COMPARISONS OF GEARS AND VESSELS USED IN THE VIRGINIA INSTITUTE OF MARINE SCIENCE JUVENILE FINFISH TRAWL SURVEY.

David Hata

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Virginia Institute of Marine Science
School of Marine Science
College of William and Mary
Gloucester Point, VA 23062

L. Donelson Wright, Dean/Director

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INTRODUCTION

The Virginia Institute of Marine Science (VIMS) currently conducts a monthly trawl survey in the three major Virginia rivers and the lower Chesapeake Bay to estimate the abundance of economically important finfish species, particularly at the juvenile stage. VIMS has conducted similar trawl surveys in various forms since 1955. Although this represents a 40 year period, variations in sampling design and gear have confounded efforts to produce a meaningful, continuous time series. Such variations include changes in stations occupied, sampling frequency, vessels, and trawl gears. Much of the trawl survey sampling has been documented (Wojcik and Van Engel 1988a, 1988b, 1988c, 1988d, 1989), although some changes have not.

Monthly sampling began in 1955; collections in the lower Chesapeake Bay were made at fixed channel stations approximately five or ten miles apart, from the bay mouth to the York River mouth. Collections in the York River were made at fixed, mid-channel stations approximately five miles apart. Sampling was expanded to include the James River in 1964, and the Rappahannock River in 1965. While the fixed river stations have usually remained nominally intact, some have gradually moved from their original sites. Sampling was usually conducted monthly, but some stations, or even entire systems (rivers or bay), were not sampled during some months. This sampling design was continued until 1973, at which time separate surveys were initiated by the Ichthyology and Crustaceology departments. The Ichthyology department conducted a semiannual trawl survey using a stratified-random sampling design in the bay and rivers. During the

1973-1978 period, the Crustaceology department continued sampling at the fixed river stations from May to November, targeting blue crabs. Finfish species were enumerated, although lengths were usually not recorded. In 1979 the separate surveys merged, and monthly sampling at the fixed stations resumed. The survey was expanded in 1988 to include a monthly, stratified-random design in Virginia's portion of the Chesapeake Bay, and similar designs were added in the York River in 1991, in the Rappahannock River in 1995, and in the James River in 1996.

When sampling began in 1955, the trawl gear consisted of a (nominal) 30 ft. (9.1 m), semi-balloon otter trawl, made from cotton thread, with a 9.4 m (31 ft) headrope and 11.3 m (37 ft) footrope, 2.4 m (8 ft) legs, 25 mm (1 inch) stretched mesh in the body and wings, and 19 mm (3/4 inch) stretched mesh in the cod end (Wojcik and Van Engel 1988a). Beginning in 1961 the net was a 30 ft, 4-seam semi-balloon otter trawl with a 9.4 m (31 ft) headrope and 11.3 m (37 ft) footrope, 1.8 m (6 ft) legs, 38 mm (1 ½ inch) stretched mesh in the body, and 32 mm (1 1/4 inch) stretched mesh in the cod end (gear code 010). A 4.8 mm link chain was attached to the footrope, hung 16 Links/30 cm. Trawls were fished with 56 cm × 122 cm (22 inch × 48 inch) wooden doors and 9.1 m (30 ft) wire bridles between the doors and the single towing cable (warp). The nets were apparently made from cotton until 1971, when nylon twine was introduced (Wojcik and Van Engel 1988a). Sampling with this and the previous gear was usually conducted using 15 minute tows (bottom time), although 7.5 minute tows were also used, especially in upriver stations.

In 1973 the Crustaceology Department undertook the monthly trawling program at fixed stations above approximately river mile 10, adding a tickler chain to the existing gear. In September 1975, the 56 cm × 122 cm doors were replaced with larger wooden trawl doors of 61 cm × 137 cm (24 × 54 inches) (gear code 043). Trawls were towed for five minutes using the 9.1 m bridles. (The larger doors were inadvertently purchased, and subsequently retained.)

The semiannual survey conducted by the Ichthyology department at this time used both a 16 ft (gear code 035) and 30 ft (gear code 033) trawl. Gear 035 had a 4.9 m (16 ft) headrope and 6.1 m (20 ft) footrope, 0.9 m (3 ft) legs, 38 mm (1 1/2 inch) stretched mesh in the body, and 32 mm (1 1/4 inch) stretched mesh in the cod end, and a 13 mm (1/2 inch) stretched mesh cod end liner (Wojcik and Van Engel 1988a). A 3.2 mm diameter link chain was hung on the footrope. This net was fished for five minutes using 7.0 m wire bridles (Chao and Musick 1977). Gear 033 was similar to that used previously, with the addition of a 13 mm (1/2 inch) stretched mesh knotless cod end liner (gear code 033). Wooden trawl doors, 56 cm × 122 cm, and 9.1 m wire bridles were used. The 16-ft trawl was used in water < 3.7 m (12 ft), while the 30-ft trawl was used in deeper water. Tows made with gear 033 were usually based on a distance of 0.25 (statute?) miles (0.40 km), rather than on duration. However, tows were frequently measured by five minutes of duration (A. D. Estes, pers. comm.).

In 1979 the Ichthyology and Crustaceology department surveys merged and returned to the monthly, fixed stations. The 30 ft trawl, with the larger wooden doors, tickler chain and 9.1 m bridles were retained from the Crustaceology survey, and the 13 mm cod end liner was retained from the Ichthyology survey (gear code 068). Tows were of five-minute duration. In 1980 the bridles were increased to 18.3 m (60 ft), while the rest of the trawl configuration remained the same (gear code 070).

The latest gear modification was a change from the wooden doors to smaller steel Vee doors, 49 cm × 71 cm (Wilcox Marine Supply, Mystic, CT), beginning in 1991, with the rest of the trawl configuration remaining the same (gear code 108).

Existing trawls without the cod end liner have six foam floats on the headrope, each 38 mm wide by 76 mm diameter (1 1/2" × 3"). Current lined nets have eight foam floats on the headrope, each 76 mm wide × 76 mm diameter (3" × 3"). This increase in the size and number of floats was apparently undocumented, so is assumed to correspond with the addition of the cod end liner. Original and current trawls were manufactured by the same company, Marinovich Trawl Company, Biloxi, MS, although other net manufacturers had been used (Wojcik and Van Engel 1988a).

In addition to variations in trawl configuration, several vessels were used during the trawl survey history (see Wojcik and Van Engel 1988a, 1988b, 1988c, 1988d, 1989). These include the R/V *Virginia Lee* (1955-1957), *Pathfinder* (1957-1981), *Langley* (1962-1979), *W. K. Brooks* (1970-1978), and *Restless* (1971-1979), among others. The R/V *Captain John Smith* was used beginning in 1976, and was the principle trawling vessel beginning in 1981. This vessel was a 12.8 m (42 ft overall length) fiberglass launch with 1.2 m (4 ft) draft and 200 HP diesel engine. The trawl was towed from a boom on the starboard side from a block 1.2 m above the water. During its use, the *Captain John Smith* underwent several changes, including a change in 1986 from side- to stern-trawling off a block 2.4 - 3 m (8 - 10 ft) above the water, increased cabin size, and larger, 350 HP, diesel engine.

In 1990 the trawl survey purchased the R/V *Fish Hawk*, a 8.5 m (28 ft) aluminum trawler with a 0.6 m (22 inch) draft and 210 HP diesel engine. Trawling off this vessel is conducted from the stern off a block 2.1 m (7 ft) off the water. Side-by-side trawling was conducted with the *Fish Hawk* and *Captain John Smith* during the regular August survey to compare vessels. From September 1990 to the present all trawling was conducted with the *Fish Hawk*. Gear 070, used on the *Fish Hawk* from September to December 1990, was replaced beginning in January 1991 by gear 108 with the smaller Vee doors to improve safety and gear handling on the smaller vessel.

Any attempts to reconstruct a continuous data series must address the variations involved. Analyses may require that collections from missing stations or months be estimated, abundance of young-of-the-year must be estimated when only total abundance is available, and abundances must be adjusted to a given sampling gear. The purpose of this study was to examine differences in catches of selected finfish species by the major trawl gear configurations, and attempt to develop a means of converting catches from previous trawl gears to the current gear.

METHODS

Comparisons of the research vessels *Captain John Smith* (modified - code JS) and *Fish Hawk* (vessel code FH) were conducted during normal survey operations in August 1990. Side-by-side trawling was conducted at 34 stations, 12 each in the Rappahannock and York River, and 10 in the James River. Of these, finfish were sampled from 23 stations, and blue crabs were sampled from those and an additional 11 stations. Sampling was conducted over three days, one for each river, using gear 070 (Table 1) from both vessels. The engine speed for the *Fish Hawk* (1000 rpm) was adjusted to approximate the speed of the *Captain John Smith* (650 rpm: 3-5 km/hr). Beginning and ending tow locations, at set and haul, were recorded using Loran-C. Catch differences were analyzed as described below for the gear comparisons, with differences noted.

The major historical trawl configurations were individually compared against the current trawl gear (code 108) (Table 1). Additionally, gear type 010 was compared using both 7.5 and 15 minute tows. Sampling with gears 010 and 043 was conducted primarily during September and October, the period of peak abundance for most of the target species. Sampling with gear 070 was also conducted in April, May and June (Table 2). Sampling with gear 033 was conducted in January-February and June-July, when this gear was used in the original semiannual survey.

An unlined trawl, intended to approximate gears 010 and 043, was made by altering an existing net. The net was modified from the present eight 76 × 76 mm floats to six 38 × 76 mm floats and the cod end liner was removed. Other net dimensions were, or were assumed to be, the same. Existing 56 × 122 cm wooden trawl doors were badly deteriorated and unusable. New doors purchased from the original supplier, Marinovich Trawl Co., for gear comparisons were slightly larger, 61 × 122 cm (24 × 48 inches).

Ancillary comparisons were made against an unlined net with eight floats, no tickler chain, 9.1 m bridles, and Vee doors fished for five and 15 minutes (gear code 010V; Table 1). Sampling was conducted in June, July, September, and February (Table 2). These comparisons were used in an attempt to examine the effects of the headrope flotation and trawl doors on catches.

Field sampling for gear comparisons consisted of fishing one historical gear configuration and the current trawl gear each sampling day using the R/V *Fish Hawk*. Sampling sites were selected to approximate normal survey station depths and substrates or to target known or assumed areas of concentration of target species. The initial gear was fished twice at a given site, once upstream and once downstream, to negate tidal effects. The alternate gear was then installed, and two more tows were made, upstream and downstream. The vessel was then moved to another site, and a set of four tows was performed again. Typically two to five sets were completed each sampling day. The beginning and ending locations of tows were recorded using Global Positioning System (GPS). Although four tows were made at each site, they rarely covered the same ground, as indicated by plots of beginning and ending positions.

Tow distances by the test gears were examined for differences. Differences were calculated as the mean of the two tows by the test gear (one tow by the *Captain John*

Smith) minus the mean of the two tows by the current gear (one tow by the *Fish Hawk*) within a set (or pair). Distances from the gear 010 comparisons using 7.5 and 15 minute tows were standardized to compare tow distances per five minutes of trawling. Standardized distances were used only to test the assumption that the gears covered the same relative amount of ground and, by extension, were towed at the same speed. They were not used for catch analyses, and are not intended to imply a relationship between tow distance and catch. The mean difference, over all sets or trawl pairs, was examined as a two-tailed paired difference test at $\alpha = 0.05$.

For each tow, the catch was separated to species, and all, or a subsample of each species, were measured to the nearest millimeter mid-line length - fork length for species with forked tails, and total length for the other species. Blue crabs, *Callinectes sapidus*, were measured to the nearest millimeter carapace width. Unmeasured fish were counted, and length frequencies derived from each tow were then applied to those individuals to obtain an estimated overall length frequency for that tow. Bay anchovies, *Anchoa mitchilli*, were measured for vessel comparisons, but only counted for most gear comparisons.

Catches from the test gears or vessels were compared using paired-difference tests. Length frequencies were divided into 25 or 50 mm intervals: 25 mm intervals were used for most species and 50 mm intervals were used in the larger species, striped bass, *Morone saxatilis*, weakfish, *Cynoscion regalis*, and summer flounder, *Paralichthys dentatus*. Only the most abundant species and important recreational species were examined. Catches were examined by size intervals in an attempt to discern any size-dependent effects of the gears, and to possibly apply the results to months other than those in which these tests occurred. The total number of individuals of a species within a tow, x, caught in a given size interval, L, was log-transformed. Because a sampling unit for a given gear consisted of two tows in each set, catches from those two tows were averaged, and the difference between that average and the two-tow average for the other gear -always the current net, gear 108- within the set was calculated:

Gear A/tow 1:	x'_{A1L}	$= \log[x_{A1L} + 1]$
Gear A/tow 2:	x'_{A2L}	$= \log[x_{A2L} + 1]$
Gear A:	x''_{AL}	$= [x'_{A1L} + x'_{A2L}]/2$
Gear 108/tow 1:	$x'_{(108)1L}$	$= \log[x_{(108)1L} + 1]$
Gear 108/tow 2:	$x'_{(108)2L}$	$= \log[x_{(108)2L} + 1]$
Gear 108:	$x''_{(108)L}$	$= [x'_{(108)1L} + x'_{(108)2L}]/2$
Difference:	D_L	$= x''_{AL} - x''_{(108)L}$

Mean catch differences, $\overline{D}_L = \sum D_L/n_L$, and 95 percent confidence intervals were based on the number of sets, n_L, in which fish of a given size interval were captured. For *Captain John Smith - Fish Hawk* comparisons and historical gear and vessel comparisons, with only one tow per vessel or gear in a set, $x''_{AL} = x'_{A1L}$. The difference in log-transformed catches, D, is equivalent to the log of the ratio of catches - $\log[(x_1 + 1)/(x_2 + 1)]$. Ratios from untransformed catches have been used in previous gear studies (Chittenden and Van Engel 1972; Lipcius and Van Engel 1990).

Weighted regressions of mean differences on length, $\overline{D}_L = \beta_0 + \beta_1(L)$, or weighted grand mean differences averaged over length intervals, $\overline{\overline{D}} = \sum W_L \overline{D}_L / \sum W_L$, were calculated to examine the ability to convert catches from other gears to the current gear as a standard. These relationships were weighted by the number of sets in which fish of a given size group were captured, divided by the variance of the gear differences for that size group, $W_L = n_L/s_L^2$ (Steele and Torrie 1980). In some instances a size-dependent stepped trend was apparent, but no significant regression equation could be fit. In those circumstances weighted mean differences were calculated for the lower and upper step, and a line was fit through $\overline{\overline{D}}$ for the median lengths in the steps. For example, a line may be fit to $\overline{\overline{D}}$ for fish 26-75 mm and fish 101-150 mm through the length midpoints (50, $\overline{\overline{D}}_{(26\text{-}75)}$) and (125, $\overline{\overline{D}}_{(101\text{-}150)}$). The weighted mean difference or weighted regression was then applied as a correction to the individual length frequencies of the experimental tows, to examine the potential for converting between gears:

$$\hat{x}_{(108)L} = 10^{(x''_{AL} - D)} - 1$$

where $D = \overline{D}_L$ from the weighted regression or $\overline{\overline{D}}$ from the weighted mean difference. For example, to convert from a gear 043 catch (duration = 5 minutes), where the original number caught at 200 mm was x = 47, and the calculated weighted regression equation is $\overline{D}_L = -0.136 + 0.0017(L)$:

$$\overline{D}_{200} = -0.136 + 0.0017(200) = 0.204$$

$$x'_{(043)200} = \log(47 + 1)$$

$$x'_{(043)200} = 1.681$$

$$x'_{(108)200} = 10^{(1.681-0.204)}-1$$

$$x_{(108)200} = 29$$

Theoretical cod end mesh retention size ranges were calculated for some fish species. A plastic cone was marked for a series of circumferences, and the cod end mesh circumference was estimated by firmly inserting the cone in the mesh and recording the cone circumference. Twelve measurements were made on each of 15 cod ends (n = 180) from nets currently available for use or cod ends salvaged from destroyed nets. However, although the original and present nets were manufactured by the same company, Marinovich Trawl Co., net makers have varied in the interim (Wojcik and Van Engel 1988a). In the absence of existing historical nets, it can only be assumed that specifications of those nets were reasonably similar.

Length-girth relationships were determined for Atlantic croaker, *Micropogonias undulatus*, black seabass, *Centropristis striata*, silver perch, *Bairdiella chrysoura*, southern kingfish, *Menticirrhus americanus*, spot, *Leiostomus xanthurus*, weakfish, white perch, *Morone americana*, and summer flounder. These relationships were intended to estimate the gear selection size, so measurements were intentionally biased toward smaller individuals. Lengths, fork or total, and maximum girth were measured to the nearest millimeter. The relationships were heteroscedastic, so lengths and girths were log-transformed prior to regression. Theoretical mesh retention lengths, $\hat{L}_M$, and 95% prediction limits (Neter et al. 1985) were calculated from the girth corresponding to the mean cod end mesh circumference.

Correlation coefficients between catches by the test gears were examined to evaluate the degree of association between the gears. Correlation coefficients, r, were calculated for each size interval and tested for significance at $\alpha = 0.05$ (Montgomery and Peck 1982). While large, positive correlation coefficients ($r \rightarrow 1$) do not predicate any causal relationship, they may indicate that catches by the compared gears are congruent-that is, they measure the same parameter. Catches from one gear may therefore be estimable from the other gear. Such correlation would be most obvious when catches from both gears are over a wide range of values - e.g. $x = 0\text{-}1000$, and individuals are uniformly distributed in the sampling area. However, low correlation coefficients ($-1 < r << 1$) do not necessarily preclude congruency, but may simply reflect a small range of catch values - e.g. all $x < 5$, small sample size (n), or contagious distribution of the target species (as with schooling species). Likewise, similar length frequency distributions from the tested gears or vessels would suggest that the two are sampling from the same population. Length frequency distributions were compared using the Kolmogorov-Smirnov two-sample test at $\alpha = 0.05$ (Sokal and Rohlf 1981; DeAlteris et al. 1989; Stender and Barans 1994) applied to the 25 or 50 mm size intervals used for the paired-difference tests. The test statistic and critical value are denoted by 'Δ' and 'Δ_{crit}' to differentiate from the paired-difference statistic, D, above.

HISTORICAL GEAR COMPARISONS:

Some previously performed gear comparisons were also examined. During July 1975 and 1977 comparisons were made between the 30 ft and 16 ft trawls used by that survey (gear codes 033 and 035). Sampling was conducted on the York River and its tributaries, the Mattaponi and Pamunkey Rivers, at depths > 3.7 m (12 ft). During 1975, gear 033 was used on the R/V *Pathfinder* (vessel code PA), a 16.8 m (55 ft length overall:LOA) wooden trawler, and gear 035 was used on the R/Vs *Restless* and *W. K. Brooks* (vessel codes RE and BR) , wooden deadrise skiffs of 9.7 m (31 ft 9 inches LOA) and 11.2 m (36 ft 8 inches LOA), respectively. Trawling with the *Pathfinder* was from the side off a block 3 m (10 ft) above the water, and from the *Restless* and *W. K. Brooks* from the stern off a block 2.4 m (8 ft) above the water. In 1977, gear 033 was used on the R/V *Langley*, and gear 035 was used on the R/V *W. K. Brooks*. The R/V *Langley* (vessel code LA) was a converted 24.4 m (80 ft length overall) steel hull ferry boat with a 1.7 m (5.5 ft) draft. Trawling from the Langley was from the stern off a block 6.1 m (20 ft) above the water. At each station, the vessels trawled against the current in similar depths. Processing was conducted similarly to the regular survey with measurements taken for up to 25 individuals of a species in 1975, and usually up to 50 individuals in 1977. Blue crabs were usually measured in 1975, but not in 1977. A total of 82 trawls, 41 with each gear, was made in July 1975, and 30 trawls, 15 with each gear, was made in July 1977. Data were analyzed as above for the *Captain John Smith-Fish Hawk* comparisons, with gear 033 representing the standard gear, in place of gear 108.

Analyses of variance were performed to examine differences between years. Two-factor ANOVAs included years and size groups as variables, with interaction. Analyses were conducted using PROC GLM from the SAS statistical program. Because the *Langley* and *Pathfinder* were used in different years, effects of interannual variation could not be separated from vessel effects.

The original gear used by the trawl survey (gear code 010) was compared with the 30 ft trawl with tickler chain used by the crab survey (code 043). On 6 June 1977 eight trawl pairs were conducted at the normal fixed York River stations at miles 10, 15, 20 and 25. Gear 043 was trawled from the R/V *Captain John Smith* (original configuration - vessel code J1), and gear 010 was towed from the *Langley*. Sampling consisted of towing the gears twice at each station. Trawls were made upstream, then both vessels trawled downstream. All tows were of five minutes duration. Blue crabs were measured, but finfish were only enumerated. Data were analyzed as above for paired tows, although catch differences by size interval were calculated only for crabs. When only total numbers were recorded, the mean difference for all fish was assumed to equal $\bar{\bar{D}}$. Gear 043 was used as the standard trawl.

Comparisons between the R/V *Langley* and old *Captain John Smith* (vessel code J1) were conducted on 8 June 1977. Five paired trawls were made at the York River station at mile 15 using gear 043 towed for 5 minutes. All tows were made upstream. Blue crabs were measured, but finfish were only counted. Data were analyzed as above, with J1 catches used as the standard.

Vessel comparisons were conducted between the R/V *Pathfinder* and old *Captain John Smith* on 6 and 7 July 1977 (12 pairs) and 8 and 9 June 1978 (28 pairs). Sampling was performed on the York River at the normal fixed survey station areas at miles 10, 15, 20, and 25. Gear 043 was towed off each vessel for 5 minutes. Trawl pairs were approximately equally split between tow directions-22 pairs were conducted upstream, and 18 pairs downstream. Carapace width was recorded for blue crabs, but finfish were only enumerated. In some instances hogchokers in *Captain John Smith* catches were recorded only as numbers of one-liter containers. In March 1995, volume estimates were made during the regular Rappahannock River trawl survey. From several one-liter samples, the average number of hogchokers was 79.5 (range 78-81). The hogchokers averaged 74.5 mm TL, and ranged from 38 to 137 mm (s.e. = 4.96). The value of 79.5 fish/liter was used to estimate the total number of hogchokers. Data were analyzed as above, with the J1 catches used as the standard.

RESULTS

VESSEL COMPARISONS

There was no significant difference in tow distances by the *Captain John Smith* and *Fish Hawk*. Beginning or ending positions were not recorded for one or both vessels in 11 of the 34 trawl pairs. In one pair, one calculated tow distance was considered unreliable, leaving 22 pairs usable for examining tow distance differences. Tows by the *Captain John Smith* ranged from 0.34 to 1.18 km, with an average of 0.52 km. Tows by the *Fish Hawk* ranged from 0.13 to 0.88 km, averaging 0.45 km. The mean difference (JS - FH) was 0.07 km ($s^2 = 0.080$).

Bay anchovies, *Anchoa mitchilli*, were collected in 19 of 23 trawl pairs in which fish were enumerated. Significantly more total anchovies were captured with the *Captain John Smith* than with the *Fish Hawk*, as indicated by the positive mean difference (Figure 1). Catches were significantly different in one of the four size intervals, producing a correction factor of $\bar{\bar{D}} = 0.3154$. Length frequency distributions differ substantially for anchovies < 65 mm (Figure 1), and overall distributions were significantly different ($\Delta = 0.243$; $\Delta_{crit} = 0.062$). Overall catches by the two vessels were significantly correlated (Table 3), but catches were correlated in only one size interval.

Weakfish, *Cynoscion regalis*, occurred in 20 trawl pairs. No significant difference was observed in total catches of weakfish between vessels (Figure 2). However, catches were significantly different between vessels in one of the six size intervals. A significant regression was fit to the mean differences at size, producing the equation $\overline{D}_L$ = 0.3049 - 0.0022(L), indicating a size-selective bias. Less than 1% of the total number caught were larger than 200 mm, in a small number of trawl pairs, so the validity of the observed difference is uncertain. Size frequency distributions from the two vessels differed significantly (Δ = 0.087; Δ_{crit} = 0.037), possibly supporting application of the regression equation. Overall catches by the two vessels were not significantly correlated (Table 3), and were correlated only in weakfish 1-50 mm.

Atlantic croaker, *Micropogonias undulatus*, were collected in 12 trawl pairs. No significant difference was observed in total catches between vessels (Figure 3). However, significantly less croaker were captured by the *Fish Hawk* in two of eight size intervals, producing a correction factor of $\overline{\overline{D}}$ = 0.3148. Most fish were captured in one trawl pair (311 of a total 397), and few fish in any size interval occurred in any other tow, so the observed differences may not be real. As for weakfish, the length frequency distributions differed (Δ = 0.167; Δ_{crit} = 0.137). However, the single correction factor may be more indicative that the two samples are from the same population. Overall catches of croaker were positively correlated between vessels (Table 3), but catches were significantly correlated in only one of eight size intervals.

Spot, *Leiostomus xanthurus*, occurred in 20 trawl pairs. No significant difference between vessels was observed for total catches (Figure 4). Similarly, no significant differences were observed among the nine size intervals. Total numbers caught were generally similar (Figure 4), although length frequency distributions differed (Δ = 0.114; Δ_{crit} = 0.036). Total catches were positively correlated between vessels (Table 3), and catches were correlated in two size intervals, including the abundant 101-125 mm size range. Therefore, catches of spot from the *Captain John Smith* may be congruent with those from the *Fish Hawk*.

Silver perch, *Bairdiella chrysoura*, were collected in 10 trawl pairs. Although the *Fish Hawk* caught fewer fish than the *Captain John Smith*, overall, the difference was not significant (Figure 5). Likewise, differences were positive, but not significant in the five size intervals. The length frequency distributions from the vessels are similar ($\Delta = 0.154$; $\Delta_{crit} = 0.363$), but the total numbers caught differed substantially (Figure 5). Catches were not positively correlated between the two vessels (Table 3), so their equivalency is unknown.

Kingfish, presumably all southern kingfish, *Menticirrhus americanus*, were collected in 17 trawl pairs. No significant difference was observed between vessels in total numbers caught, or in any of the six size intervals (Figure 6). Length frequency distributions were also similar between vessels ($\Delta = 0.120$; $\Delta_{crit} = 0.139$). Overall catches of kingfish were correlated between vessels, and catches were correlated for fish 51-75 mm, the most abundant size interval (Table 3). Therefore, catches from the two vessels may be equivalent.

Too few **striped bass**, *Morone saxatilis*, or **white perch**, *Morone americana*, were captured to adequately assess vessel differences.

Oyster toadfish, *Opsanus tau*, occurred in 12 trawl pairs. No significant difference between vessels was observed for total numbers caught, but more toadfish were caught by the *Captain John Smith* in three size intervals, yielding a weighted mean difference of $\bar{\bar{D}} = 0.1511$ (Figure 7). Length frequency distributions from both vessels were scattered (Figure 7), but did not differ significantly ($\Delta = 0.183$; $\Delta_{crit} = 0.260$). Catches were not correlated in any size interval, or for total numbers (Table 3).

Hogchokers, *Trinectes maculatus*, were collected in 18 trawl pairs. No significant difference was observed for total numbers caught (Figure 8). The *Fish Hawk* caught significantly more hogchokers 51-75 mm than the *Captain John Smith*, but the latter vessel caught more hogchokers 151-175 mm. However, hogchokers > 150 mm represented less than 0.5% of the total catch, in a small number of trawl pairs, so this catch difference may not be important. Furthermore, only one hogchoker > 150 mm was caught by the *Fish Hawk*. The correction factor, $\bar{\bar{D}} = 0.1023$, fit to hogchokers 1-175 mm, did not intersect the confidence interval for the 51-75 mm size range, and seemed more appropriate for fitting the 151-175 mm size range than the more abundant 51-75 mm fish. Hogchoker length frequencies differed significantly ($\Delta = 0.192$; $\Delta_{crit} = 0.031$). Total numbers of hogchokers were significantly correlated between vessels (Table 3). Catches were also correlated in three of the eight size intervals, suggesting that the catches by the two vessels are comparable.

Blackcheek tonguefish, *Symphurus plagiusa*, were captured in 13 of 23 trawl pairs. Overall catch differences were not significant (Figure 9). No significant differences were observed for the six size intervals. Length frequency distributions were also similar between vessels ($\Delta = 0.093$; $\Delta_{crit} = 0.219$). However, overall catches were not correlated, and catches were correlated in only one size interval (Table 3). Therefore, it is not established that the catches from the two vessels are congruent.

Summer flounder, *Paralichthys dentatus*, occurred in six of the 23 pairs. No significant difference in overall catches was observed (Figure 10). Likewise, no significant differences were observed within the eight size intervals. However, very few flounder were collected (Figure 10), and catches from the vessels were not correlated (Table 3). Therefore, the congruency of the two vessels could not be established. Length frequency distributions differed marginally ($\Delta = 0.488$; $\Delta_{crit} = 0.484$).

Blue crabs, *Callinectes sapidus*, were collected in 34 trawl pairs, the 23 pairs in which fish were enumerated, and 11 additional pairs in which only crabs were examined. There was no difference in overall catches of crabs between the vessels (Figure 11). However, significantly fewer blue crabs 1-25 mm were caught by the *Fish Hawk*, and significantly more were captured by the *Fish Hawk* in two other size intervals. Length frequency distributions are similar for blue crabs > 50 mm, but differ substantially for those < 50 mm (Figure 11). The distributions were significantly different for all crabs ($\Delta = 0.195$; $\Delta_{crit} = 0.034$), but not for those above 25 mm ($\Delta = 0.031$; $\Delta_{crit} = 0.037$). The disparate distributions may indicate errors in measurement, or incomplete culling of the catch, or both, in respect to the smaller crabs. The correction factor, $\bar{\bar{D}} = -0.0903$, was fit only to crabs 26-200 mm. Overall catches were positively correlated between vessels, and catches were correlated in six of the nine size intervals, all > 25 mm (Table 3), indicating congruency between vessels at least for larger crabs.

LINED TRAWLS

Gear 033 vs Gear 108

There was no significant difference in tow distances by gears 033 and 108. From 36 sets (72 tows by each gear), the mean difference was 0.01 km ($s^2 = 0.002$). Tows by gear 033 ranged from 0.20 to 0.72 km, averaging 0.37 km. Tows by gear 108 ranged from 0.13 to 0.57 km and averaged 0.38 km.

Bay anchovies occurred in 29 sets. There was no significant difference in total numbers caught by the two gears (Figure 12). There was also no significant catch difference in the three size intervals. Length frequency distributions differed ($\Delta = 0.084$; $\Delta_{crit} = 0.015$). However, overall catches by the two gears were positively correlated (Table 4), and catches were correlated in the two most abundant size intervals, suggesting that catches by the two gears are comparable.

Weakfish were collected in 22 of the 36 comparison sets. Total catches by the two gears were not significantly different (Figure 13). Catches by gear 033 were significantly smaller than by gear 108 for weakfish < 50 mm, but were greater for fish 201-250 mm. The catch differences may indicate a change in gear 033 efficiency relative to gear 108 at approximately 100-150 mm. These differences are also evident in the length frequency distributions (Figure 13), which differed significantly ($\Delta = 0.244$; $\Delta_{crit} = 0.073$). Despite this increase in mean difference with size, no significant regression could be fit. A three-part correction was applied to the catch differences. Correction factors were fit to sizes 1-100 mm ($\bar{\bar{D}}$ = -0.2400) and sizes 151-350 mm ($\bar{\bar{D}}$ = 0.06953), and the intervening sizes were fit by interpolation ($\bar{D}_L$ = -0.2400 + 0.00619(L-100)). An alternative line was fit through the midpoints of the upper and lower steps, 50 and 250 mm, yielding the equation $\bar{D}_L$ = -0.3174 + 0.0015(L). Total numbers of weakfish were significantly correlated in the two gears, and in five of the nine size intervals (Table 4), indicating that catches from the two gears are congruent.

Atlantic croaker were captured in 32 gear comparison sets. Overall catches by gear 033 were less than by gear 108, but not significantly so (Figure 14). Catches by gear 033 were significantly less in two of 16 size intervals. A significant regression could be fit to the catch differences, indicating that gear 033 efficiency relative to gear 108 increased with size: $\bar{D}_L$ = -0.2694 + 0.001238(L). Length frequency distributions from the two gears differed, as would be expected from the significance of the regression line (Δ = 0.075; Δ_{crit} = 0.024). Overall catches by the two gears were positively correlated (Table 4), and were significantly correlated in nine of the 16 size intervals, indicating that gear 108 catches may be reasonably approximated by gear 033 catches.

Spot were collected in 25 gear comparison sets. Significantly fewer spot were captured by gear 033 than by gear 108 (Figure 15). Gear 033 caught significantly fewer spot in two of the eight size intervals. Regression of the mean catch differences on size produced the correction factor $\bar{D}_L$ = 0.1350 - 0.003018(L). Catches were positively correlated in two size intervals, and for total catches (Table 4). Length frequency distributions differed significantly (Δ = 0.696; Δ_{crit} = 0.112), as expected from the regression line.

Black seabass, *Centropristis striata*, were collected in 12 of 36 comparison sets. Overall catches by gear 033 were significantly less than those by gear 108 (Figure 16). Likewise, catches by gear 033 were less in four size intervals, producing a mean difference of $\overline{\overline{D}} = -0.2230$. Overall catches by the two gears were significantly correlated (Table 4). Correlation coefficients were positive for the four size intervals, and significant for two of them. Length frequency distributions from the two gears were similar ($\Delta = 0.094$; $\Delta_{crit} = 0.320$).

Striped bass occurred in ten comparison sets. There was no significant difference in overall catches between gears (Figure 17). Likewise, no differences were observed in the seven size intervals, and length frequency distributions were similar ($\Delta = 0.052$; $\Delta_{crit} = 0.186$). Catches were positively correlated in one size interval, and for total numbers (Table 4).

White perch were collected in ten sets. No significant difference was found in total catches between gears (Figure 18). Gear 033 caught significantly more white perch than gear 108 in one size interval. A significant regression was fit to the mean catch differences, $\overline{D}_L = -0.2613+0.00148(L)$, indicating increasing catch by gear 033 relative to gear 108 with size. Length frequency distributions differed from the two gears (Figure 18), as expected with the significant regression ($\Delta = 0.076$; $\Delta_{crit} = 0.053$). Catches were positively correlated in seven of the nine size intervals, and for all sizes combined (Table 4), indicating that gear 108 catches may be estimable from gear 033 catches.

Hogchokers occurred in 33 of the 36 sets. Gear 033 caught significantly fewer hogchokers than did gear 108 (Figure 19), due to the absence of the tickler chain. Catches by gear 033 were significantly less in four of six size intervals. The fitted mean difference, $\bar{\bar{D}} = -0.2210$, did not intercept the confidence limits for three size intervals. The modal length from gear 033 was smaller than from gear 108 (Figure 19), producing a significant difference in size distributions ($\Delta = 0.184$; $\Delta_{crit} = 0.051$). Overall catches were positively correlated, and catches in four size intervals were correlated (Figure 19).

Summer flounder occurred in 29 sets. Gear 033 caught significantly fewer flounder than gear 108, due to the absence of a tickler chain (Figure 20). Gear 033 catches were significantly less in four size intervals, giving a mean difference of $\bar{\bar{D}} = -0.1203$. Length frequency distributions were generally similar (Figure 20) ($\Delta = 0.086$; $\Delta_{crit} = 0.161$). Catches were positively correlated in the two smallest size intervals with multiple occurrences and for overall catches (Table 4). However, catches were negatively correlated for two larger size intervals.

Blue crabs were collected in 33 of the 36 sets. Gear 033 caught significantly fewer total crabs than did gear 108 (Figure 21). Catches by gear 033 were also less in all of the seven size intervals. A slight decrease in catch difference with size produced a significant regression, $\bar{D}_L = -0.3538 + 0.001194(L)$. Length frequency distributions differed marginally ($\Delta = 0.089$; $\Delta_{crit} = 0.088$) (Figure 21), probably in conjunction with the significant regression equation. Catches were positively correlated in the two smallest, most abundant, size intervals, and for total numbers (Table 4).

Gear 070 vs Gear 108

Tows by gear 070 were significantly shorter than those by gear 108. In two of the 27 comparison sets, beginning or ending positions were not recorded for one of the four tows of that set. In one set, the calculated distance for one tow was questionable and therefore omitted, leaving 24 sets (48 tows by each gear) usable for examining tow distance differences. Tows by gear 070 ranged from 0.20 to 0.71 km, averaging 0.35 km. Tows by gear 108 ranged from 0.26 to 0.73 km, with an average of 0.40 km. The mean difference was -0.05 km ($s^2 = 0.005$).

Bay anchovies were collected in all 27 sets comparing gear 070 and 108. The previously used trawl, gear 070, caught significantly more anchovies, overall, than did the current gear ($\bar{D} = 0.3189$; $s^2 = 0.2558$; $n = 27$). Total numbers caught in the two gears were positively correlated ($r = 0.876$; $t = 9.10$).

Weakfish were collected in 16 of the 27 sets. Gear 070 generally caught slightly more weakfish, overall, than did gear 108, although this difference was not significant (Figure 22). No significant differences in catches were found within size intervals, although generally more fish > 150 mm were captured by gear 070 than by gear 108. A significant regression could be fit to the catch differences, giving the equation $\bar{D}_L = -0.0964 + 0.0010(L)$. The length frequency distributions for all weakfish collected also indicated that gear 070 caught more fish > 150 mm than did gear 108 (Figure 22), and distributions were significantly different ($\Delta = 0.137$; $\Delta_{crit} = 0.052$) . Catches in the two gears were significantly correlated for all weakfish (Table 5). Catches were correlated for fish 51-200 mm, but not for larger fish, probably due to their relative scarcity. The positive correlations indicate that catches by gear 108 may be reasonably approximated by gear 070.

Atlantic croaker were collected in 21 sets. Total numbers of croaker were generally greater in gear 070 than in the current gear, although, again, not significantly so (Figure 23). Catch differences appeared bimodal, being similar for fish < 125 mm, and for fish > 150 mm. No significant regression could be fit to the observed catch differences at size. The mean difference fit to all sizes was $\bar{\bar{D}} = 0.0952$. An alternative line could be fit through the mean differences for the lower (1-125 mm; $\bar{\bar{D}} = -0.0787$) and upper (151-275 mm; $\bar{\bar{D}} = 0.1509$) steps to obtain the equation $\bar{D}_L = -0.1743 + 0.0015(L)$. Size distributions from the two gears differed significantly ($\Delta = 0.139$; $\Delta_{crit} = 0.026$). Catches by the two gears were positively correlated for all croaker (Table 5). Catches were positively correlated in six of the twelve size intervals, where the most croaker were caught. Catches were negatively correlated for croaker 251-275 mm, but few fish were collected in this size range.

Spot were collected in all 27 gear comparison sets. Gear 070 caught significantly more spot, overall (Figure 24). Within size intervals, positive mean differences indicated that generally more spot were captured by gear 070, the differences being significant in two of the nine intervals and yielding $\bar{\bar{D}} = 0.1053$. The overall length frequencies likewise indicated that more spot were captured by gear 070 (Figure 24), although distributions did not significantly differ ($\Delta = 0.026$; $\Delta_{crit} = 0.037$). Catches by the gears were positively correlated for all spot, and in the four size intervals (101-200 mm) in which most spot occurred (Table 5), indicating that gear 108 catches can be reasonably approximated by gear 070.

Silver perch occurred in 15 sets. Gear 070 caught significantly more silver perch than gear 108, overall (Figure 25). Similarly, gear 070 generally caught more fish than gear 108 within all size intervals, and the difference was significant for fish 151-200 mm. The mean catch difference was $\bar{\bar{D}} = 0.1600$. As with spot, the overall length frequencies indicated that more silver perch were captured by gear 070 (Figure 25), although distributions did not differ ($\Delta = 0.096$; $\Delta_{crit} = 0.154$). Catches were positively correlated for all fish combined, and for three of the six size intervals (Table 5), indicating that gear 108 catches can be reasonably approximated by gear 070.

Striped bass were collected in only seven of the 27 sets. More fish were captured by gear 070, overall, but the difference was not significant (Figure 26). Differences in catches were not significant within size intervals. Neither total catches nor catches by size intervals were significantly correlated (Table 5), possibly due to the relatively small number of occurrences in sets and the few total fish caught. Therefore, it is uncertain whether gear 070 catches approximate those by gear 108. However, length frequency distributions were similar ($\Delta = 0.119$; $\Delta_{crit} = 0.257$).

White perch were collected in five sets. More fish occurred in gear 070 than in 108 overall, as well as within size intervals, although no differences were significant

(Figure 27). The overall length frequencies also indicated more white perch were collected by gear 070 (Figure 27), but size distributions were similar ($\Delta = 0.086$; $\Delta_{crit} = 0.162$). Although not significant, the mean catch difference, $\bar{\bar{D}} = 0.1748$, was larger than the significant differences for croaker, spot and silver perch, and the lack of statistical significance may reflect the species' infrequent occurrence in the study. As with striped bass, catches were not significantly correlated due to the small sample size (Table 5).

Oyster toadfish, *Opsanus tau*, occurred in 18 sets. Overall catches did not differ significantly between gears (Figure 28). Similarly, no differences were observed within size intervals. Slightly more toadfish 150-250 mm were captured by gear 108, although length frequency distributions were similar (Figure 28) ($\Delta = 0.130$; $\Delta_{crit} = 0.176$). Catches were correlated in only one of 14 size intervals (Table 5), due to the small number of fish caught in any trawl set, but were positively correlated for overall catches.

Hogchokers occurred in 25 of 27 sets. There was no significant difference in overall catches between the gears (Figure 29). Likewise, there were no significant differences within size intervals. Total numbers were similar between gears, although length frequency distributions were not (Figure 29) ($\Delta = 0.087$; $\Delta_{crit} = 0.031$). Catches were positively correlated for all hogchokers, and for fish 50-125 mm (Table 5), so gear 070 catches reasonably approximate those by gear 108.

Blackcheek tonguefish were collected in 22 sets. Overall, gear 070 caught significantly fewer tonguefish than did gear 108 (Figure 30). Within size intervals, gear 070 generally caught fewer tonguefish, although differences in catches were not significant. Catches were not positively correlated (Table 5), possibly due to the small number of tonguefish caught in any set. Length frequency distributions were not significantly different ($\Delta = 0.116$; $\Delta_{crit} = 0.254$).

Summer flounder were collected in 26 sets. There was no significant difference in overall catches between the two gears (Figure 31). No significant catch differences were observed for flounder > 50 mm, but significantly more fish < 50 mm were caught by gear 108 than by 070. However, this difference was due to only four fish in three sets, so was not considered important. The length frequencies were similar between gears (Figure 31) ($\Delta = 0.032$; $\Delta_{crit} = 0.107$). Catches were positively correlated for total catches of flounder, and in two of eleven size intervals, where larger numbers of fish occurred (Table 5). Although catches were negatively correlated in one size interval, 251-300 mm, this was probably due to the small number of fish captured. Therefore, gear 070 catches reasonably approximate those by gear 108.

Blue crabs were collected in all 27 comparison sets. There was no significant difference in overall catches between gears (Figure 32). Within size intervals, gear 108 caught significantly more crabs 26-50 mm than did gear 070, whereas differences were not significant in the other size intervals. Mean catch differences generally increased above 25 mm, and a significant regression was fit through the entire size range: $\bar{D}_L = .1229 + 0.0014(L)$. The overall length frequencies indicated that, although gear 108 caught significantly more crabs 26-50 mm, more total crabs < 50 mm were collected by gear 070 (Figure 32). Size distribution differences were significant ($\Delta = 0.056$; $\Delta_{crit} =$

0.044). Catches by the two gears were positively correlated for all crabs, and for all size intervals < 175 mm (Table 5), suggesting that gear 070 catches reasonably approximate those for gear 108.

UNLINED TRAWLS

Theoretical Cod End Mesh Size Selection

Cod end meshes averaged 55.9 mm in circumference, and ranged from 42.4 to 67.3 mm ($s^2 = 22.86$; $n = 180$). The 95% confidence limits of the mean circumference were 55.3 and 56.5 mm. Length-girth relationships for weakfish, Atlantic croaker, spot, silver perch, southern kingfish, black seabass, white perch, and summer flounder are given in Table 6.

Gear 043 vs Gear 108

There was no significant difference in tow distances by the two gears. The 26 tows by gear 043 (two tows in each of 13 sets) averaged 0.38 km, ranging from 0.25 to 0.57 km. Tows by gear 108 ranged from 0.25 to 0.55 km, averaging 0.38 km. The mean difference in tow distances was -0.01 km ($s^2 = 0.002$).

Bay anchovies occurred in 12 of the 13 sets comparing gear 043 and 108. Gear 043 caught significantly fewer anchovies than did gear 108 ($\bar{\bar{D}} = -1.0336$; $s^2 = 0.1868$; $n = 12$), most probably due to the absence of the cod end liner. Total catches were positively correlated between gears ($r = 0.763$; $t = 3.73$).

Weakfish were collected in 12 sets comparing gear 043 and 108. Gear 043 caught fewer weakfish overall, and caught significantly fewer fish in one of the eight size intervals (Figure 33). There was no notably greater difference in catches between gears for small fish, although the theoretical mesh retention suggested that fish < about 109 mm should pass through the unlined cod end of gear 043 (Table 6). The length frequencies also indicated that gear 043 captured fewer weakfish than gear 108 overall (Figure 33), but distributions of all sizes did not significantly differ between the gears even considering the presence of the liner ($\Delta = 0.057$; $\Delta_{crit} = 0.068$). The weighted mean difference for weakfish 151-400 mm (all size intervals above $\hat{L}_M$) was $\overline{\overline{D}} = -0.1544$, and for fish 1-400 mm was $\overline{\overline{D}} = -0.1659$. Total catches from the two gears were not significantly correlated, but positive correlations were observed for weakfish 1-50 mm and 201-250 mm (Table 7).

Atlantic croaker occurred in 12 sets. There was no significant difference in the overall catches by the two nets (Figure 34). Only three croaker < 50 mm were captured by gear 043, all in one tow, while 118 were captured by gear 108 in eight sets (Figure 34). After a large gap in the length frequency distribution from 50 to 125 mm, significantly more croaker were collected by gear 043 in two of five size intervals, giving a mean catch difference of $\overline{\overline{D}} = 0.1558$. The gap in the length distribution does not indicate at what size croaker may be fully recruited to the gear, although fish < about 102 mm should theoretically pass through the cod end mesh (Table 6). Length frequency distributions for croaker > 125 mm were similar ($\Delta = 0.025$; $\Delta_{crit} = 0.078$), supporting the single correction for larger fish. Catches of croaker 150-200 mm, the most abundant size classes, were positively correlated (Table 7). Because of the absence of small croaker (< 50 mm) from the gear 043 catches, and lack of correlation in catches between gears, no correction could be applied to those sizes.

Spot were collected in all 13 sets. Gear 043 caught significantly more spot, overall (Figure 35). The unlined net caught significantly more spot in one of the six size intervals, and the overall mean catch difference was $\bar{\bar{D}} = 0.1061$. No spot were collected less than the theoretical mesh retention size of 84 mm (Table 6), so that could not be evaluated. Size distributions significantly differed between gears ($\Delta = 0.066$; $\Delta_{crit} = 0.044$). Catches were positively correlated for all spot, and in four of the six size intervals (Table 7).

