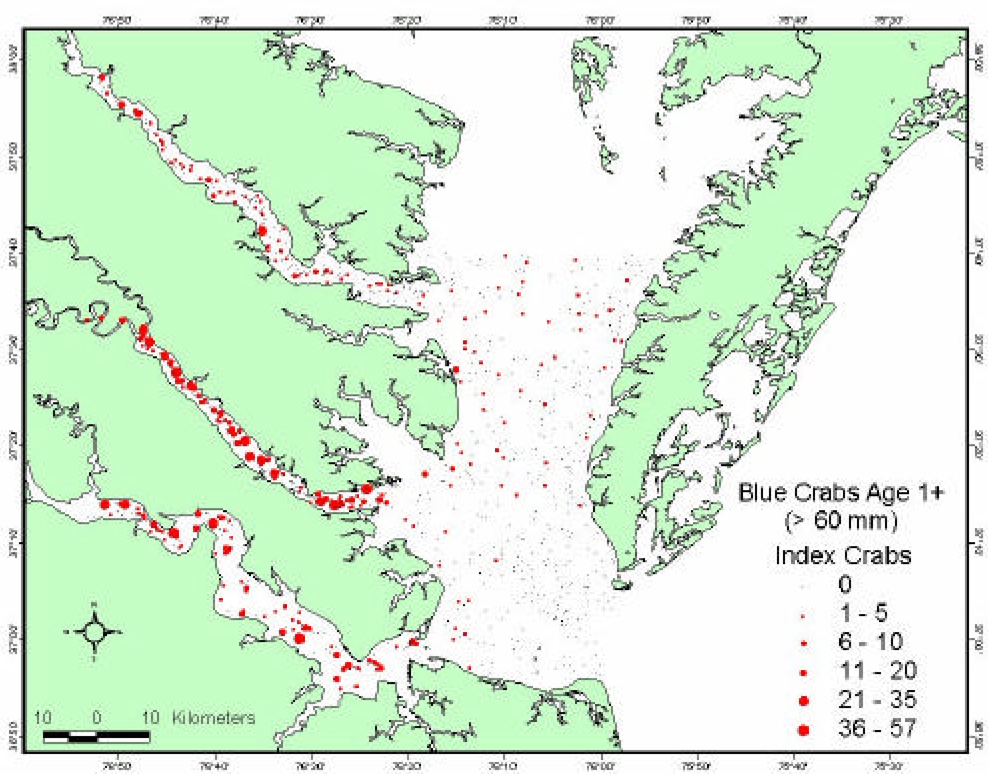


Figure 36. Distribution of Age 0 blue crabs from July 2004 through June 2005.