Silver perch occurred in 11 of the 13 sets. Gear 043 caught fewer silver perch, overall, than did gear 108, although the difference was not significant (Figure 36). However, the difference was significant in three of the six size intervals, producing a weighted mean difference of $\bar{\bar{D}} = -0.2177$ for perch > 100 mm (all size intervals > $\hat{L}_M$). Few silver perch were collected below the theoretical mesh retention length of 88 mm (Table 6), so that could not be evaluated. The length frequencies also indicated that gear 108 caught more fish (Figure 36), although distributions for perch > 100 mm were similar ($\Delta = 0.172$; $\Delta_{crit} = 0.188$). Catches were positively correlated in one of six size intervals, and negatively correlated or not correlated in the others (Table 7). However, overall catches in the two gears were positively correlated.

Oyster toadfish were collected in 12 of the 13 sets. There was no significant difference in overall catches by the two gears (Figure 37). Likewise, there were no significant differences within size intervals. The overall length frequency distributions for the two gears were similar (Figure 37) ($\Delta = 0.061$; $\Delta_{crit} = 0.140$). Catches were positively correlated for all toadfish, but in only one of 11 size intervals, probably due to the small number of toadfish caught in any set (Table 7).

Hogchokers occurred in all 13 sets. Although gear 043 caught more hogchokers, the difference in total catches was not significant (Figure 38). However, the difference was significant in one of the six size intervals, giving a weighted mean catch difference of $\bar{\bar{D}} = 0.1125$. Length frequency distributions for hogchokers significantly differed ($\Delta = 0.103$; $\Delta_{crit} = 0.045$). Overall catches of hogchokers were not significantly correlated, but catches were positively correlated in two of the seven size intervals (Table 7).

Summer flounder were collected in 10 of the 13 sets. Fewer summer flounder were captured by gear 043 than by gear 108, but total catches of the two gears were not significantly different (Figure 39). Likewise, no significant differences were observed for individual size intervals, but no fish below the theoretical mesh retention size of 74 mm were captured. Size distributions were similar from the two gears ($\Delta = 0.167$; $\Delta_{crit} = 0.273$). Overall catches, and catches within size intervals, were not correlated (Table 7), probably due to the small number of flounder occurring in any set.

Blue crabs were collected in all 13 sets. There was no significant difference in overall catches of the two gears (Figure 40). Similarly, there were no significant differences between gears for the six size intervals. Overall length frequency distributions were similar as well (Figure 40) ($\Delta = 0.119$; $\Delta_{crit} = 0.122$). Total catches were not positively correlated, although catches were correlated in the 26-50 mm size interval, which included a large number of crabs (Table 7).

Gear 010: 7.5 minute tows vs Gear 108

There was no significant difference in adjusted tow distances per five minutes of effort by the gear 010 and 108. Actual tow distances by gear 010 were divided by 1.5 to adjust the 7.5 minute tows to five minutes of effort. The 24 tows by gear 010 (two tows in each of 12 sets) averaged 0.41 km per five minutes, ranging from 0.25 to 0.80 km. Tows by gear 108 ranged from 0.23 to 0.62 km, averaging 0.41 km. The mean difference in tow distances was < 0.01 km ($s^2 = 0.007$).

Bay anchovies were collected in all 12 sets. Gear 010 caught significantly fewer anchovies per five minutes of trawling, overall, than did gear 108 ($\bar{\bar{D}} = -0.7319$; $s^2 = 0.1531$; $n = 12$), due to the absence of a cod end liner. Overall catches of anchovies were not significantly correlated ($r = 0.418$; $t = 1.45$).

Weakfish were collected in eight of the 12 sets. Overall catches from the two gears did not significantly differ (Figure 41). No significant differences were observed for any size intervals, including those below the theoretical mesh retention size. The two gears caught similar numbers (Figure 41), even though catches by gear 010 are based on 7.5 minute tows, in contrast to the five minute tows by gear 108. Length frequency distributions do not differ for fish > 150 mm ($\Delta = 0.075$; $\Delta_{crit} = 0.134$). Catches of all weakfish, as well as in three size intervals, were positively correlated (Table 8), suggesting that gear 010 catches are reasonable indicators of gear 108 catches in that size range.

Atlantic croaker were collected in all 12 sets. Fewer croaker were caught by gear 010, overall, due to the absence of a cod end liner, although the difference was not significant (Figure 42). Gear 010 caught significantly fewer croaker < 75 mm. However, generally more croaker were caught by that gear in larger size intervals, due to the longer tow duration, producing $\overline{\overline{D}} = 0.1022$ for croaker 126-275 mm. Although tow durations differed, size distributions for croaker > 125 mm were similar ($\Delta = 0.074$; $\Delta_{crit} = 0.158$). Catches of croaker in two size intervals were positively correlated (Table 8). However, overall catches of croaker were not, possibly due to the smaller numbers of large fish captured.

Spot occurred in 11 of the 12 sets. There was no significant difference in overall catches between gears (Figure 43). Likewise, there were no significant differences in the six size intervals. However, no size intervals were below the theoretical mesh retention size, so that could not be evaluated. Length frequency distributions significantly differed between the two gears ($\Delta = 0.106$; $\Delta_{crit} = 0.072$). Catches of spot 101-150 mm, the two most abundant size intervals, were positively correlated (Table 8), as were overall catches, indicating that gear 010 catches may be useful in predicting gear 108 catches, at least above the mesh retention size.

Silver perch were collected in eight sets. There was no significant difference in overall catches between gears (Figure 44). No significant differences in catches were observed in the five size intervals, but no silver perch < 100 mm were collected, so the effect of the cod end mesh size could not be examined. Length frequency distributions from the two gears were similar (Figure 44) ($\Delta = 0.148$; $\Delta_{crit} = 0.185$). Overall catches of silver perch were significantly correlated, and catches were correlated in one size interval (Table 8).

Striped bass were collected in five sets. Gear 010 caught significantly more fish, overall (Figure 45). Catches differed in one of the seven size intervals. The weighted mean catch difference for striped bass > 100 mm was $\bar{\bar{D}} = 0.1759$ (Although the mesh retention size was not estimated for this species, most or all fish > 100 mm should be retained). The length frequency distributions for bass > 100 mm were similar (Figure 45) ($\Delta = 0.138$; $\Delta_{crit} = 0.249$). Overall catches were positively correlated, but catches were not correlated within intervals due to small sample sizes (Table 8).

White perch occurred in only six sets. No significant differences were observed for entire catches, but gear 010 caught more perch in two size intervals (Figure 46). The weighted mean catch difference was $\bar{\bar{D}} = 0.3096$ for perch > 100 mm. The capture of fish 51-75 mm by the unlined net suggests that some mesh retention occurs in that size range. However, some selectivity is suggested by the smaller catch difference relative to those for perch > 100 mm. Size distributions for perch > 100 mm differed significantly ($\Delta = 0.151$; $\Delta_{crit} = 0.105$). Overall catches of white perch were positively correlated, and catches were correlated in four size intervals (Table 8), indicating that catches by the two gears may be congruent.

Oyster toadfish occurred in 10 sets. Gear 010 caught fewer toadfish, overall, than did gear 108, though not significantly so (Figure 47). Significantly fewer toadfish were captured by gear 010 in three of the 12 size intervals, producing a mean difference of $\bar{\bar{D}}$ = -0.1261. Toadfish size distributions from the two gears were similar for all fish (Δ = 0.071; Δ_{crit} = 0.226). Catches were not significantly correlated in any size interval (Table 8), possibly due to the small numbers occurring in any one set. Likewise, overall catches were not positively correlated. Therefore, the ability to estimate gear 108 catches from gear 010 catches could not be established.

Hogchokers were collected in 12 sets. No difference was observed in overall catches between gears (Figure 48). Furthermore, no differences were observed in the six size intervals. However, the consistently positive catch differences produced a mean of $\bar{\bar{D}}$ = 0.1390. Length frequency distributions were different (Δ = 0.097; Δ_{crit} = 0.056). Total catches were not positively correlated (Table 8), and catches were positively correlated in only one size interval, so the predictive ability of gear 010 was not established.

Summer flounder were collected in eight sets. No significant difference in gears was observed for total flounder catches (Figure 49). Likewise, no significant differences were observed in the six size intervals, probably due to the small numbers caught, and size distributions were similar (Δ = 0.109; Δ_{crit} = 0.420). Furthermore, catches were not significantly correlated (Table 8), so, as for oyster toadfish, the predictive ability of gear

010 catches is unknown.

Blue crabs occurred in 12 sets. Overall catches by gear 010 were significantly less than by gear 108 (Figure 50). Catches were significantly different in the smallest size interval, and the weighted mean catch difference was $\bar{\bar{D}} = -0.1268$. Length frequency distributions from the two gears are similar (Figure 50) ($\Delta = 0.097$; $\Delta_{crit} = 0.143$). Catches were positively correlated in only one size interval and for overall catches (Table 8), but not for the most abundant sizes (< 50 mm), so the comparability of the gears is questionable.

Gear 010: 15 minute tows vs Gear 108

There was no significant difference in adjusted tow distances per five minutes of effort by gear 010 and 108. Actual tow distances by gear 010 were divided by 3 to adjust the 15 minute tows to five minutes of effort. The 20 tows by gear 010 (two tows in each of 10 sets) averaged 0.39 km per five minutes, ranging from 0.30 to 0.49 km. Tows by gear 108 ranged from 0.28 to 0.46 km, averaging 0.39 km. The mean difference in tow distances was less than 0.01 km ($s^2 = 0.001$).

Bay anchovies were collected in 10 sets. Gear 010 caught significantly fewer anchovies per five minutes than did gear 108 ($\bar{\bar{D}} = -0.8204$; $s^2 = 0.5585$; $n = 10$), due to the absence of a cod end liner. Total catches were not significantly correlated ($r = 0.264$; $t = 0.77$).

Weakfish occurred in all 10 sets. Gear 010 caught significantly more total weakfish than did gear 108 (Figure 51). Gear 010 caught fewer weakfish < 100 mm despite the greater tow durations, apparently reflecting the mesh selectivity. Catches by gear 010 were greater for fish > 150 mm, the differences being significant for the 201-300 mm size intervals, yielding a mean difference of $\bar{\bar{D}} = 0.4179$. Length frequency distributions for fish > 150 mm significantly differed between gears ($\Delta = 0.244$; $\Delta_{crit} = 0.093$). Catches of all weakfish, and of fish 51-250 mm, were positively correlated, suggesting that gear 108 catches are estimable from gear 010 catches (Table 9).

Atlantic croaker were collected in 10 sets. Gear 108 caught significantly more croaker, overall, than gear 010 (Figure 52). Gear 010 caught significantly fewer croaker < 75 mm than gear 108, but generally more fish > 125 mm (Figure 52). This produced a mean catch difference of $\bar{\bar{D}} = 0.1784$. Catches by the two gears are positively correlated for all croaker, and for fish 151-225 mm, the most abundant size intervals (Table 9). Only two croaker < 125 mm were captured in gear 010, so the mesh selectivity could not be evaluated. Size frequency distributions for croaker > 125 mm were similar ($\Delta = 0.029$; $\Delta_{crit} = 0.079$).

Spot were also collected in 10 sets. Gear 010 caught significantly fewer spot, overall, than gear 108 (Figure 53). Significant differences were observed in three of the seven size intervals, yielding $\bar{\bar{D}} = -0.3071$ for spot 101-225 mm. Although apparently large, this observed mean difference was consistent among sets, even excluding an extreme catch of over 1200 spot in one gear 108 tow. Length frequency distributions differed for spot > 100 mm ($\Delta = 0.132$; $\Delta_{crit} = 0.050$). Overall catches of spot were significantly correlated (Table 9). Catches were correlated for spot 101-150 mm, the most abundant size intervals, suggesting that gear 108 catches may be estimable from gear 010 catches, at least for fish in the observed size range. No fish were captured less than the theoretical mesh retention size, so size selectivity could not be evaluated.

Silver perch were collected in 10 sets. The unlined trawl caught significantly more perch than did the lined net overall, and in three of six size intervals (Figure 54). The weighted mean difference for fish 101-225 mm was $\bar{\bar{D}} = 0.2670$. Few fish captured were below the theoretical mesh retention size, so that could not be evaluated. Size distributions from the two gears were not significantly different ($\Delta = 0.128$; $\Delta_{crit} = 0.145$). Catches were correlated for all fish, and for two of the more abundant size intervals (Table 9), indicating that gear 108 catches may be estimable from gear 010 catches in these size classes.

Hogchokers occurred in 10 sets. Overall catches of hogchokers were less in gear 010 than in gear 108 (Figure 55). Significantly fewer hogchokers were caught by gear 010 in two size intervals, yielding a weighted mean difference of $\bar{\bar{D}} = -0.1906$. Hogchoker length frequency distributions were similar from the two gears ($\Delta = 0.074$; $\Delta_{crit} = 0.100$). Catches by gear 010 and 108 were correlated in one size interval and for all fish (Table 9).

Summer flounder were captured in nine of the 10 sets. Gear 108 caught significantly more flounder than gear 010 (Figure 56). Likewise, gear 108 caught more flounder in three of 10 size intervals, giving $\bar{\bar{D}} = -0.1679$. Size distributions did not significantly differ ($\Delta = 0.113$; $\Delta_{crit} = 0.359$). Catches were not positively correlated in any size interval (Table 9), due to the small number of summer flounder caught, so the estimability of gear 108 catches is questionable.

Blue crabs were captured in 10 sets. Total catches differed significantly between the two gears (Figure 57). Significant differences in catches were observed in three of the seven size intervals, giving $\bar{\bar{D}} = -0.2378$. Catch differences were similar among the size intervals, and length frequency distributions were similar (Figure 57) ($\Delta = 0.171$; $\Delta_{crit} = 0.177$). Catches by the two gears were significantly correlated in one size interval and for total catches (Table 9).

Gear 010V: 5 minutes vs Gear 108

There was no significant difference in tow distances between gears. Of the 18 trawl sets conducted, positions were not recorded in at least one tow from three sets, leaving 15 sets usable. Tows by gear 010V averaged 0.45 km, and ranged from 0.21 to 0.86 km. Tows by gear 108 averaged 0.41 km, ranging from 0.16 to 0.84 km. The mean difference in tow distances, 0.04 km ($s^2 = 0.008$) was not significant at $\alpha = 0.05$.

Bay anchovies were collected in 17 comparison sets. Gear 108 caught significantly more total anchovies than did gear 010V (Figure 58). Catch differences were likewise significant in the two most abundant size intervals, resulting in a mean difference of $\bar{\bar{D}} = -0.8609$. Length frequency distributions from the two gears differed significantly ($\Delta = 0.165$; $\Delta_{crit} = 0.042$). Overall catches were significantly correlated, as were catches in those two abundant size intervals (Table 10).

Weakfish were collected in 11 sets. There was no significant difference in overall catches between gears (Figure 59). There were no significant differences between gears for weakfish > 50 mm, but gear 010V caught fewer fish < 50 mm. Length frequency distributions are similar for fish > 150 mm ($\Delta = 0.037$; $\Delta_{crit} = 0.158$), but fewer weakfish less than 109 mm were captured by gear 010V (Figure 59). Overall catches were correlated, and catches were correlated for fish 51-100 mm, the most abundant size interval (Table 10). Catches were not correlated in the other six size intervals, but few fish occurred in those size ranges.

Atlantic croaker occurred in 14 trawl sets. There was no significant difference in overall numbers caught by the two gears (Figure 60). However, gear 010V caught significantly more croaker 201-225 mm, and fewer croaker 26-50 mm, although gear 010V also captured few croaker 51-75 mm. For croaker 126-275 mm, $\bar{\bar{D}} = 0.0706$. The length frequency distributions differ for croaker > 125 mm ($\Delta = 0.132$; $\Delta_{crit} = 0.060$) (Figure 60). Overall catches by the two gears were positively correlated (Table 10). Catches were correlated for croaker 101-250 mm, where most fish occurred, indicating that the gears were congruent, at least above 100 mm.

Spot were captured in 13 sets. Gear 010V caught more spot, overall, than did gear 108 (Figure 61). Gear 010V caught fewer spot 51-75 mm, below the mesh retention size, but catches were not significantly different in the six larger size intervals. The mean catch difference for spot 101-225 mm was $\bar{\bar{D}} = 0.0675$. Length frequency distributions differed between the two gears ($\Delta = 0.058$; $\Delta_{crit} = 0.042$) (Figure 61). Overall catches were significantly correlated, and catches were correlated in four of the seven size intervals (Table 10).

Striped bass occurred in five sets. Overall catches by the two gears were not significantly different (Figure 62). Catches did not significantly differ in four size intervals. The length frequency distributions for fish > 100 mm are also similar ($\Delta = 0.015$; $\Delta_{crit} = 0.140$), although gear 108 caught more striped bass < 100 mm (Figure 62). Overall catches were positively correlated, and were correlated for fish 101-150 mm, one of the most abundant size intervals (Table 10).

White perch were also captured in five sets. No significant difference was observed for total numbers (Figure 63). Likewise, no differences were detected in the size intervals, although gear 010V caught fewer fish 51-75 mm. Length frequency distributions from the two gears were similar for fish > 100 mm ($\Delta = 0.032$; $\Delta_{crit} = 0.190$), but fewer fish < 82 mm, the theoretical mesh retention size, were captured by gear 010V (Figure 63). Overall catches were positively correlated, and catches were correlated for fish < 100 mm (Table 10).

Hogchokers were collected in 16 sets. Overall catches by the gears did not significantly differ (Figure 64). Similarly, catches did not differ within size intervals, and length frequency distributions were similar ($\Delta = 0.045$; $\Delta_{crit} = 0.077$). Overall catches were positively correlated, as were catches in three size intervals (Table 10), indicating that the gears are congruent.

Summer flounder were captured in 10 comparison sets. Total numbers caught by the gears did not significantly differ (Figure 65). Catches did not significantly differ within size intervals, although gear 010V caught more flounder 151-200 mm. Size distributions of flounder caught by the two gears were similar, although few flounder were captured by either gear (Figure 65) ($\Delta = 0.295$; $\Delta_{crit} = 0.354$). Catches were not correlated, either for total numbers or within size intervals, probably due to the small numbers collected (Table 10).

Blue crabs occurred in all 18 sets. No significant difference in total numbers was observed (Figure 66). Catches did not differ in six size intervals, but gear 010V caught significantly fewer crabs 101-125 mm. The mean catch difference for all crabs (1-175 mm) was $\bar{\bar{D}} = -0.0642$. Size distributions differed between gears ($\Delta = 0.152$; $\Delta_{crit} = 0.075$). Total numbers of crabs were not significantly correlated (Table 10). Catches were positively correlated in two size intervals.

Gear 010V: 15 minutes vs Gear 108

There was no significant difference in tow distances per five minutes between gears. Of the seven trawl sets conducted, positions were not recorded in at least one tow from three sets, leaving only four sets usable. Tows by gear 010V averaged 0.43 km per five minutes, and ranged from 0.32 to 0.53 km. Tows by gear 108 averaged 0.38 km, ranging from 0.26 to 0.55 km. The mean difference in tow distances, 0.06 km ($s^2 = 0.002$) was not significant at $\alpha = 0.05$.

Bay anchovies were collected in all seven sets. Gear 108 caught significantly more anchovies, overall, and in two of three size intervals (Figure 67), giving a mean difference of $\bar{\bar{D}} = -1.2981$. The length frequency distributions indicate the extreme differences in numbers caught by the two gears (Figure 67). Size distributions differed significantly ($\Delta = 0.267$; $\Delta_{crit} = 0.103$), although only three size intervals were included in the test. Catches by the two gears were not correlated (Table 11).

Weakfish occurred in seven sets. Gear 010V caught significantly more weakfish because of the greater tow duration (Figure 68). More weakfish were caught by the unlined net in two of the seven size intervals. However, few fish > 200 mm were captured, 25 by gear 010V and 29 by gear 108, so observed differences for those sizes may not be real. The weighted mean difference for weakfish 151-350 mm was $\bar{\bar{D}} = -0.0339$. Length frequency distributions for fish > 150 mm were similar ($\Delta = 0.097$; $\Delta_{crit} = 0.109$). Total catches were positively correlated, as were catches in the four most abundant size intervals (Table 11).

Atlantic croaker occurred in seven comparison sets. Gear 010V caught significantly fewer croaker, overall (Figure 69). This result was due to significant catch differences in the three smallest size intervals, approximately below the mesh retention size. Catches were similar or greater in gear 010 for croaker larger than the theoretical mesh retention size, yielding $\bar{\bar{D}} = 0.3162$ for fish 126-225 mm. Size distributions for croaker > 100 mm were similar ($\Delta = 0.078$; $\Delta_{crit} = 0.111$). Overall catches from the two gears were not significantly correlated, due to the influence of small fish (Table 11).

Catches were correlated for croaker 176-200 mm, one of the abundant larger size intervals.

Spot were also collected in seven sets. Total catches were greater in gear 010, and in two size intervals (Figure 70). The weighted mean difference for spot 101-225 mm was $\bar{\bar{D}} = 0.2039$. No spot smaller than the theoretical mesh retention size were caught, so that could not be examined. Length frequency distributions from the gears differed significantly ($\Delta = 0.135$; $\Delta_{crit} = 0.099$). Catches were positively correlated in two size intervals, but overall catches were not (Table 11).

Silver perch were captured in all seven sets. Catch differences were significant for total numbers and in three of six size intervals (Figure 71). The mean catch difference was $\bar{\bar{D}} = 0.2603$. Size distributions of perch > 100 mm from the gears were similar ($\Delta = 0.035$; $\Delta_{crit} = 0.114$). Catches were positively correlated in one size interval, but total numbers were not (Table 11).

Kingfish occurred in seven comparison sets. Although gear 010V caught few kingfish, the total numbers were not significantly different (Figure 72). Catches did not significantly differ in any size interval. Length frequency distributions for kingfish > 100 mm were similar ($\Delta = 0.233$; $\Delta_{crit} = 0.274$). Catches were not significantly correlated between gears, either for total numbers or within size intervals (Table 11).

Oyster toadfish were collected in seven sets. Catches by the two gears were not significantly different, within size intervals or overall ($\bar{\bar{D}} = 0.0744$), despite the difference in tow durations (Figure 73). Likewise, size distributions for all fish were not significantly different ($\Delta = 0.055$; $\Delta_{crit} = 0.158$). Catches were not correlated between the gears, probably due to the lack of a tickler chain in gear 010V (Table 11).

Hogchokers and **blackcheek tonguefish** both occurred in all seven comparison sets. Total catches of hogchokers were not significantly different, but gear 010V caught more fish in one size interval, giving $\bar{\bar{D}} = 0.0835$ (Figure 74). Likewise, numbers of tonguefish were similar, overall and within size intervals ($\bar{\bar{D}} = 0.0648$) (Figure 75). Length frequency distributions of hogchokers differed ($\Delta = 0.082$; $\Delta_{crit} = 0.061$), although they did not for tonguefish ($\Delta = 0.083$; $\Delta_{crit} = 0.093$). Catches of the two species were not significantly correlated, either for total numbers or within size intervals (Table 11).

Summer flounder were collected in all seven sets. Catches by the gear 010V were greater for total numbers and within two size intervals, producing a value of $\bar{\bar{D}} = 0.2905$ (Figure 76). Size distributions of flounder were similar ($\Delta = 0.067$; $\Delta_{crit} = 0.154$). Total numbers of flounder in the two gears were significantly correlated, and catches were correlated in the smallest size interval (Table 11).

Blue crabs occurred in the seven comparison sets. Overall catches did not significantly differ (Figure 77). Gear 010V caught more crabs in two of the eight size intervals, giving $\bar{\bar{D}} = 0.1209$ for crabs 1-175 mm. Size distributions were barely similar between the two gears ($\Delta = 0.096$; $\Delta_{crit} = 0.097$). Total catches were not positively correlated, although catches were correlated in one size interval (Table 11).

HISTORICAL COMPARISONS

Gear 035 vs 033

Bay anchovies were collected in 35 of the 41 trawl pairs in 1975 and 13 of 15 in 1977. Analysis of variance indicated a significant effect of year on catch differences, so the two data sets were examined separately (Table 12). The 16 ft trawl (gear 035) caught significantly fewer total anchovies than the 30 ft trawl with the *Pathfinder* (Figure 78a). Gear 035 caught significantly fewer anchovies in two size intervals, with a weighted mean catch difference of $\bar{\bar{D}} = -0.4615$. Catches by the two gears were positively correlated in one size interval, and for all individuals (Table 13), suggesting that the gears are congruent. However, the length frequency distributions differed (Figure 78a) ($\Delta = 0.163$; $\Delta_{crit} = 0.073$).

In contrast, no significant differences in bay anchovy catches were observed between gears in 1977 when the *Langley* was used (Figure 78b).Catches did not differ for any of the three size intervals, although the smaller net captured more than twice as many anchovies as the larger net (Figure 78b). Catches by the two gears were not correlated in any size intervals (Table 13), although length frequency distributions were similar ($\Delta = 0.062$; $\Delta_{crit} = 0.096$).

Weakfish occurred in only eight of the 41 trawl pairs in 1975 and seven of 15 pairs in 1977. Few weakfish were captured by the sampling gears in either year - in 1975 gear 035 captured only three and gear 033 caught 29 weakfish. Analysis of variance indicated no differences between years (Table 12), so the two data sets were combined.

Gear 035 caught significantly fewer weakfish than did gear 033 in one size interval, and overall (Figure 79). The mean catch difference between gears for fish 1-350 mm was $\bar{\bar{D}}$ = -0.4346. Size distributions did not significantly differ between gears, although few fish were caught ($\Delta = 0.299$; $\Delta_{crit} = 0.328$). Catches by the two gears were not significantly correlated (Table 13).

Atlantic croaker were captured in 50 trawl pairs. Gear 035 caught significantly fewer croaker than gear 033 (Figure 80). No differences in catches were observed between years (Table 12), so data were combined. Mean catch differences were significantly negative in four size intervals, yielding a mean difference of $\bar{\bar{D}}$ = -0.1836. Catches by the two gears were positively correlated in two size intervals, and for all fish, but were negatively correlated in two intervals (Table 13). Size distributions did not differ significantly ($\Delta = 0.028$; $\Delta_{crit} = 0.039$).

Spot occurred in 54 of the 56 trawl pairs. No differences were found between the two data sets (Table 12). The 16 ft trawl caught significantly fewer total numbers of spot than did the 30 ft trawl (Figure 81). Catch differences were significant in seven of the 10 size intervals, and produced $\bar{\bar{D}}$ = -0.2913. Catches were positively correlated in four size intervals, and for all fish (Table 13). Length frequency distributions were significantly different ($\Delta = 0.058$; $\Delta_{crit} = 0.047$).

Oyster toadfish were collected in 30 trawl pairs. Analysis of variance indicated that catch differences varied between years (Table 12). However, few fish occurred in 1977 - one fish in gear 035 and 11 in gear 033, so data were combined. Overall catches by the two gears did not significantly differ (Figure 82), although catches differed in one size interval. The weighted mean catch difference was $\bar{\bar{D}} = -0.1130$. Catches were negatively correlated in three intervals (Table 13). This may reflect the absence of a tickler chain in either gear, and the somewhat arbitrary capture of toadfish by them. Length frequency distributions did not differ between the gears ($\Delta = 0.285$; $\Delta_{crit} = 0.300$).

Hogchokers were captured in 53 trawl pairs. Analysis of variance indicated no significant difference in catches between years (Table 12) so data sets were combined. Catch differences between gears were not significant for any size interval or for all fish combined (Figure 83). Catches were positively correlated in three size intervals, and negatively correlated in one (Table 13). Overall catch differences were also positively correlated. Size distributions significantly differed between gears ($\Delta = 0.073$; $\Delta_{crit} = 0.043$).

Blackcheek tonguefish occurred in 17 pairs in 1975, but were not collected in 1977. Fewer tonguefish were captured by the 16 ft trawl (Figure 84). Catches were significantly different in one of four size intervals and overall, and the weighted mean catch difference was $\bar{\bar{D}} = -0.4128$. Numbers of tonguefish caught by the two gears were not significantly correlated (Table 13). Length frequency distributions for tonguefish were similar ($\Delta = 0.089$; $\Delta_{crit} = 0.391$).

Summer flounder were caught in 33 trawl pairs. No significant differences between years or size intervals were observed in the ANOVA (Table 12). For combined data, significantly fewer total flounder were caught by gear 035 than by gear 033 (Figure

85). The catch difference was significant in two of 10 size intervals. The mean catch difference for flounder 51-450 mm was $\overline{\overline{D}} = -0.2405$. Length frequency distributions from the two gears were significantly different ($\Delta = 0.173$; $\Delta_{crit} = 0.164$). Numbers of flounder caught by the two nets were positively correlated overall and in one size interval (Table 13).

Blue crabs occurred in 40 of the 41 comparisons in 1975, but were not recorded in 1977. Overall catches by gear 035 were significantly less than by the 30 ft trawl (Figure 86). Catches significantly differed in one of seven size intervals, and yielded a mean difference of $\overline{\overline{D}} = -0.1414$. Total catches by the two nets were not correlated, and catches were negatively correlated in one size interval (Table 13). However, size distributions from the two gears were similar ($\Delta = 0.104$; $\Delta_{crit} = 0.124$).

Gear 010 vs 043

There were generally no differences in catches by gear 043 and 010, the only differences being for benthic species. Few **bay anchovies** were captured in the eight trawl pairs, due to the absence of a cod end liner, and no significant difference between gears was observed (Table 14). Likewise, no differences were found for **weakfish**, **Atlantic croaker** or **spot**, although few weakfish were caught. Only two **summer flounder** were captured, both in gear 010. No difference was observed for **hogchokers**, but gear 043, with the tickler chain, caught significantly more **catfish** ($D = -0.4203$) and **blue crabs** ($D = -0.2862$) than did gear 010, without a chain. Blue crabs were typically not measured in these comparisons, so catch differences could not be examined by size. Only catches of blue crabs by the two gears were positively correlated (Table 14).

***Langley* vs *Captain John Smith* (old)**

In some instances, the R/V *Langley* caught more fish than the *Captain John Smith*, although the validity of the differences may be questionable due to small sample sizes. **Bay anchovies** were collected in only two of the five trawl pairs, and no significant difference was observed (Table 15). No differences in catches between vessels were found for **weakfish** or **Atlantic croaker**, although few weakfish were captured. Significantly more **spot** were caught in five pairs by the *Langley* (D = 0.3070), although, again, few were caught overall. Only 12 **summer flounder** were collected in five trawl pairs by the two vessels, but the catch by the *Langley* was significantly greater (D = 0.2760). No differences were found for total numbers of **hogchokers** or **blue crabs**, although the Langley caught significantly fewer crabs in one size interval (Figure 87). Catches of weakfish, spot and blue crabs were positively correlated (Table 15). Length frequency distributions for blue crabs did not differ between vessels ($\Delta = 0.048$; $\Delta_{crit} = 0.078$).

***Pathfinder* vs *Captain John Smith* (old)**

The R/V *Pathfinder* generally appeared to catch fewer fish than the *Captain John Smith*. No significant difference in catches from the two vessels was observed for **bay anchovies** (Table 16). No difference in total catches was found for **weakfish**, but significantly fewer **Atlantic croaker** (D = -0.2845) and **spot** (D = -0.2397) occurred in catches by the *Pathfinder*. Few **summer flounder** were captured, and no significant difference between vessels was observed. Similarly, no difference was found for **oyster toadfish**, but the *Pathfinder* caught fewer **hogchokers** (D = -0.460) and **blue crabs** (D = -0.2183) (Figure 88). Although catches of blue crabs differed between vessels, size distributions did not ($\Delta = 0.037$; $\Delta_{crit} = 0.052$). Only catches of croaker, spot and crabs were positively correlated (Table 16).

DISCUSSION

Some observed differences between the modified *Captain John Smith* and *Fish Hawk* (JS and FH) may be due to scientific crews, and not to any real vessel differences. The larger *Captain John Smith* carried more scientific personnel (usually five or six) than the *Fish Hawk* (usually three), and set the field sampling pace as the "official" survey vessel. Therefore, catches were more quickly and thoroughly culled on the former vessel within the time constraints. This explains the results observed for bay anchovies and small blue crabs, which were probably culled incompletely from *Fish Hawk* catches in deference to other, more visible or "important" species within the available time.

Significant vessel differences observed for some other species may not be important. The actual differences in catches for weakfish 201-250 mm and hogchokers 151-175 mm may be negligible considering the relatively small numbers of fish captured in those size ranges during the study. Hogchokers were frequently subsampled due to their abundance, and measured subsamples may not have been truly representative of the catch. However, observed differences for other fish species and larger crabs could not be readily explained. The catch differences may be due to differences in the amount of cable deployed (scope) by the vessel/winch operators, and the resulting contact pressure of the footrope, winch speed, or to other vessel differences.

Observed differences between the *Langley* and old *Captain John Smith* (LA and J1) may likewise be unimportant. The number of trawl pairs was probably too small to adequately compare the two vessels. Furthermore, few individuals were caught during the study and observed catch differences appeared unusually large relative to other comparisons presented.

In contrast, catch differences observed in the *Pathfinder - Captain John Smith* (PA - J1) comparisons were probably realistic. The number of trawl pairs was much greater for the *Pathfinder* comparisons than for the *Langley* comparisons. Where significant catch differences were found, the *Pathfinder* consistently caught fewer fish than the old *Captain John Smith*. These differences were for bottom-oriented (spot and Atlantic croaker) or benthic (hogchokers and blue crabs) species. Catches from the *Pathfinder* may have been affected by the location of the trawling block (off the side 3 m above the water), which would have resulted in loss of ground contact by the gear in a rolling sea. Other, unknown factors may also be involved, such as vessel operators. Considering differences in methodology, the conversion for blue crabs reported by Lipcius and Van Engel (1990) for the same data ($x_{J1}/x_{PA} = 1.50$) was comparable to the equivalent value from this study (from $\bar{\bar{D}} = -0.2183$, $x_{J1}/x_{PA} \geq 1.65$).

Size dependent catch differences from the gear 033 - 108 comparisons were apparent for many species. The step-wise correction for weakfish might be more adequately represented by a regression equation, although that was not significant. Significant regressions were calculated for Atlantic croaker, spot, white perch, and blue crabs. Except for spot, the regressions indicated that gear 033 became more efficient relative to gear 108 as fish size increased. As the trawl envelops the fish, they are stimulated to swim at the towing speed, and larger fish can persist longer than smaller fish (Wardle 1993). Tow distances, and therefore median tow speeds (distance/5 minutes) by the two gears were not significantly different, so the size dependent differences should not be due to stamina or swimming speed of the fish. The differences may reflect a size dependent effect of the larger wooden trawl doors of gear 033 relative to the smaller doors of gear 108. The higher attachment point of the net legs to the wooden doors would have raised the headrope, allowing the net to fish higher in the water column. The larger surface of the wooden doors, and possibly the angle of attack, may produce a larger pressure wave than the smaller metal doors, and impart some herding effect. Alternatively, the catch differences may be simply artifacts of sample sizes, independent of actual gear effects.

The shorter bridles should have resulted in a narrower net opening and smaller catches by gear 033, but this was not clearly evident. In some instances, the narrower opening may have been compensated for by the herding effect of the trawl doors. During deployment of gear 033 and other gears which used the smaller, 56×122 cm, wooden doors and 9.1 m bridle, the net was observed to spread widely, and possibly even over-spread. Wider net spread causes higher bridle (leg) angles, which may not herd the fish as effectively as narrow bridle angles, so catches are lower (Rose and Walters 1990). Also, with wide net spread, the sand clouds from the doors may pass well outside the wings and lose their herding effect (Engas and Godo 1986). If the trawl did over-spread, it may have lost ground contact (Engas and Godo 1986), and some fish, especially smaller individuals nearer the bottom, may have escaped under the footrope. This may, in part, explain the lower catches of smaller fish in gear 033, and possibly of spot and black seabass. The height of the net opening and net spread are correlated (Godo and Engas 1989; Koeller 1991), so if the net did overspread, the headrope would have been lowered, possibly resulting in the loss of larger fish higher in the water column. The headrope attachments for the wooden doors are higher than for the Vee doors, so the relative loss in overall net height may have been diminished. Because the trawl doors used in this study differed from those used originally, the net spread and effectiveness may have differed from the original gear. Lipcius and Van Engel (1990) also reported that catches of blue crabs increase with longer bridles, although DeAlteris et al. (1989) observed inconsistent finfish catch differences among different bridle lengths.

The absence of a tickler chain was apparent in the catch differences of benthic species. Catches of hogchokers, summer flounder and blue crabs were significantly less with gear 033. These lower catches may have also been partly due to loss of ground contact by the trawl because of overspreading. The decreasing catch differences with size possibly evident with hogchokers > 75 mm and with blue crabs suggest that larger individuals are increasingly susceptible to gear 033 even without a tickler chain.

The comparisons indicate that gear 070 may be more effective than the present gear for demersal and nektonic species, but not for benthic ones (herein demersal refers to species associated with the bottom, such as spot and croaker, but excludes more benthically-oriented species, such as flatfishes, catfishes, toadfish, and crabs). Gear 070 caught significantly more spot, silver perch and large croaker, despite the slightly shorter distances covered. Catch differences were also positive, albeit not significant, for white perch and large weakfish. In contrast, differences were not significant or were negative for summer flounder, hogchokers, blackcheek tonguefish, oyster toadfish, and blue crabs. This difference in results may be attributable to the trawl doors, the only difference between the gears. The 61×137 cm wooden doors may produce a greater herding effect than the smaller 49×71 cm Vee doors in species dispersed in the water column, but have no greater effect than the Vee doors on species closely associated with the bottom. Additionally, the attachment point of the headrope on the wooden doors is higher than on the Vee doors, so gear 070 may open slightly higher, and the herding influence of the legs may be higher. Flatfish are herded into the net path by the footrope and enter the net at low heights (Main and Sangster 1981; Bublitz 1996), so the height of the doors may be irrelevant for those species.

The size-dependent catch differences observed with gear 033 are also present in gear 070 catches of weakfish, Atlantic croaker and blue crabs. The stepped corrections indicated for weakfish in gear 033 and Atlantic croaker in gear 070 are apparently results of the bimodal length frequency distributions. The step pattern is less apparent, and regressions are significant, for weakfish catches in gear 070 and croaker in gear 033, when length frequency distributions are more continuous. Since the length frequency distributions over the year would be generally continuous, regression equations are probably more appropriate for these species. The size-dependence may reflect differential abilities to avoid or escape nets with different openings (Stender and Barans 1994).

The results from the gear 010V comparisons may clarify some of the observations for these gears. No size dependent catch differences as with gear 033 and gear 070, other than those attributable to the cod end liner, were detected for gear 010V. Because the Vee doors were used with this gear, the herding effect of the wooden doors, and any size selectivity attributed to them, was negated. This would suggest that the door effects ascribed to gears 033 and 070 may be real, although other gear differences may also be involved. Length frequency distributions were similar, and no size selectivity was observed, for large weakfish and white perch in the gear 010V:5 minute comparisons, but distributions differed for croaker, spot and crabs.

The height of the net opening probably had a substantial effect on catches of demersal and nektonic species. The fewer and smaller floats on gear 043 probably did not open the net as high as the present net. This might explain the significantly lower catches of large (above the mesh retention size) weakfish and silver perch, which may occupy the middle and upper water column (Chao and Musick 1977). Fish higher in the water would be captured by the higher opening gear 108, but would be missed by gear 043. Spot and croaker probably occupy the lower water column (Chao and Musick 1977), making the higher opening of gear 108 less important. However, a low headrope may influence fish even near the bottom, increasing trawl avoidance behavior, and decrease the number of fish entering the net (Watson 1989). In addition, although the trawl doors used for gear 043 and gear 070 were larger than those used for gear 033 and 010, the difference in rigging may have resulted in less spreading force. Therefore, the shorter bridles were probably more influential.

The absence of a cod end liner in gear 043 should render it less perceptible to the fish. Hydrodynamic resistance of the trawl increases the pressure ahead of the net, and some species sense this pressure and take evasive action (Carrothers 1981). The reduced drag due to the unlined cod end should also permit the net to open wider. Any potential increases in catches of large weakfish and silver perch by gear 043 due to the reduced pressure wave and wider net spread may have been negated by the lower net opening and shorter bridles. In contrast, if the lower net opening of gear 043 did not affect catches of large spot and croaker, the larger catches of those species may be due to the reduced pressure wave and wider net opening, beyond the loss due to the shorter bridles. Alternatively, the greater catches of large spot and large croaker by gear 043 may be due to the herding effect of the large, wooden trawl doors, as observed with gear 070 using the same doors, while the effect on weakfish and silver perch was negated by the low net opening.

Negative catch differences for large weakfish and silver perch in the gear 043 comparisons were attributed to the lower net opening of that gear and possibly a reduced net spread from the shorter bridles. Since the same Vee doors and headline flotation were used in the gear 010V- gear 108 comparisons, the net heights were approximately the same, and the lack of differences in weakfish catches from the 010V: 5 minute comparisons seem to reflect that. Any increase in catches due to the reduced pressure wave may have been canceled by the shorter bridles. Too few silver perch were collected by gear 010V with five minute tows to examine the gear differences.

In contrast, the greater catches of large spot and Atlantic croaker by gear 043 were ascribed to the absence of a cod end liner and reduced pressure wave, and possibly to the herding effect of the doors. Catches of spot (overall) and croaker (one size interval) by gear 010V with five minute tows may have been slightly greater than those by gear 108, though not convincingly so. These small differences may be due to the reduced pressure wave. The smaller Vee doors may have had a lesser herding effect, and the net spread may have been less than with the wooden doors, so the possible difference due to the doors was absent. If the net height had little effect on the capture of spot or croaker, and the reduced pressure wave of the unlined net resulted in only a minimal increase in catch by gear 010V, the large differences with gear 043 may be more appropriately ascribed to the herding effect of the doors.

The effect of the cod end liner in the gear 043 - 108 comparisons was noticeable for bay anchovy and small Atlantic croaker, but not for small weakfish. Although catch differences between gears 043 and 108 were similar for weakfish above and below the theoretical retention size, the causes of those differences are probably not similar. While smaller catches of large weakfish by gear 043 may be due, in part, to the lower net opening, the difference in catches of smaller weakfish are probably due to the cod end mesh size. Variability in catches, as illustrated by the lack of correlation between gears, probably obscured the mechanisms involved. The unlined cod end was very inefficient in capturing small croakers < 50 mm or anchovies. The magnitude of the catch differences was more due to the size of the catches by gear 108 than any indication of the efficiency of gear 043.

The negative catch differences with gear 010V for bay anchovy, weakfish, Atlantic croaker, spot, and white perch below the theoretical retention sizes, although not always significant, probably reflect the influence of the cod end liner. The retention size for striped bass was not examined, but the catch difference for bass < 100 mm, although not significant, may also indicate the effect of the cod end liner. The results for weakfish in the 010V:5 minute comparisons suggest that the apparent lack of cod end selectivity for small weakfish in gear 043 was not real.

The gear 010 comparisons, in conjunction with gear 043 comparisons, illustrate the varying effects that tow duration had on the different species. The absence of catch differences between gear 010 and 043 (both five minutes duration) for demersal and nektonic species in the historical gear comparison allow for some tow duration comparisons. Although gear 043 (5 minute tows) caught fewer large weakfish ($\bar{\bar{D}}$ = -0.154) or silver perch ($\bar{\bar{D}}$ = -0.218) than gear 108, no differences between gears were observed in the gear 010:7.5 minute tows, and gear 010 catches exceeded gear 108 catches as tow durations increased to 15 minutes ($\bar{\bar{D}}$ = 0.418 for weakfish and $\bar{\bar{D}}$ = 0.267 for silver perch). Catch differences for Atlantic croaker were inconsistent, being similar throughout the range of tow durations for gears 043 and 010 (gear 043:5 min - $\bar{\bar{D}}$ = 0.156; gear 010:7.5 min - $\bar{\bar{D}}$ = 0.102; gear 010:15 min - $\bar{\bar{D}}$ = 0.178), but increasing with duration for gear 010V (010V:5 min $\bar{\bar{D}}$ = 0.071, 010V:15 min $\bar{\bar{D}}$ = 0.316). Because comparisons were based on total tow durations, rather than being standardized, it is not possible to evaluate the effect of tow duration on gear efficiency - that is, whether catch per minute increases with number of minutes towed as fatigue sets in. Although the scaling effect would suggest that larger individuals have greater stamina than smaller ones and therefore would only become a more substantive catch component with longer tow durations, there was insufficient evidence to indicate that in this study. Godo et al. (1990) found no effect of tow duration on mean lengths of catches.

Tow duration results for spot proved enigmatic, as catch differences decreased with increasing tow duration. Gear 043 caught more spot than gear 108 ($\bar{\bar{D}} = 0.106$), no significant differences between gears were observed for spot in the gear 010:7.5 minute tows ($\bar{\bar{D}} = 0$), and the gear 010:15 minute tows caught fewer spot than the present gear ($\bar{\bar{D}} = -0.307$). Rather than tiring the fish, it appears that the longer tows may have allowed more time for the spot to escape. However, no significant differences were observed in larger spot (above the retention size) for the gear 010V:5 minute comparisons, and catch differences were positive for the gear 010V:15 minute comparisons ($\bar{\bar{D}} = 0.204$), in disagreement with that theory (but see discussion below regarding the effect of the tickler chain on gear 010V).

The analyses assumed a constant relationship of catches between gears regardless of the actual abundance of a species, but this may not be true. The use of catch differences assumed those differences were constant, essentially a linear regression of catches by one gear against catches by the other with a slope of unity. The analyses then tested the significance of the intercept as $\bar{\bar{D}}$ (Figure 89). The proportion of the population available to the gear is assumed constant, and results are due only to the gear. However, when fish densities are low, they may be concentrated near the bottom, and a large proportion of the population will be available to the gear. At high densities a greater proportion of the fish may be higher in the water column, so a smaller proportion of the population is available to the gear, and the total number of fish may be underestimated (Engas and Godo 1986). Likewise, large numbers of individuals swimming ahead of or within the net mouth may affect others as the net approaches them, enhancing avoidance or escapement (Wardle 1993). The relatively high density of spot in the 15 minute gear 010 comparisons may have resulted in larger catch differences than would have occurred with lower densities. Catches of spot in the gear 010:15 minute comparisons (geometric mean catch per five-minute tow by gear 108 = 90.8) were greater than in the gear 010:7.5 minute comparisons (geometric mean catch by gear 108 = 5.5), the gear 010V:15 minute comparisons (gear 108 mean = 12.8) or gear 010V:5 minute comparisons (gear 108 mean = 46.0).

Although the higher opening net used in the gear 010V comparisons should have resulted in larger catches than from gear 010, this was not observed. The catch difference for large weakfish in the gear 010:15 minute comparisons ($\bar{\bar{D}}$ = 0.418) was much larger than from the gear 010V:15 minute tows ($\bar{\bar{D}}$ = -0.034), but the results from the latter may have been affected by the small numbers caught. Catches of silver perch from the two comparisons were similar (gear 010:15 minutes $\bar{\bar{D}}$ = 0.267; gear 010V:15 minutes $\bar{\bar{D}}$ =

0.260). Gear 010V caught more croaker ($\bar{\bar{D}} = 0.316$) and spot ($\bar{\bar{D}} = 0.204$) than did gear 010 ($\bar{\bar{D}} = 0.178$ and -0.307, respectively). This is in opposition to the assumption that catches of the more nektonic species (weakfish and silver perch) would increase with the higher-opening net, but catches of the demersal species (croaker and spot) would not be affected. These observations may be due in part to the small Vee doors, resulting in a reduced herding effect of the doors.