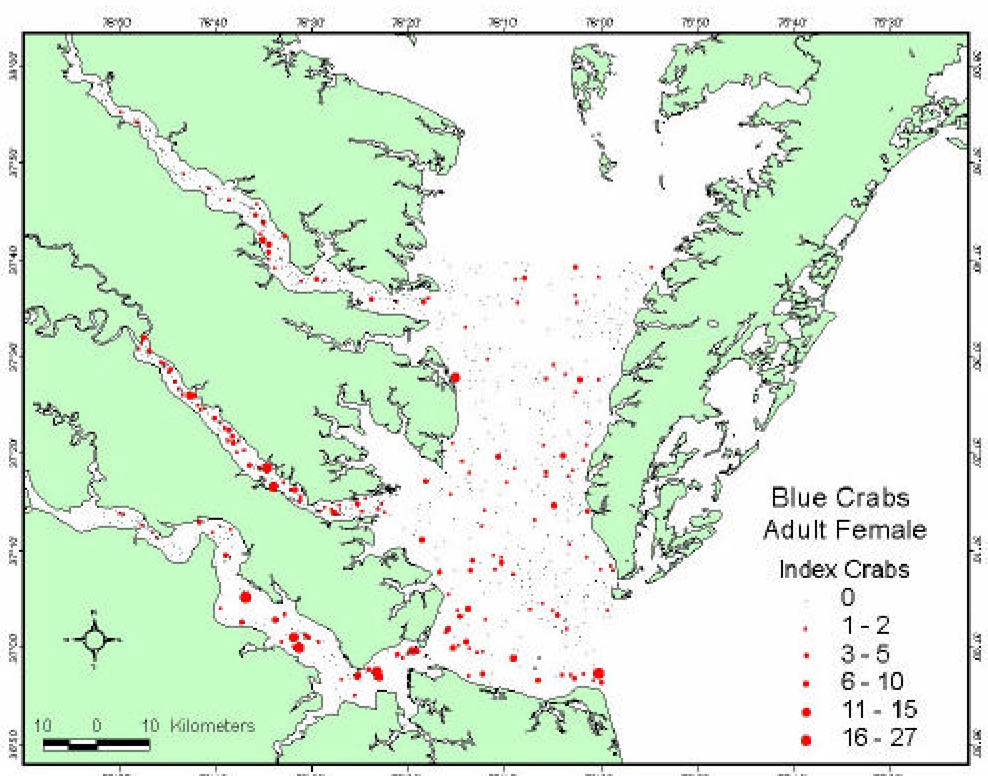


Figure 37. Distribution of Age 1+ blue crabs (**top**), and adult female blue crabs (**bottom**), from July 2004 through June 2005.

Figure 38. Size frequency of male and juvenile female blue crabs by month for July 2004 to June 2005. Index months are shown in red.