The effect of the tickler chain was apparent in the gear 010 comparisons. From the historical gear study, catches differed between the otherwise identical gears 010 and 043 only for benthic species (catfishes and blue crabs). Likewise, previous comparisons between gears 010 and 043 revealed nearly a threefold increase in blue crab catches due to the tickler chain (Chittenden and Van Engel 1972). Despite the greater duration, the 7.5 minute tows by gear 010 caught as many summer flounder, and significantly fewer blue crabs and oyster toadfish than did gear 108 with five minute tows. Likewise, the 15 minute tows caught fewer summer flounder, hogchokers, and blue crabs than did gear 108. However, no significant differences were observed for hogchokers in the gear 010:7.5 minute tows or in the historical comparisons of gear 010 and 043. The inefficiency of the gear without a tickler chain (lack of ability to catch benthic species) may have rendered the increased tow durations inconsequential. Chittenden and Van Engel (1972) likewise reported no effect of tow duration on catches of blue crabs using the same gear.

In contrast to the results generally observed for the other gears, the effect of the tickler chain with gear 010V using both five and 15 minute tows appeared limited. The absence of significant differences for summer flounder may be due to the small numbers captured. However, excluding one size interval (101-125 mm) for blue crabs, gear 010V caught as many crabs and hogchokers as did gear 108. Catch differences from the gear 010V:15 minute comparisons were frequently positive, occasionally significantly so, for summer flounder, hogchokers, oyster toadfish, and blue crabs. These differences are indicative of the effect of tow duration rather than of the tickler chain, in contrast to the gear 010 comparisons. The gear 010V comparisons were often conducted in open, soft-bottom areas. In such areas, the weighted footrope probably digs into the substrate, acting as a tickler chain. In hard or live bottom areas (e.g. sand, sponge and oyster shell bottom), the footrope may not dig into the ground, necessitating the tickler chain to disturb the substrate. Furthermore, the wooden doors used with gear 010 may have overspread the net and reduced the ground contact, resulting in loss of fish under the footrope - such overspreading and loss of catch may have been absent from the gear 010V comparisons. This may also explain the spot catches; whereas spot may have been able to escape from the gear 010 tows under the footrope, they may not have been able to escape under gear 010V.

As with gear 043, the cod end liner had a noticeable effect on the capture of smaller individuals by gear 010. Although no mesh selectivity was apparent for small weakfish captured in gear 043, it was more evident with gear 010. However, substantial numbers of small weakfish were captured by the unlined net. Catches of bay anchovies were significantly smaller in all unlined net comparisons, and were typically uncorrelated with the gear 108 catches. Blockage of the cod end meshes by other fish and debris may cause retention of fish smaller than would be kept otherwise. Furthermore, tension on the cod end from drag would constrict the meshes, effectively reducing the retention size. These factors may produce results similar to those expected by use of the cod end liner, and catches may be correlated, as observed for weakfish 1-50 mm in the gear 043 comparisons and for Atlantic croaker 26-75 mm in the gear 010:7.5 minute comparisons. However, these factors are not consistent. The amount of other fish and debris varies spatially and temporally. Tension on the cod end and constriction of the meshes depends on other factors such as the amount of fish and debris already in the cod end and body of the net, tow speed, and current direction. The potential variability of these factors would make catch corrections for fish below the retention size unreliable. In contrast, there was no obvious effect of the cod end liner on catches of small crabs. Their body shape, appendages, and ability to grasp the net, as well as fish or debris in the net probably all contributed to their retention in the net. In addition, size frequency distributions for crabs did not differ between lined (gear 108) and unlined (gear 043, 010) nets, indicating no mesh selectivity. Catches of crabs, large or small, are probably more dependent on the presence of a tickler chain than the mesh size, at least for the trawl gears used here.

As expected, the smaller 16 ft trawl (gear 035) generally caught fewer fish than the 30 ft trawl (gear code 033) in the historical gear comparisons. These differences reflect the narrower and lower net opening of the smaller net. Of the species examined, catch differences were absent only in bay anchovies using the R/V *Langley*, and hogchokers. Differences in results for anchovies may reflect true vessel differences, such as winch speed or vessel noise, or unrelated effects such as random patchiness in fish distribution, interannual abundance differences, or procedural differences. The absence of differences with hogchokers, despite the different net sizes, may illustrate species-specific effects of the nets, since similar results were not observed in other benthic species.

The purpose of the gear comparisons was to adjust the estimates of abundance of young-of-the-year to the current gear and vessel. These size-dependent catch analyses were used in an effort to provide a form of correction for catches of any size, and in any month. However, seasonal differences in availability and catchability are possible. Differences in water temperature affect swimming speed and stamina. Water clarity, and therefore the visual range to detect and avoid the net changes seasonally and in different areas. Seasonal changes in girth may affect the retention size. The abundance of the target species or other species may affect the distribution and availability of a given species. Spatial distribution (vertically and horizontally) may vary with time of day, food, size/age of the fish, or season.

Conversions may require that any corrections are additive - that is, adjustments from one vessel to another and from one gear to another do not involve any interactions between vessels and gears. However, this had not been examined. Additionally, while comparisons had been made to adjust *Pathfinder* and *Langley* catches to the original *Captain John Smith*, and from the modified *Captain John Smith* to the *Fish Hawk*, it is

SUMMARY AND RECOMMENDATIONS

Finfish and blue crab catches from the four major historical trawl configurations and tow durations used in the VIMS trawl survey were compared with catches using the current configuration. In addition, the most recently used vessel was compared with the current vessel, and previously conducted gear and vessel comparisons were examined.

In general, there were no substantial differences in catches between the modified *Captain John Smith* and *Fish Hawk.* Significantly greater numbers of bay anchovies and small blue crabs were captured by the *Captain John Smith* than by the *Fish Hawk.* However, this was probably not due to real differences in the vessels. Likewise, differences observed for weakfish and Atlantic croaker are probably not real. Catch differences for larger blue crabs are probably due to real disparities in vessels, and it is probably reasonable to apply a single correction to the entire size range (Table 17).

Although some differences in catches between the *Langley* and old *Captain John Smith* were observed, they were not considered of practical significance due to the small number of comparison tows made. However, substantial catch differences were observed for Atlantic croaker, spot, hogchokers and blue crabs between the *Pathfinder* and old *Captain John Smith*, and catch corrections are probably warranted (Table 17). In the gear 035 - 033 comparisons, analyses of variance suggested meaningful differences between the *Langley* and *Pathfinder* only for bay anchovies.

The trawl doors apparently had a significant effect on catches, at least for species dispersed in the water column. Catches by the historical gears, all with large wooden trawl doors, typically increased with size relative to the current gear, with smaller Vee doors. These trends are most evident with weakfish and Atlantic croaker in gears 033 and 070, where cod end liners were used. The increasing catches, relative to gear 108, with size may be due to the herding effect of the large wooden trawl doors. Although linear size-dependent trends are not always statistically significant, this absence is likely due to sampling artifacts - e.g. bimodal length frequency distributions due to the sampling period(s). For those species exhibiting such trends, a regression equation is probably a reasonable method of adjustment (Table 17). Other species exhibited consistent catch relationships between gears over the observed size ranges.

The tickler chain usually affected the catches of benthic species. Flatfishes, oyster toadfish and blue crabs were typically less abundant in gears 033 and 010 without tickler chains than in the current gear 108 with a chain. However, in some instances no such catch disparities were observed. The apparent similarities between gears in some cases are probably due to the small sample sizes, but simple explanations are lacking in other cases, notably for hogchokers. Furthermore, catches by the historical and current gears were typically not correlated for benthic species. Assuming catches by the nets using tickler chains are representative of the true population (gear A, Figure 89), absence of correlation may indicate that catches by the gear without a tickler chain (e.g. gear B, Figure 89) are arbitrary, and unrelated to the true abundance. Catch differences, or lack thereof, and absence of correlation between gears make the validity of any attempt to adjust catches of benthic species by these gears questionable. For gears with tickler chains, it is probably reasonable to apply corrections to the catches (Table 17).

The cod end liner had a significant effect on catches of small individuals. Catches of bay anchovies were substantially less in gears 043 and 010 without liners than in gear 108 with the cod end liner. Anchovy catches were similar in the gear 033-108 and 070-108 comparisons, both with liners. Likewise, small Atlantic croaker and weakfish were less abundant in the unlined nets. The occurrence of small individuals in the unlined nets is often probably a matter of chance or the amount of other fish or material impinging on the meshes. As noted for the tickler chain, absence of correlation between gears for small fish may indicate that true levels of abundance are not represented. Adjustments are probably reasonably applicable to catches of larger individuals above the mesh retention size, but corrections are probably not reliable for individuals much below the retention size.

The height of the net opening apparently had a substantial effect on the catches of some species. The fewer and smaller floats on gear 010 and 043 probably did not open the net as high as the floats on gear 033, 070 and 108. Significantly fewer weakfish and silver perch were caught by gear 043 with five minute tows. These species may be vertically distributed in the water column. Fish dispersed in the water column would be captured by the higher opening gear 108, but would be missed by gear 043. Spot and croaker are probably absent from or sparse in that higher part of the water column, making the larger opening of gear 108 less important.

Tow durations had varying effects on the different species. Catches of weakfish and silver perch in gear 043 and 010 increased with tow duration relative to gear 108. Catch differences for Atlantic croaker were similar among tow durations for gears 043 and 010, suggesting that this species fatigues sooner, within the first five minutes of the tow. Catches of spot, relative to gear 108, decreased as tow durations increased. Rather than tiring the fish, the longer tows may have allowed more time for the spot to escape. Alternatively, it might be more likely that the relative density of spot may have affected the results.

Net size generally had an obvious and expected effect on catches. However, in a few instances, net size had no apparent effect. These may reflect peculiarities of gear/vessel combinations - likely with bay anchovies, or peculiarities of the species - hogchokers have proven troublesome in some instances. Although explanations may not be apparent, corrections, or lack thereof, may be reasonably applicable. Some results may appear contradictory regarding vessels, but few tows were made in the *Langley - Captain John Smith* comparisons, so inconsistencies may be due, at least in part, to sample sizes, unaccounted effects of the *Brooks* or *Restless*, as well as to possible interannual differences in the gear 035 - 033 comparisons.

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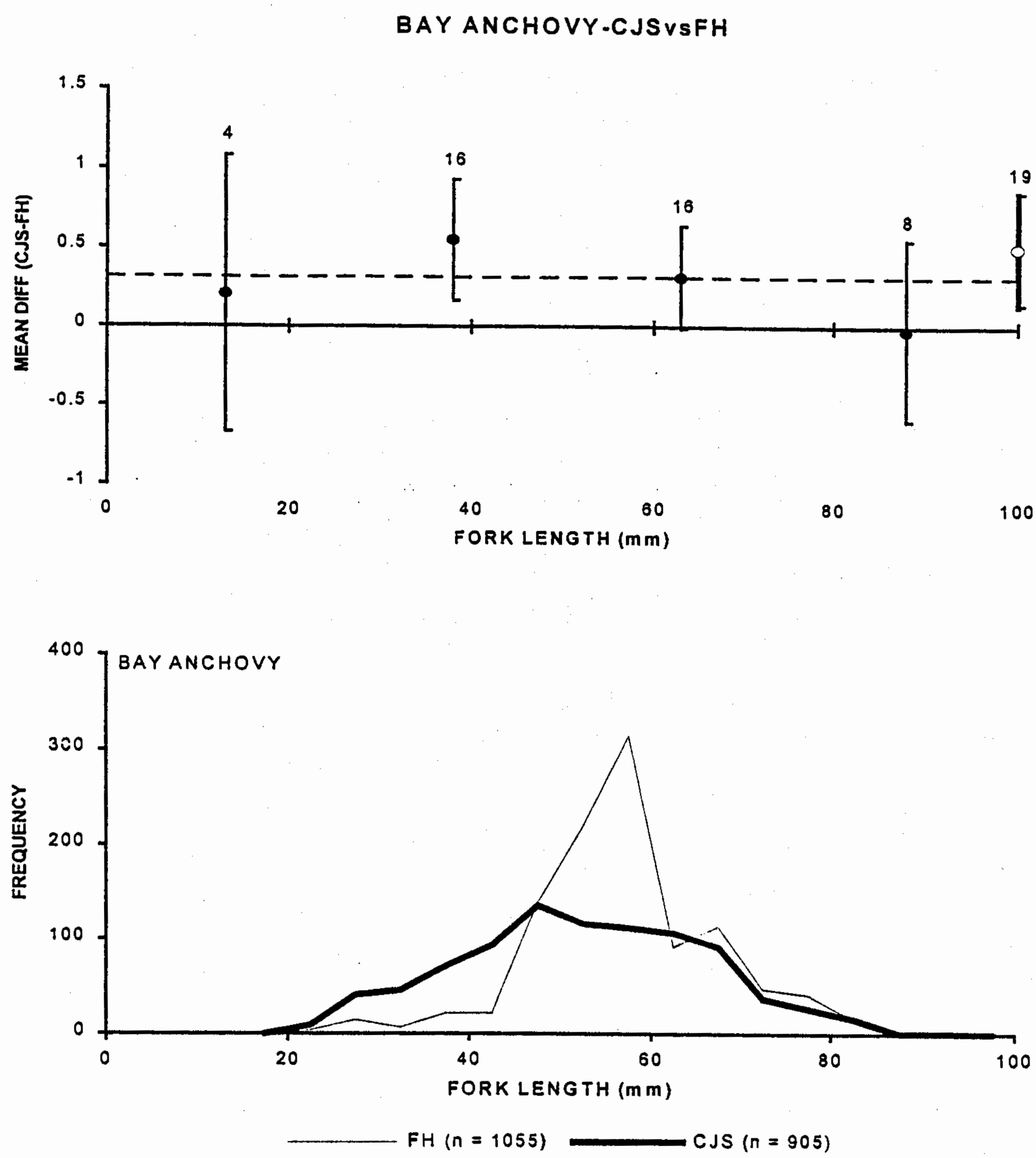


Figure 1. TOP: Mean catch differences ($\overline{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for bay anchovies, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{\overline{D}}$) calculated from the 1-100 mm size intervals. BOTTOM: Length frequency distributions of all bay anchovies (5 mm increments) from the comparison trawls.

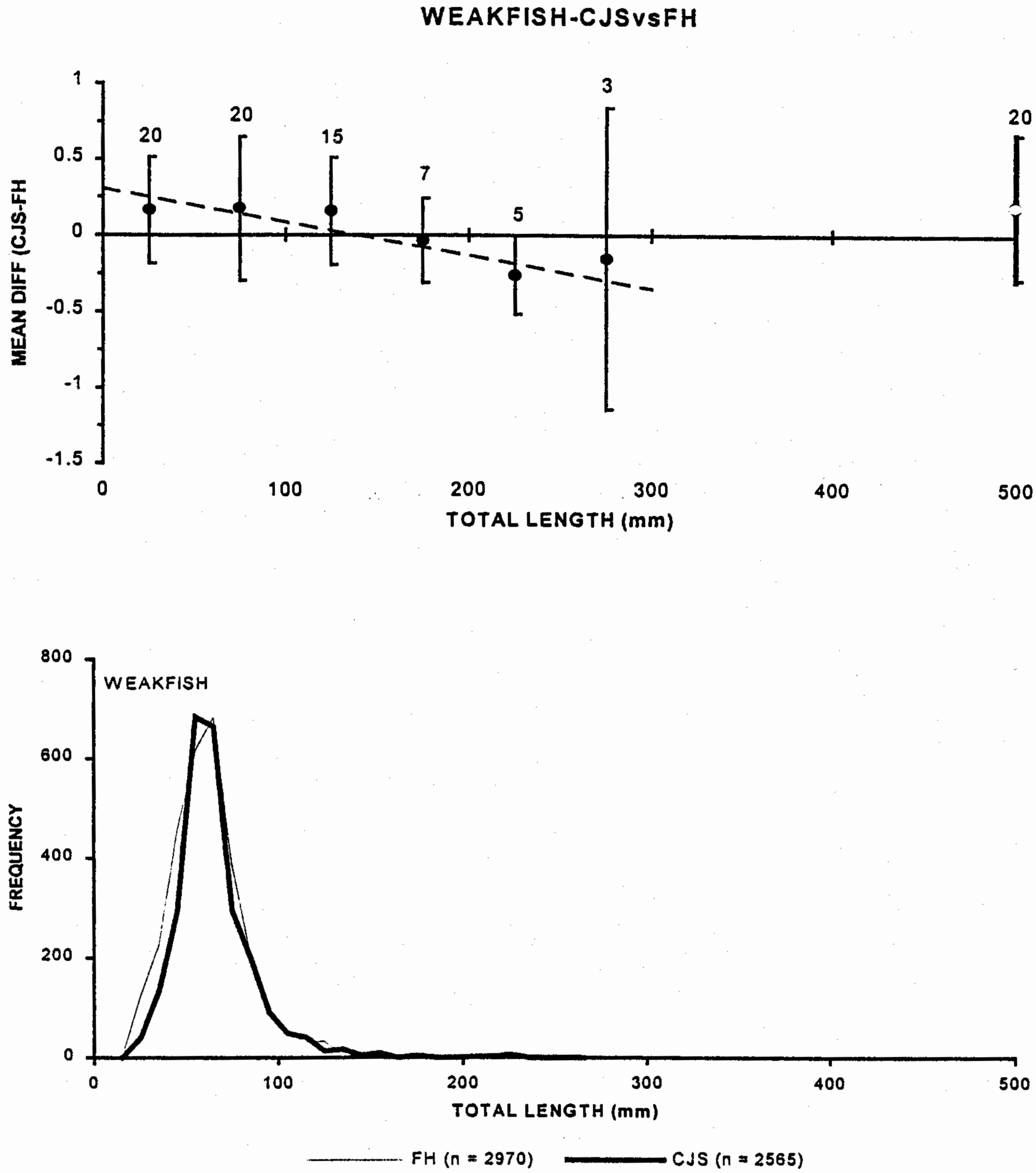
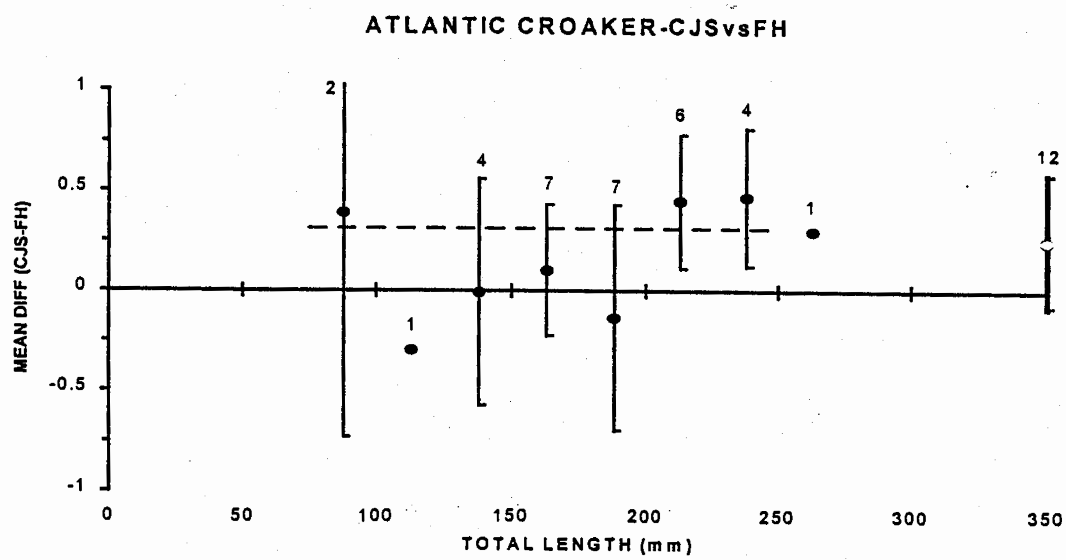


Figure 2. TOP: Mean catch differences ($\bar{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted regression equation calculated from the 1-300 mm size intervals. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls.



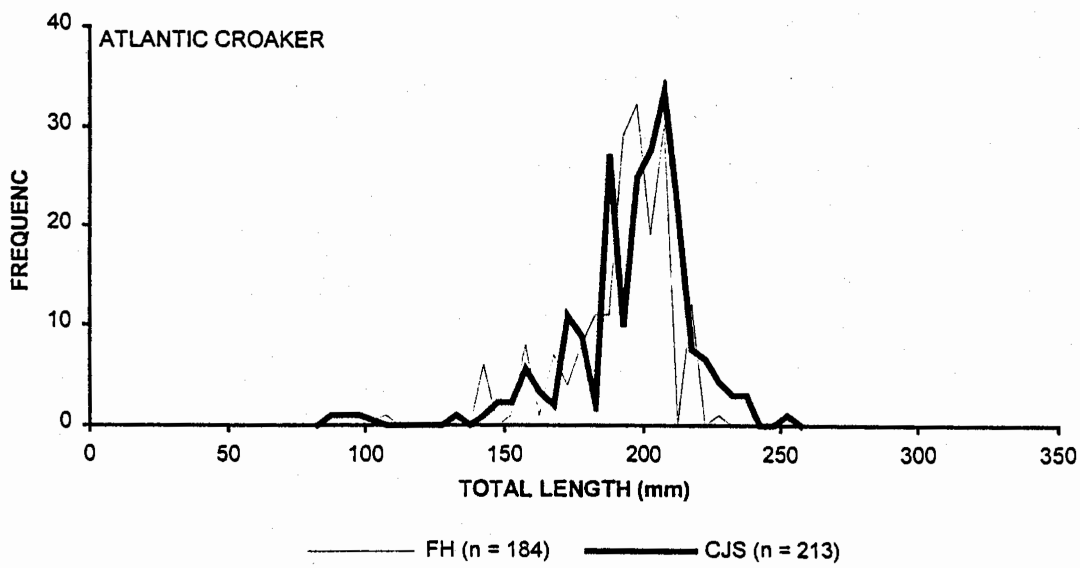


Figure 3. TOP: Mean catch differences ($\overline{D_L}$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{\overline{D}}$) calculated from the 76 - 250 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls.

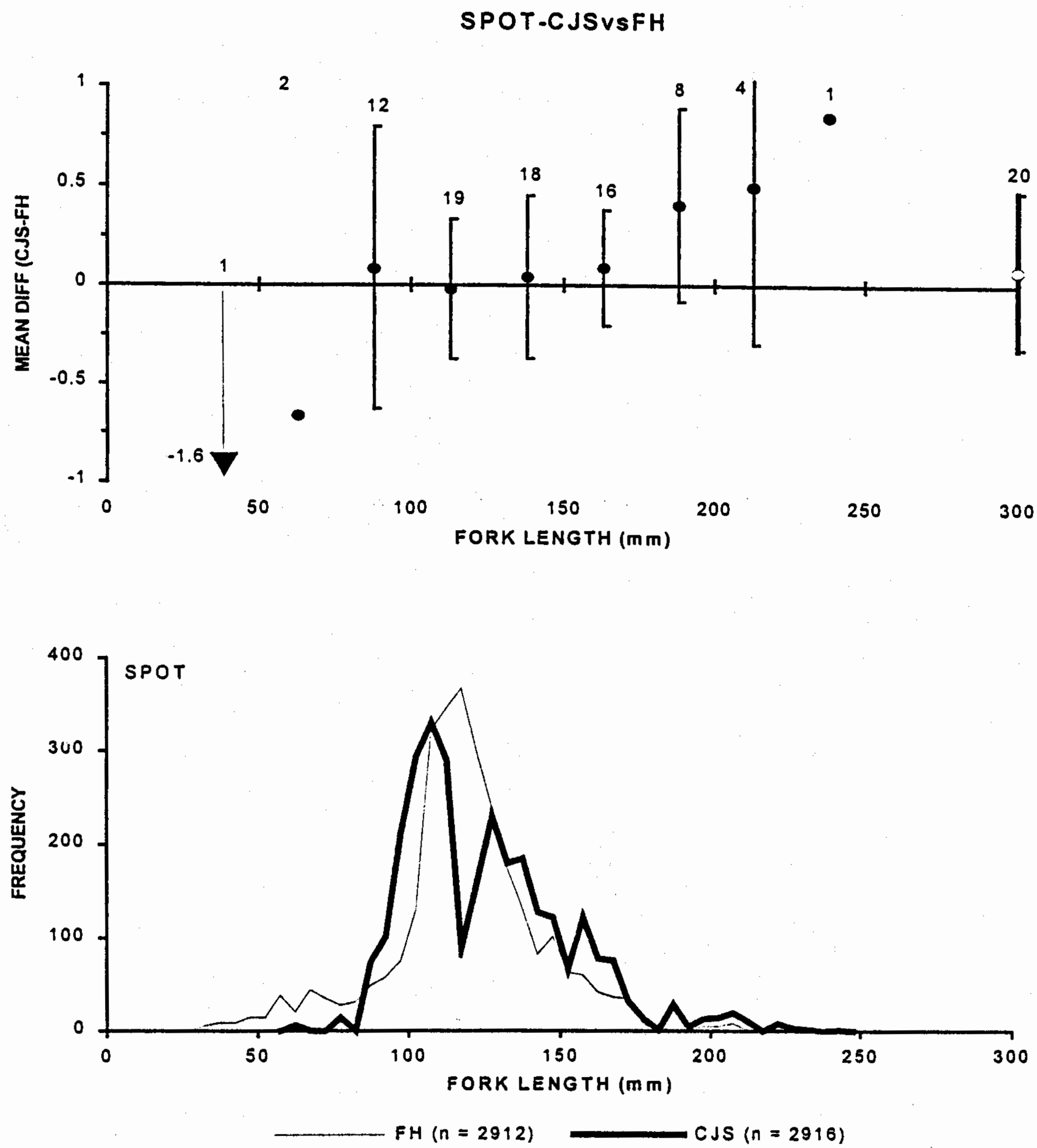


Figure 4. TOP: Mean catch differences ($\bar{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls.

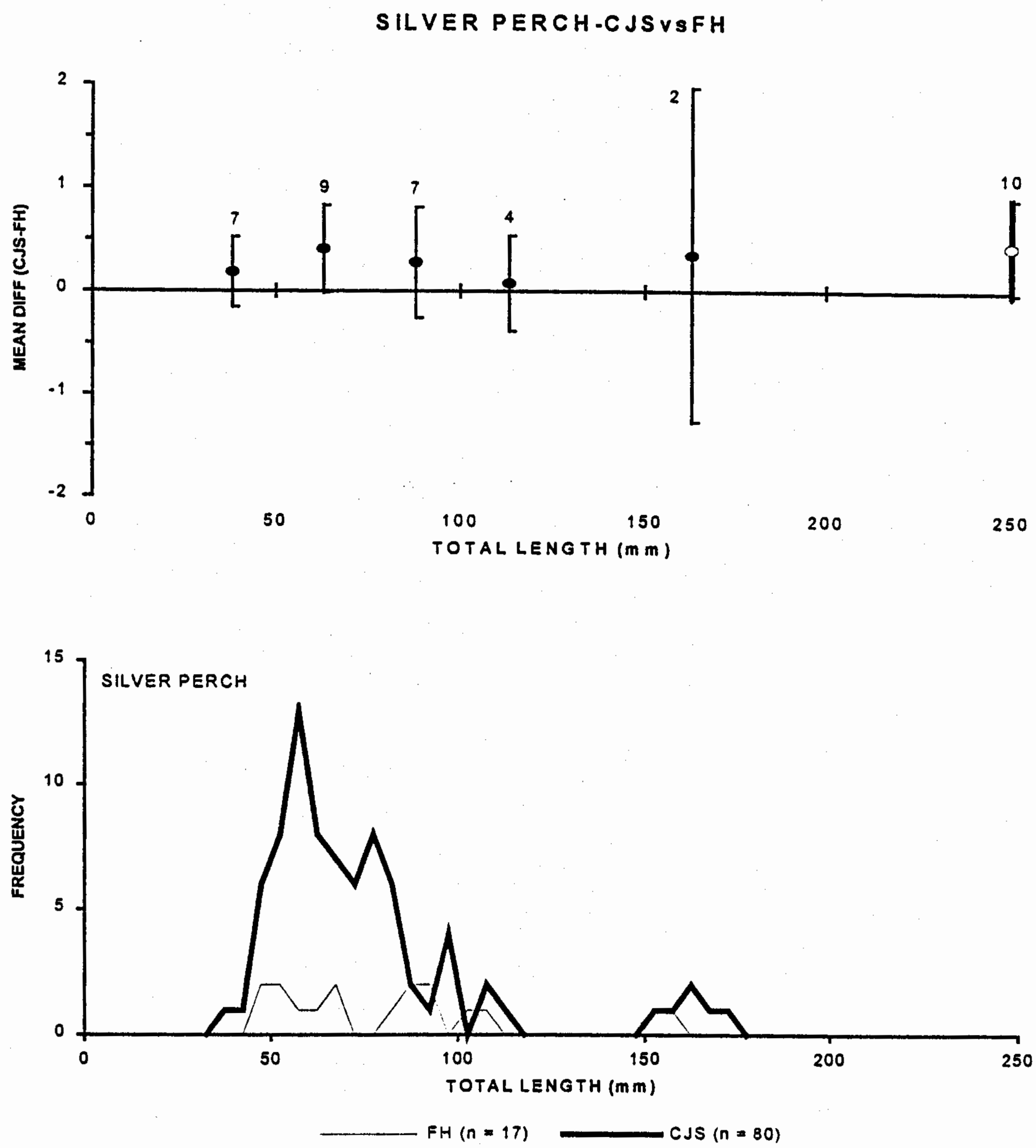


Figure 5. TOP: Mean catch differences ($\bar{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all silver perch (5 mm increments) from the comparison trawls.

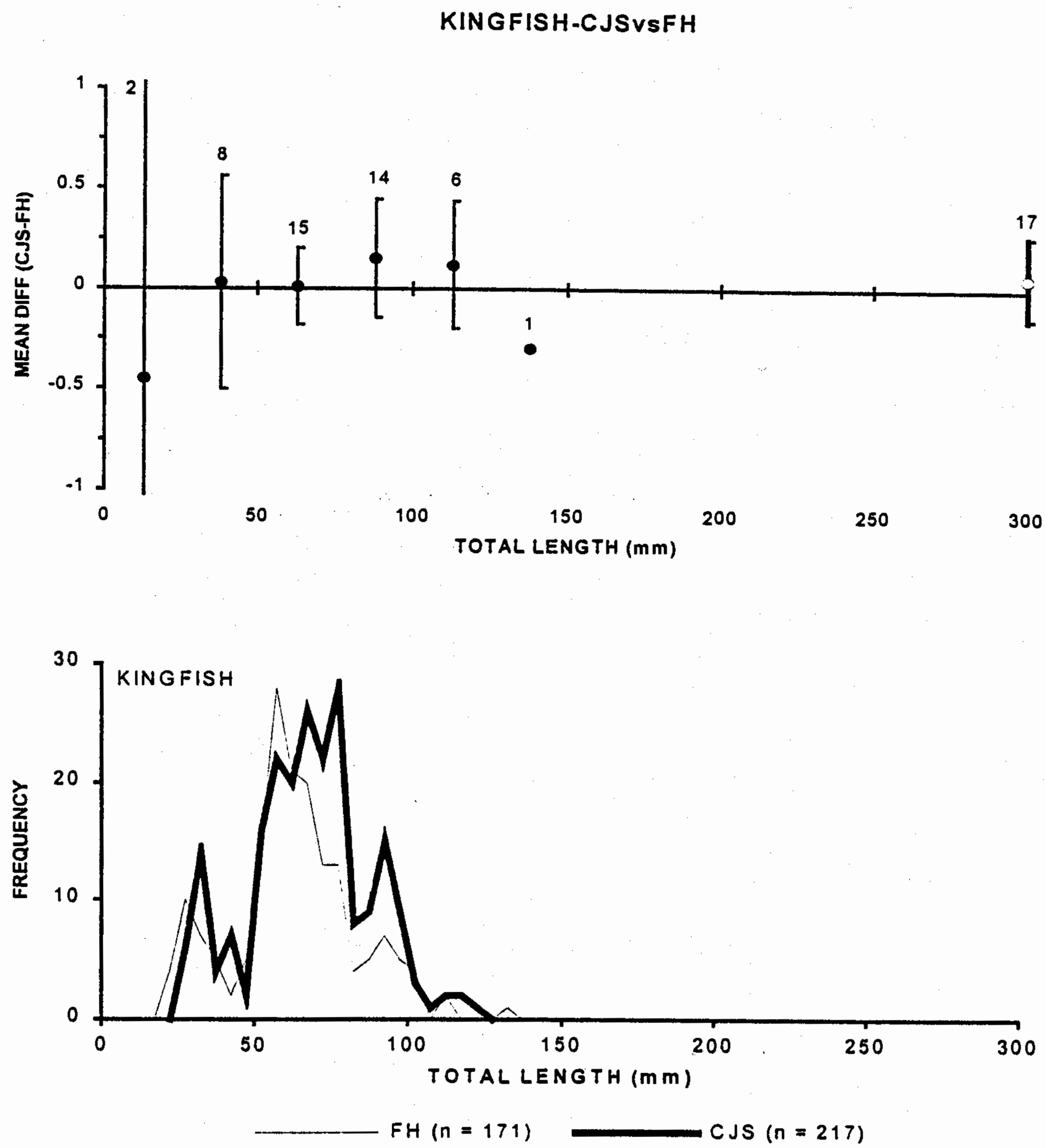


Figure 6. TOP: Mean catch differences ($\overline{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for kingfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all kingfish (5 mm increments) from the comparison trawls.

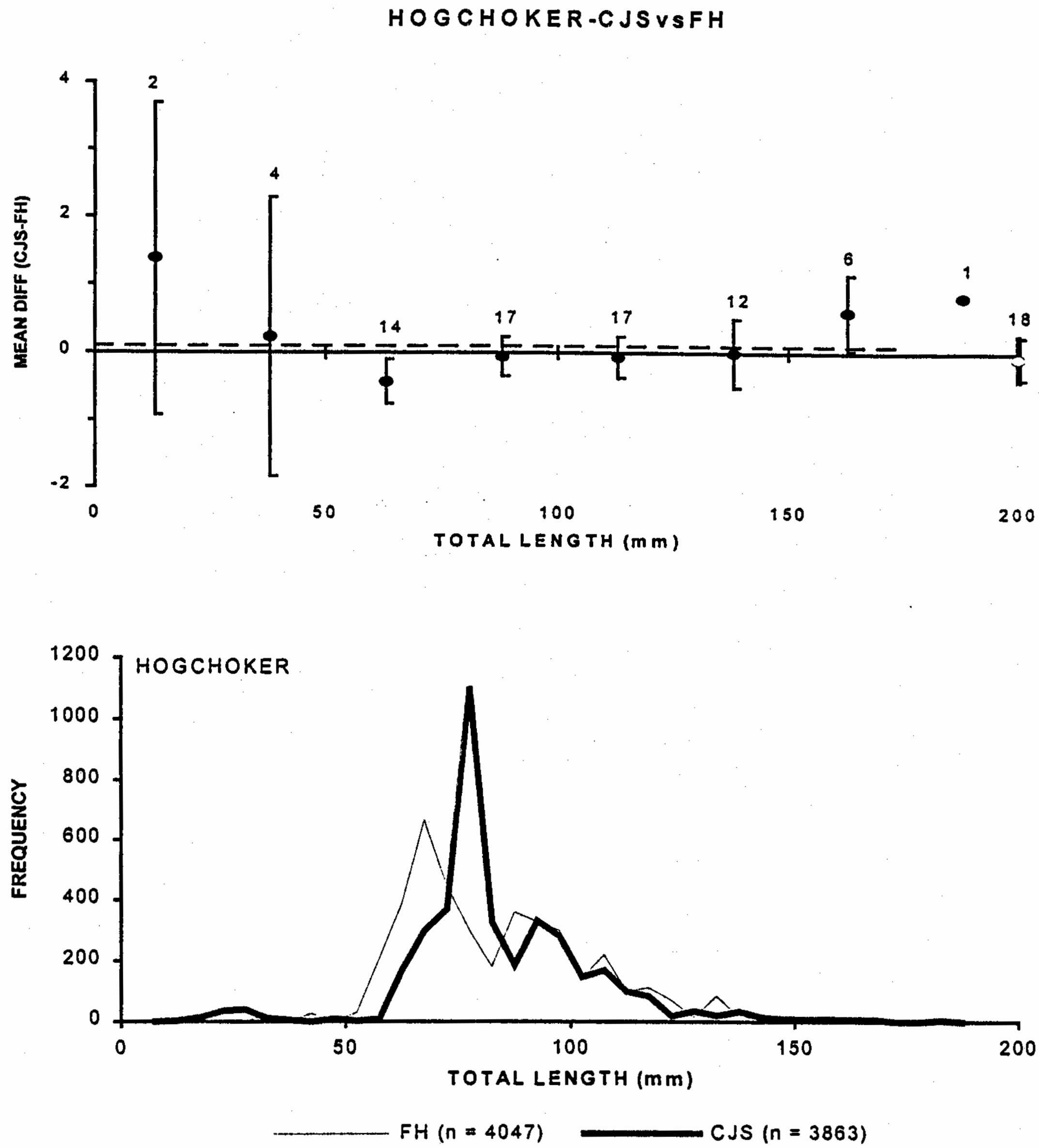


Figure 8. TOP: Mean catch differences ($\overline{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{\overline{D}}$) calculated from the 1-175 mm size intervals. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

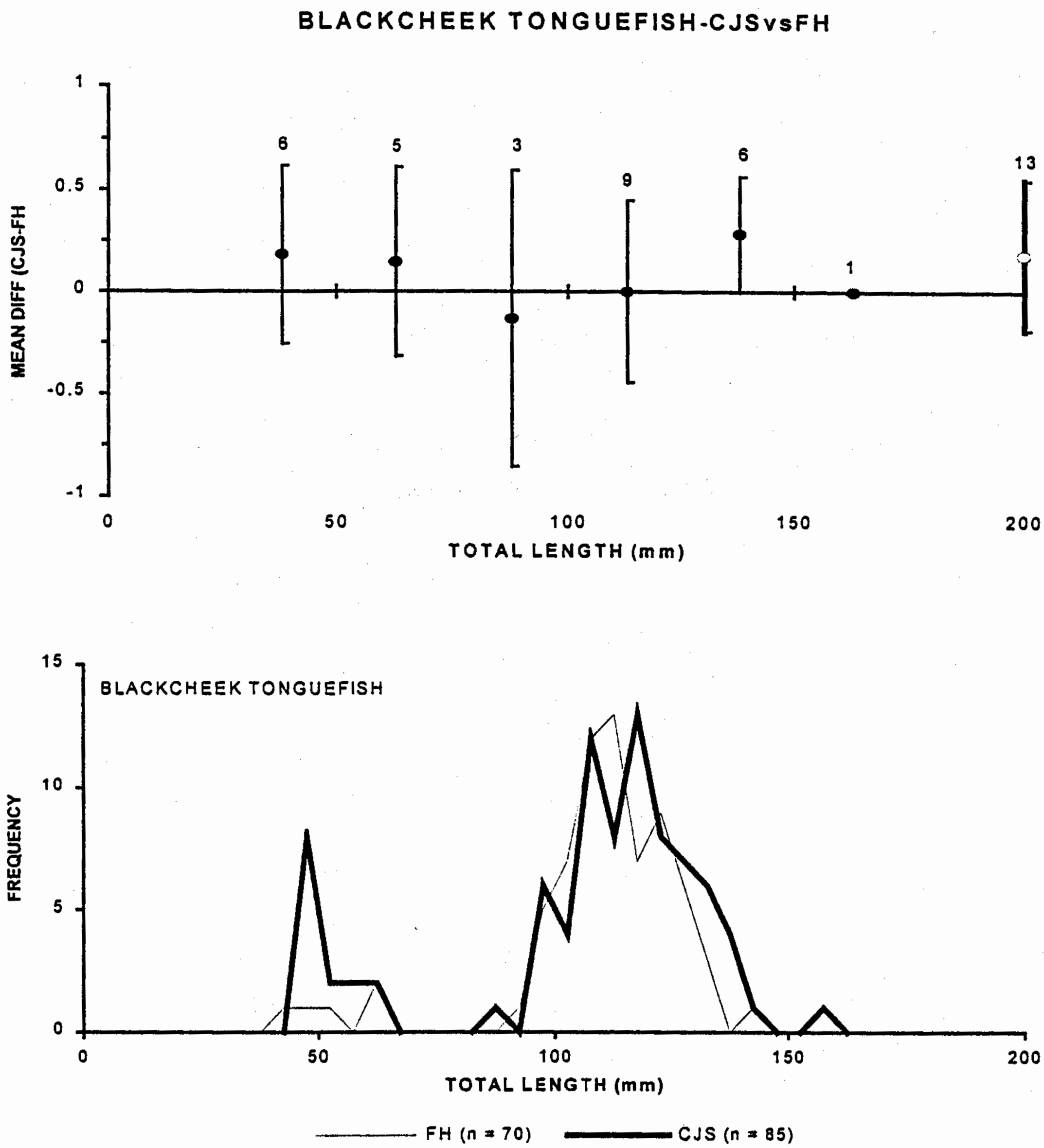
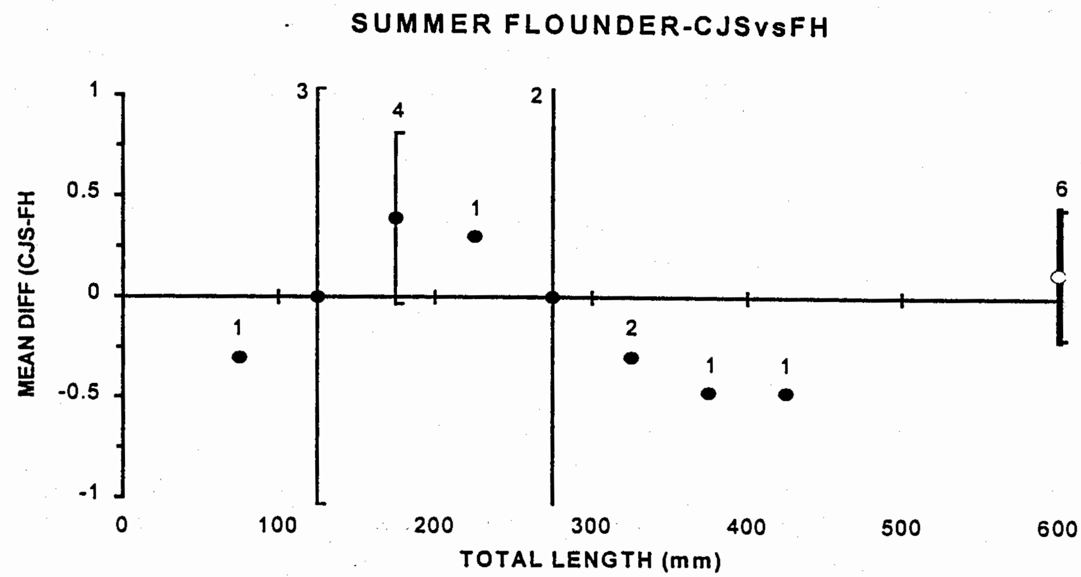


Figure 9. TOP: Mean catch differences ($\bar{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for blackcheek tonguefish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all blackcheek tonguefish (5 mm increments) from the comparison trawls.



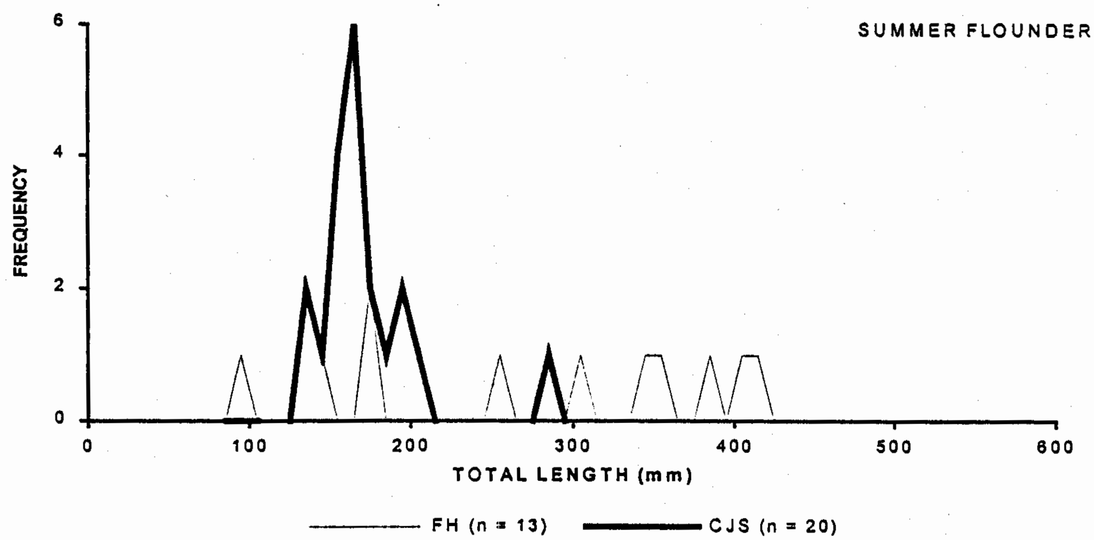
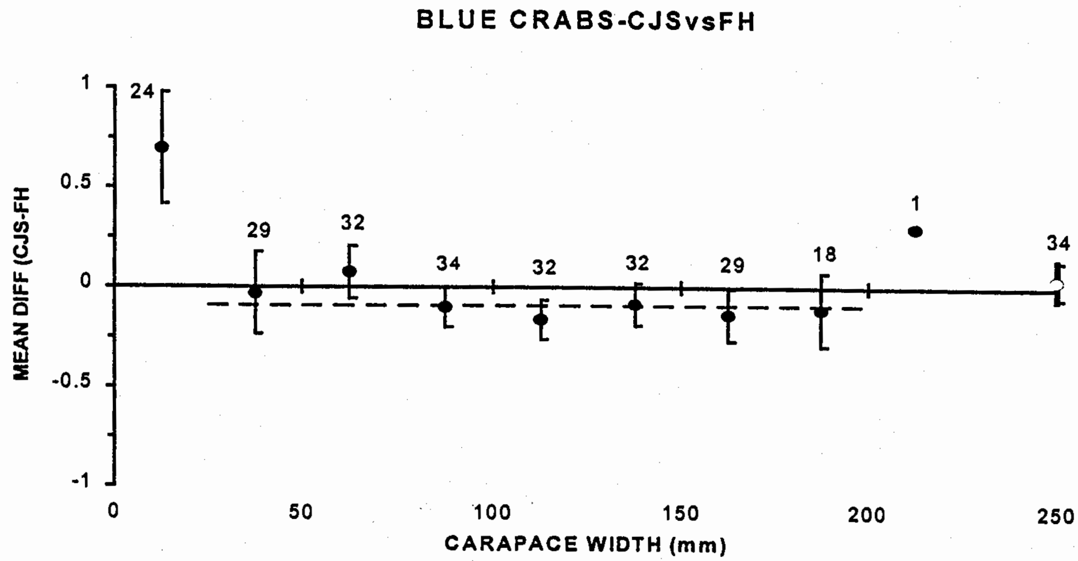


Figure 10. TOP: Mean catch differences ($\overline{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls.



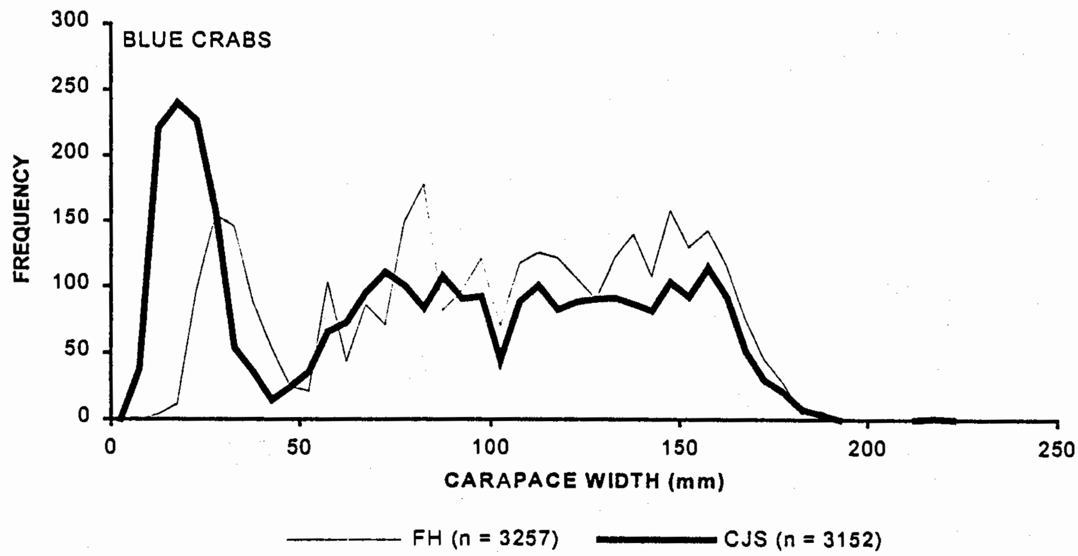
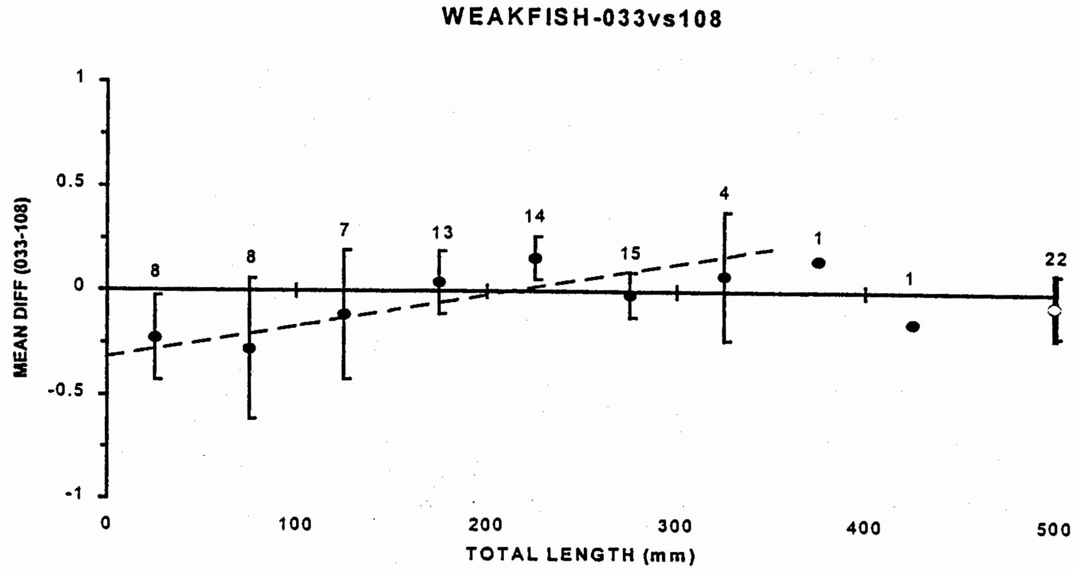


Figure 11. TOP: Mean catch differences ($\overline{D}_L$) between the *Captain John Smith* (CJS) and *Fish Hawk* (FH) for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{\overline{D}}$) calculated from the 26 - 200 mm size intervals. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.



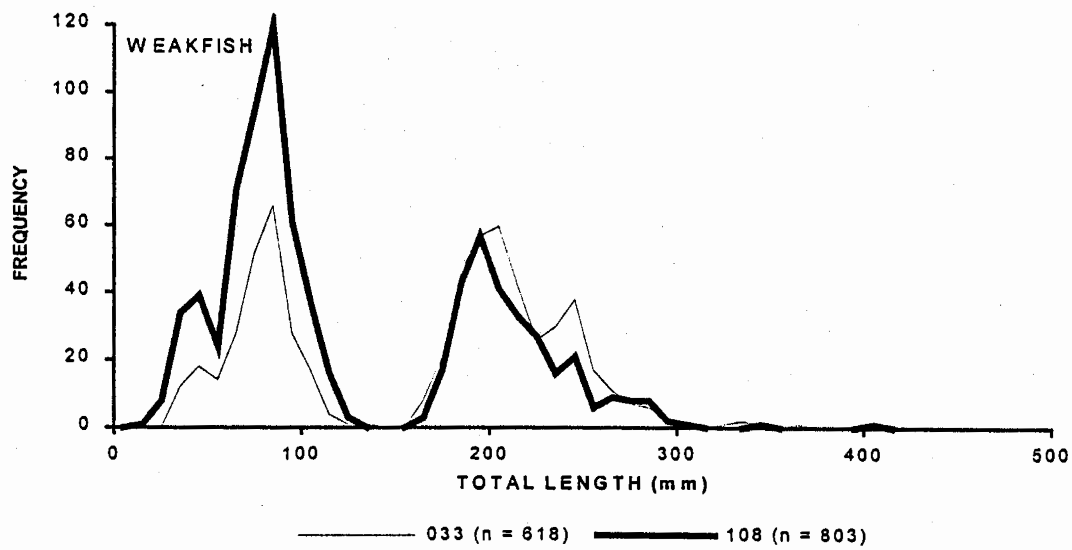
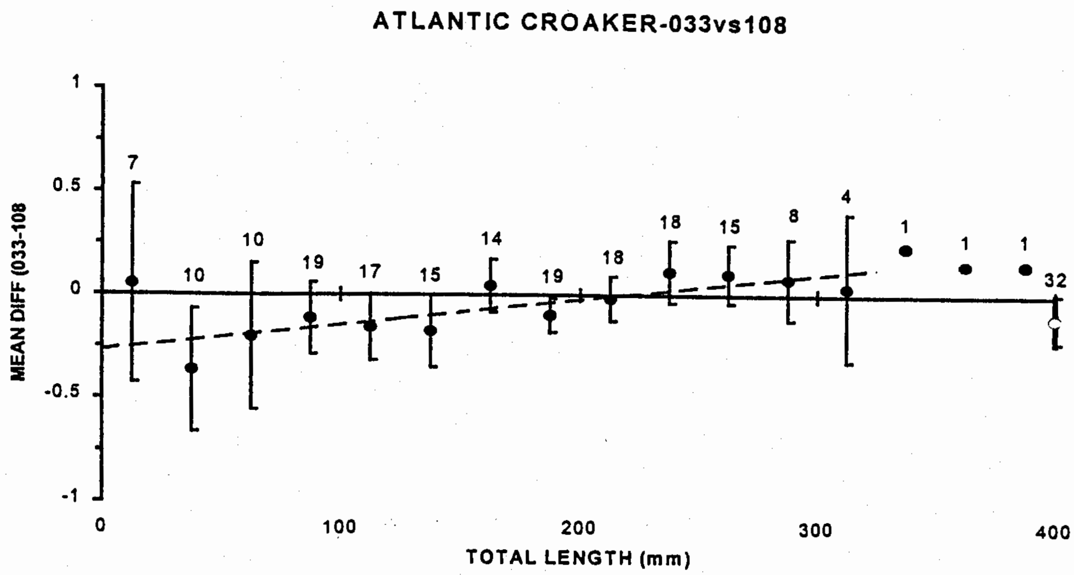


Figure 13. TOP: Mean catch differences ($\overline{D}_L$) between gear 033 and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against total length, calculated from the 1-350 mm size intervals. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls.



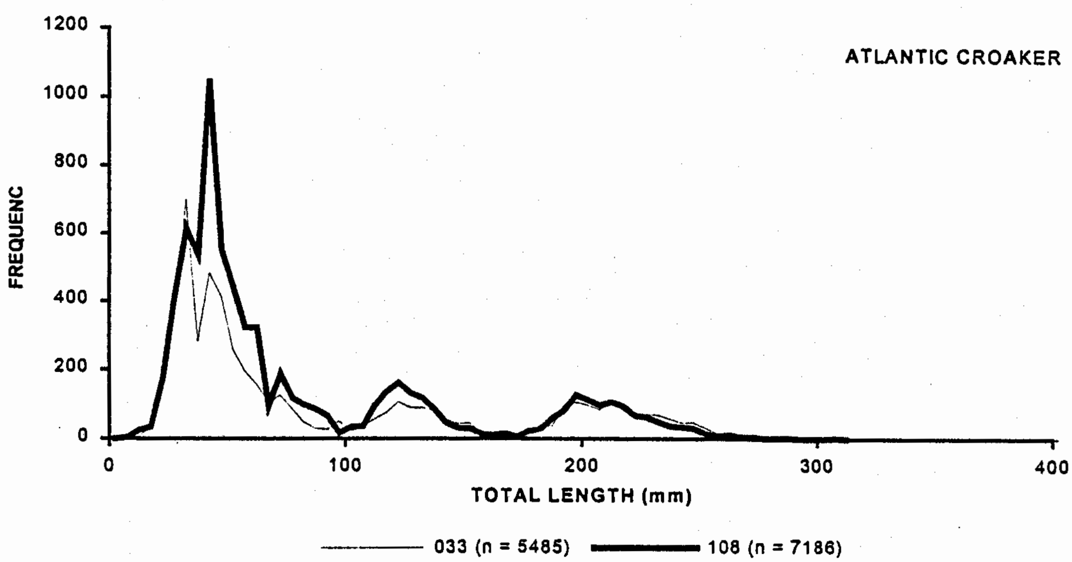
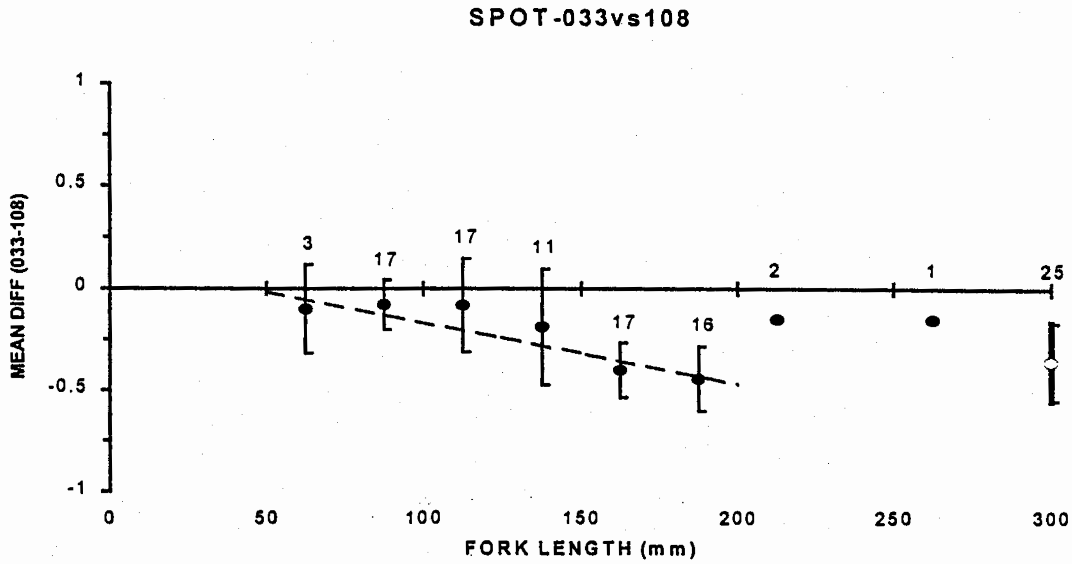


Figure 14. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against total length, calculated from the 1-325 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls.



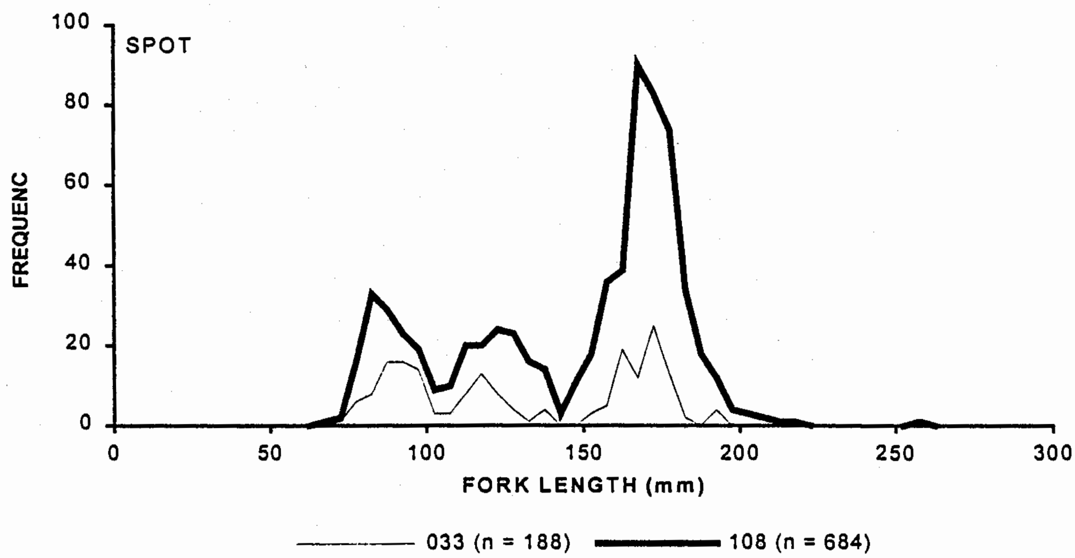
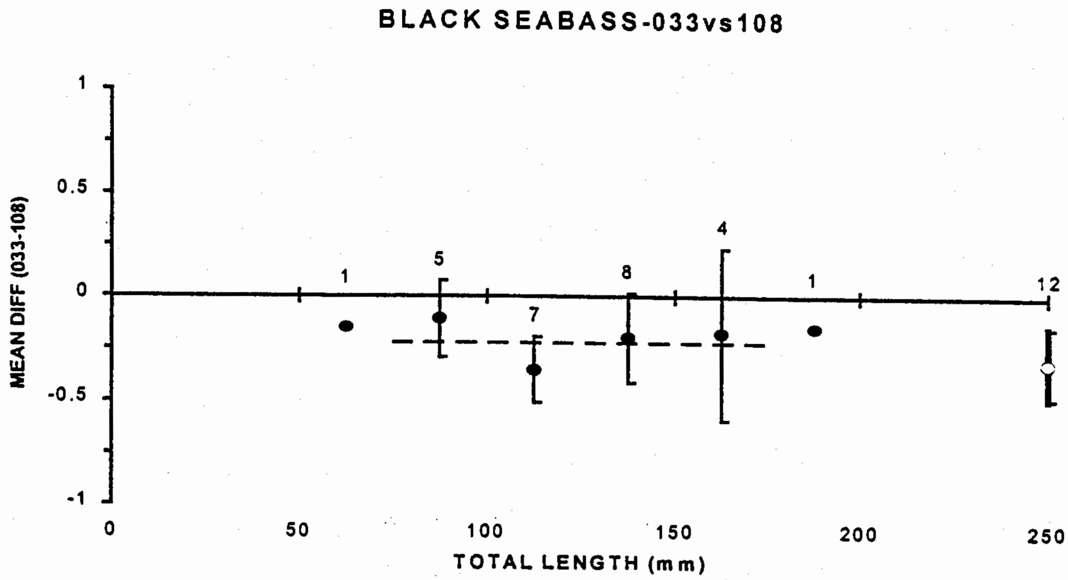


Figure 15. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against fork length, calculated from the 51-200 mm size intervals. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls.



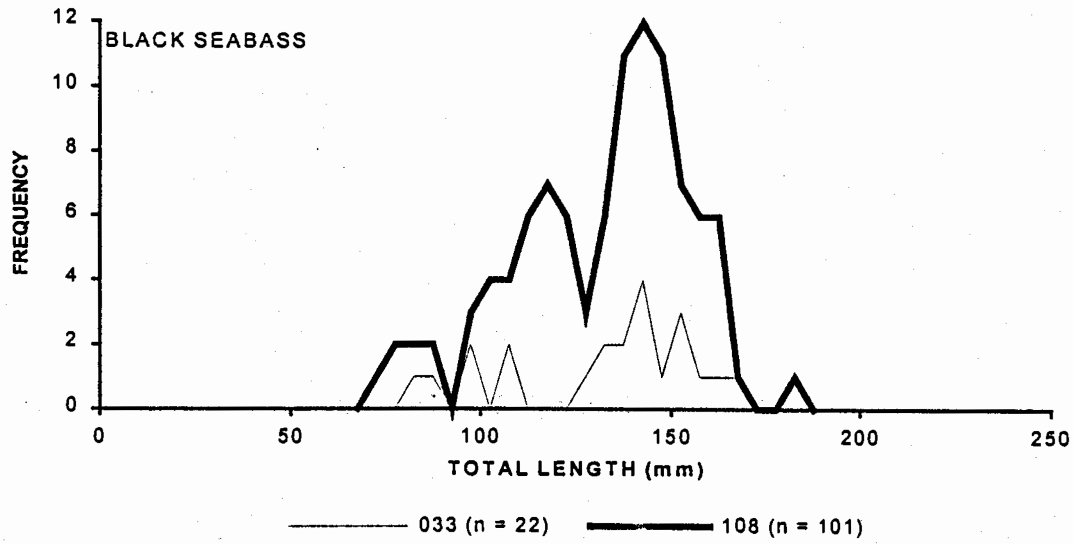
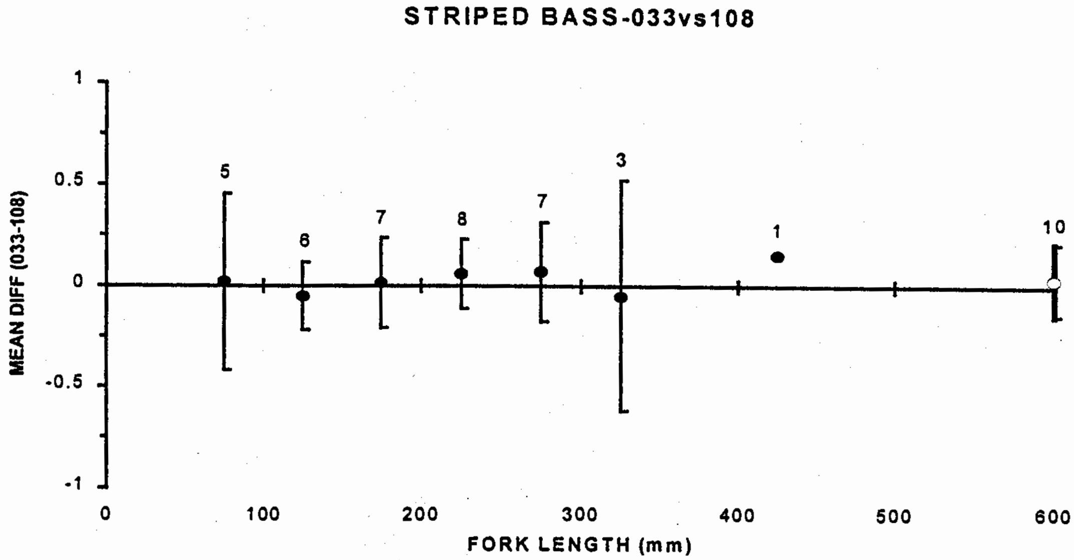


Figure 16. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for black seabass, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$), calculated from the 76-175 mm size intervals. BOTTOM: Length frequency distributions of all seabass (5 mm increments) from the comparison trawls.



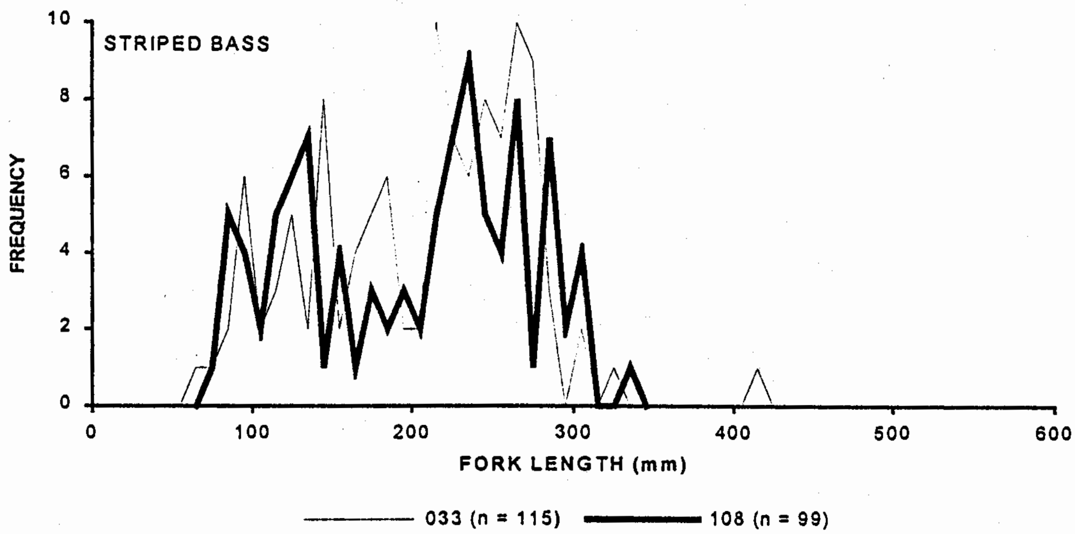


Figure 17. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for striped bass, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all striped bass (10 mm increments) from the comparison trawls.

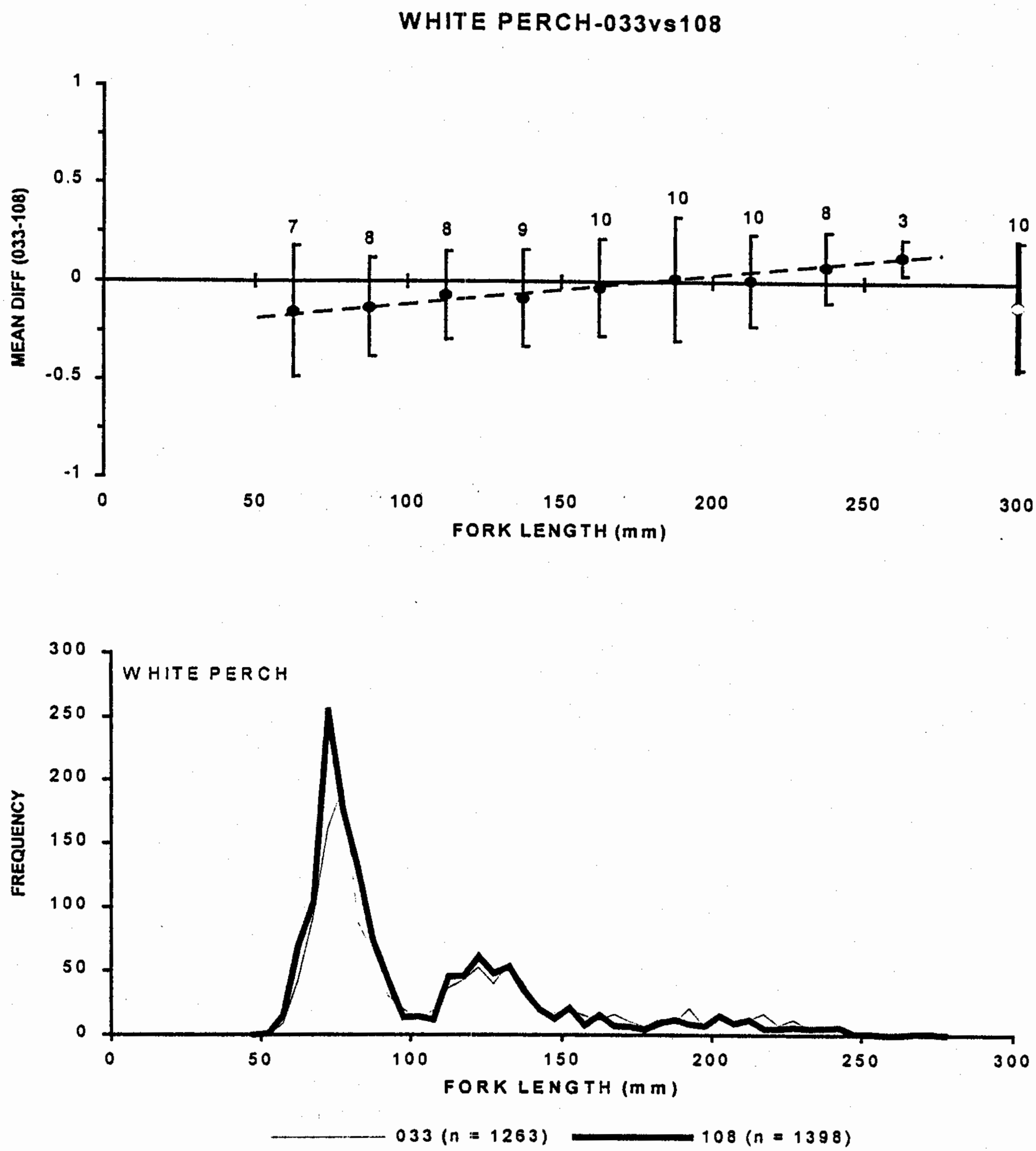


Figure 18. TOP: Mean catch differences ($\overline{D}_L$) between gear 033 and gear 108 for white perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against fork length, calculated from the 51-275 mm size intervals. BOTTOM: Length frequency distributions of all white perch (5 mm increments) from the comparison trawls.

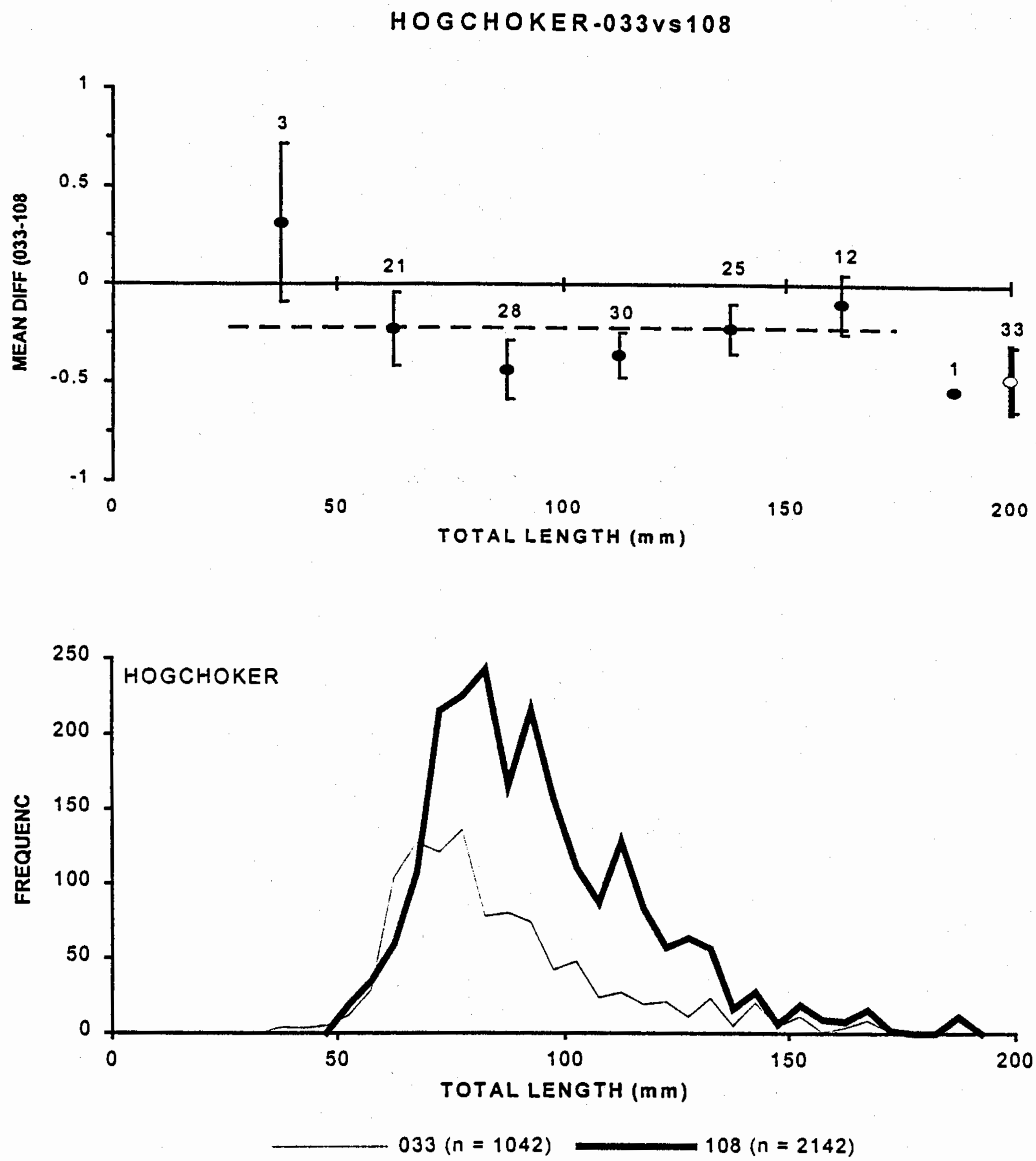
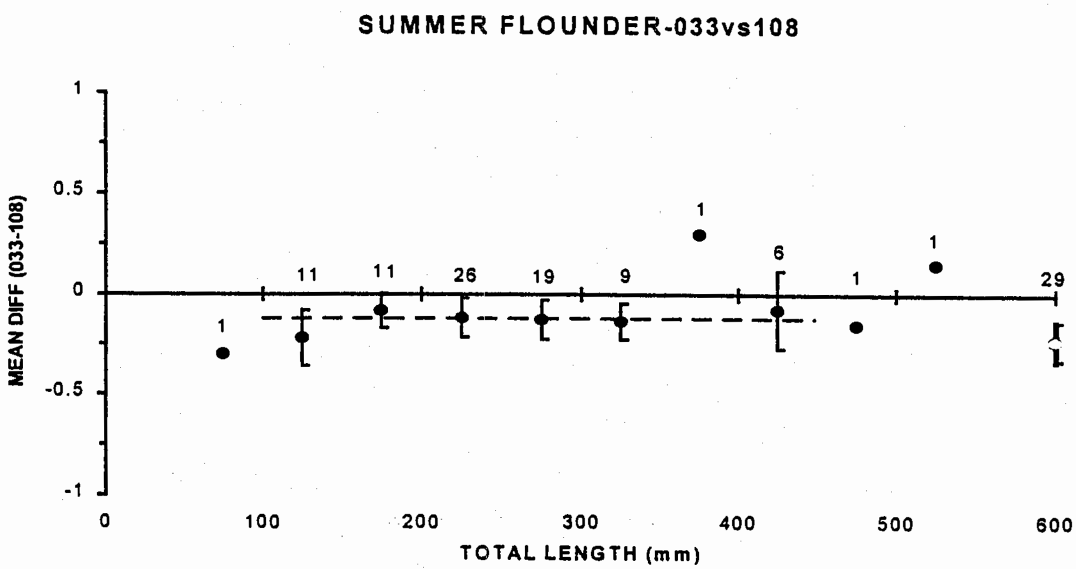


Figure 19. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{\bar{D}}$), calculated from the 26-175 mm size intervals. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.



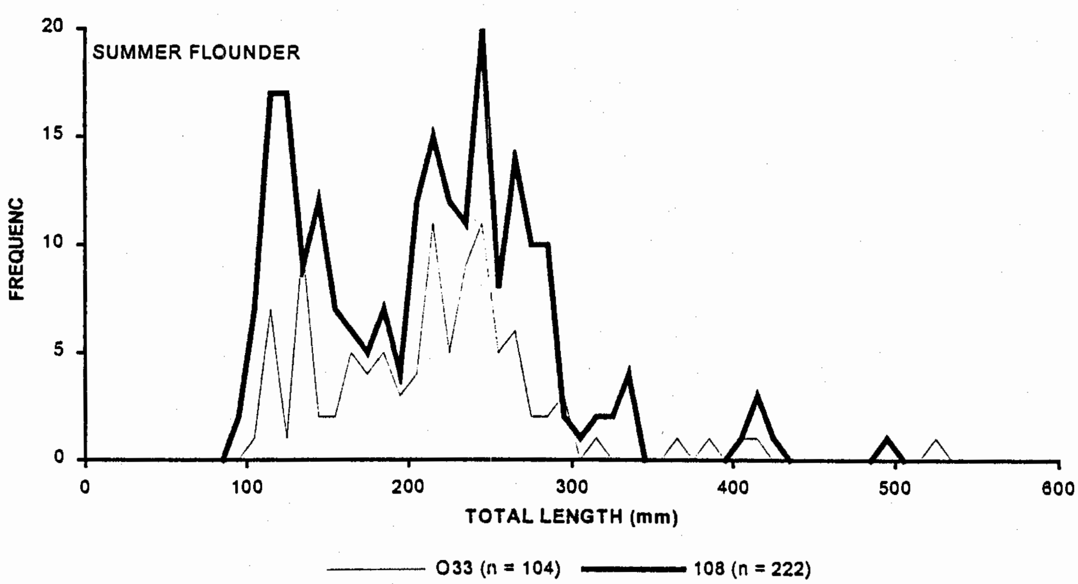
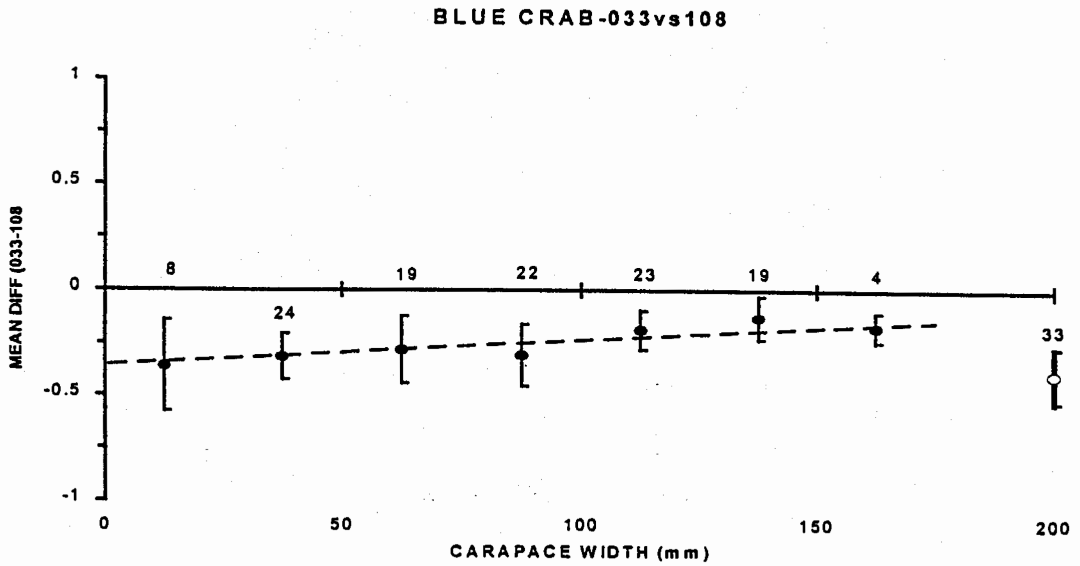


Figure 20. TOP: Mean catch differences ($\bar{D}_L$) between gear 033 and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$), calculated from the 101-450 mm size intervals. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls.



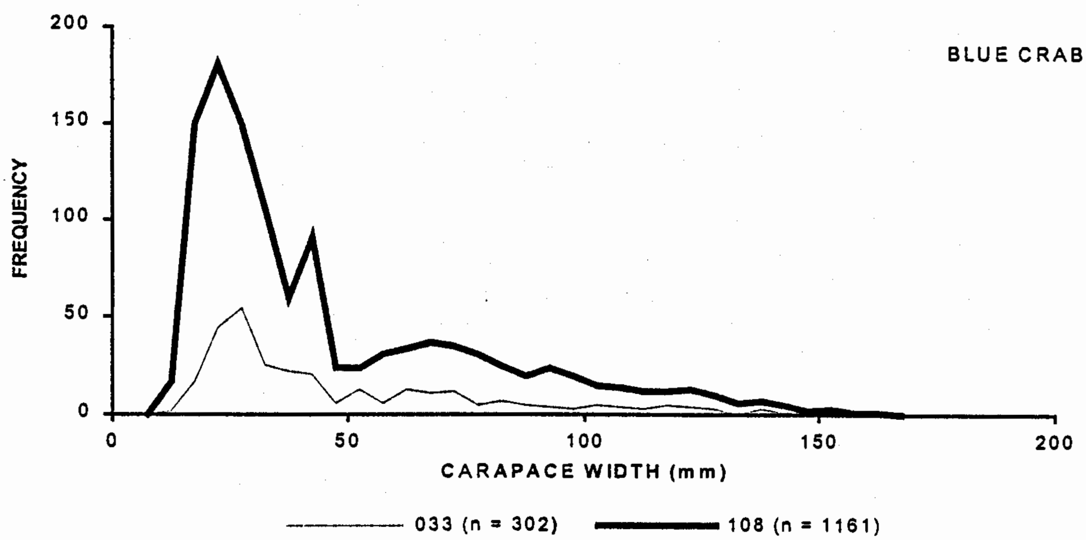


Figure 21. TOP: Mean catch differences ($\overline{D}_L$) between gear 033 and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against width, calculated from the 1 - 175 mm size intervals. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

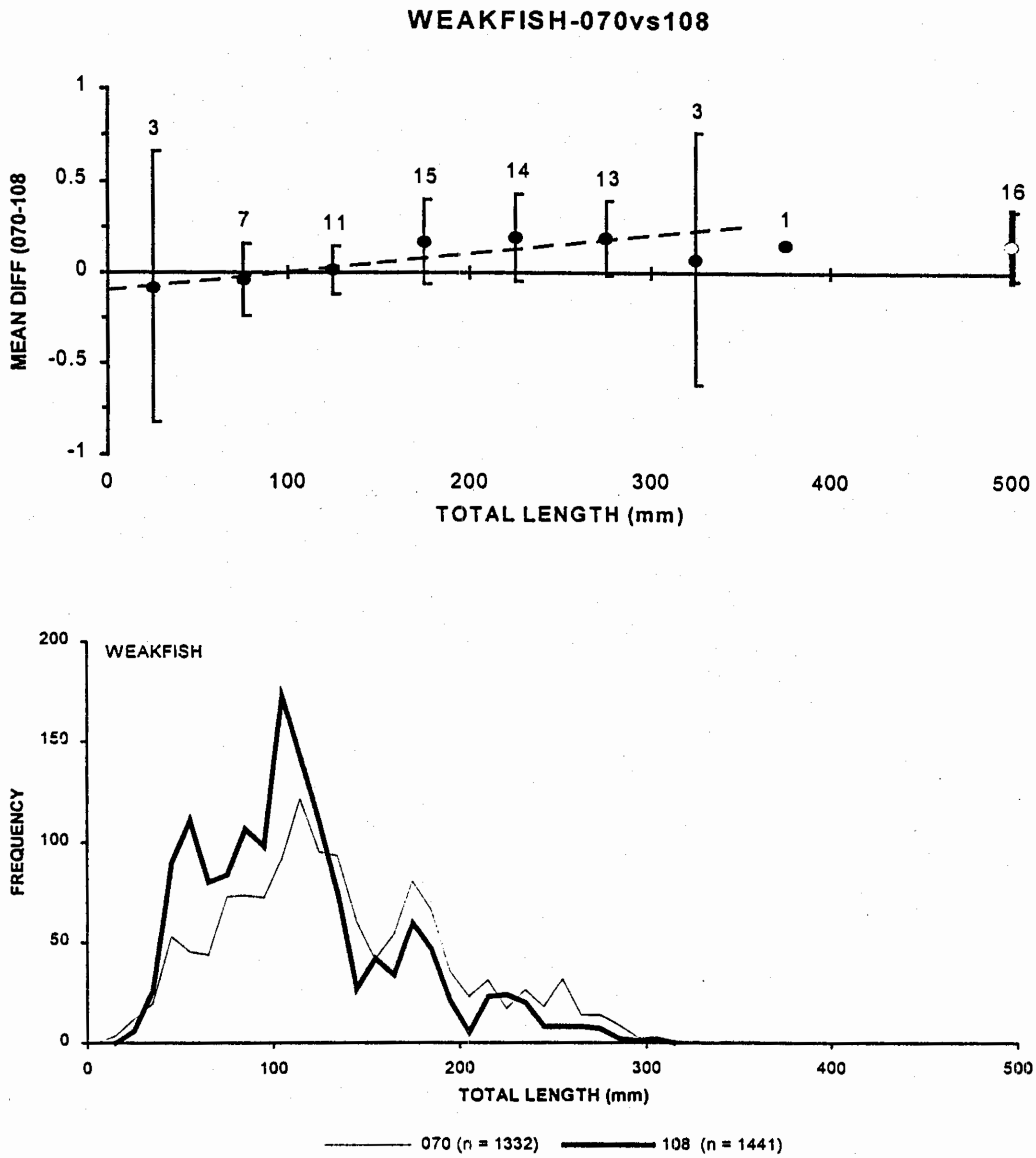


Figure 22. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against total length, calculated from the 1-350 mm size intervals. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls.

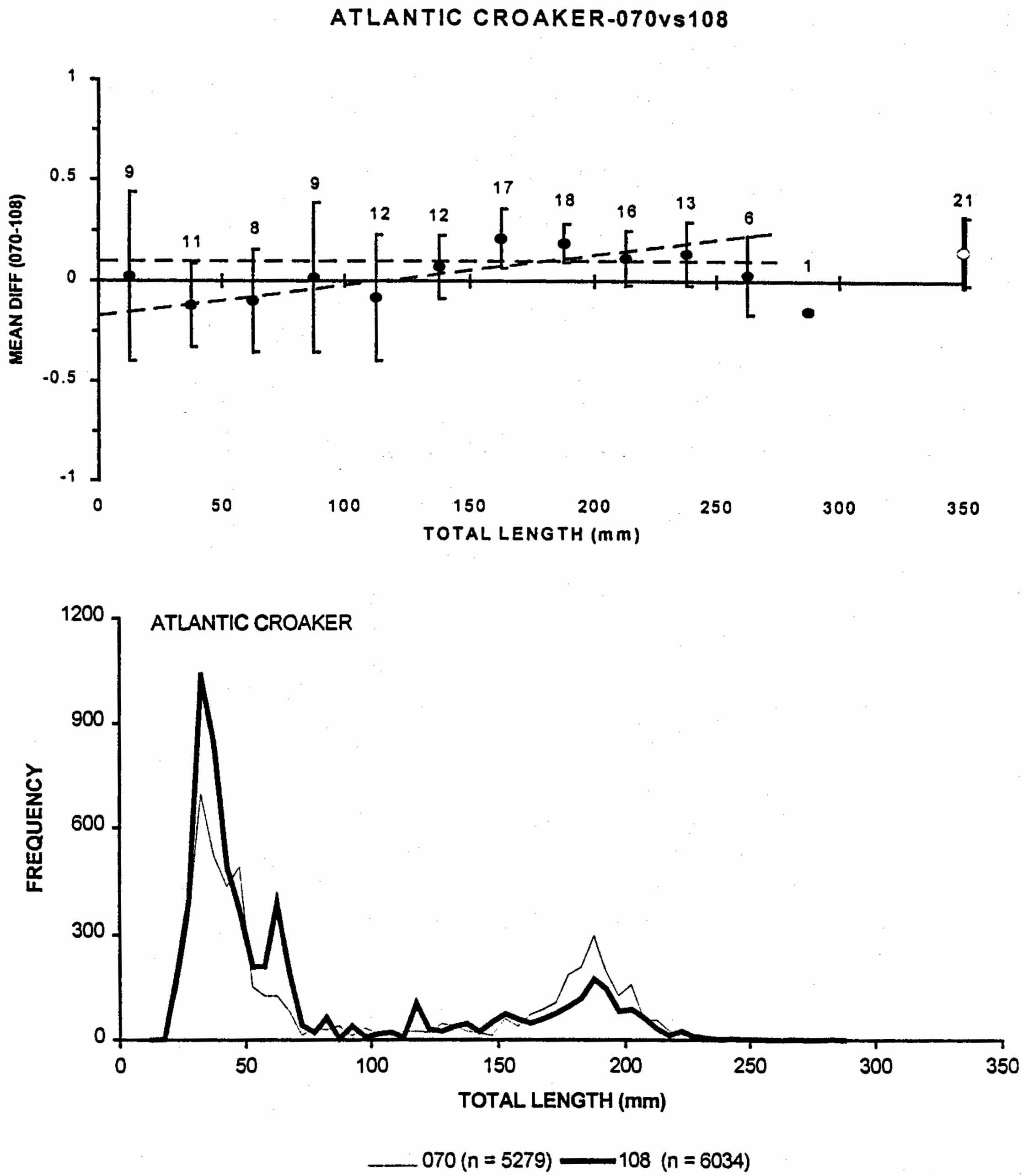
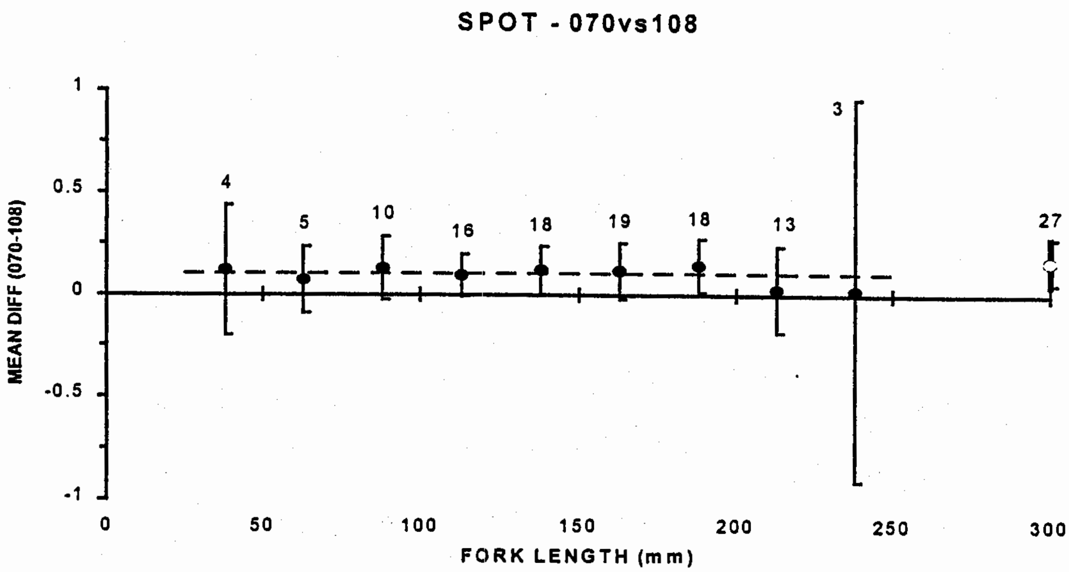


Figure 23. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$), and fitted regression equation of mean difference (D_L) against total length, calculated from the 1-275 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls.