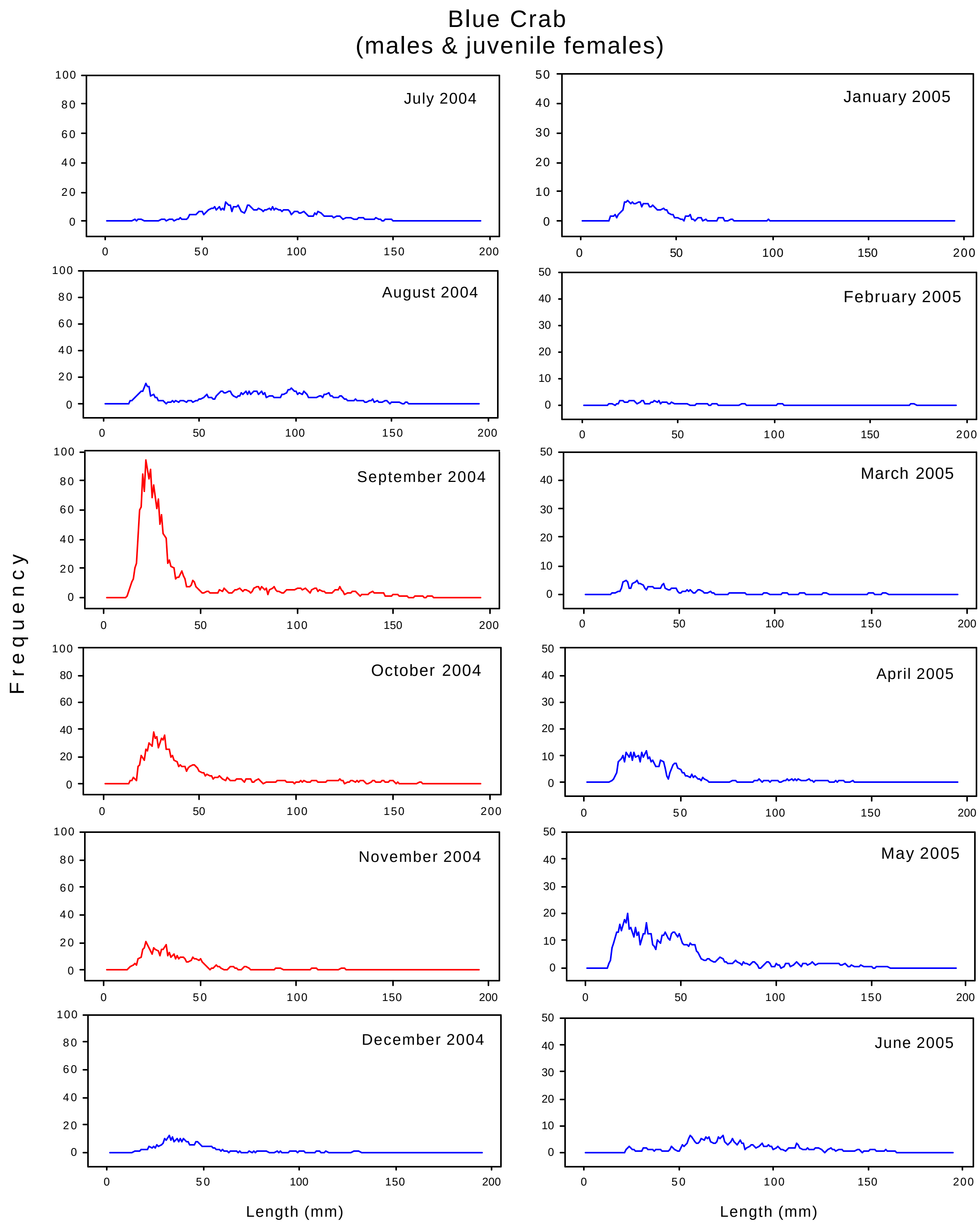
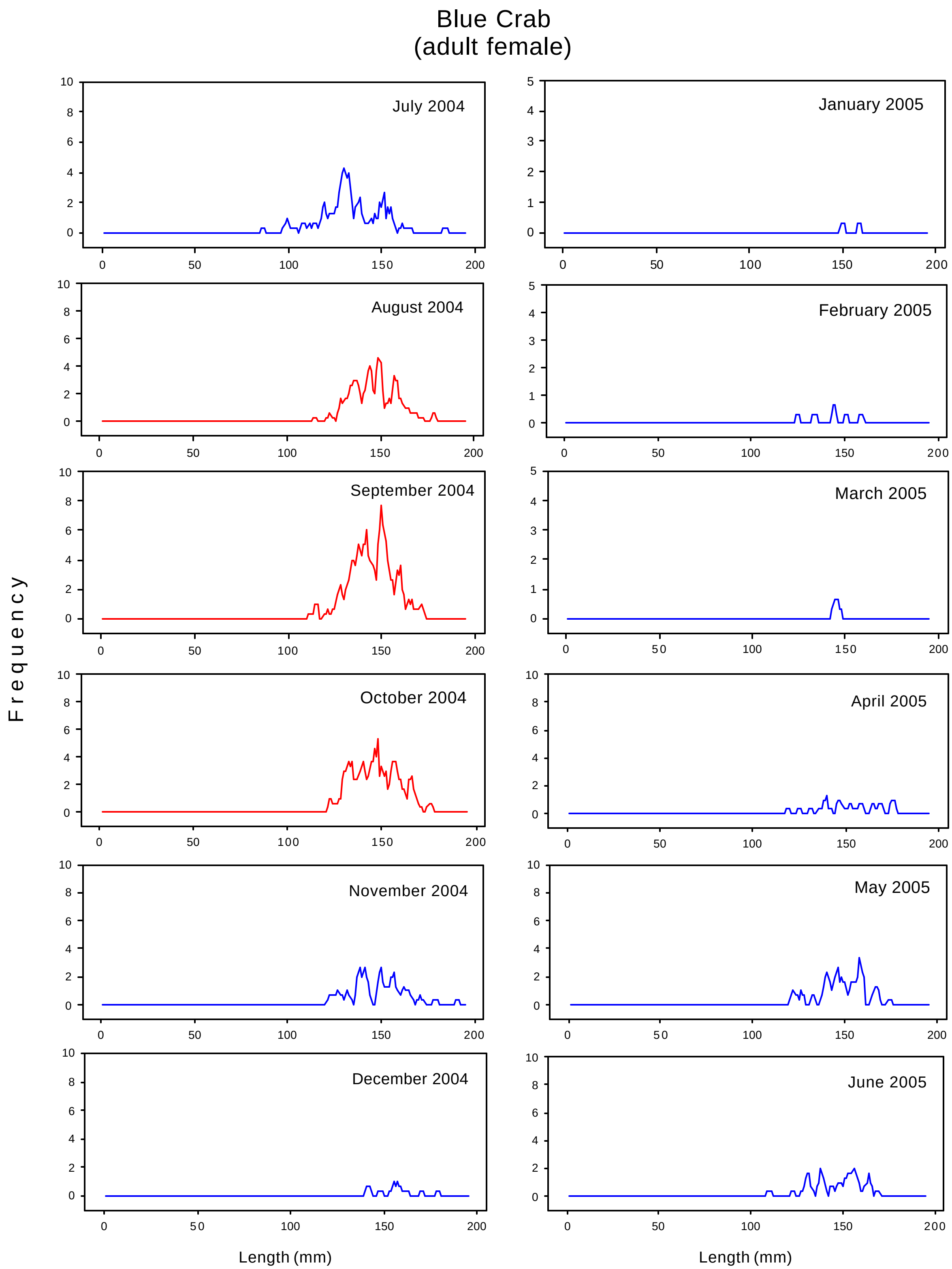


Figure 39. Size frequency of adult female blue crabs by month for July 2004 to June 2005. Index months are shown in red.