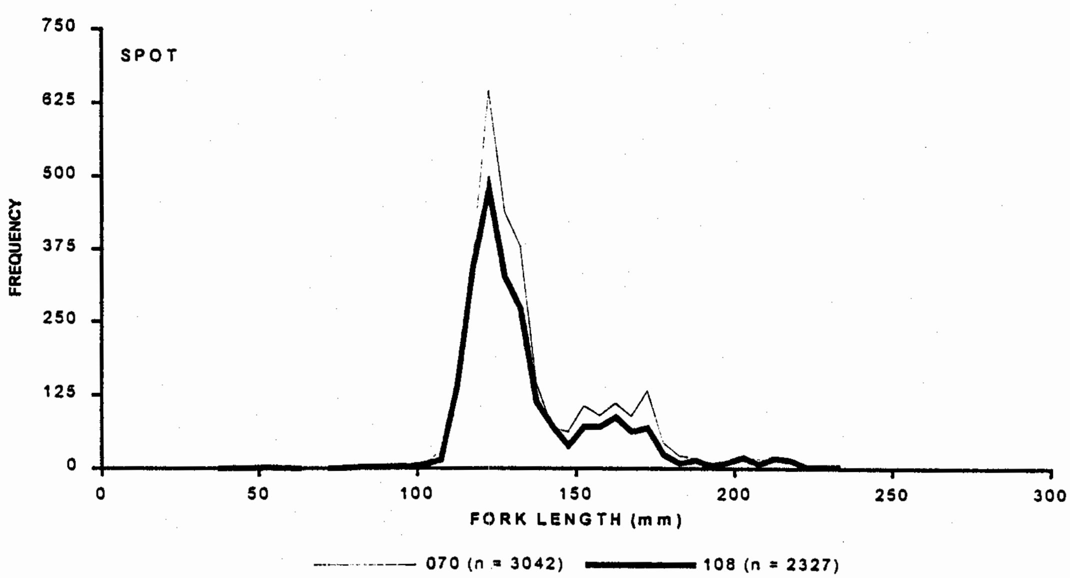


Figure 24. TOP: Mean catch differences ($\overline{D}_L$) between gear 070 and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$), calculated from the 26-250 mm size intervals. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls.

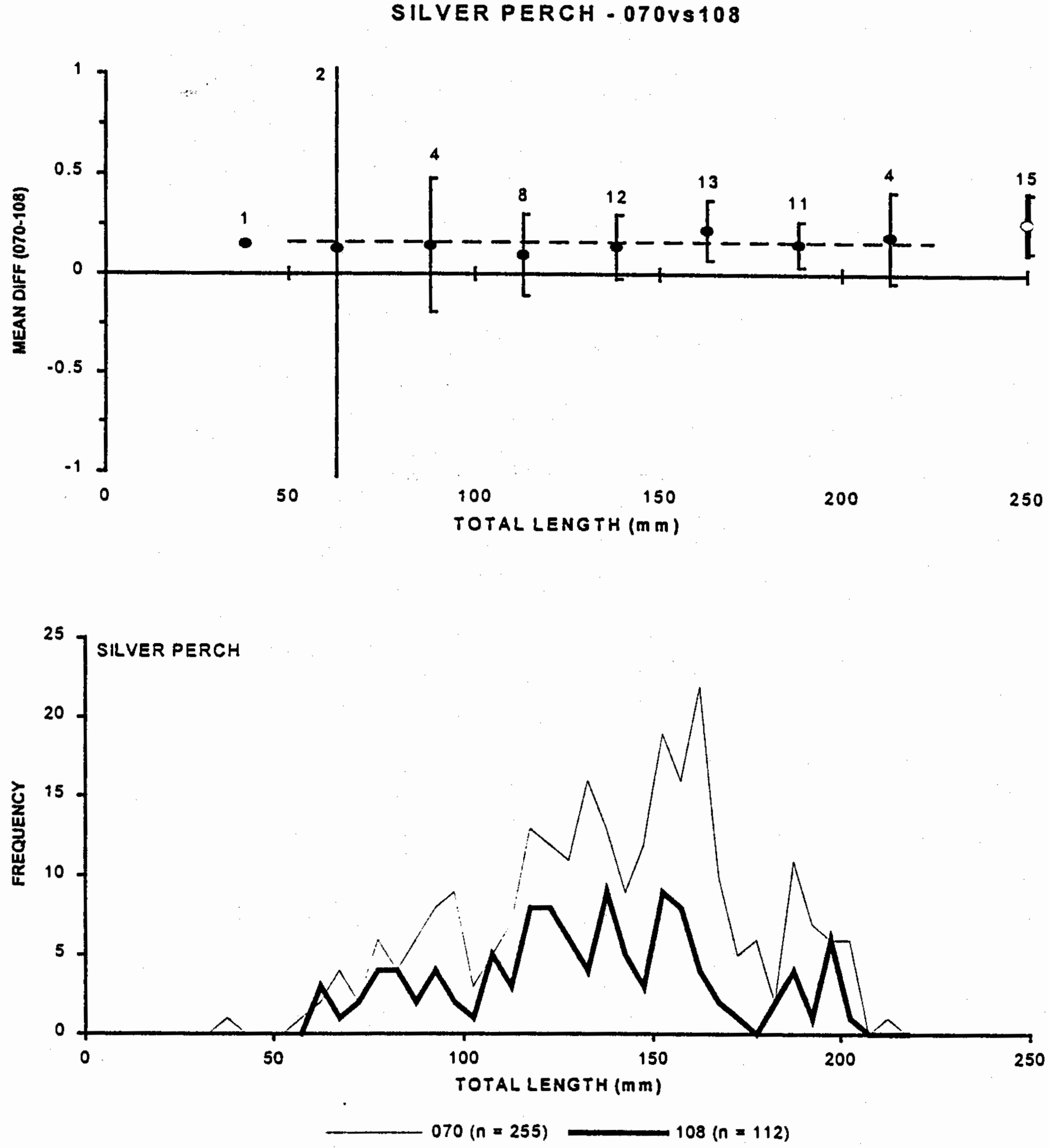
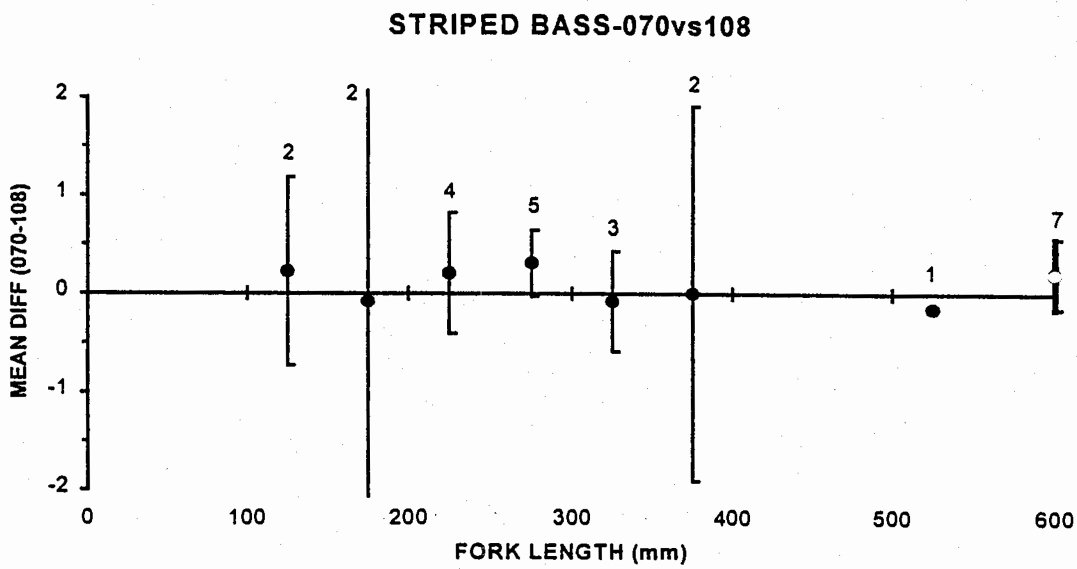


Figure 25. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$), calculated from the 51-225 mm size intervals. BOTTOM: Length frequency distributions of all silver perch (5 mm increments) from the comparison trawls.



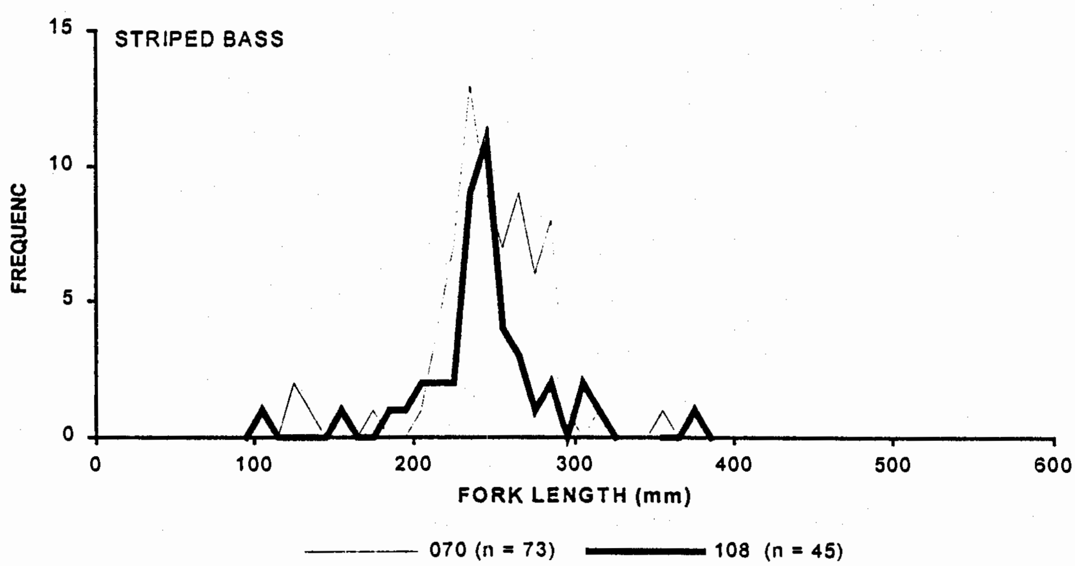


Figure 26. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for striped bass, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all striped bass (10 mm increments) from the comparison trawls.

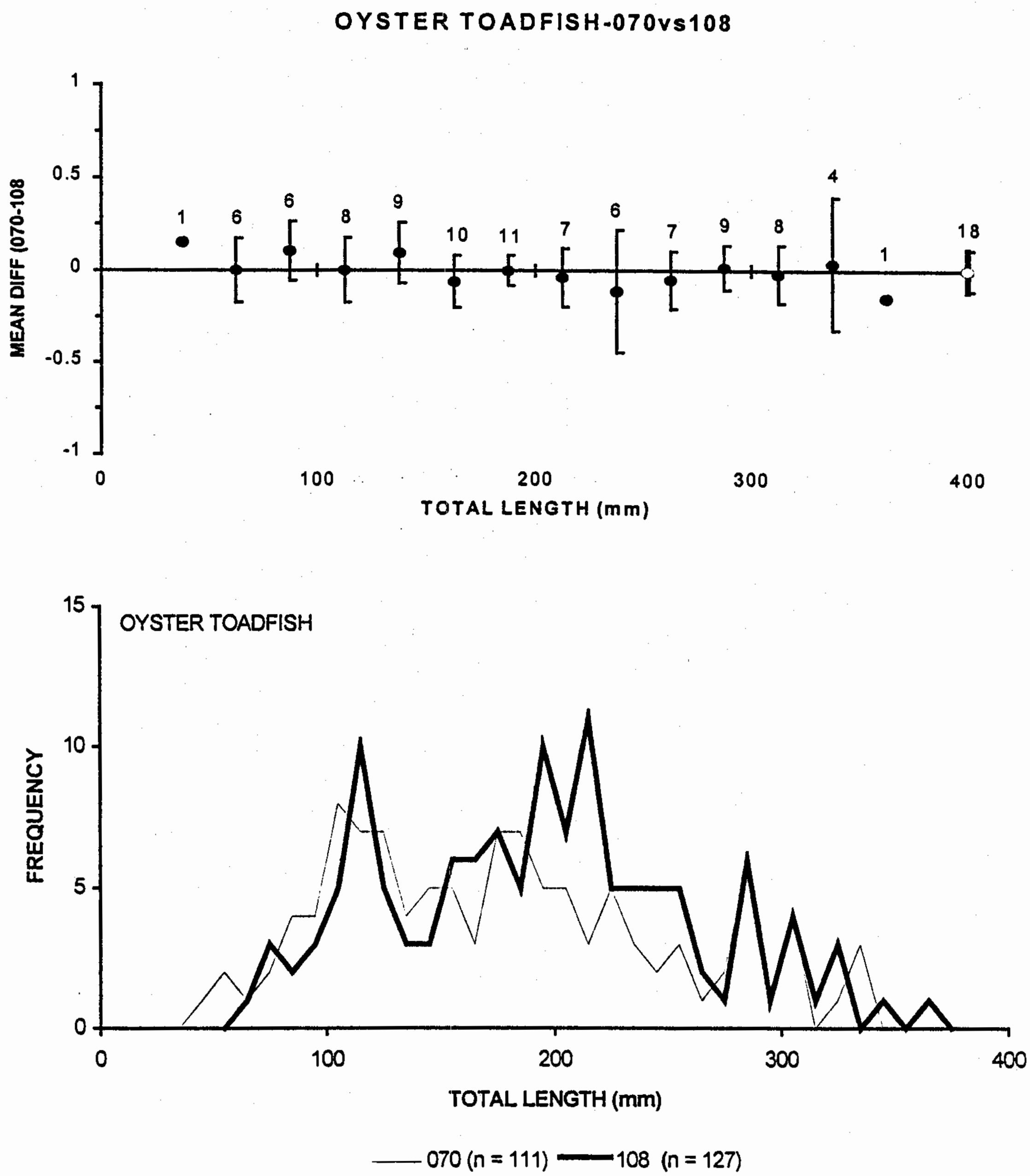


Figure 28. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for oyster toadfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all toadfish (10 mm increments) from the comparison trawls.

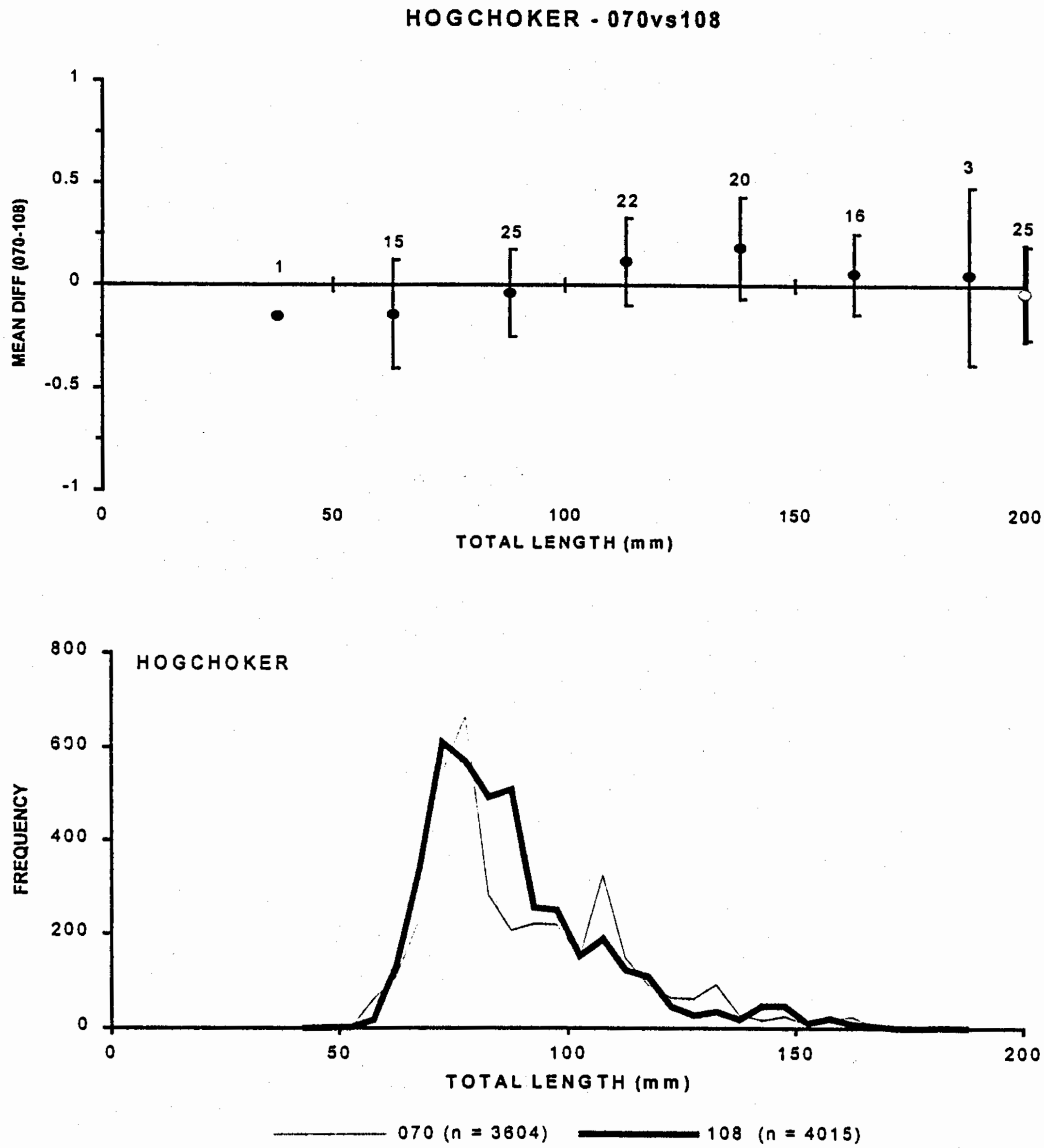


Figure 29. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

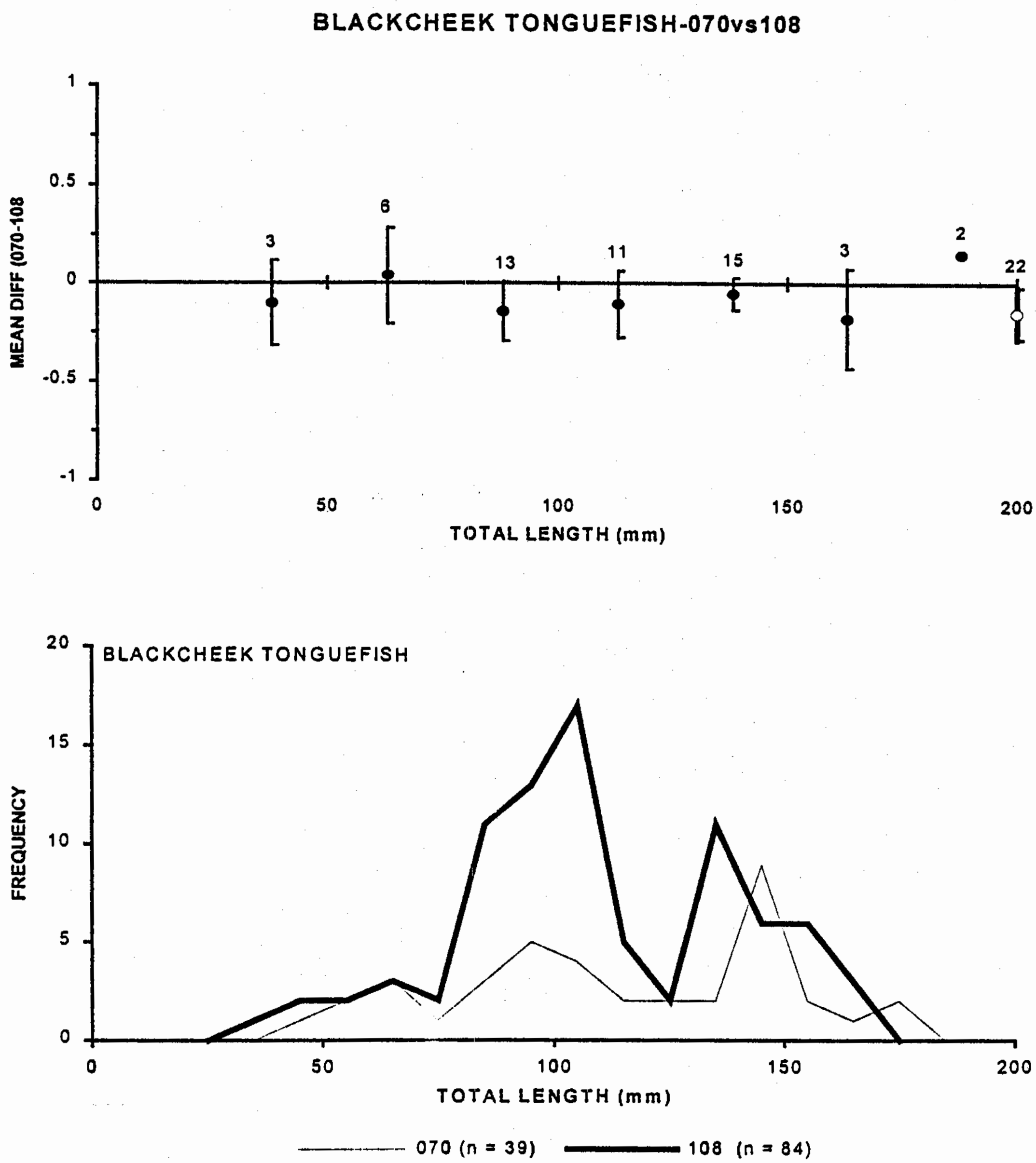
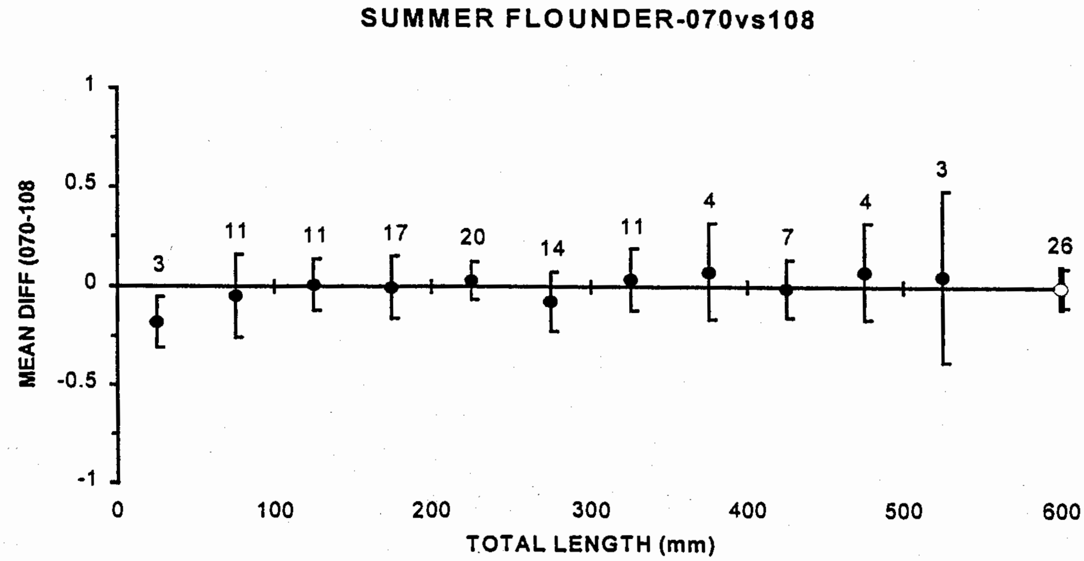


Figure 30. TOP: Mean catch differences ($\overline{D}_L$) between gear 070 and gear 108 for blackcheek tonguefish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all tonguefish (5 mm increments) from the comparison trawls.



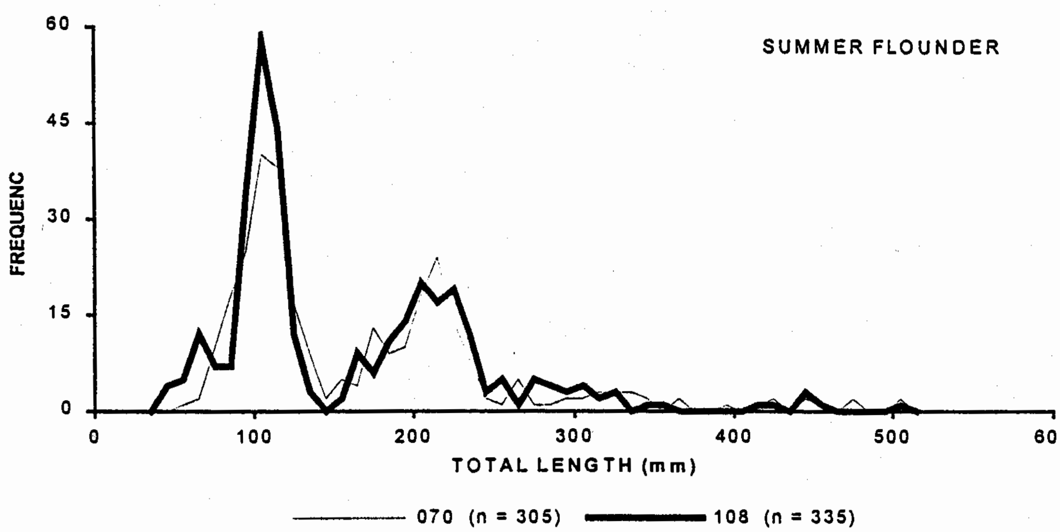


Figure 31. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls.

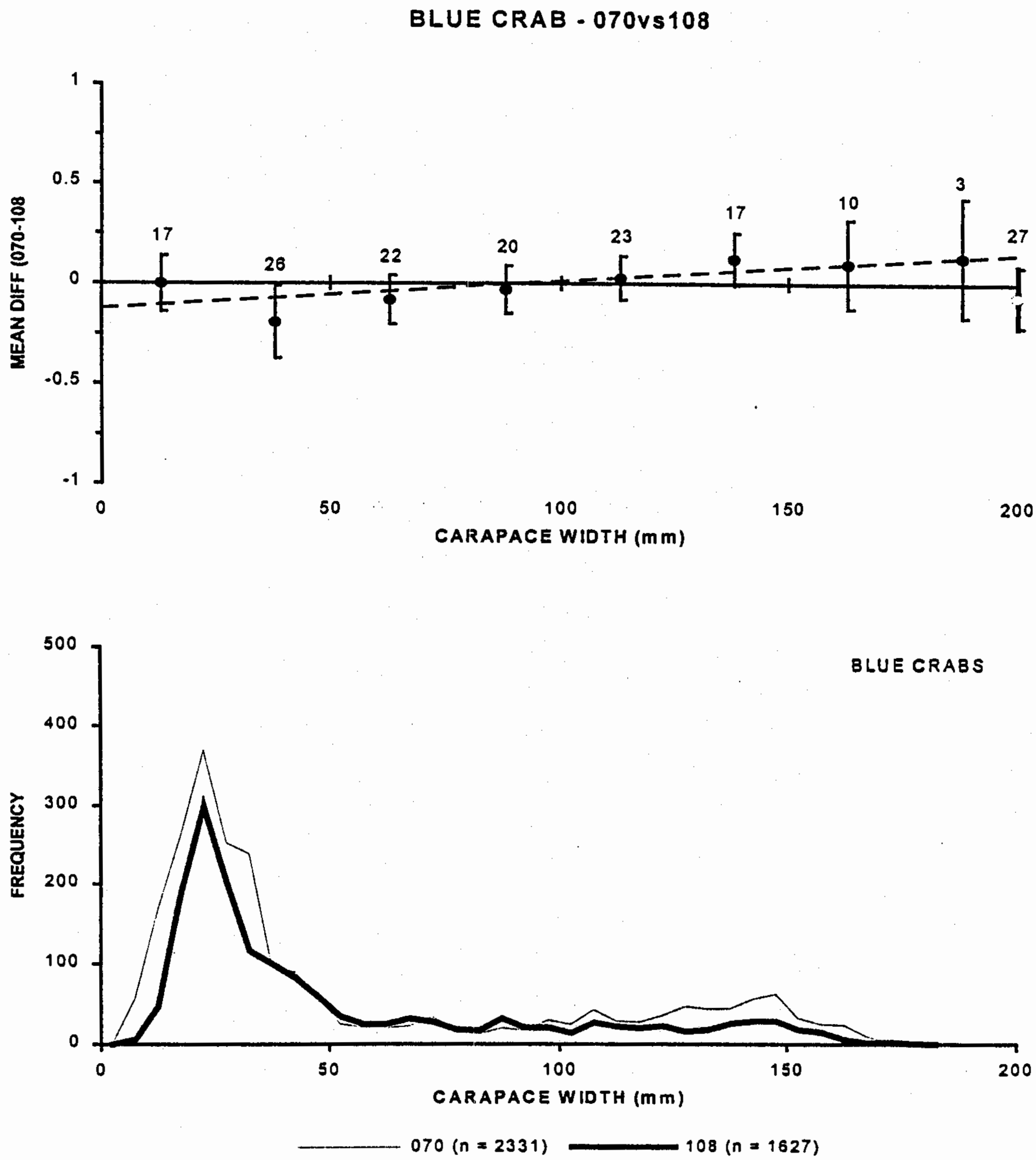


Figure 32. TOP: Mean catch differences ($\bar{D}_L$) between gear 070 and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the fitted regression equation of mean difference (D_L) against width, calculated from the 1 - 200 mm size intervals. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

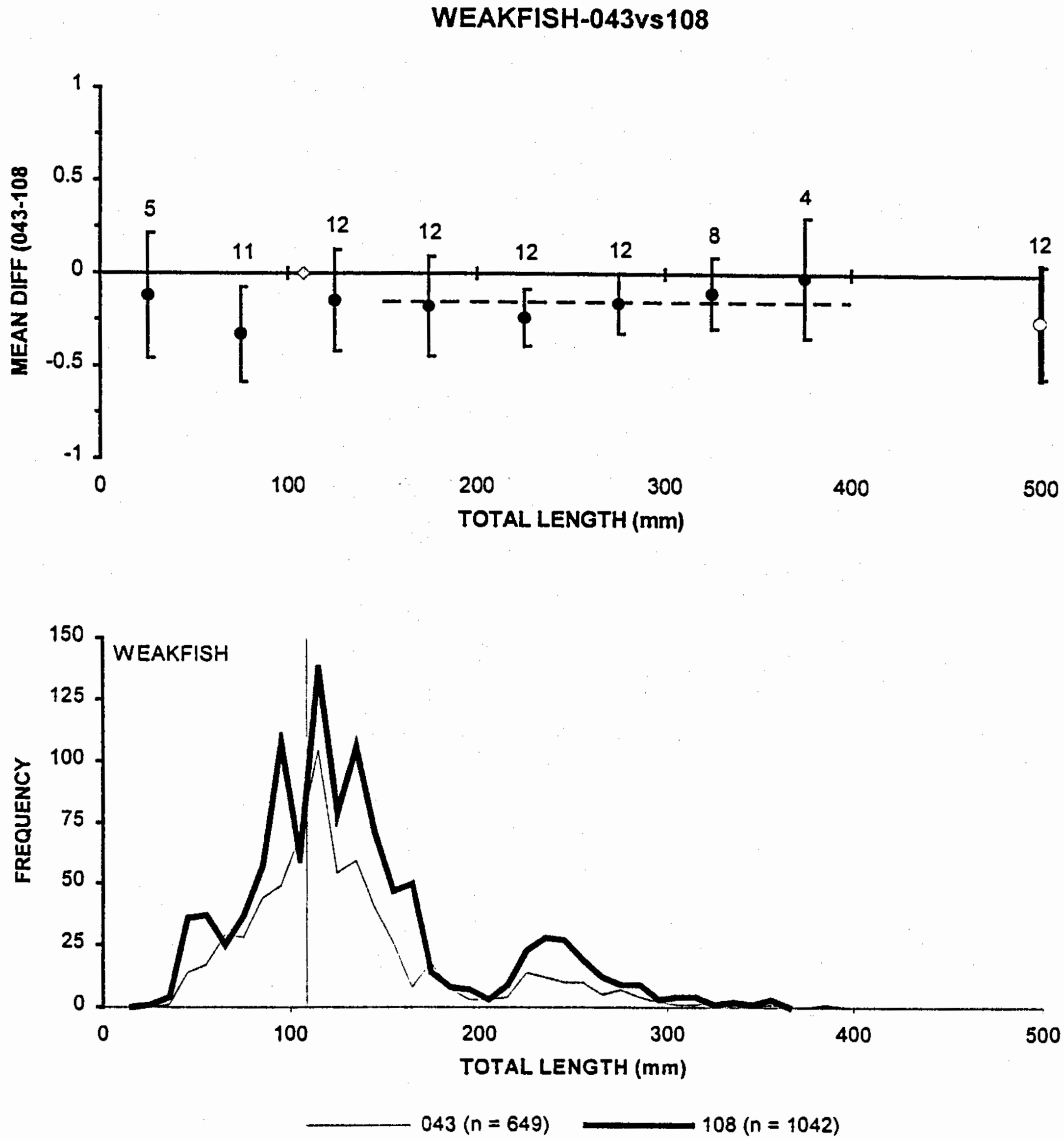


Figure 33. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 151-400 mm size intervals. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

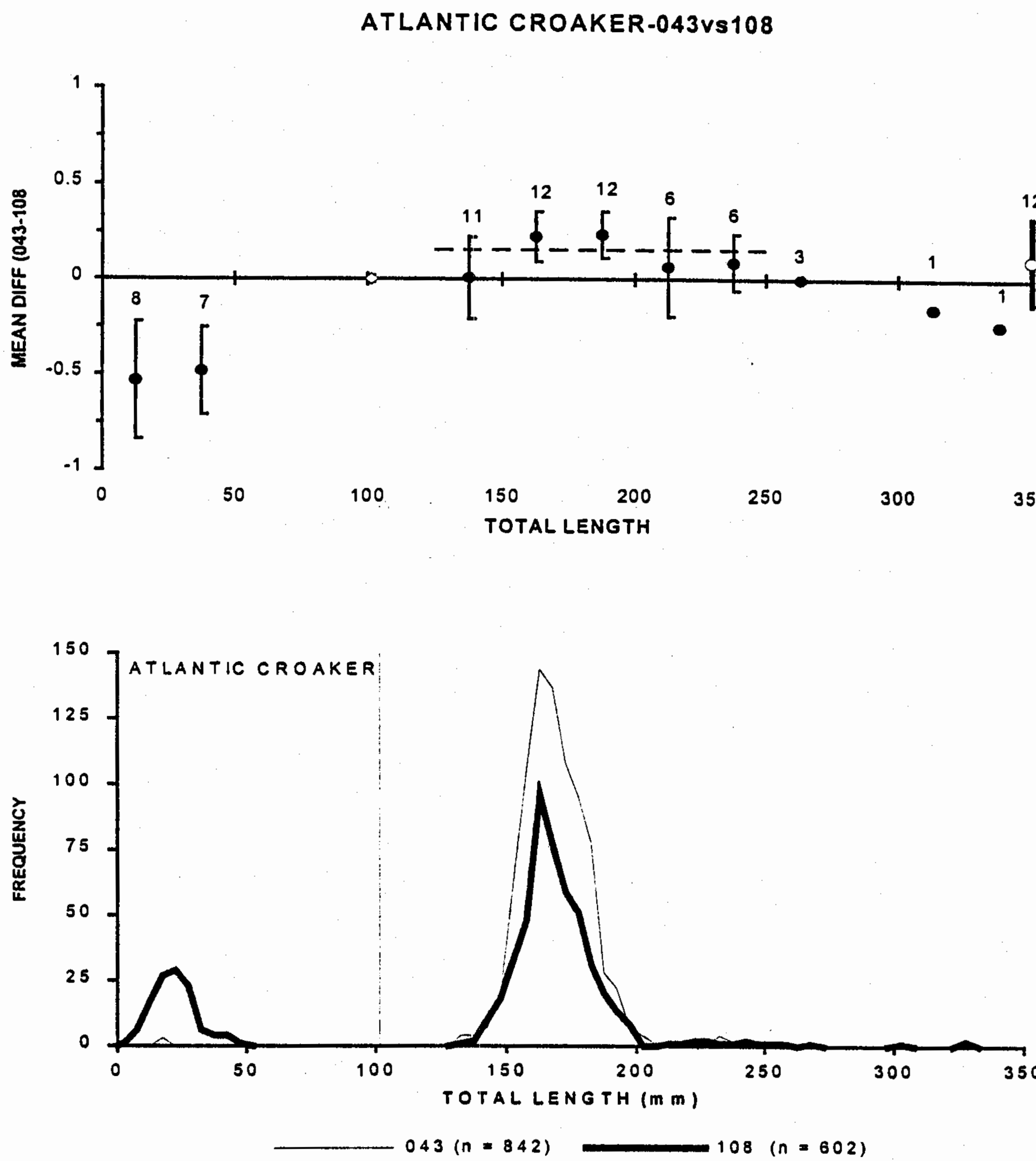


Figure 34. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 126-250 mm size intervals. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

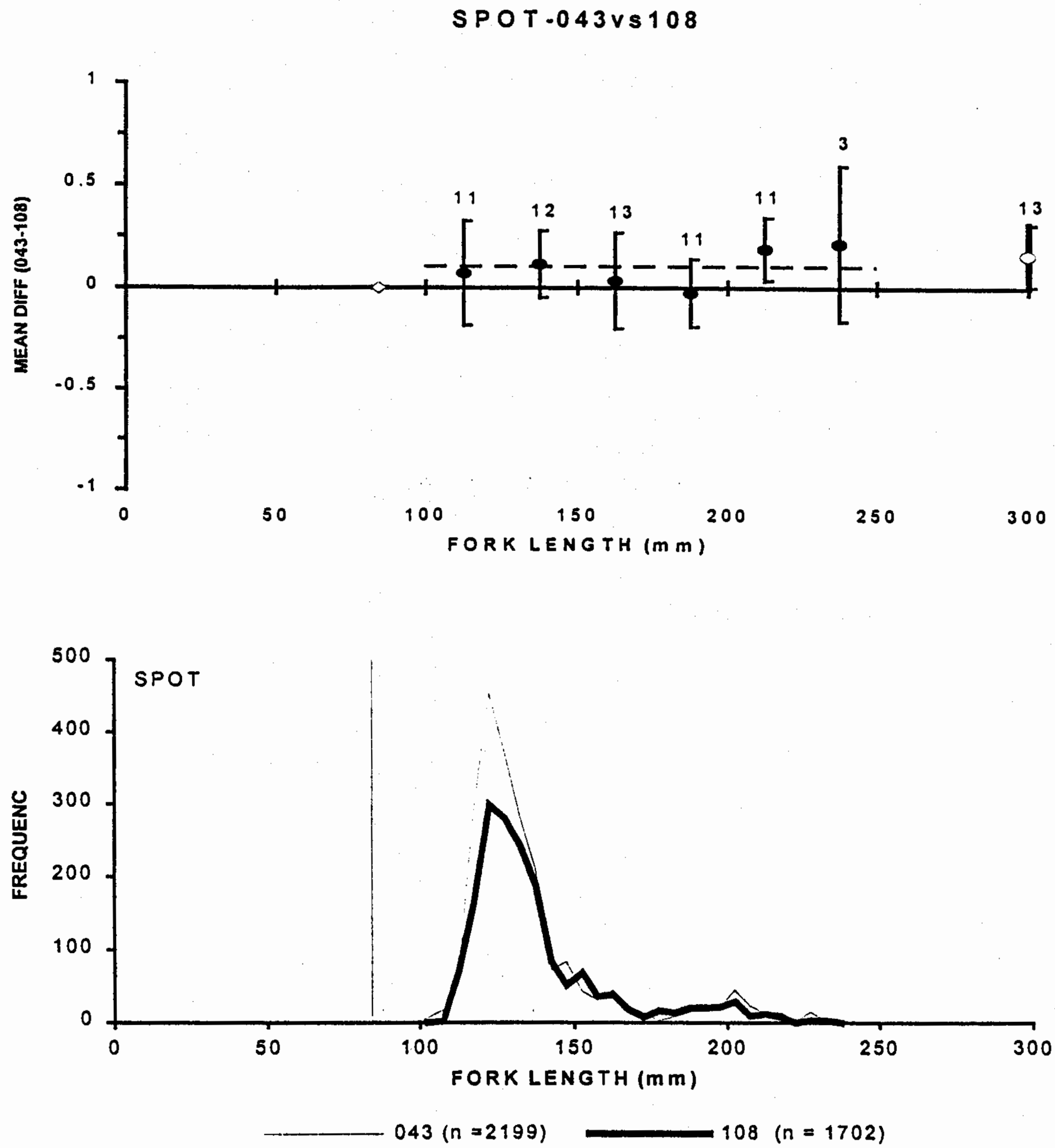


Figure 35. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-250 mm size intervals. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

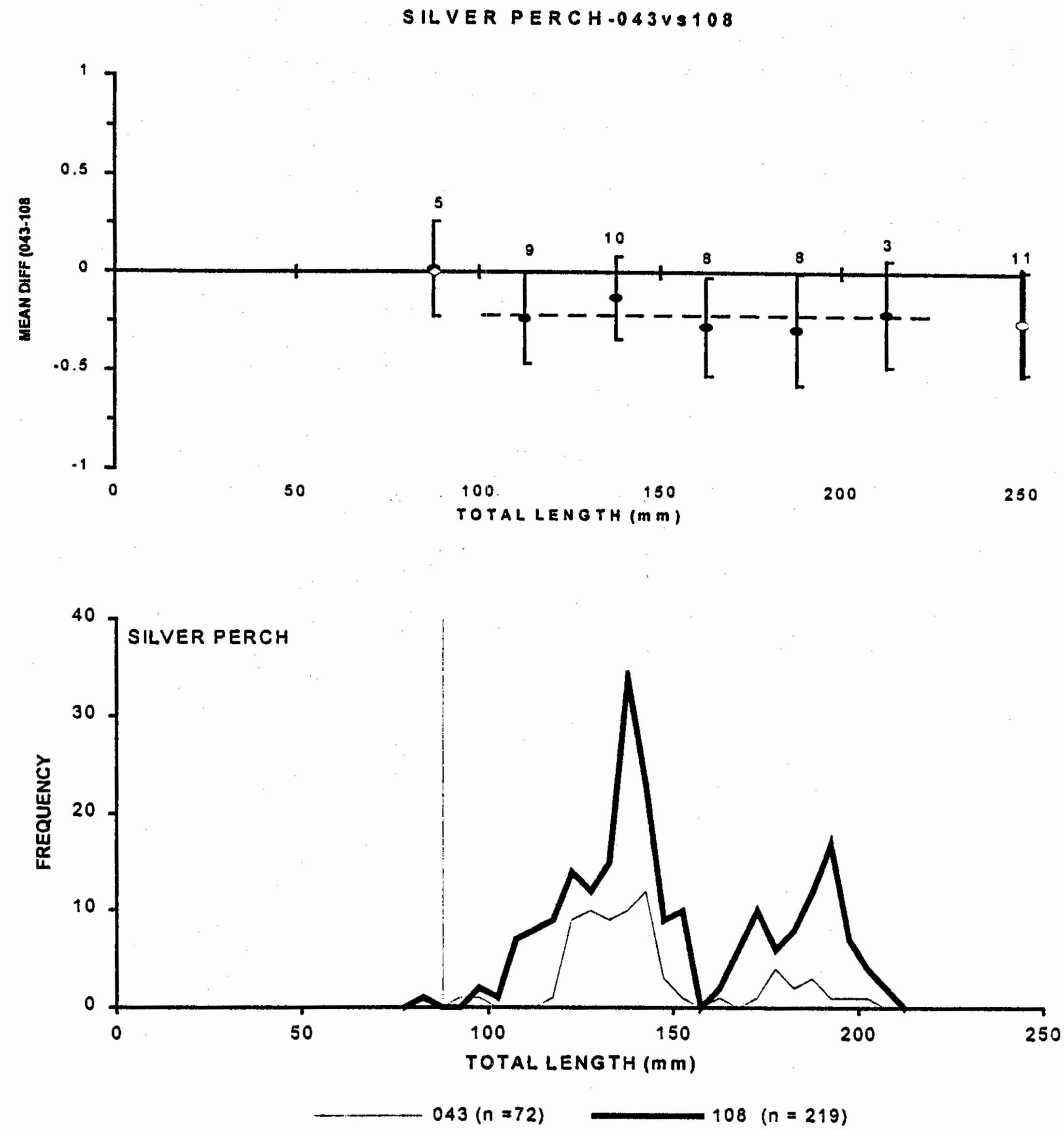


Figure 36. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-225 mm size intervals. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all silver perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

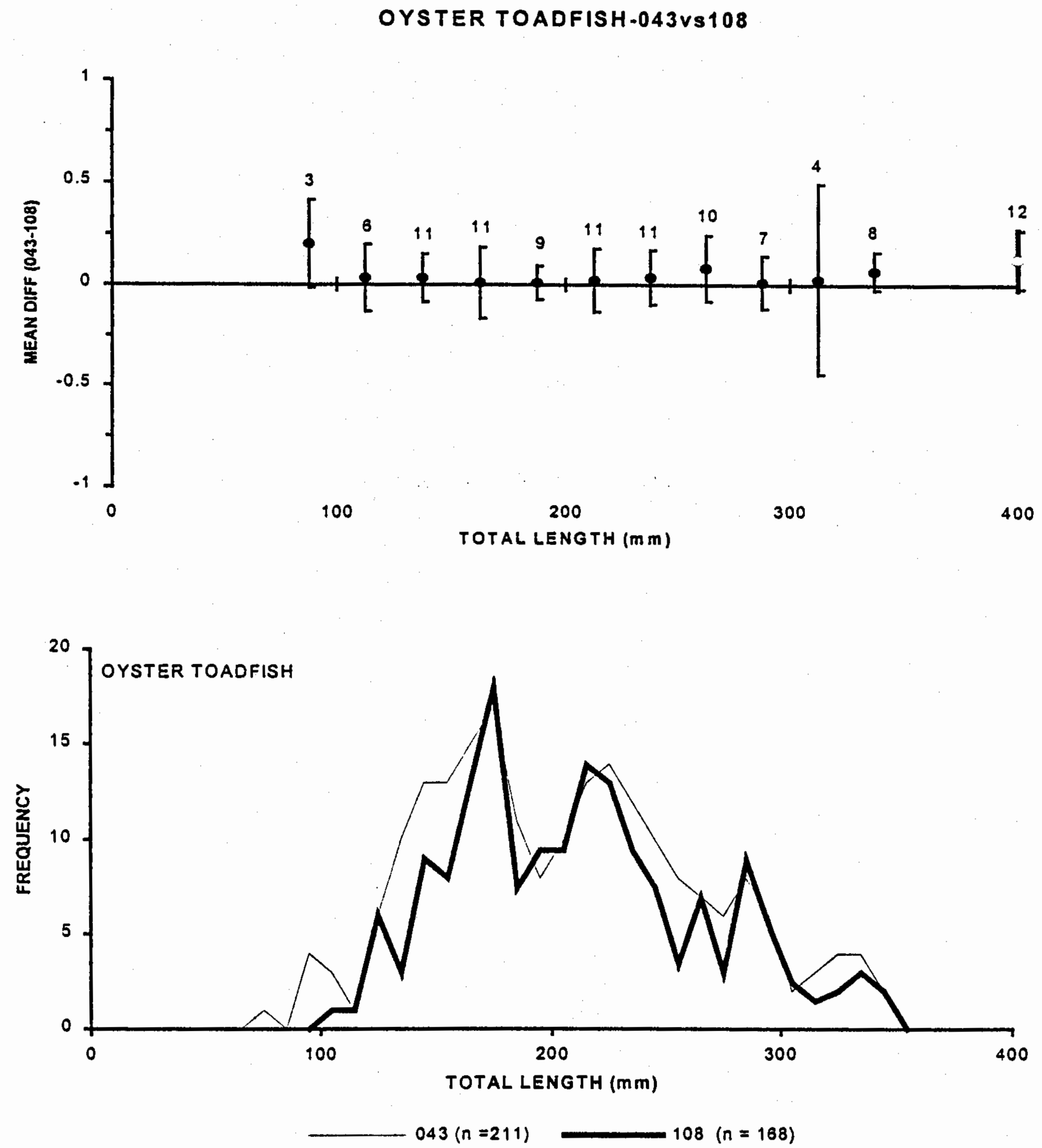


Figure 37. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for oyster toadfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all toadfish (10 mm increments) from the comparison trawls.

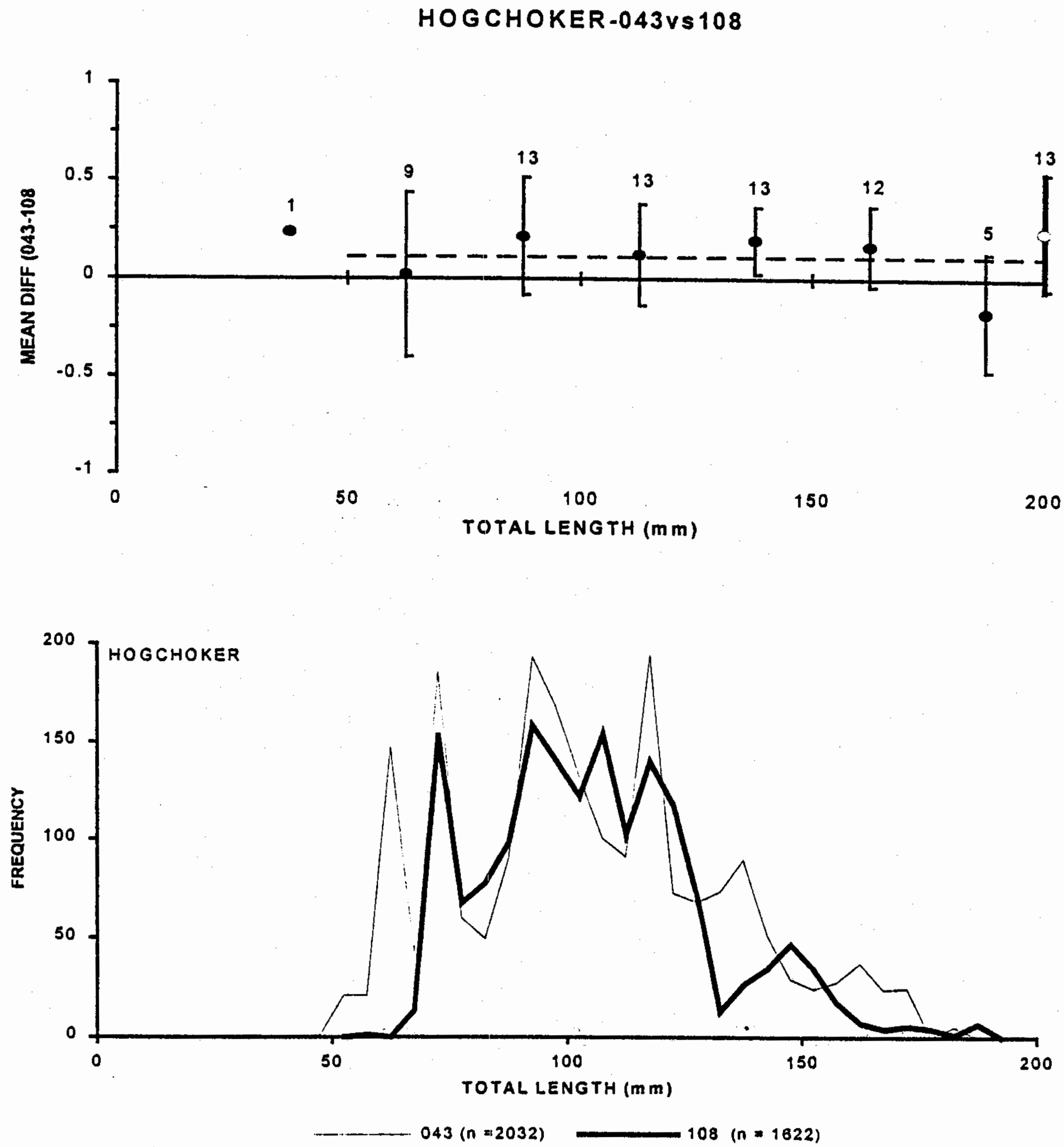
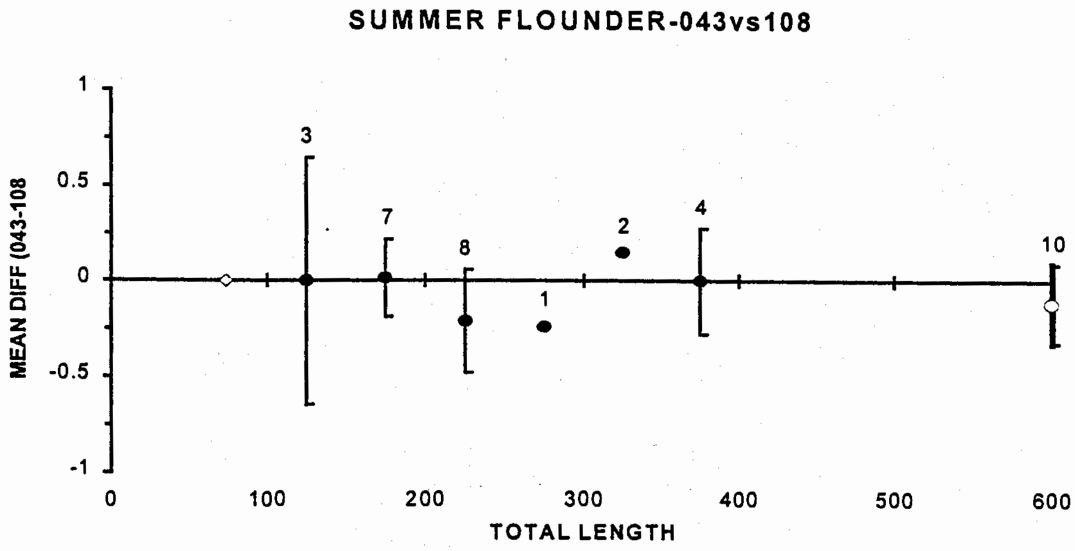


Figure 38. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 51-200 mm size intervals. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.



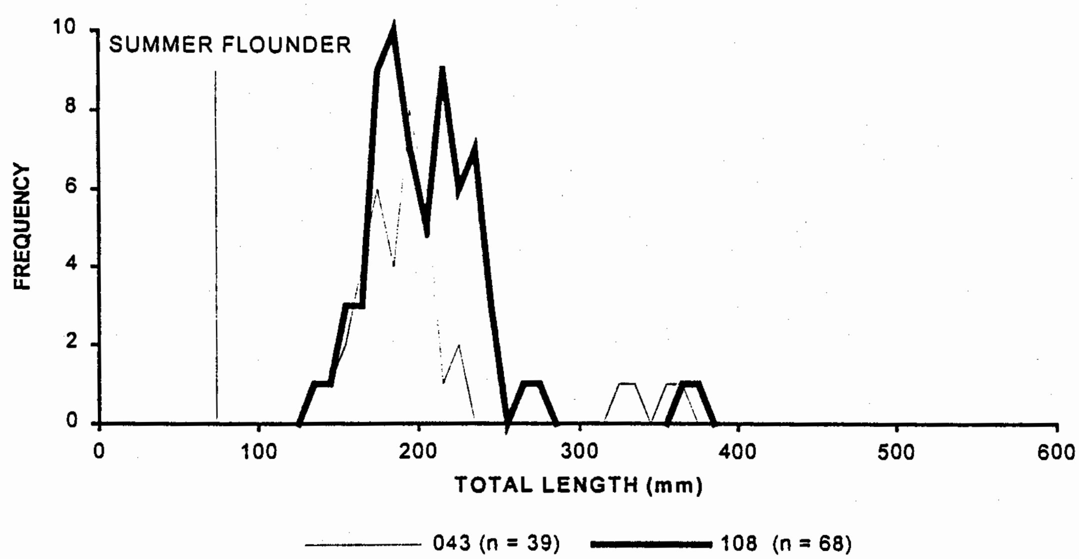
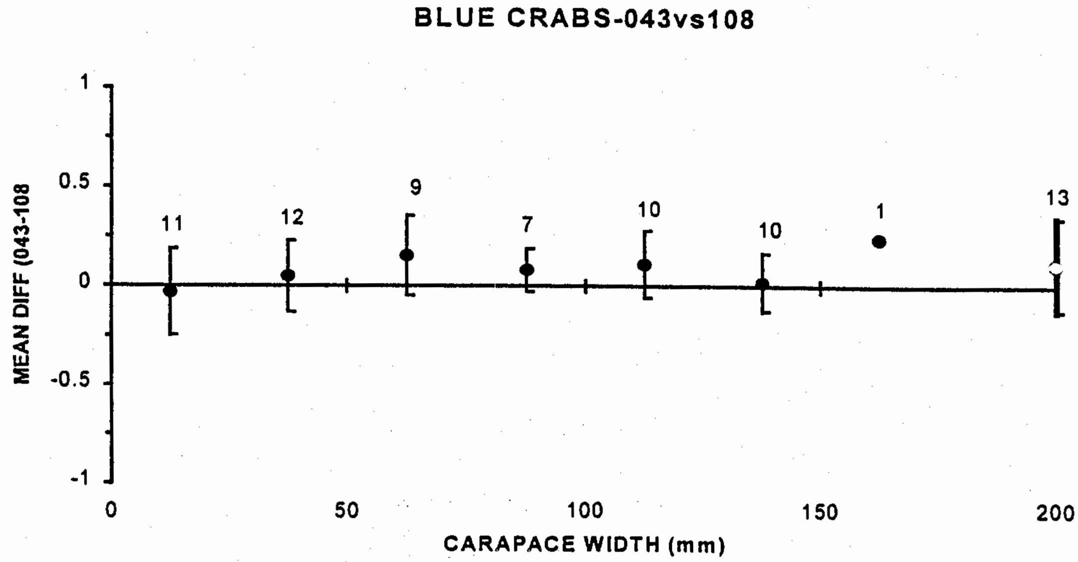


Figure 39. TOP: Mean catch differences ($\overline{D}_L$) between gear 043 and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



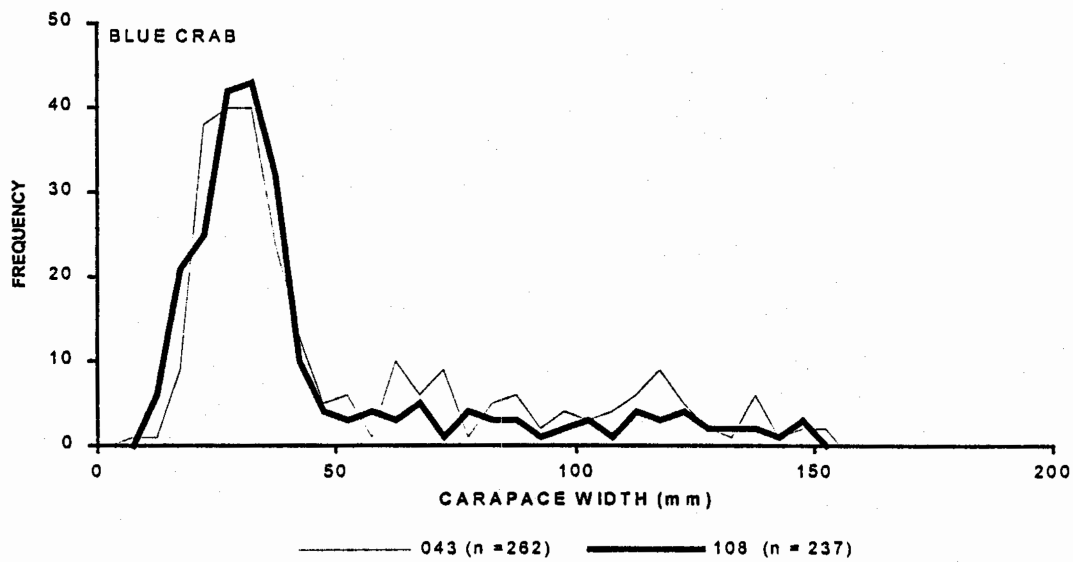


Figure 40. TOP: Mean catch differences ($\bar{D}_L$) between gear 043 and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

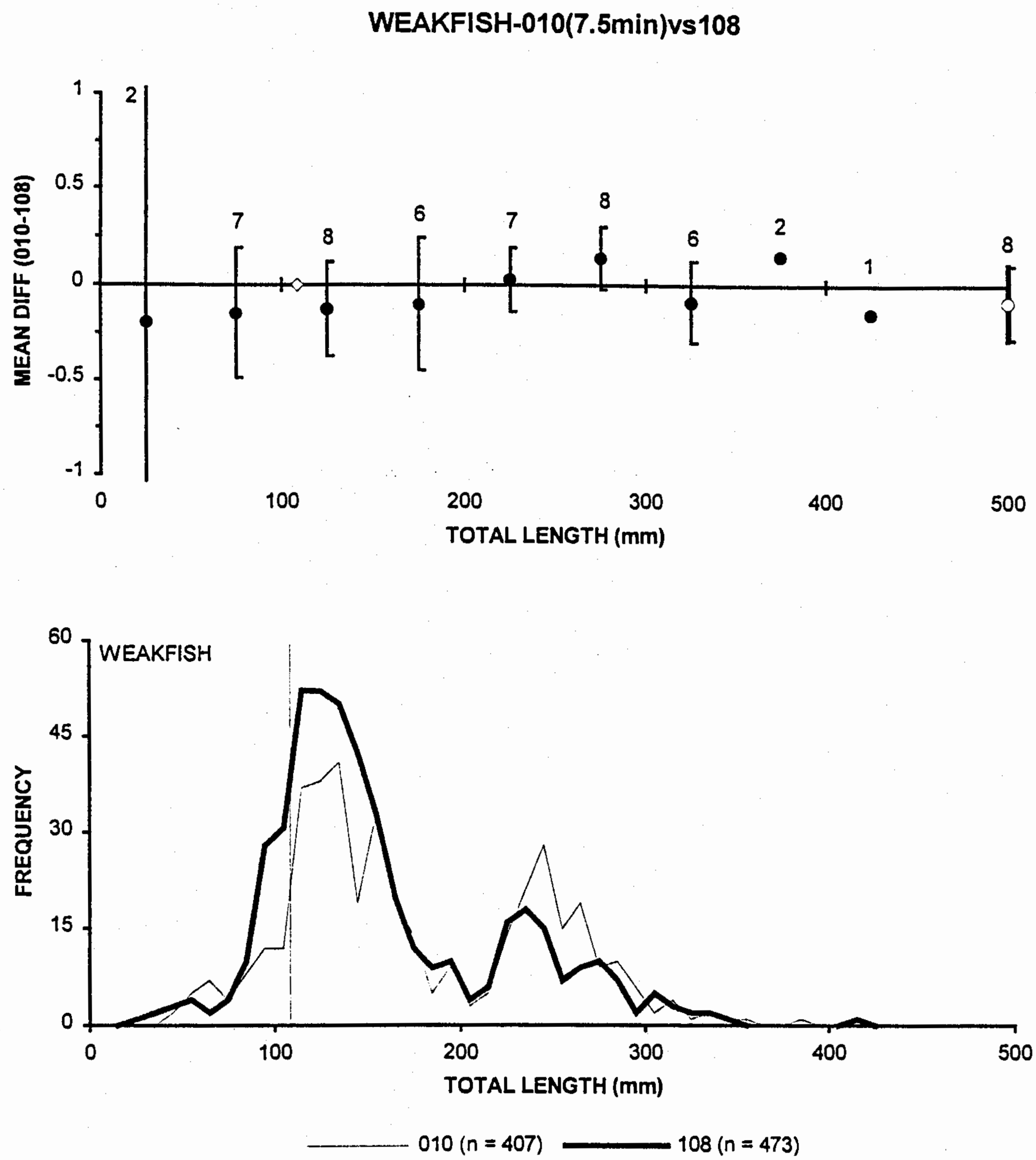
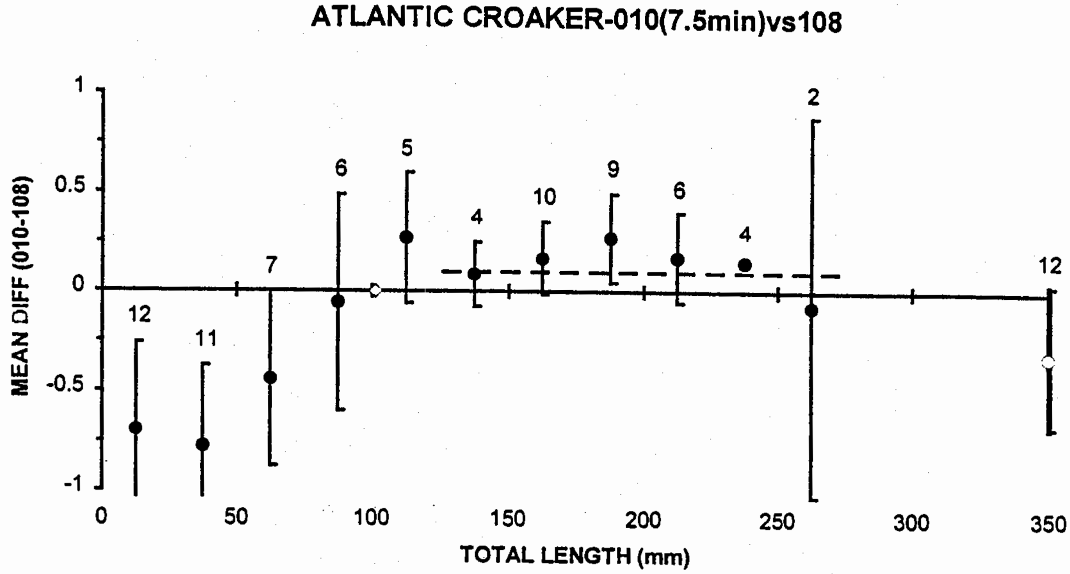


Figure 41. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



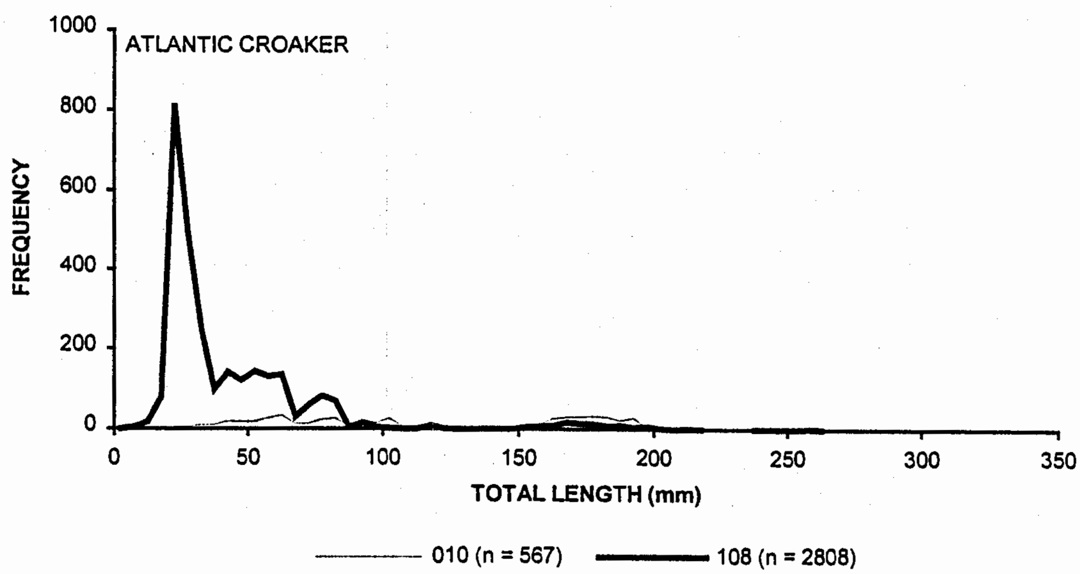


Figure 42. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 126-275 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

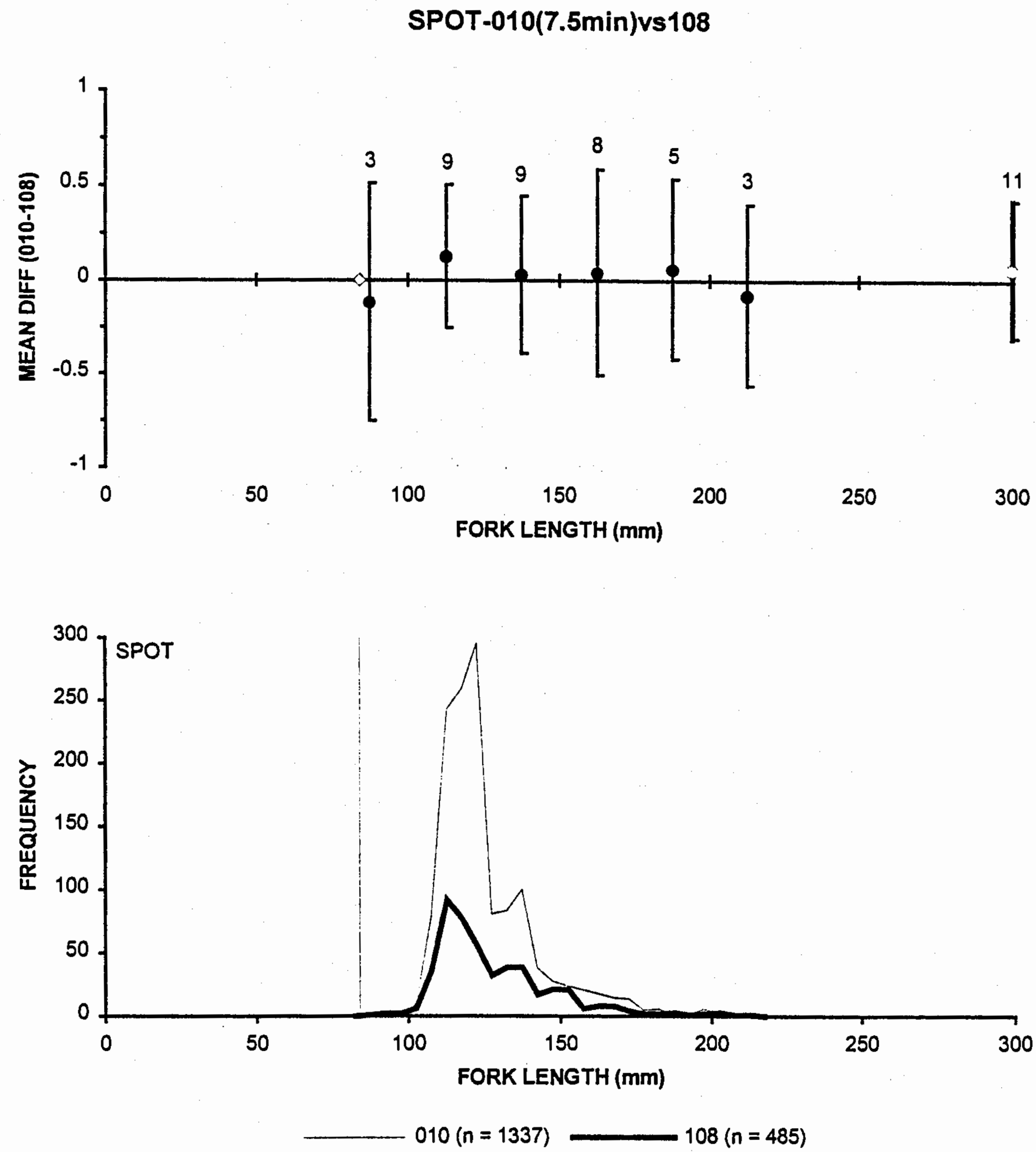


Figure 43. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

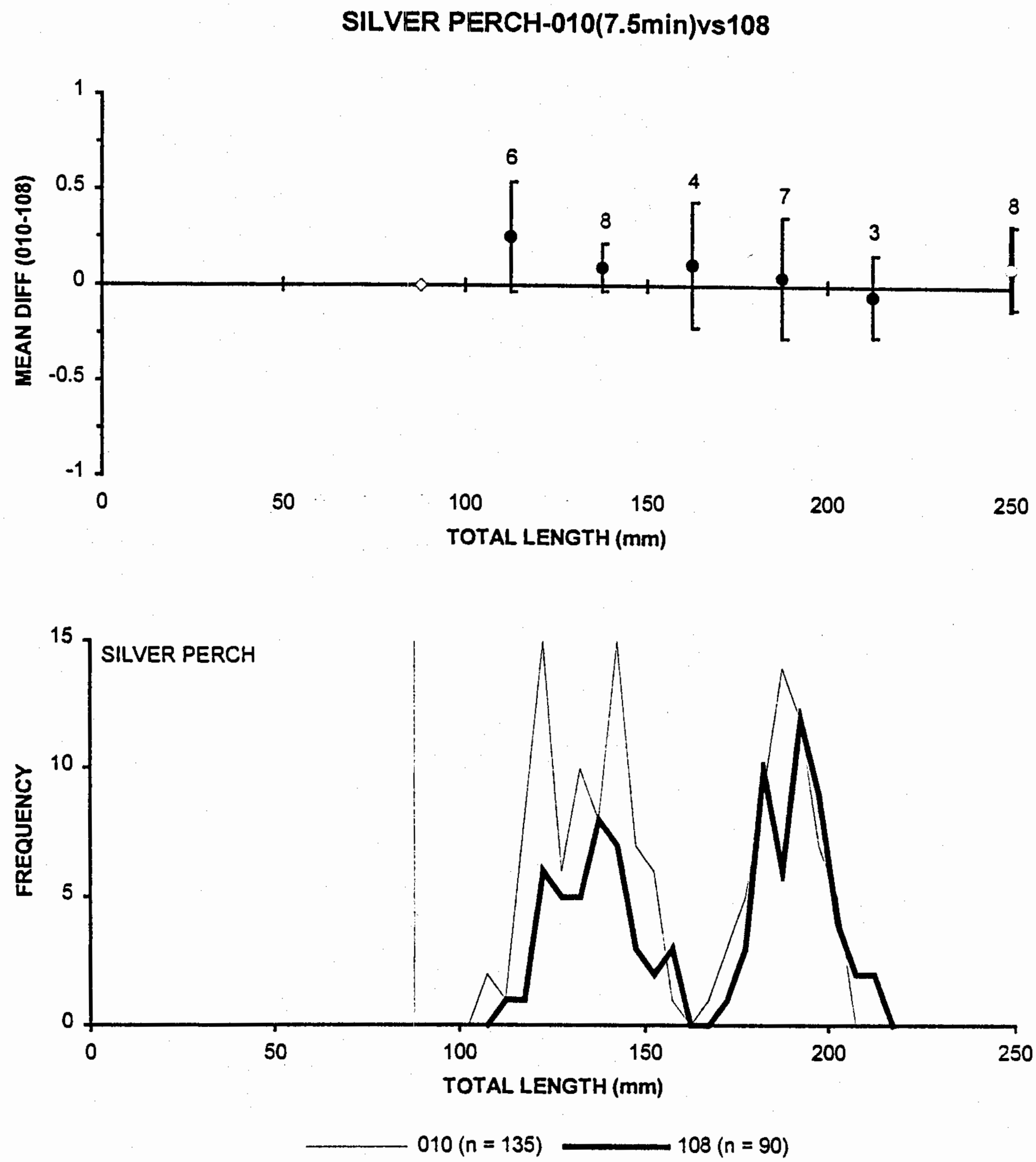


Figure 44. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all silver perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

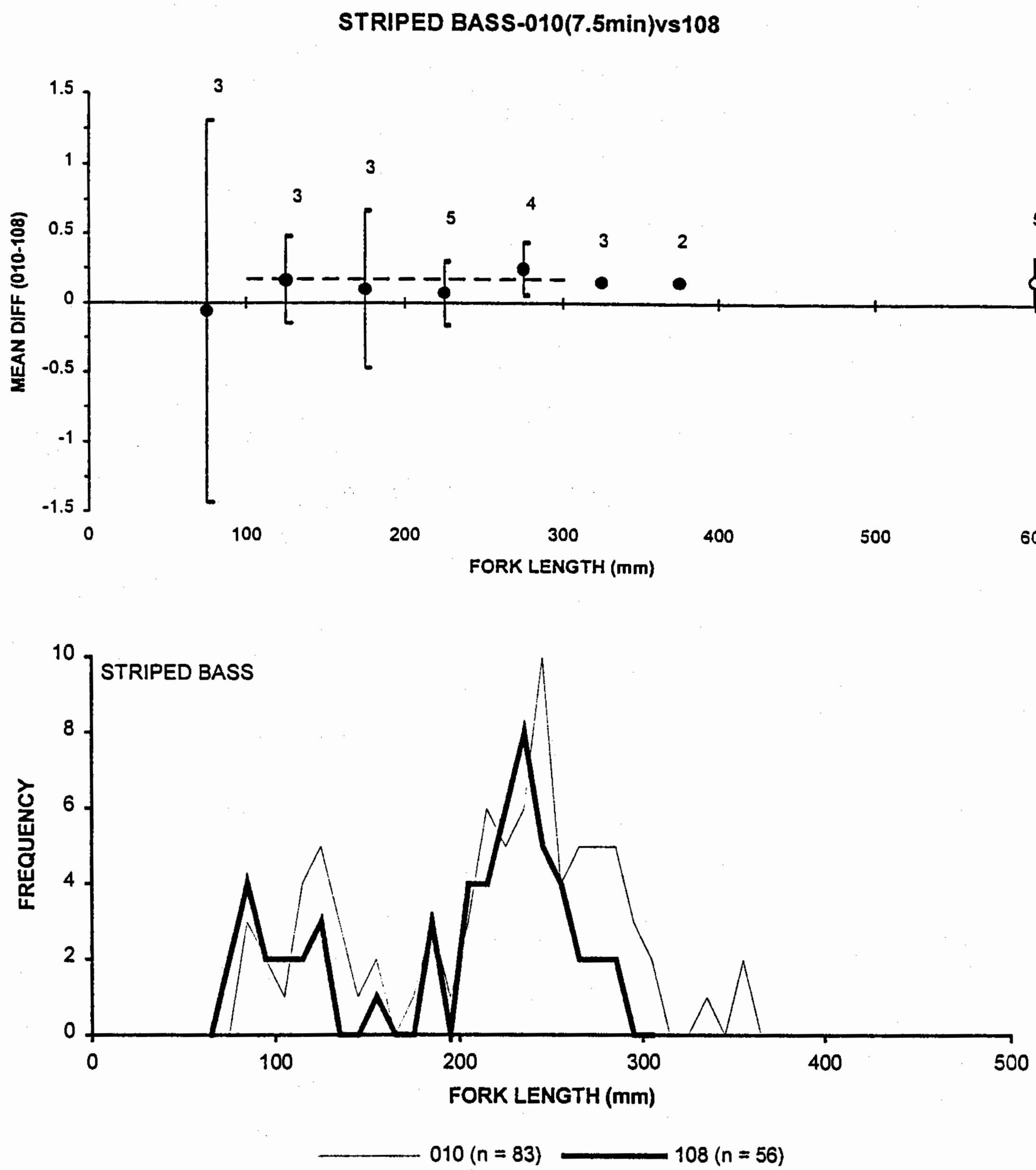


Figure 45. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for striped bass, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{\bar{D}}$) calculated from the 101-300 mm size intervals. BOTTOM: Length frequency distributions of all striped bass (10 mm increments) from the comparison trawls.

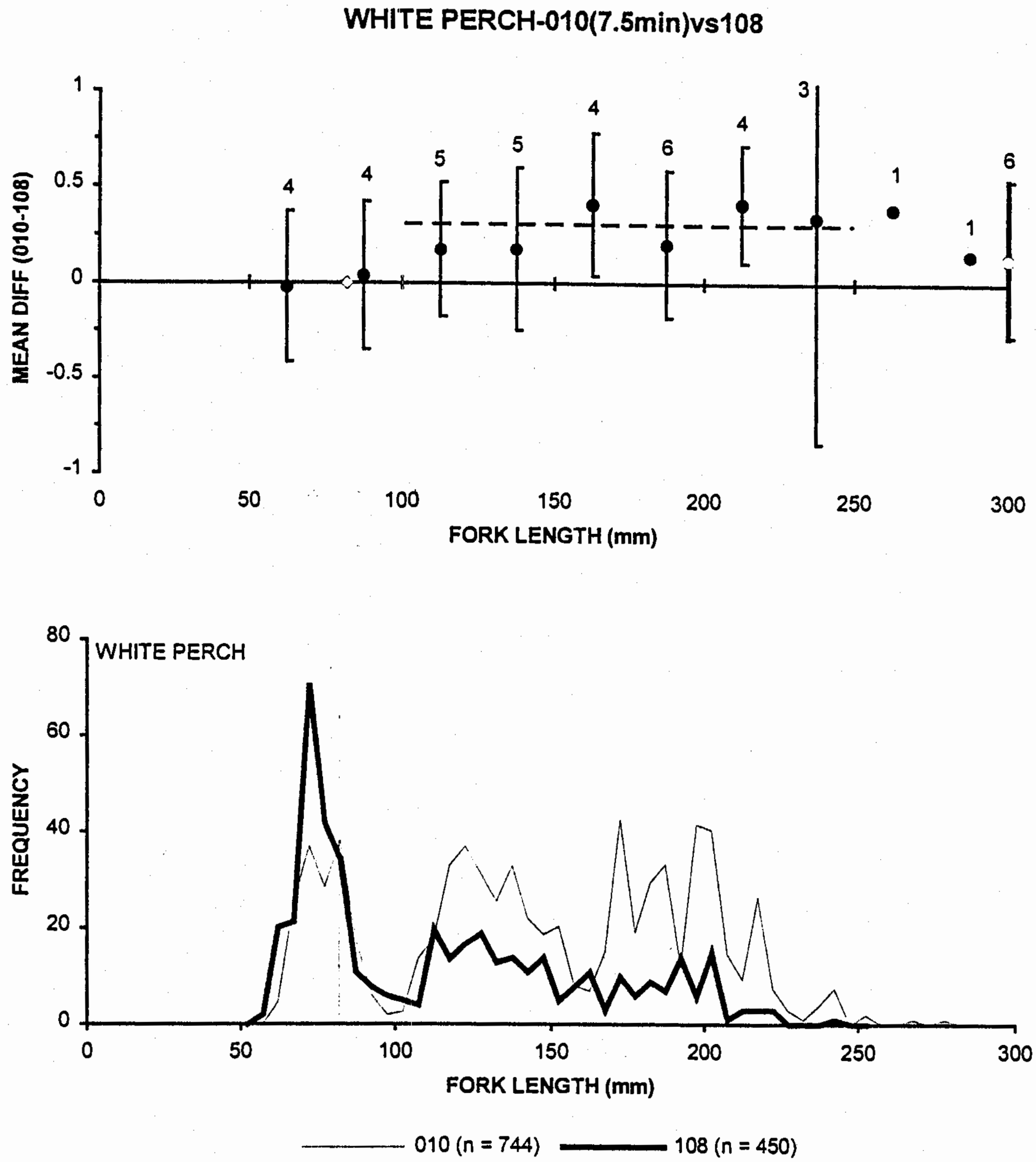


Figure 46. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for white perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-250 mm size intervals. BOTTOM: Length frequency distributions of all white perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

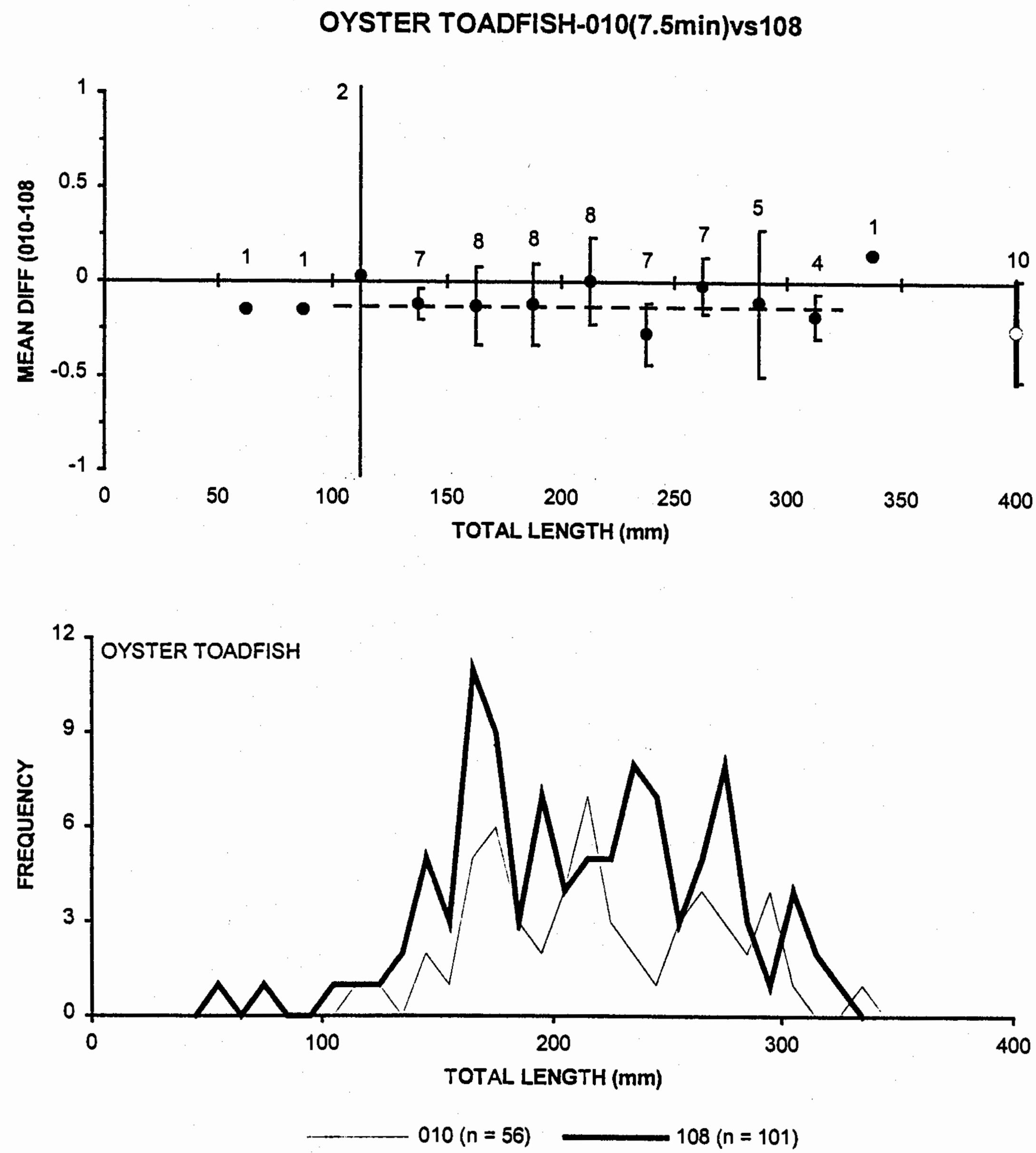
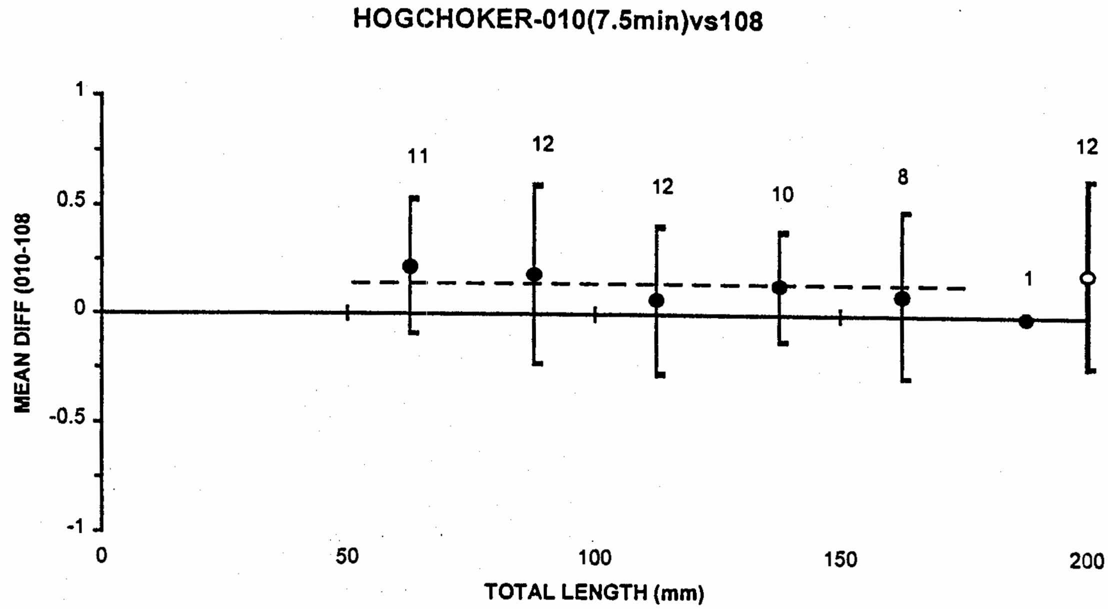


Figure 47. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for oyster toadfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-325 mm size intervals. BOTTOM: Length frequency distributions of all toadfish (10 mm increments) from the comparison trawls.