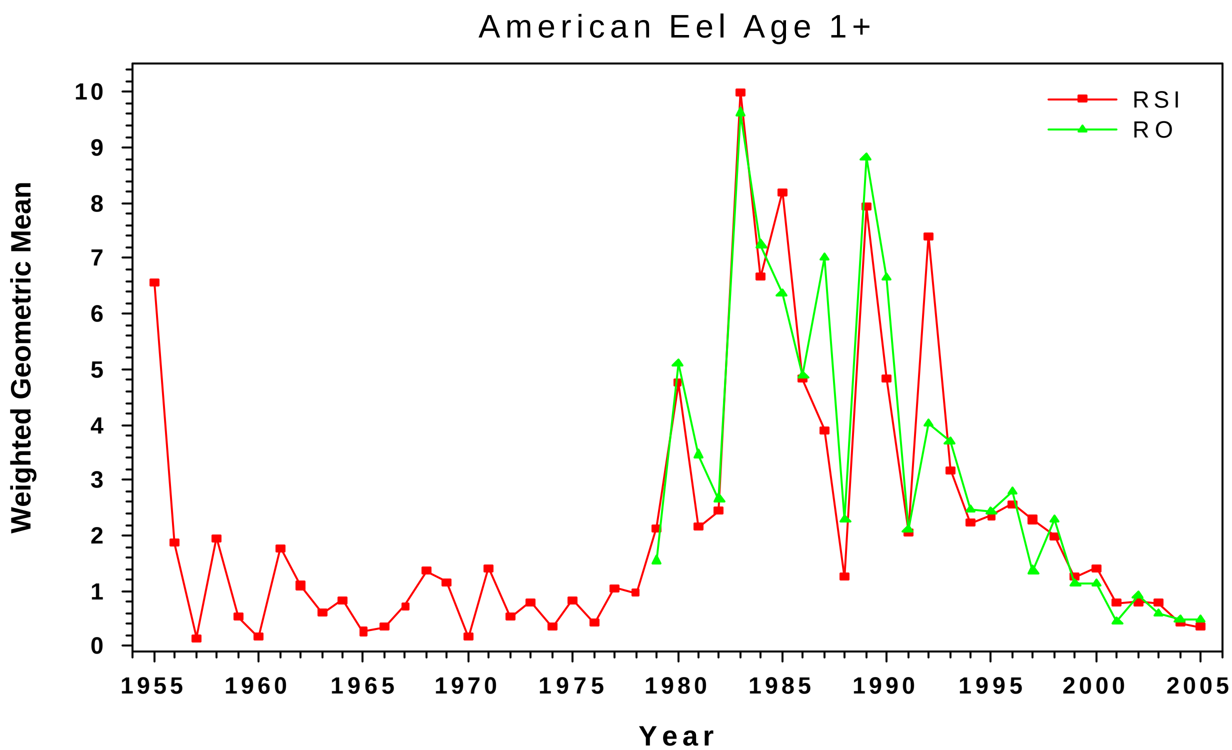


Figure 40. American eel random stratified index (RSI) index (**top**) and distribution of American eel (all year classes combined; **bottom**) from July 2004 - June 2005.

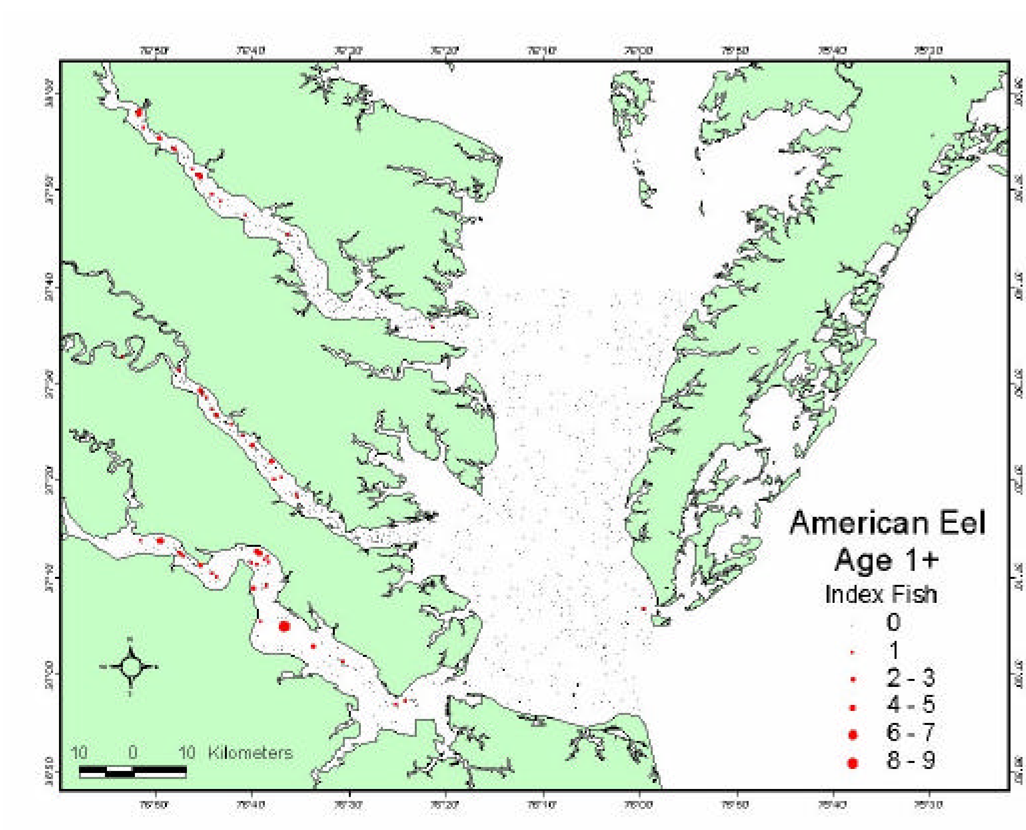
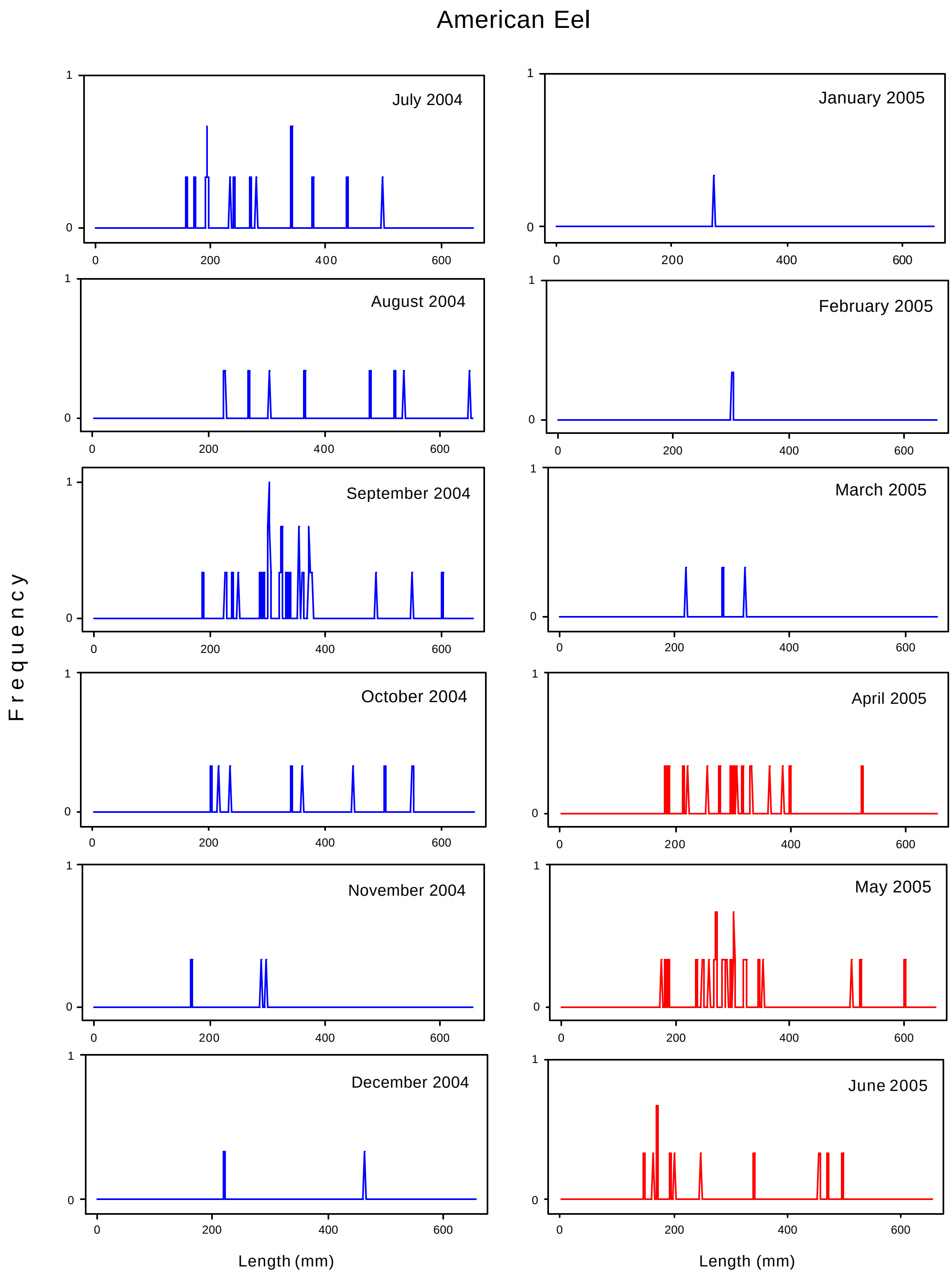