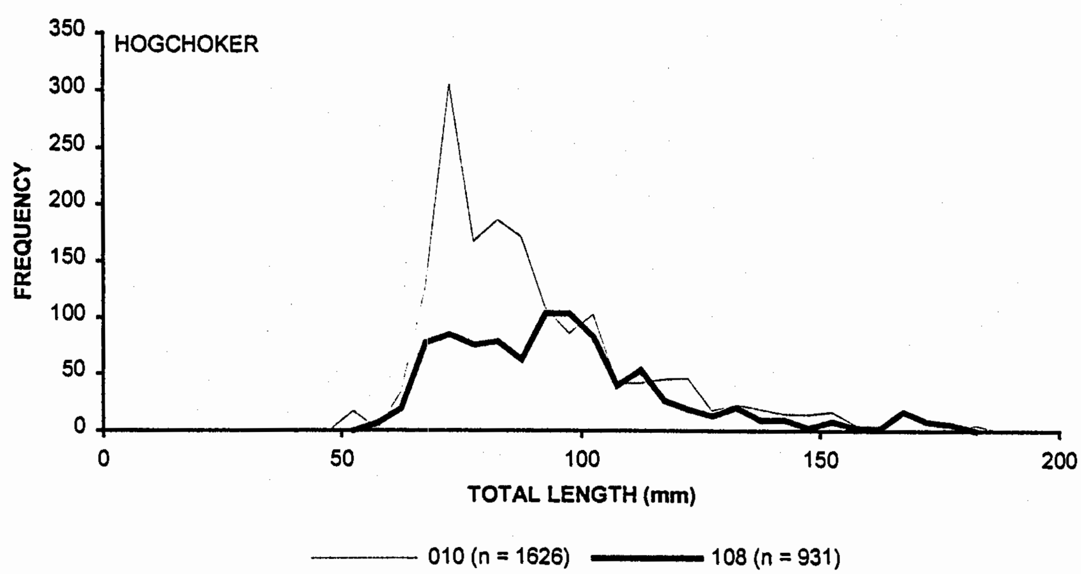


Figure 48. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 51-175 mm size intervals. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

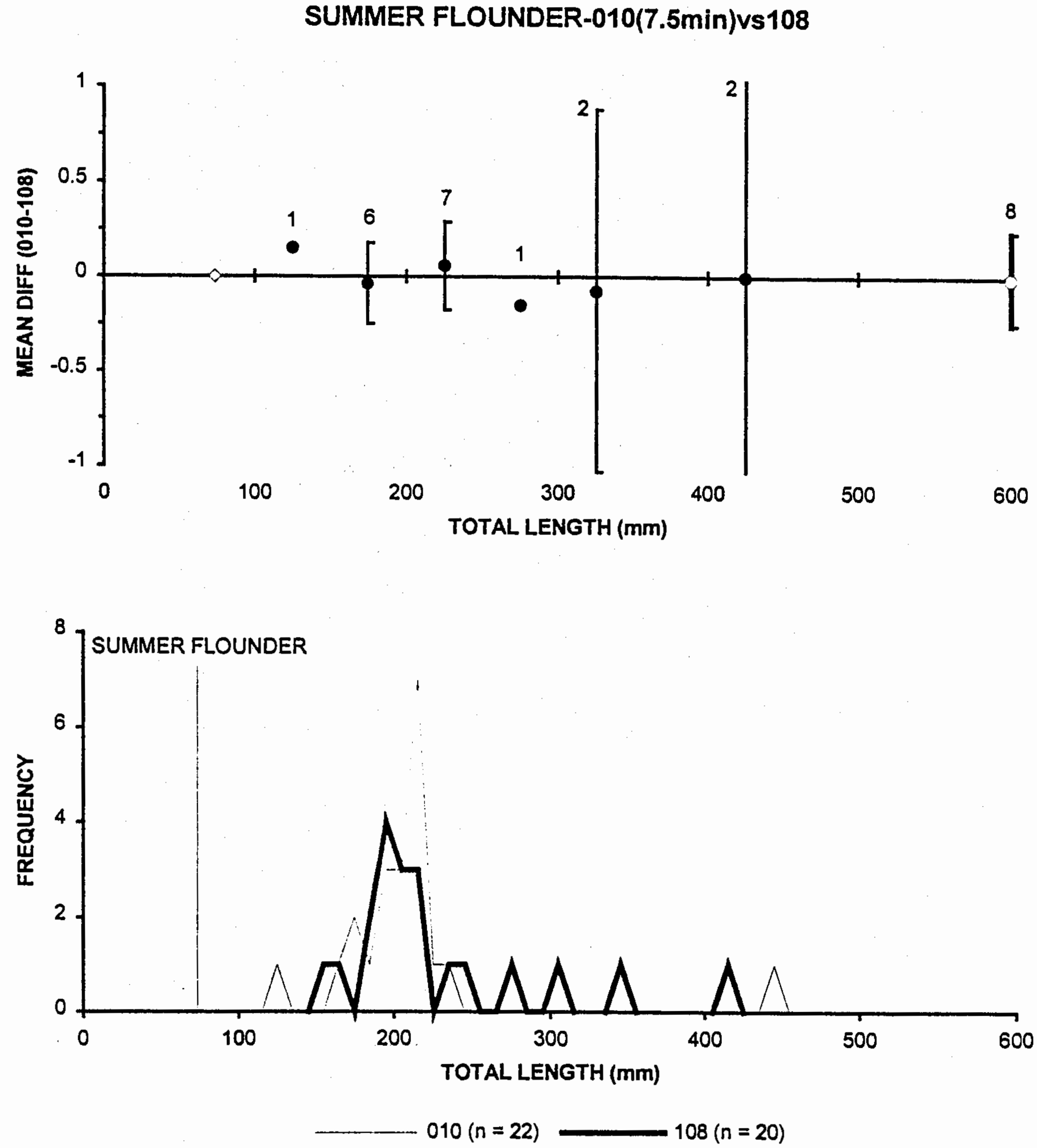


Figure 49. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

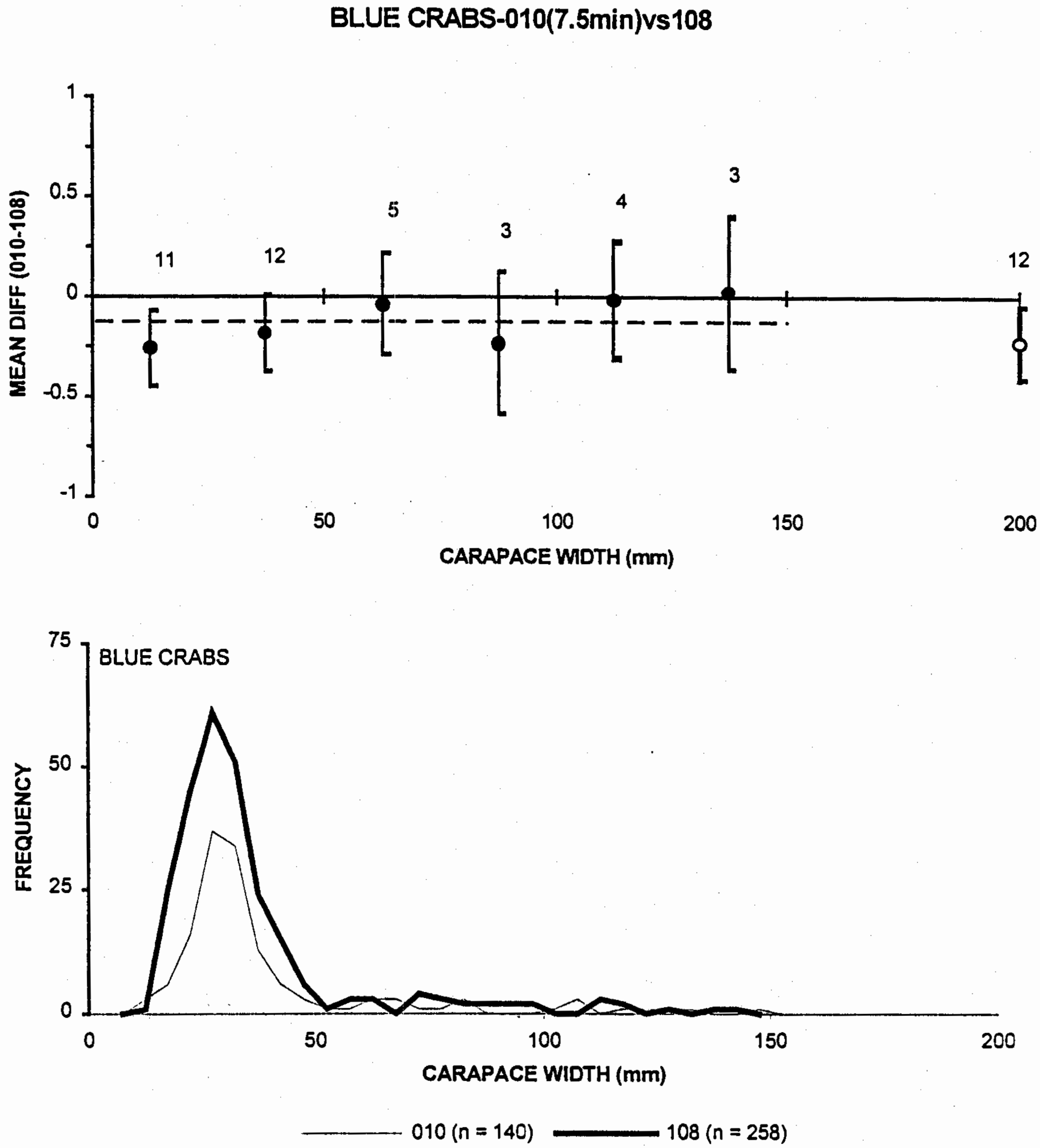


Figure 50. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (7.5 minute tows) and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 1-150 mm size intervals. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

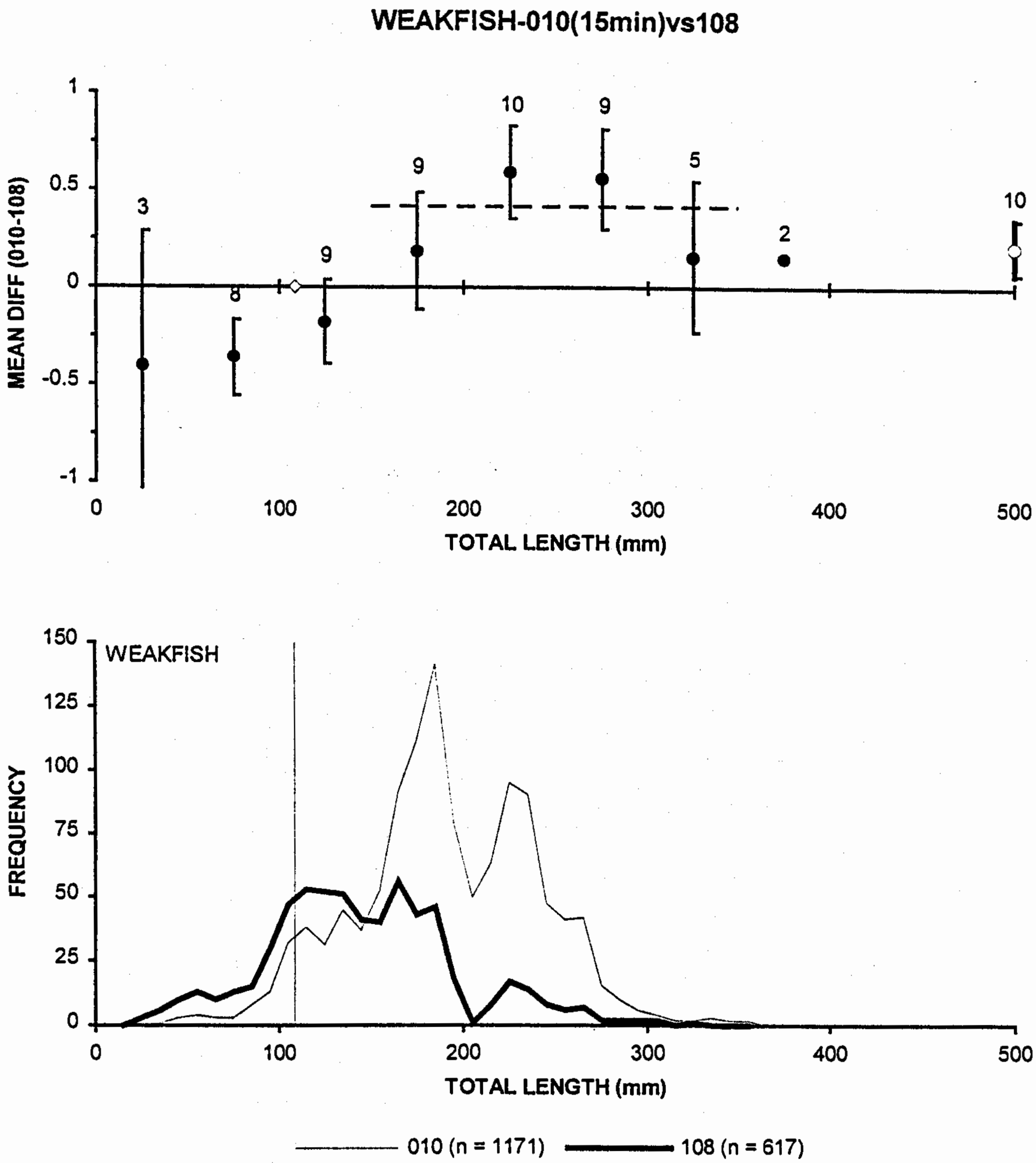


Figure 51. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (15 minute tows) for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 151-350 mm size intervals. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

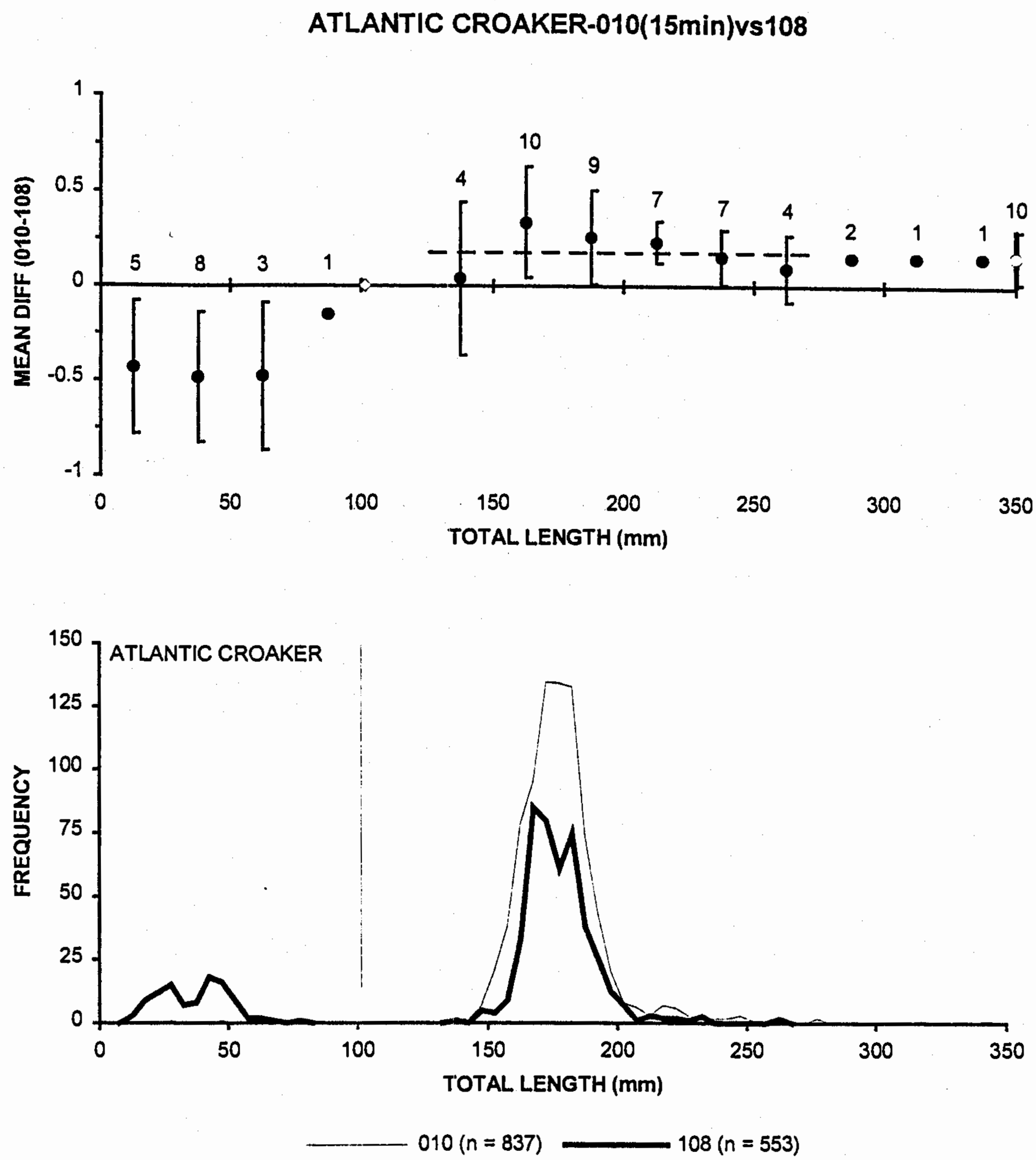


Figure 52. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (15 minute tows) for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 126-275 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

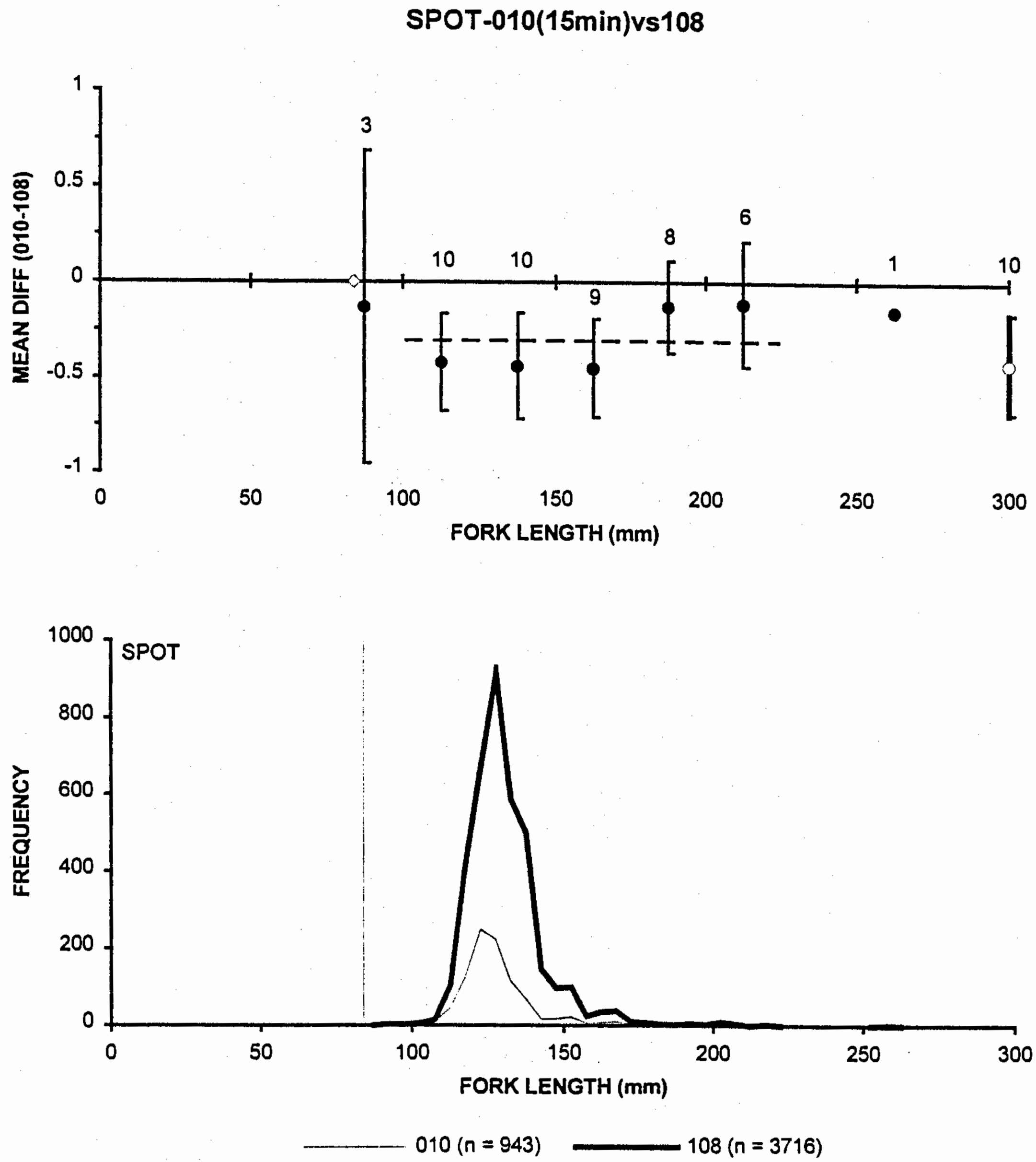


Figure 53. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (15 minute tows) for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-225 mm size intervals. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

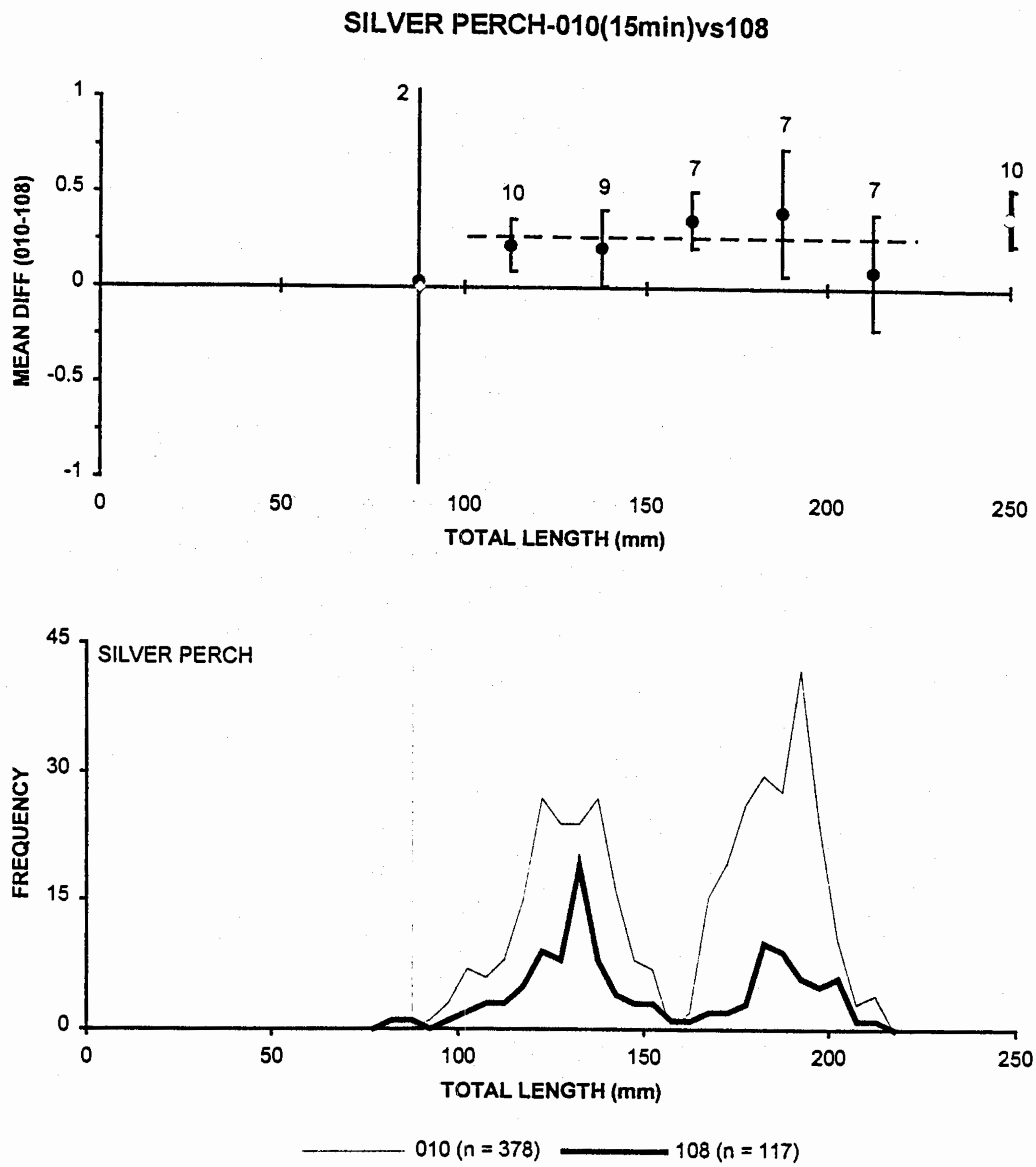


Figure 54. TOP: Mean catch differences ($\overline{D}_L$) between gear 010 (15 minute tows) for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 101-225 mm size intervals. BOTTOM: Length frequency distributions of all silver perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

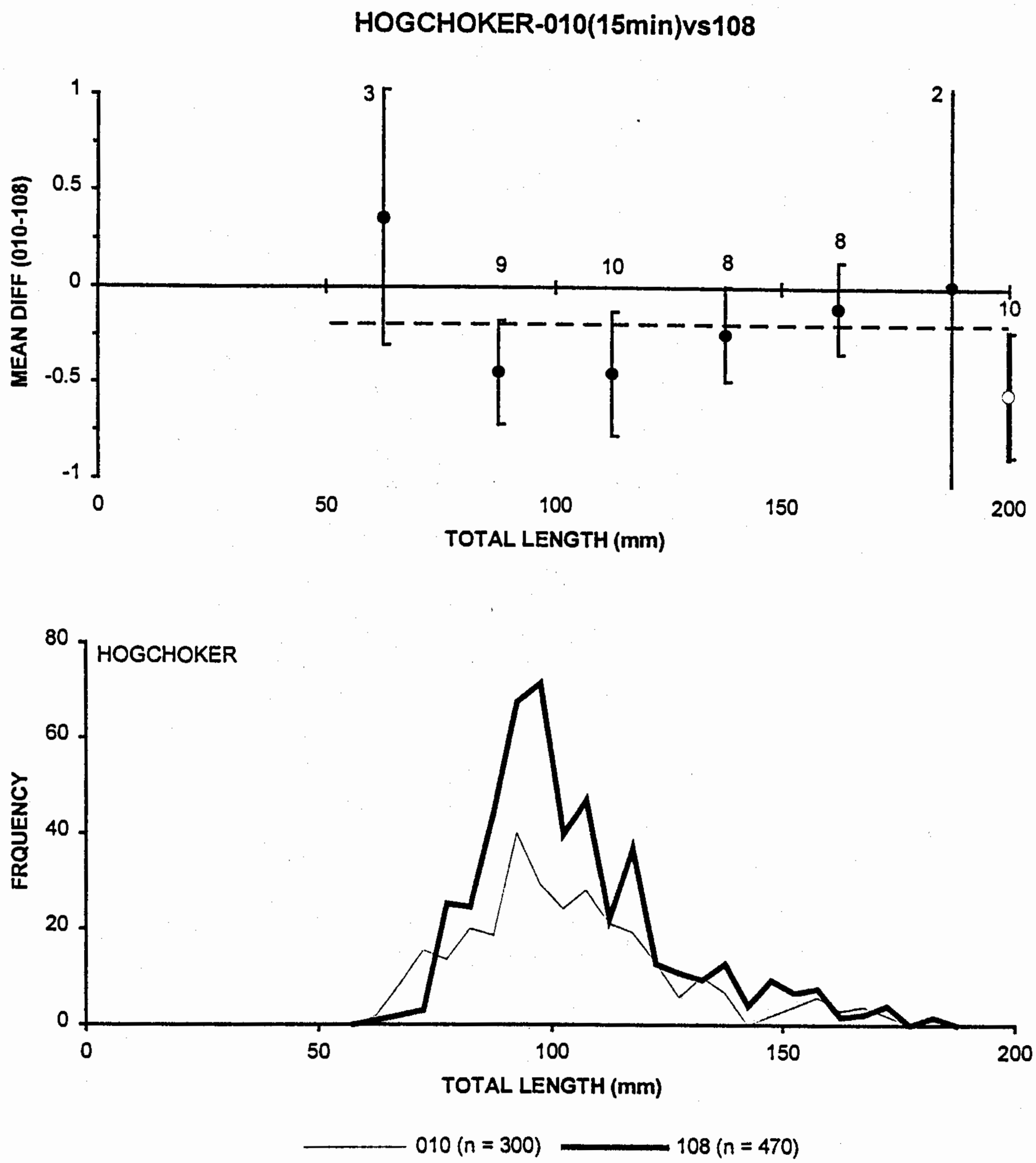


Figure 55. TOP: Mean catch differences ($\overline{D}_L$) between gear 010 (15 minute tows) for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 51-200 mm size intervals. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

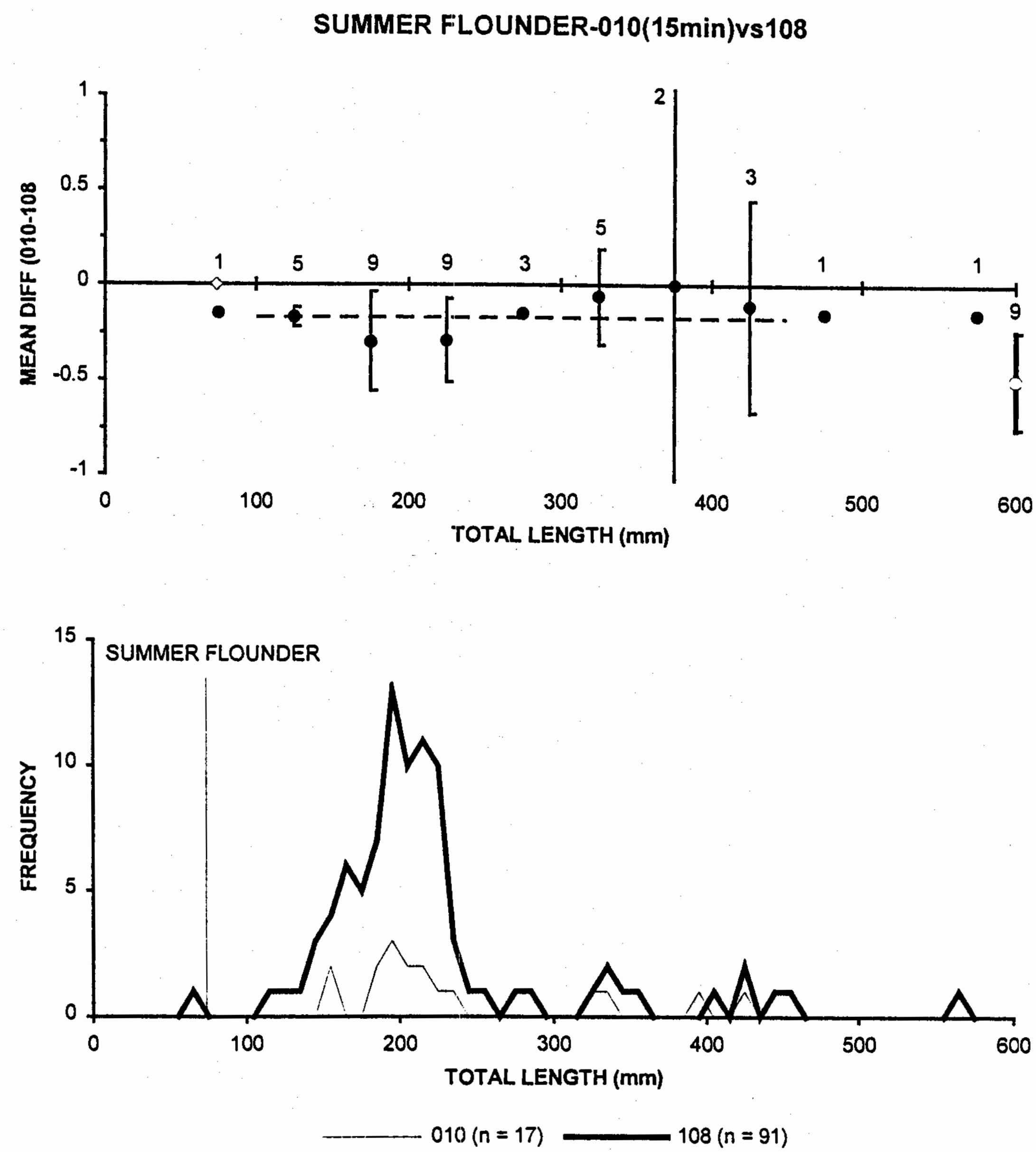
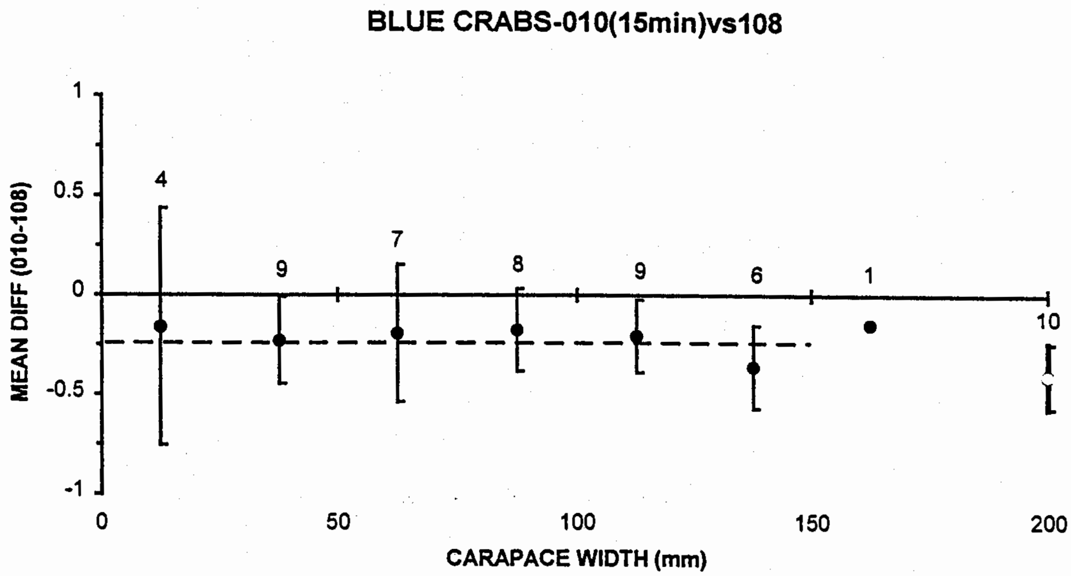


Figure 56. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (15 minute tows) for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101-450 mm size intervals. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



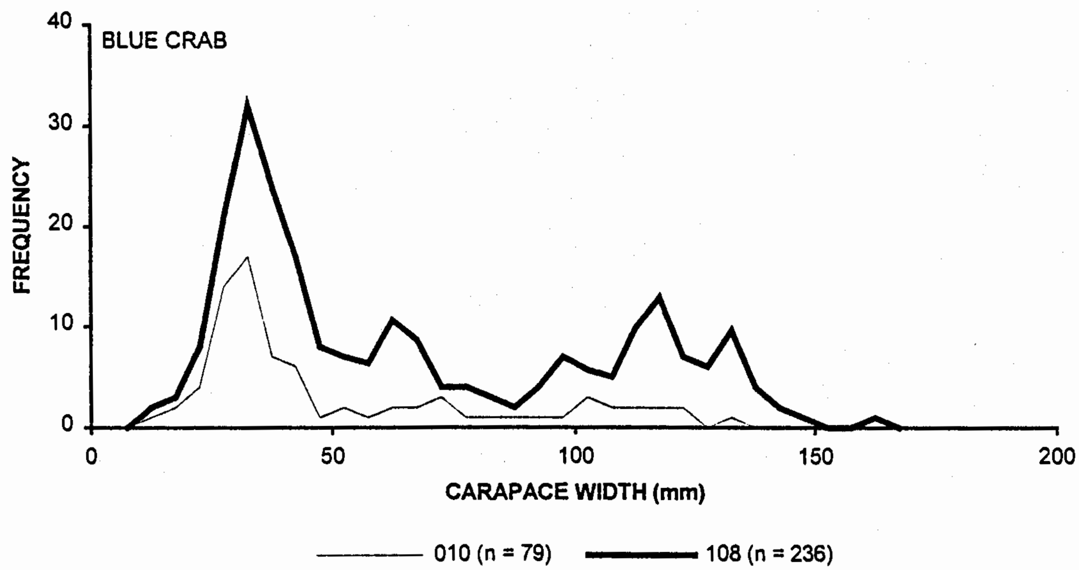


Figure 57. TOP: Mean catch differences ($\bar{D}_L$) between gear 010 (15 minute tows) for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 1 - 150 mm size intervals. BOTTOM: Length frequency distributions of all crabs (5 mm increments) from the comparison trawls.

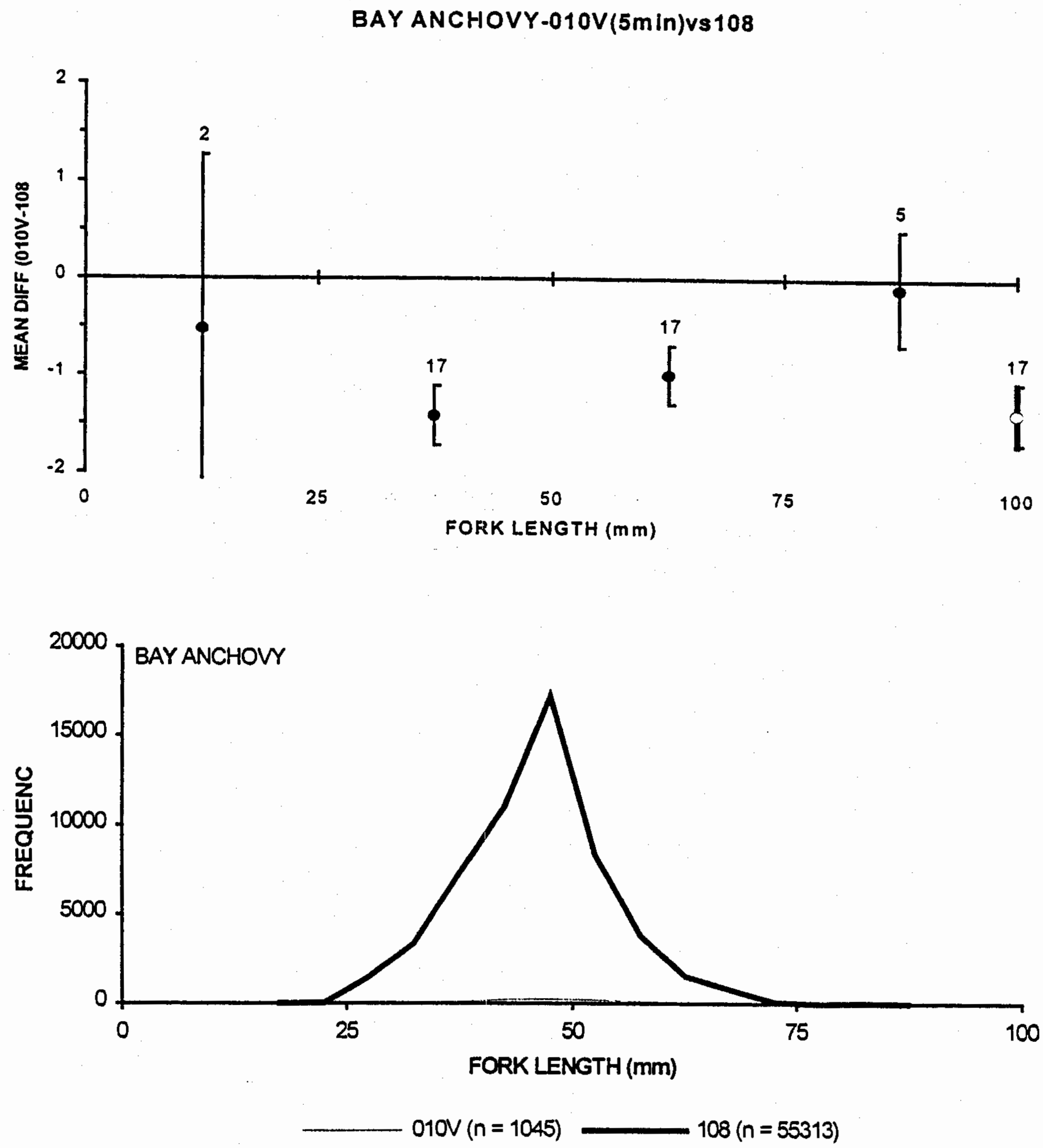
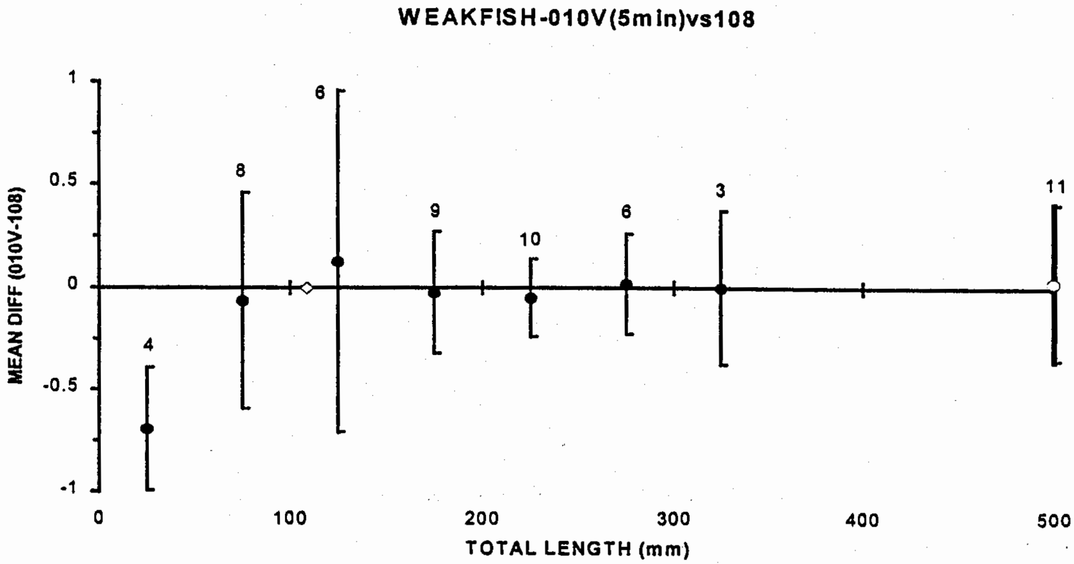


Figure 58. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (5 minute tows) and gear 108 for bay anchovies, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all anchovies (5 mm increments) from the comparison trawls.



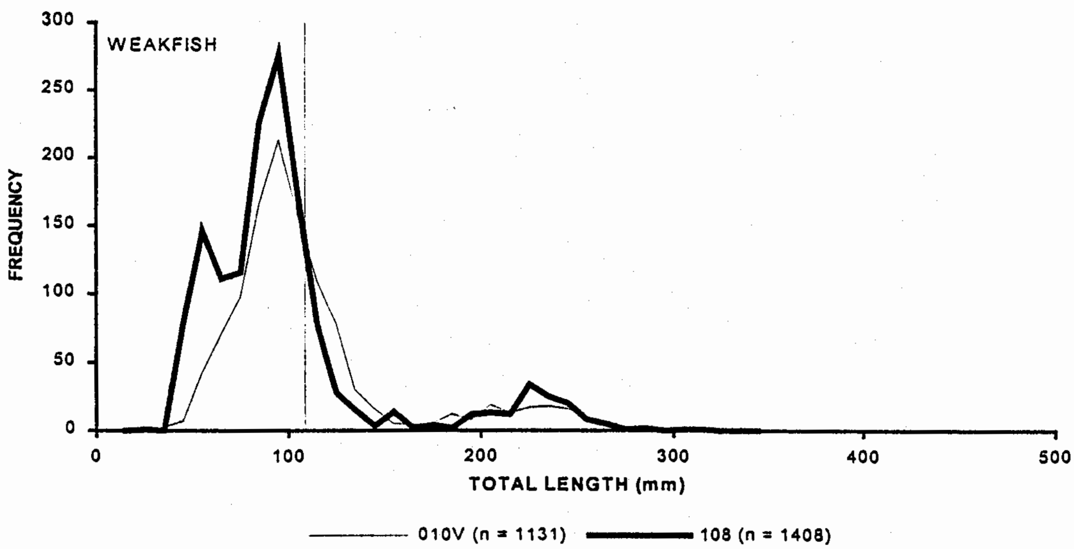
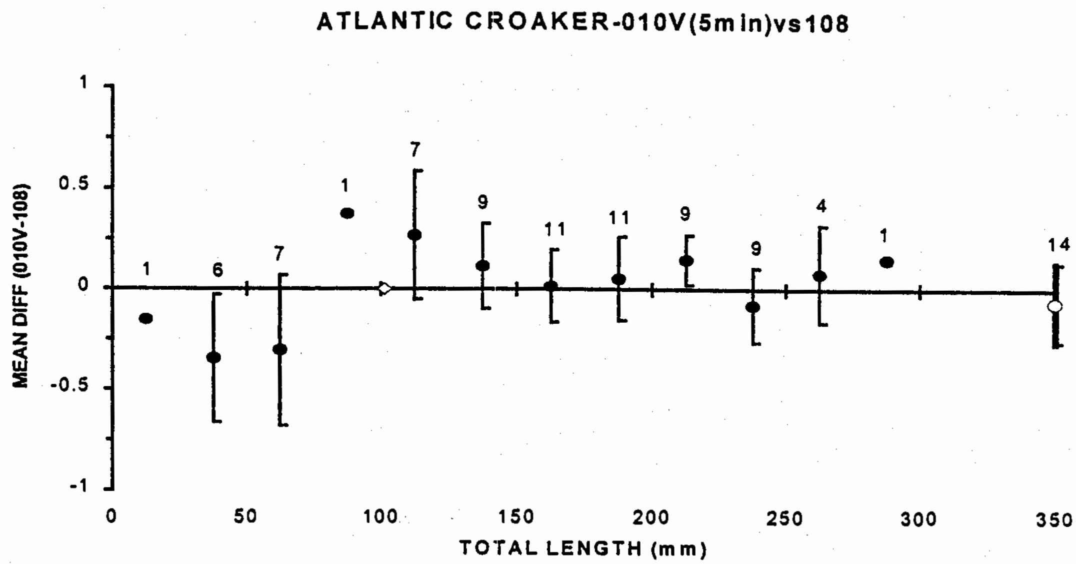


Figure 59. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



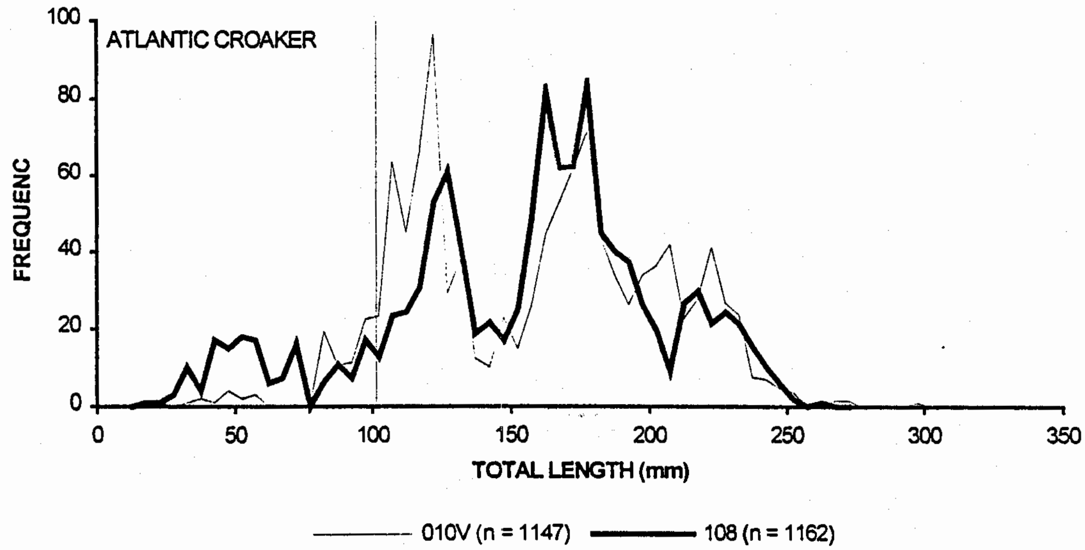
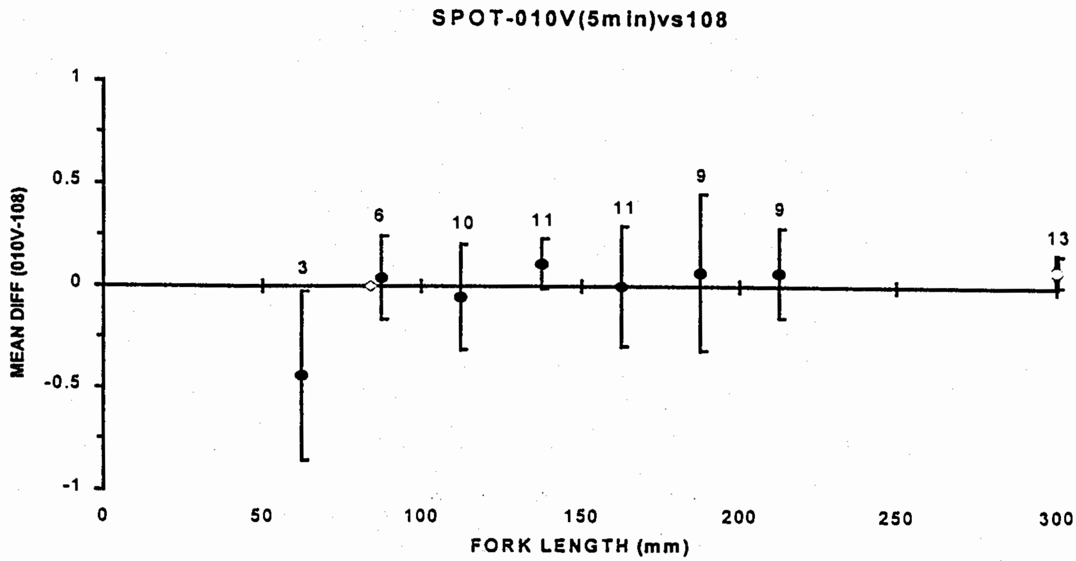


Figure 60. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured.The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



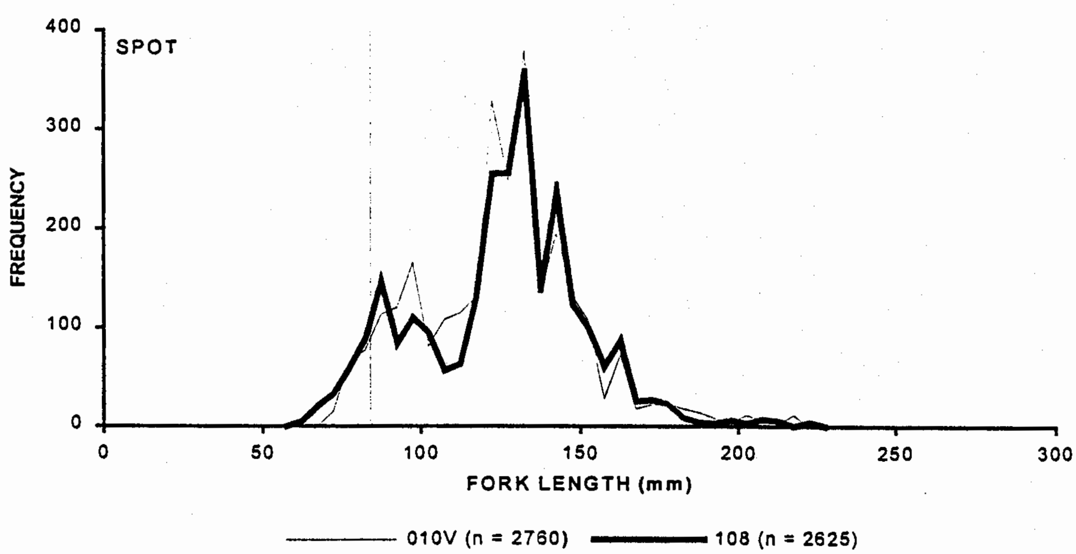
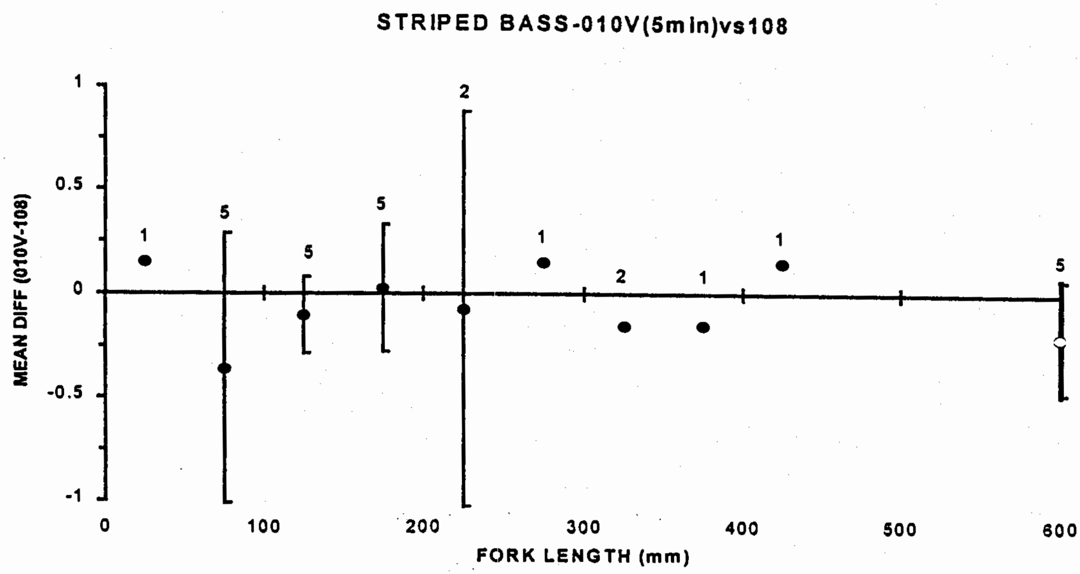


Figure 61. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



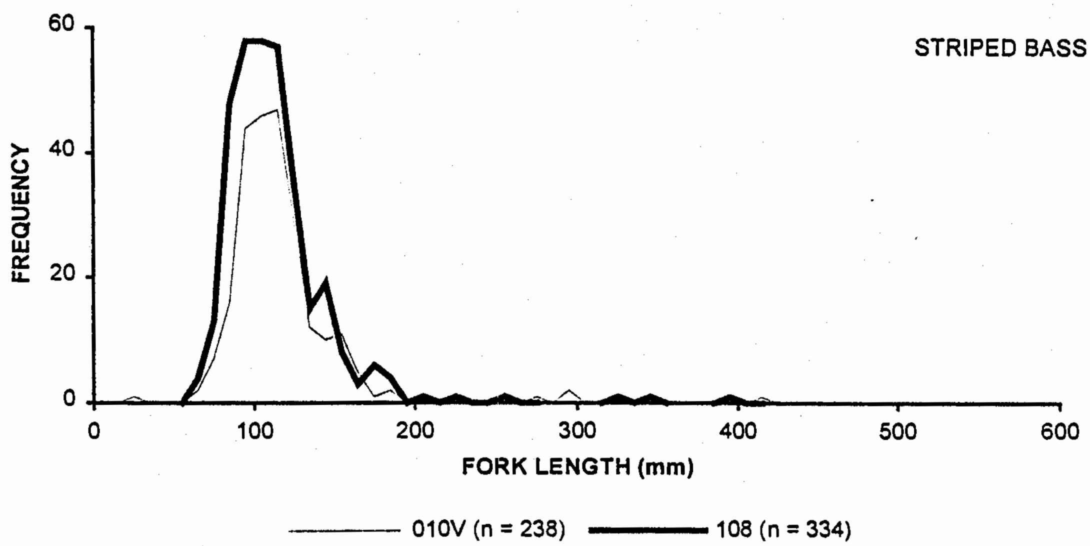


Figure 62. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (5 minute tows) and gear 108 for striped bass, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all striped bass (10 mm increments) from the comparison trawls.