Figure 41. Size frequency of American eels by month for July 2004 to June 2005. Index months are shown in red.



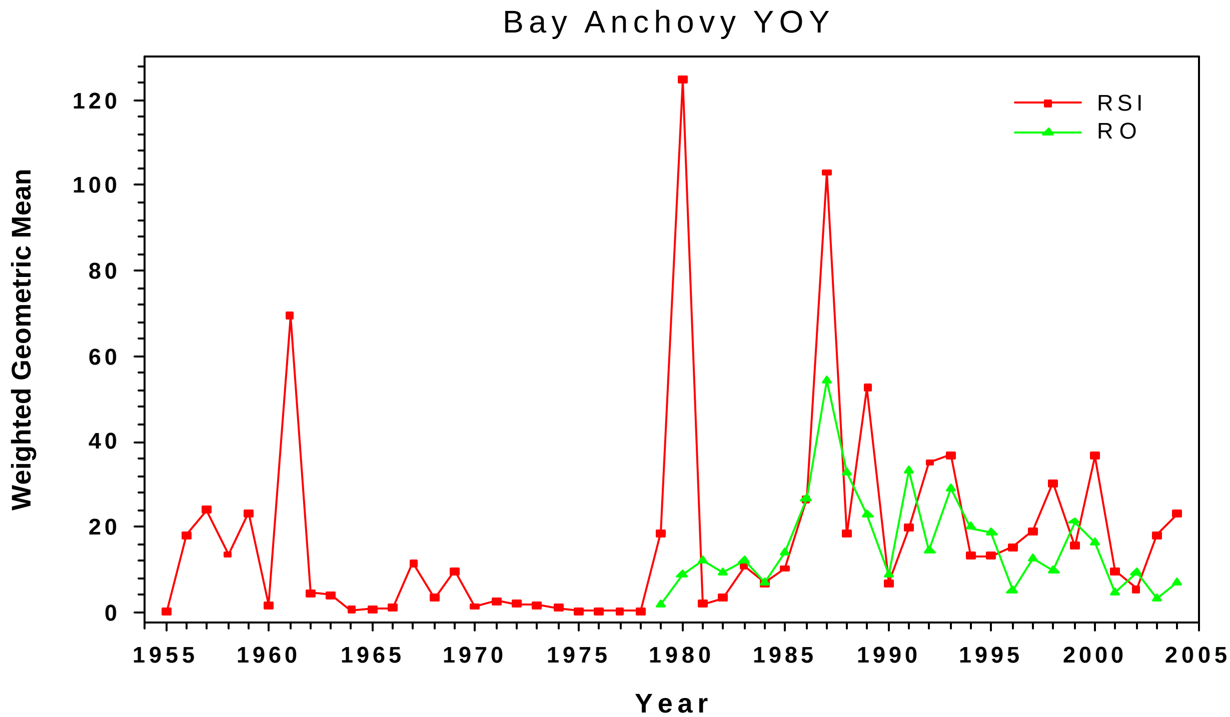


Figure 42. Bay anchovy random stratified (RSI) and river only (RO) index (**top**) and distribution of YOY bay anchovy from July 2004 through June 2005 **(bottom).**

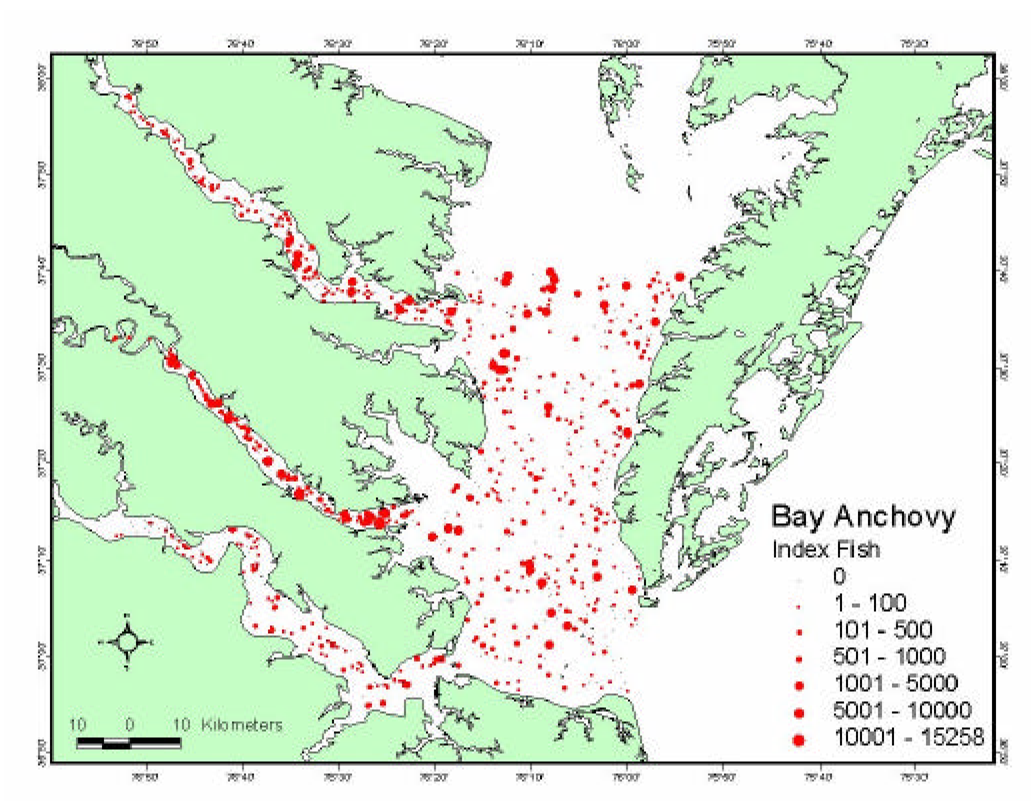
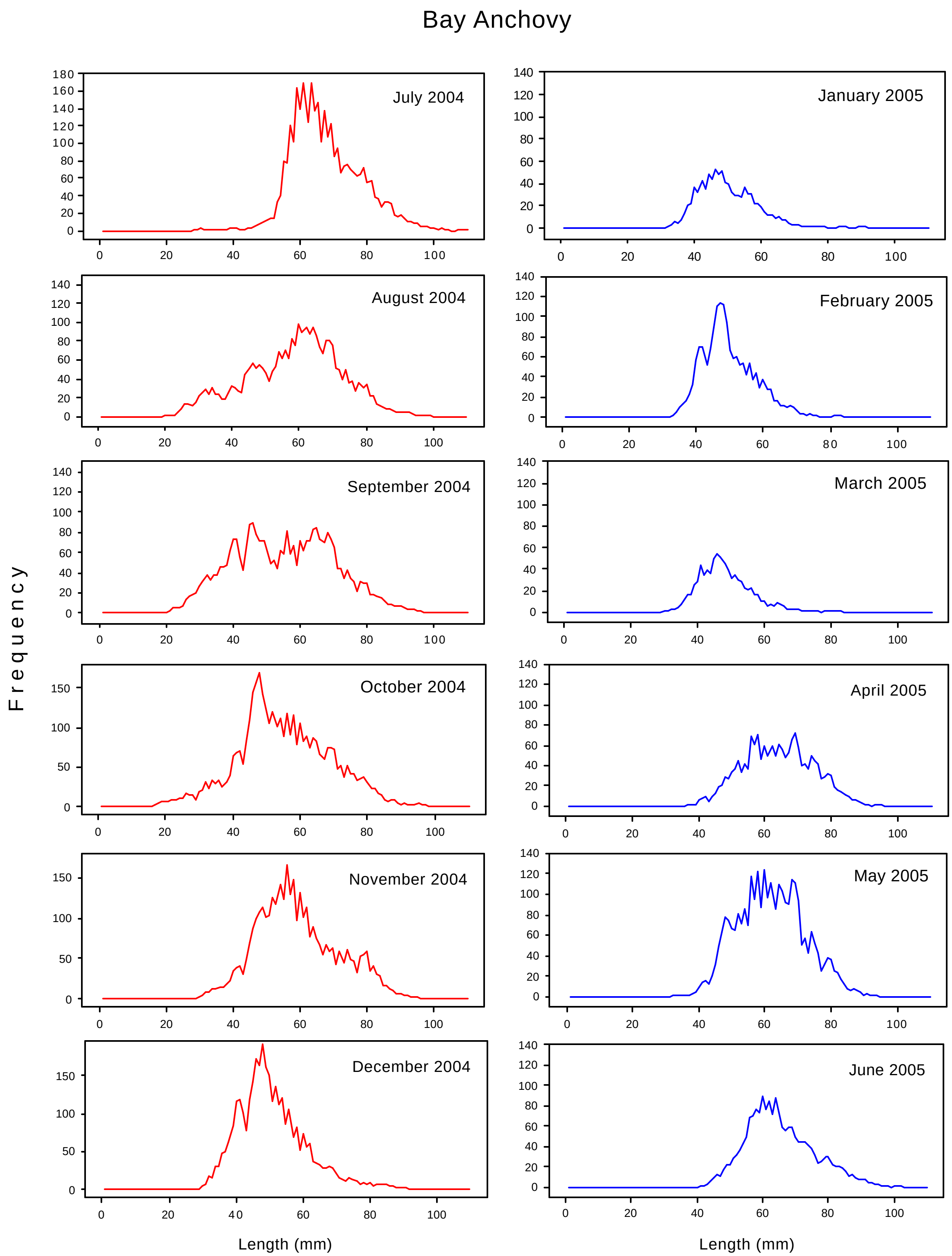


Figure 43. Size frequency of bay anchovy by month for July 2004 to June 2005. Index months are shown in red.



Appendix Table 1. Listing of Recent Trawl Survey Advisory Requests.

Agency	Nature of Request	Time Spent on Request (hrs)
American Eel Data Workshop	VIMS Eel Data	24.00
ASMFC	Atlantic Croaker Indices	0.50
CBL	Trawl Menhaden Data June-October 2005 (corr. with collections)	1.00
Dalhousie University	Trawl Survey Shark Data	1.00
Georgia DNR	American Eel	1.00
Georgia DNR	American Eel	1.00
Malcolm Pirnie, Inc.	JA 124 Data	1.00
NJ Marine Resources/ASMFC	Trawl Eel Data	1.00
NJ Marine Resources/ASMFC	Trawl Eel Data Question	0.25
NJ Marine Resources/ASMFC	Trawl Eel Data Question	3.00
NJ Marine Resources/ASMFC	Trawl Eel Data Question	1.00
Smithsonian	Northern Puffer Index and Hurricanes	0.50
U-Haul Env. Education	Chesapeake Bay Fishes	0.25
USFWS	VIMS American Eel Research	1.00
UVA Institute for Environmental Negotiation	Trawl Survey Status	0.50
VA Power and DFRTAC	*Anguillicola crassus*	0.75
VIMS	Trawl Sturgeon Data	0.25
VIMS	Sturgeon	0.50
VIMS	Elasmobranch Data	2.00
VIMS	York River 2004 Hydro Data	0.25
VIMS Advisory	VA Power *Anguillicola crassus*	2.00
VIMS Wetlands	Summer Flounder Data	0.25
VMRC	Eel Conservation Efforts by VIMS for USFWS	8.00
VMRC	Horseshoe Crab Data	0.25
VMRC	Summer Flounder Data	0.50
VMRC	Trawl Eel Data	0.50
VMRC	Trawl Survey Croaker Index Description	0.50
VMRC	Trawl Sturgeon Data 2004	0.25