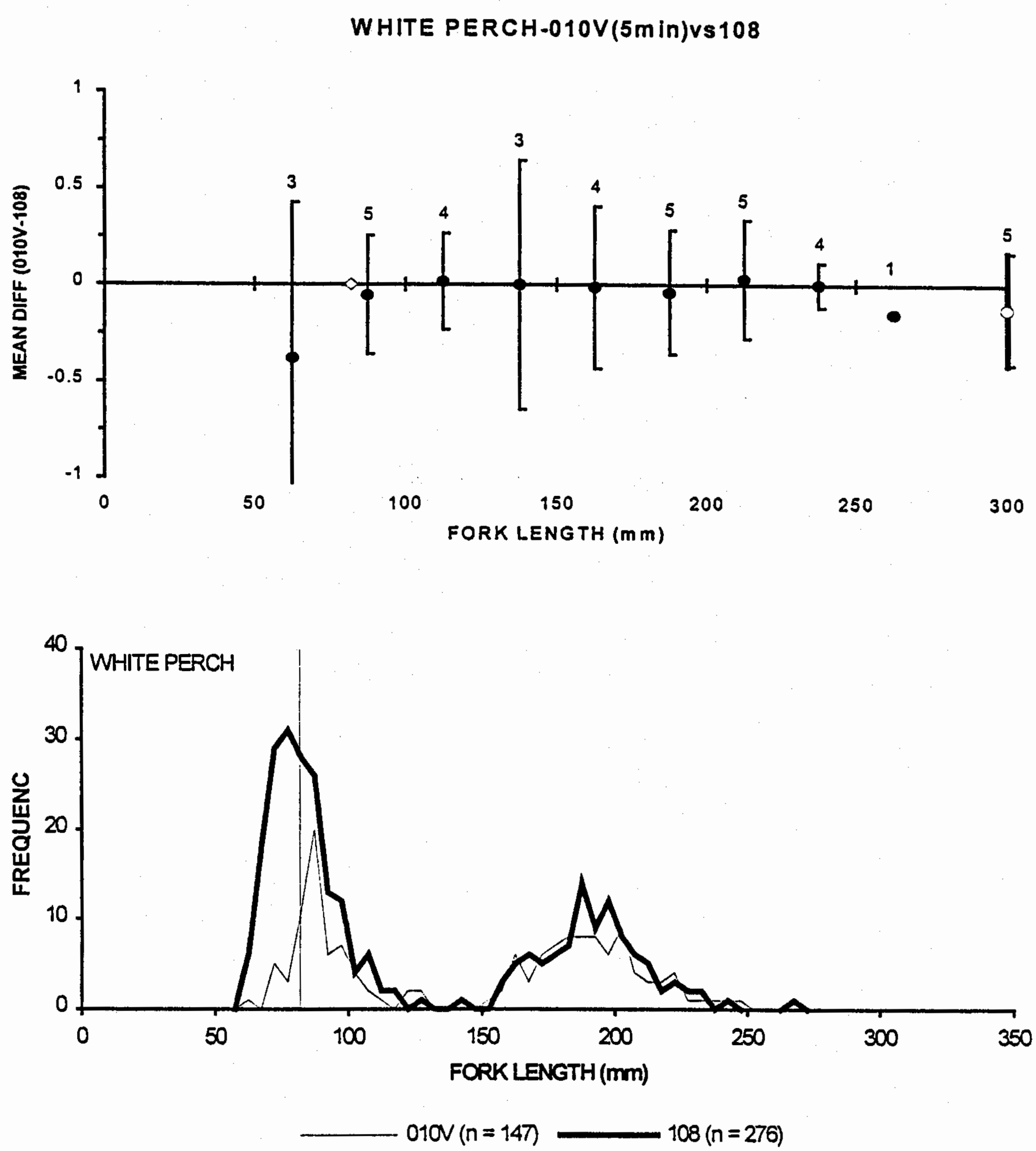
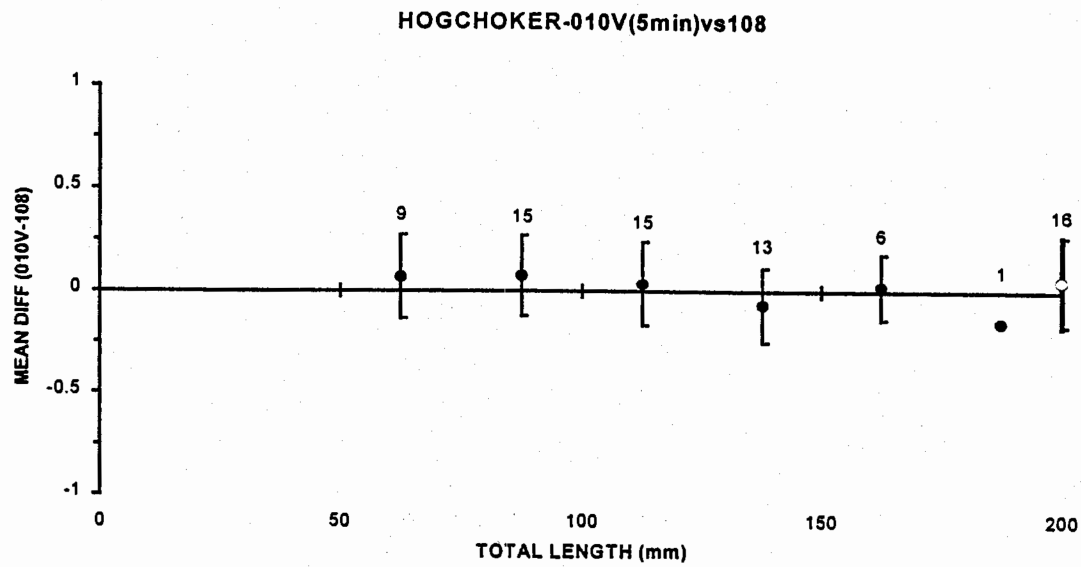


Figure 63. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for white perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



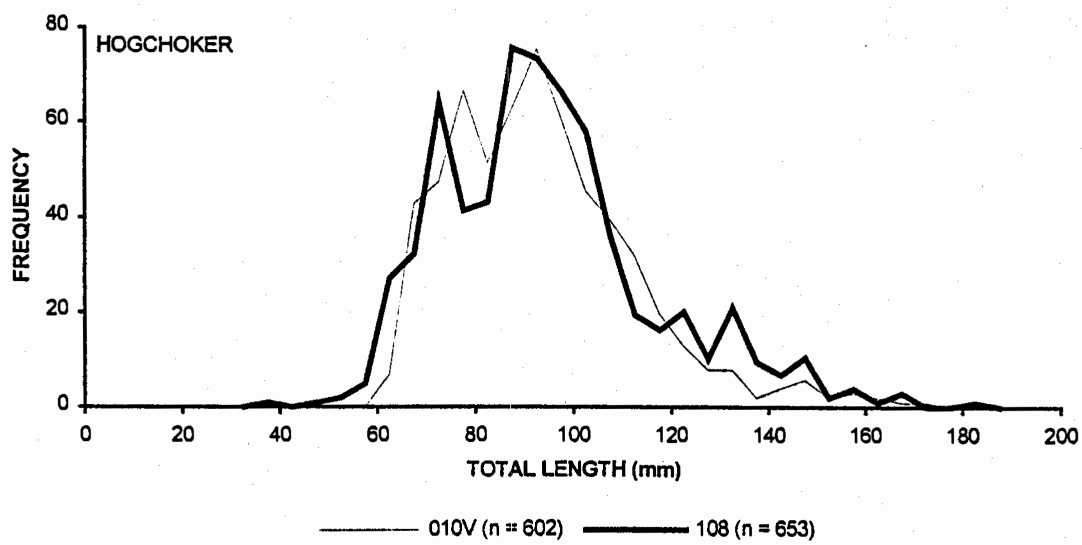


Figure 64. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

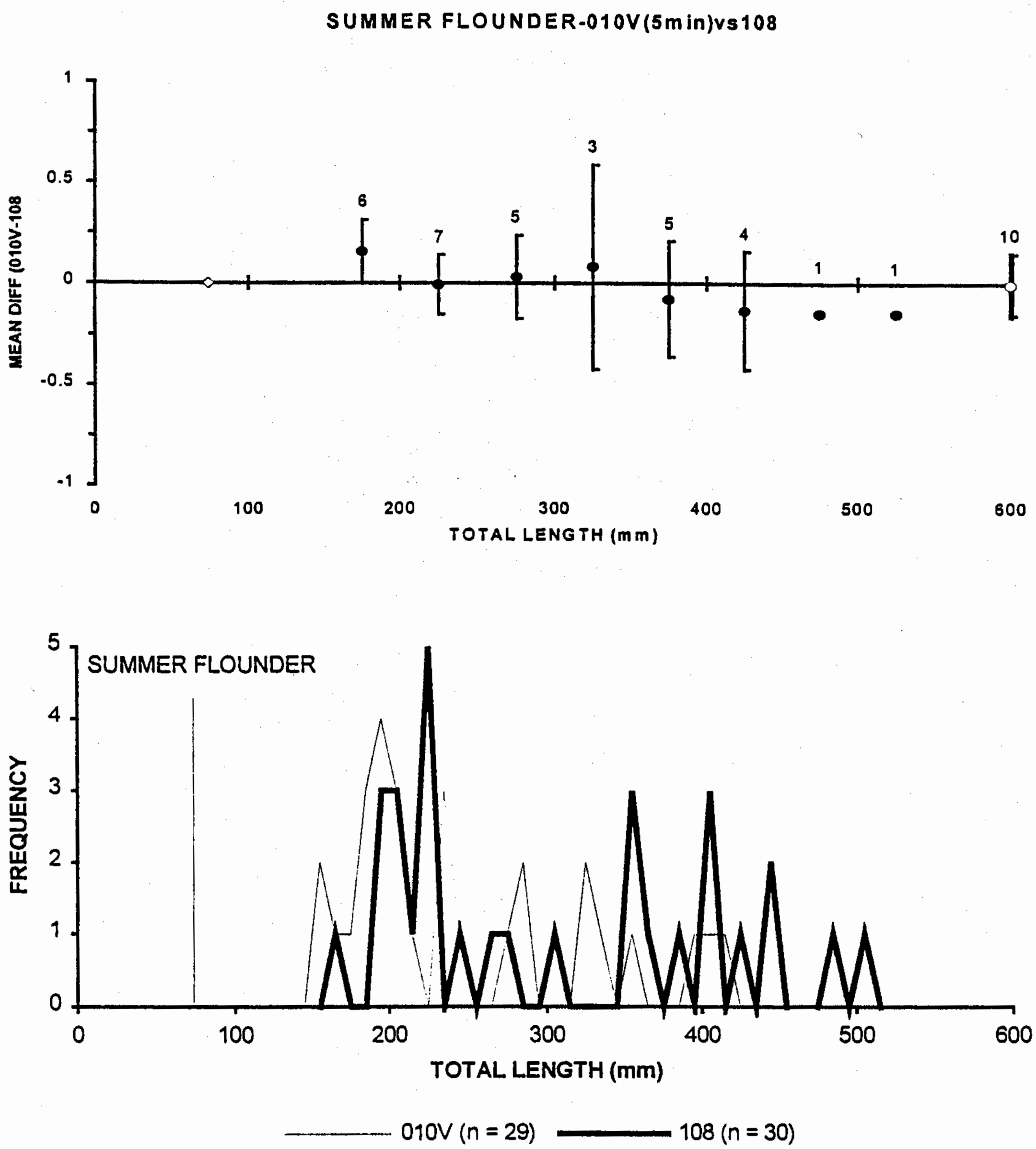


Figure 65. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

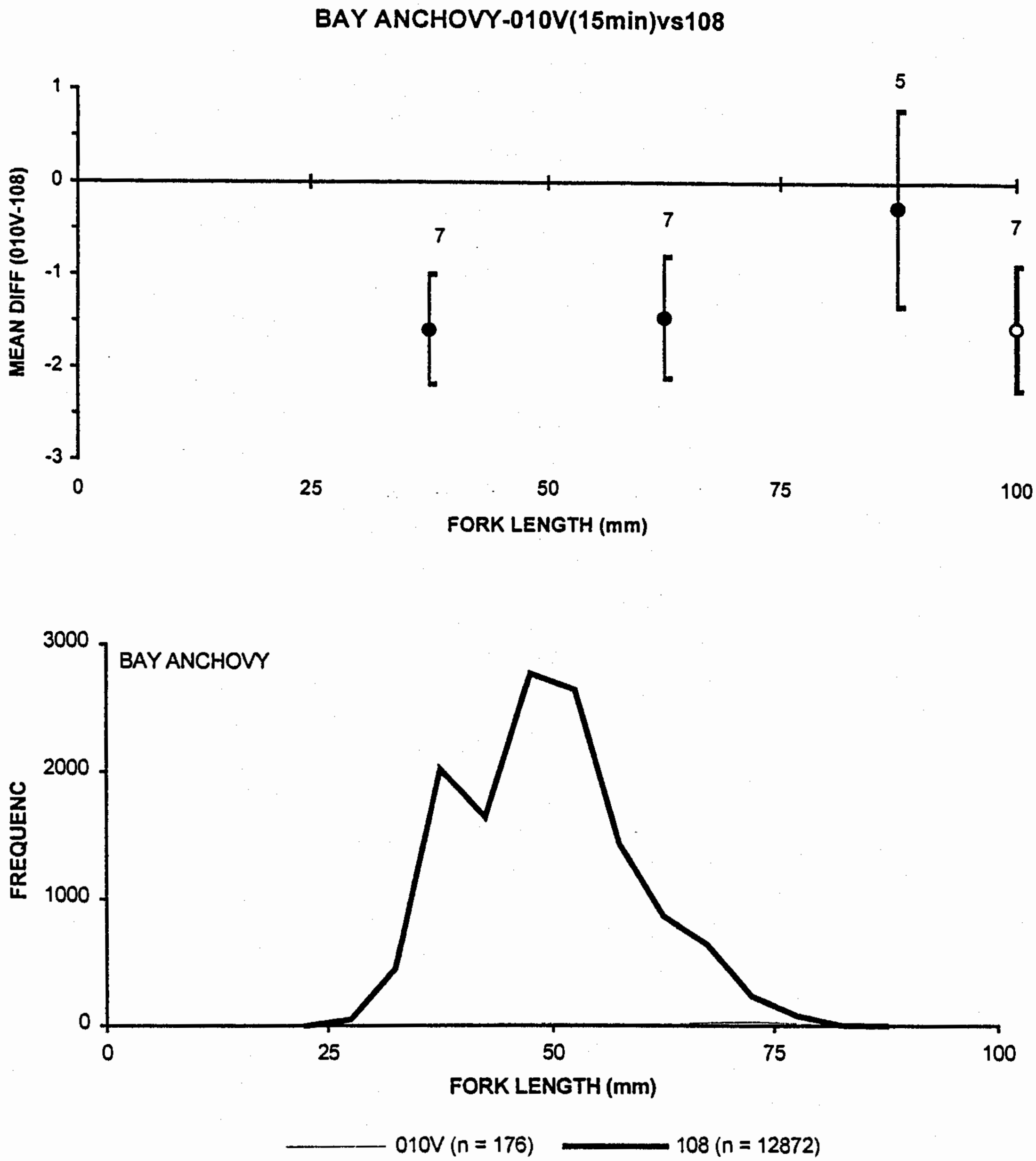


Figure 67. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for bay anchovies, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all anchovies (5 mm increments) from the comparison trawls.

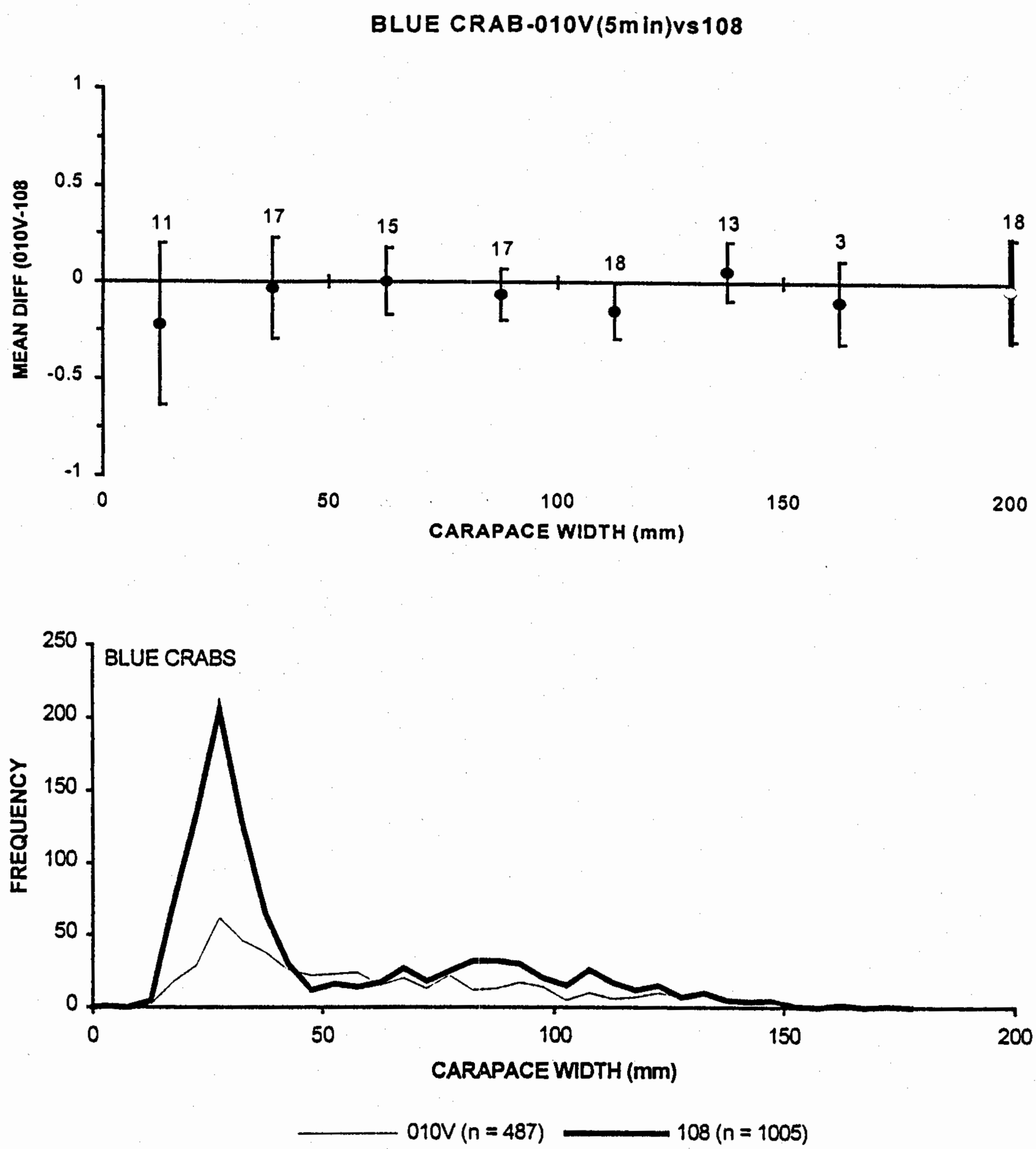


Figure 66. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (5 minute tows) and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

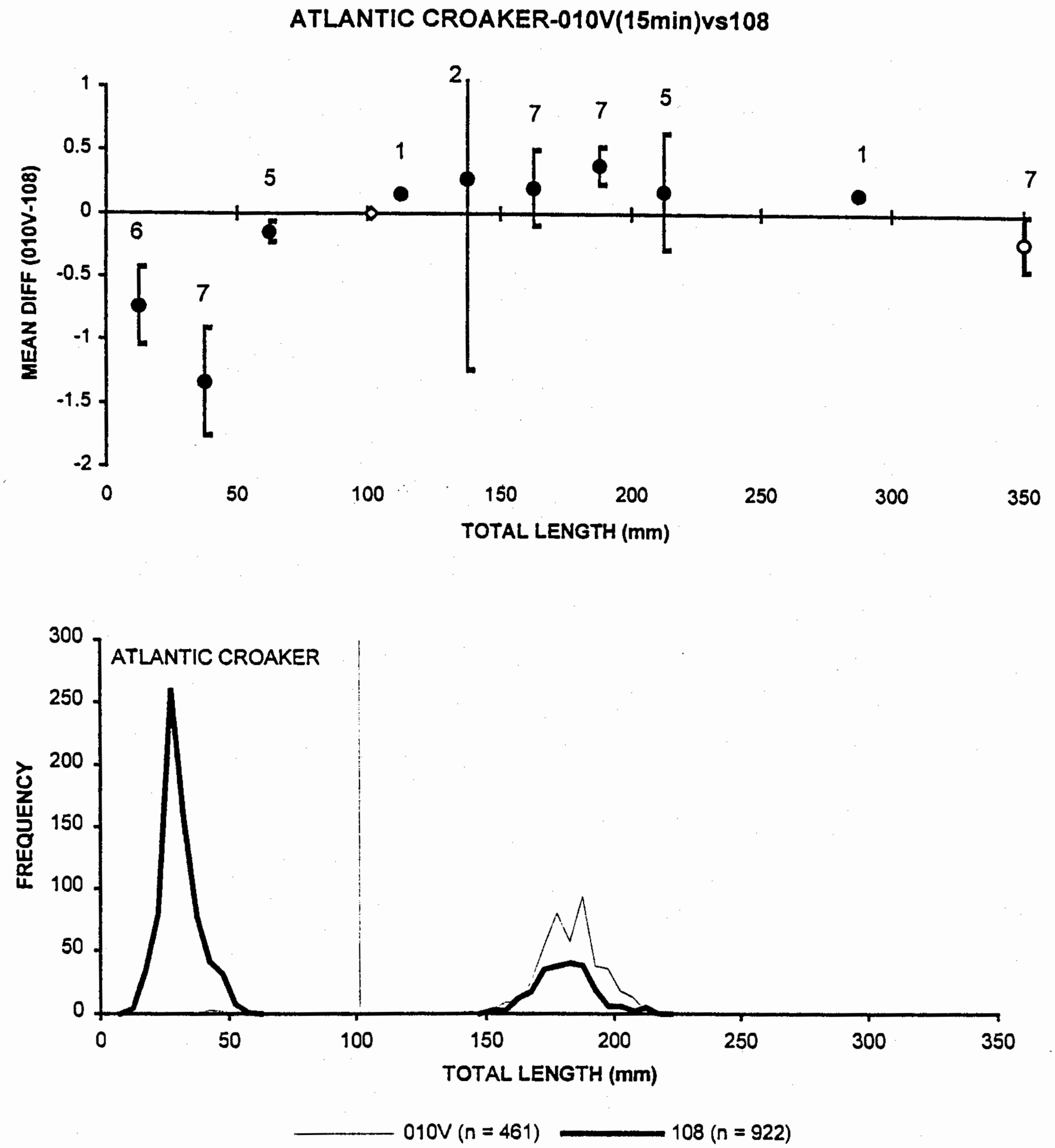


Figure 69. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (15 minute tows) and gear 108 for Atlantic croaker, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

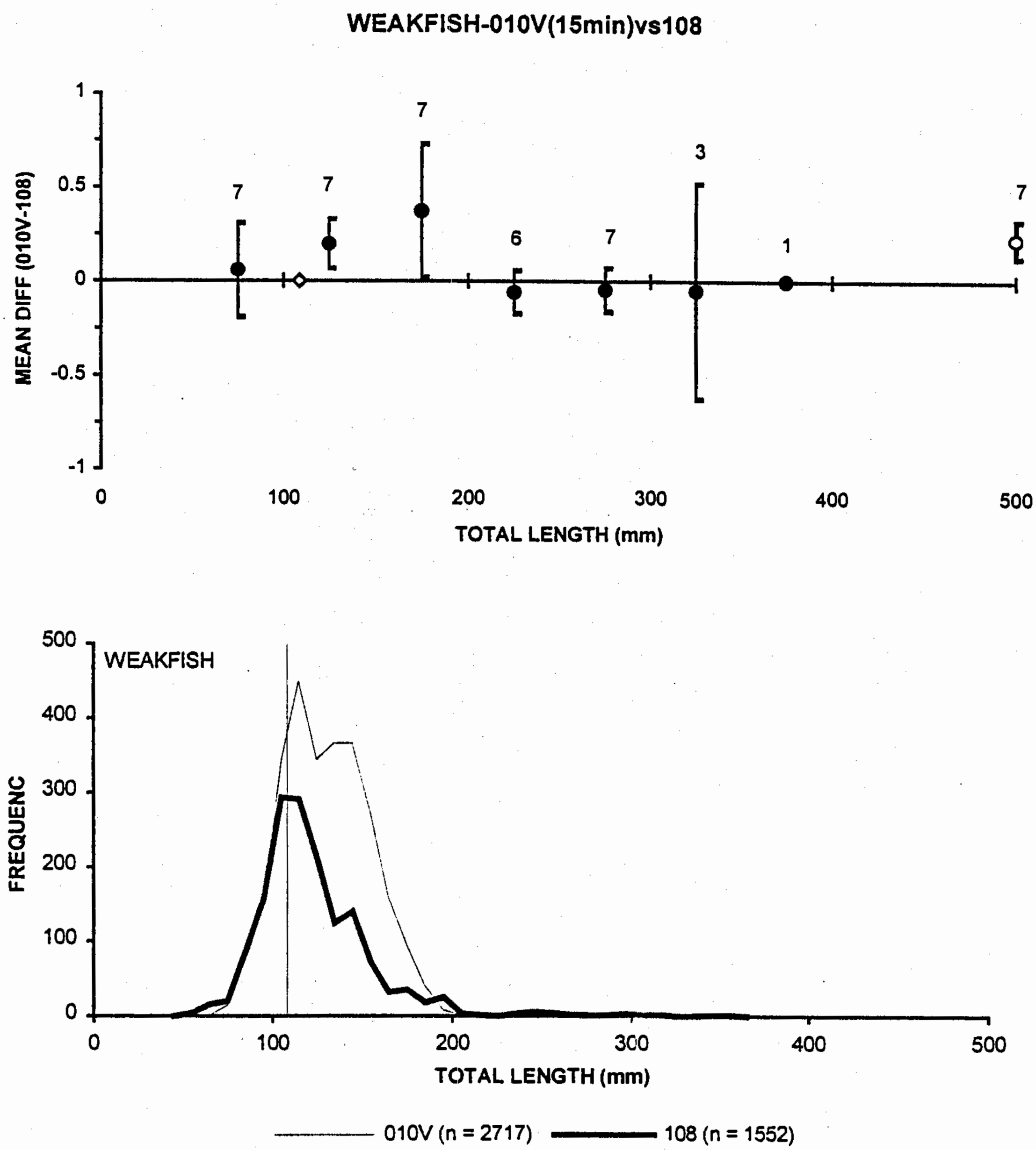
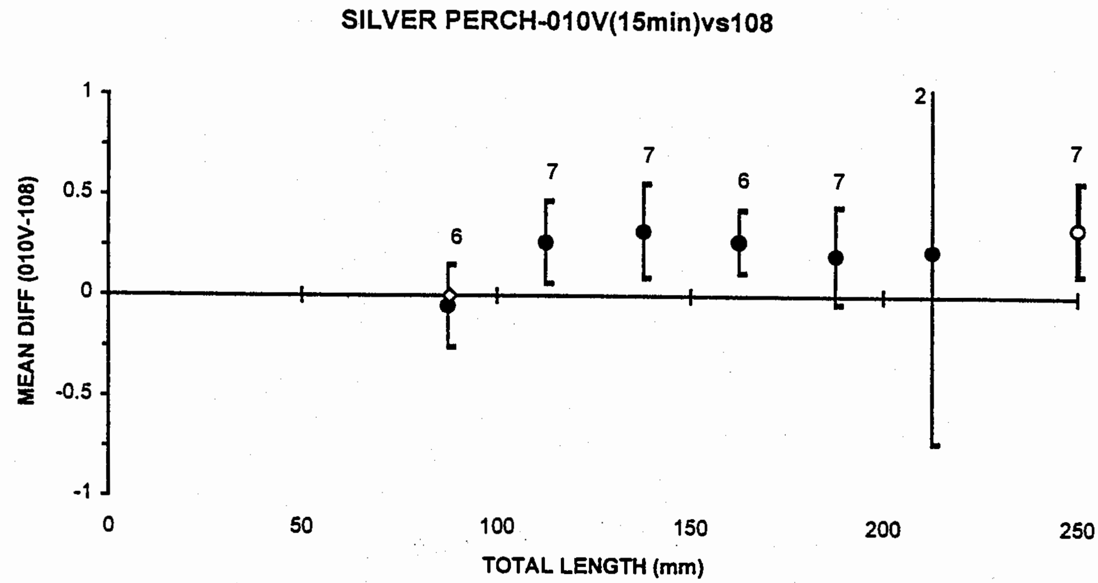


Figure 68. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for weakfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



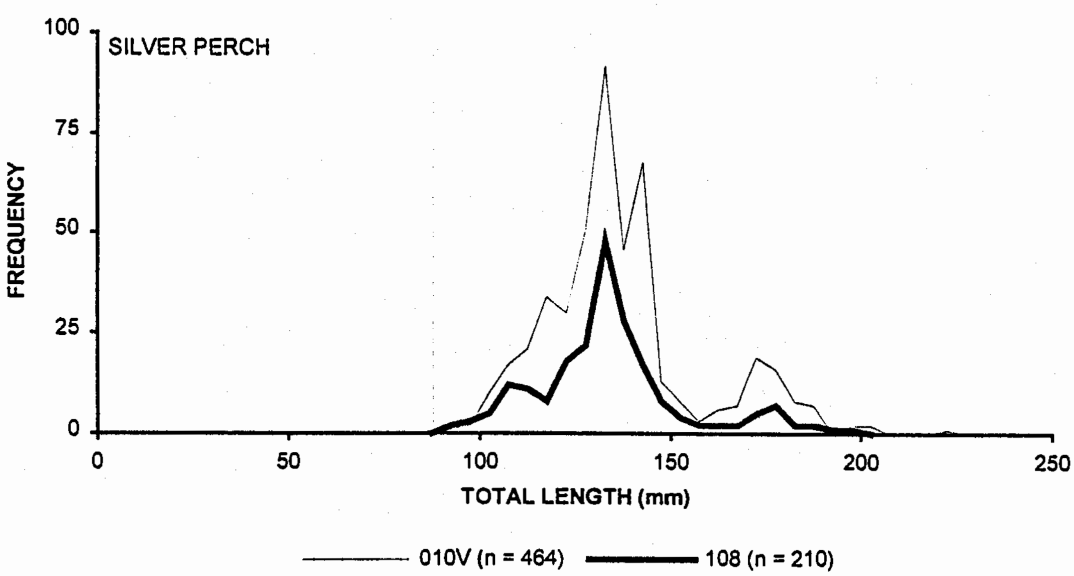


Figure 71. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (15 minute tows) and gear 108 for silver perch, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all perch (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

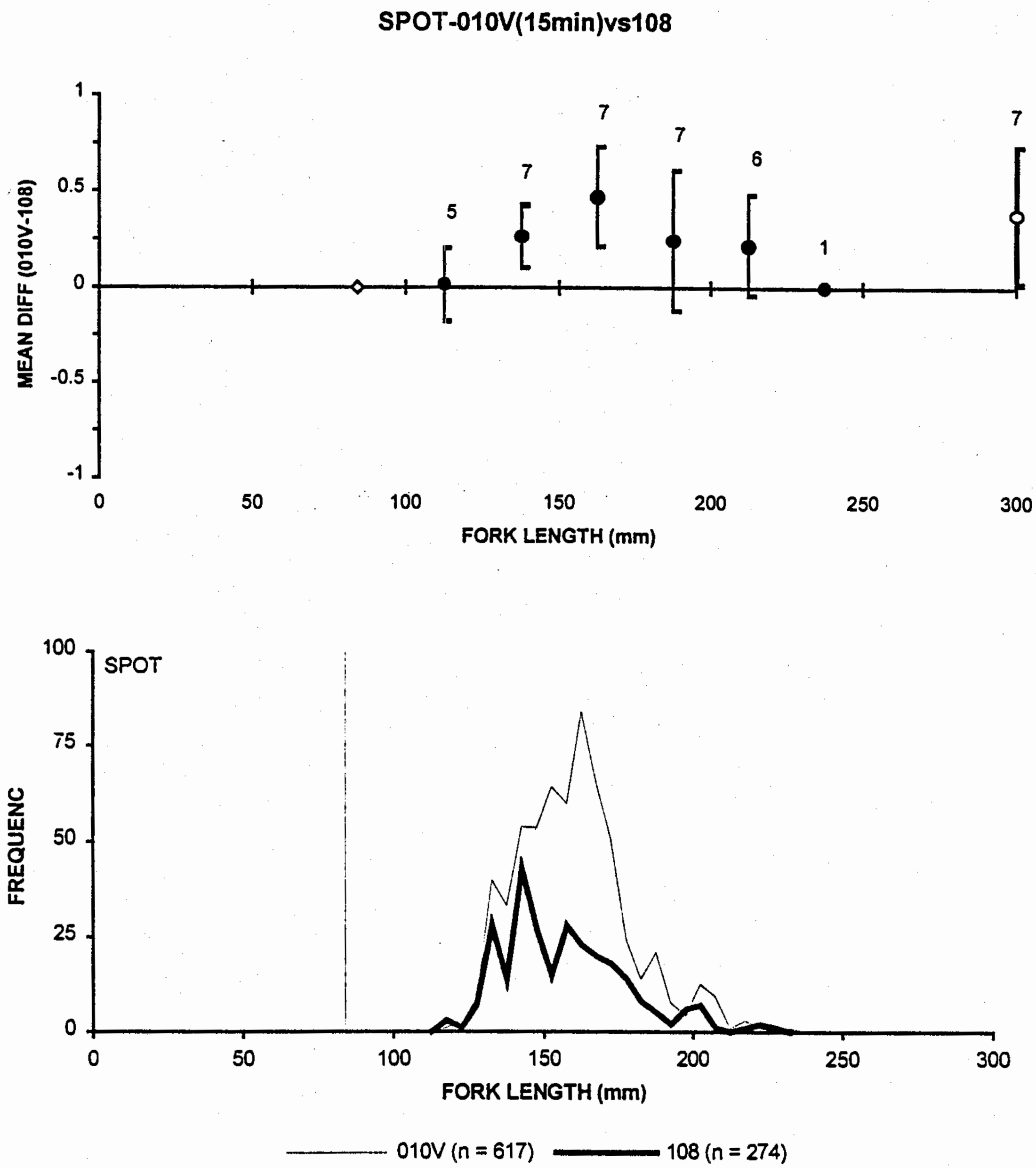
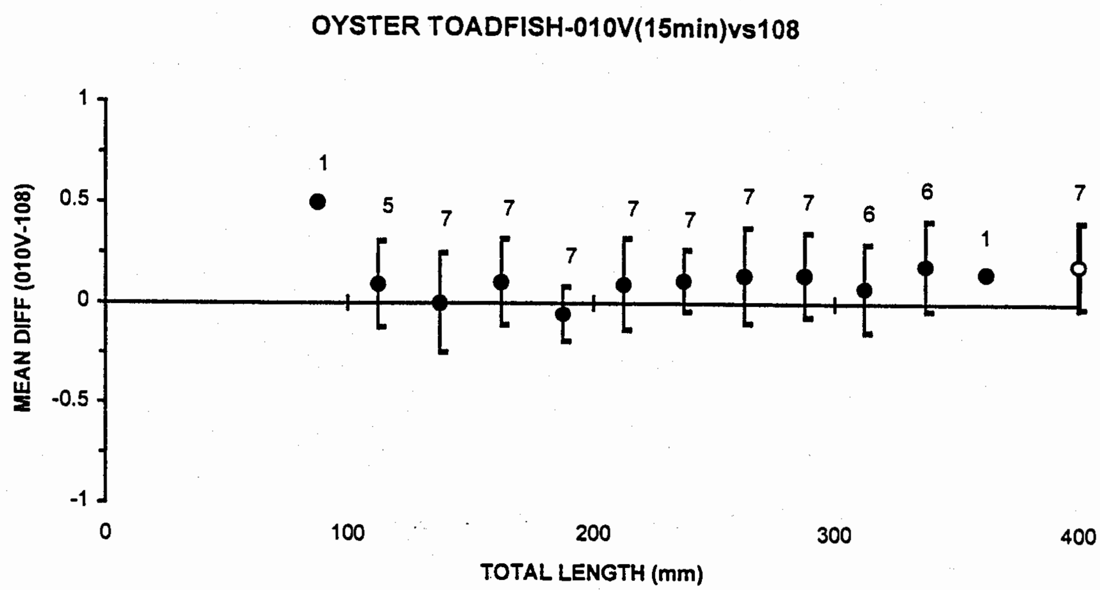


Figure 70. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for spot, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



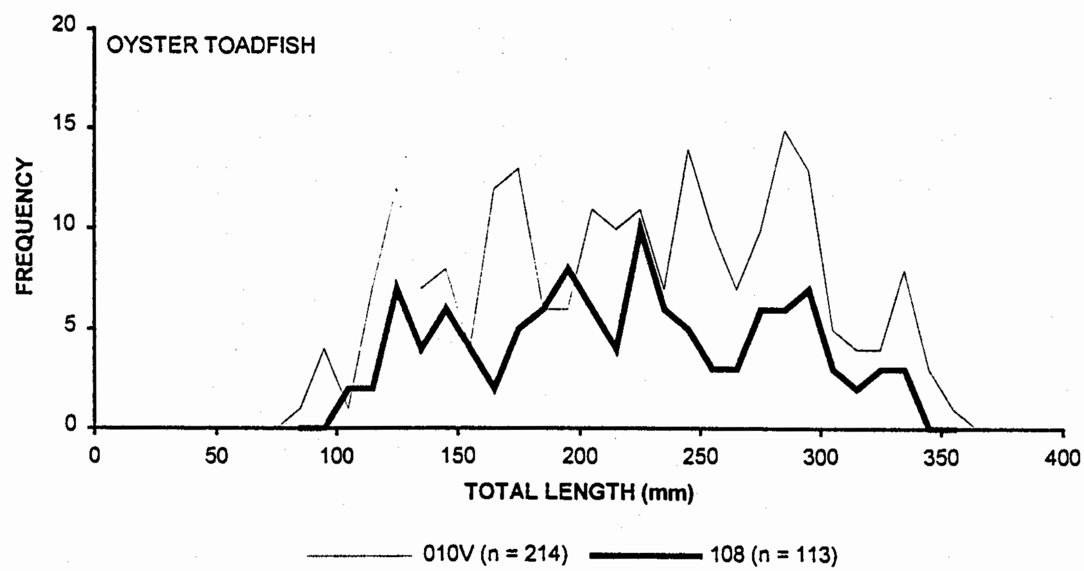
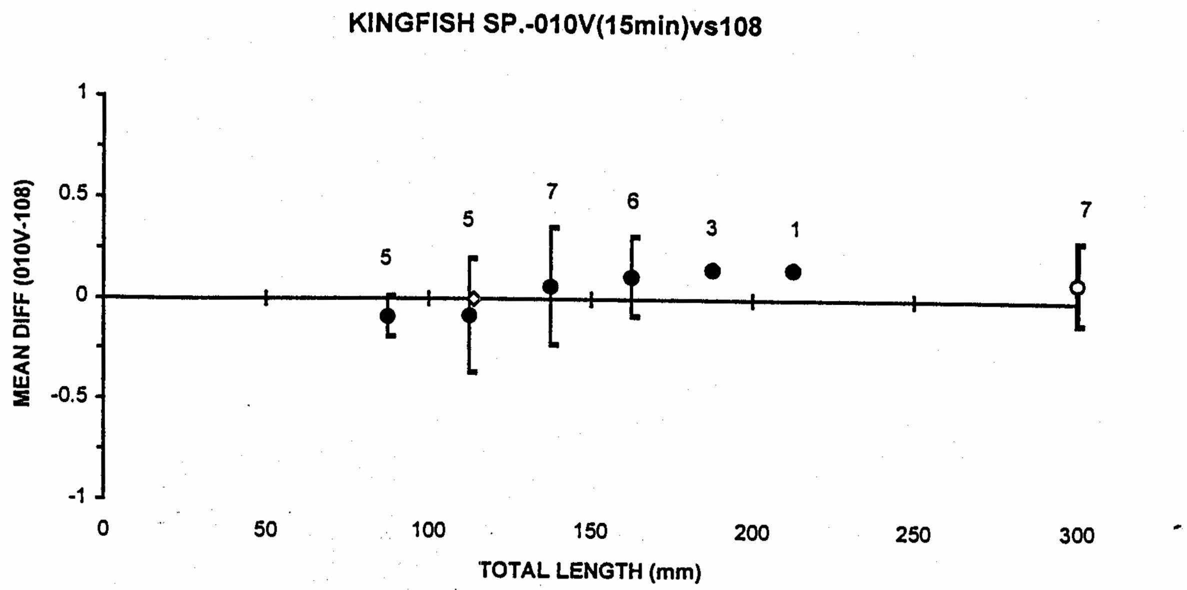


Figure 73. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for oyster toadfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all toadfish (10 mm increments) from the comparison trawls.



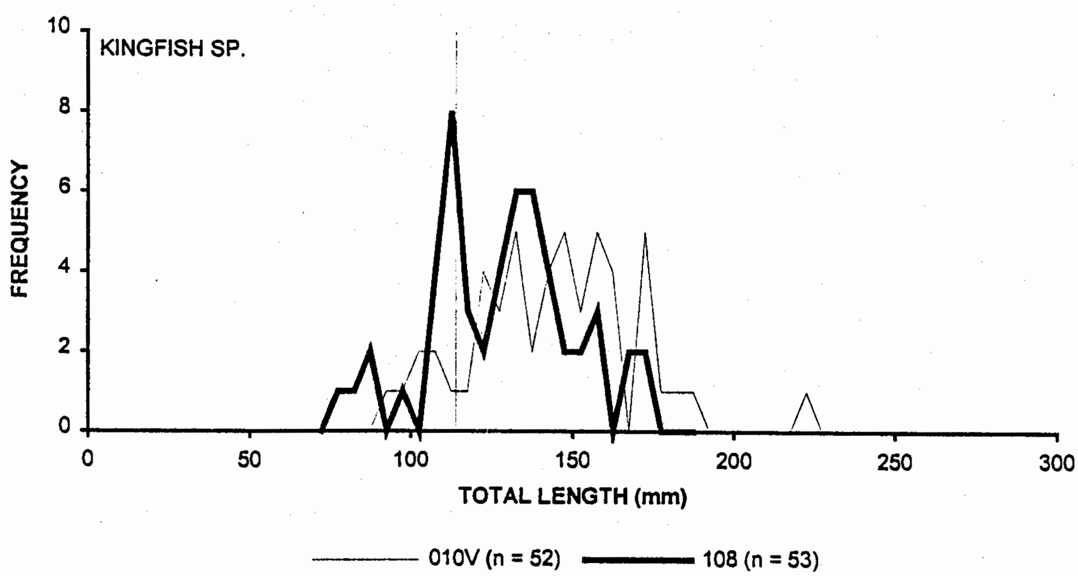


Figure 72. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for kingfish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all kingfish (5 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.

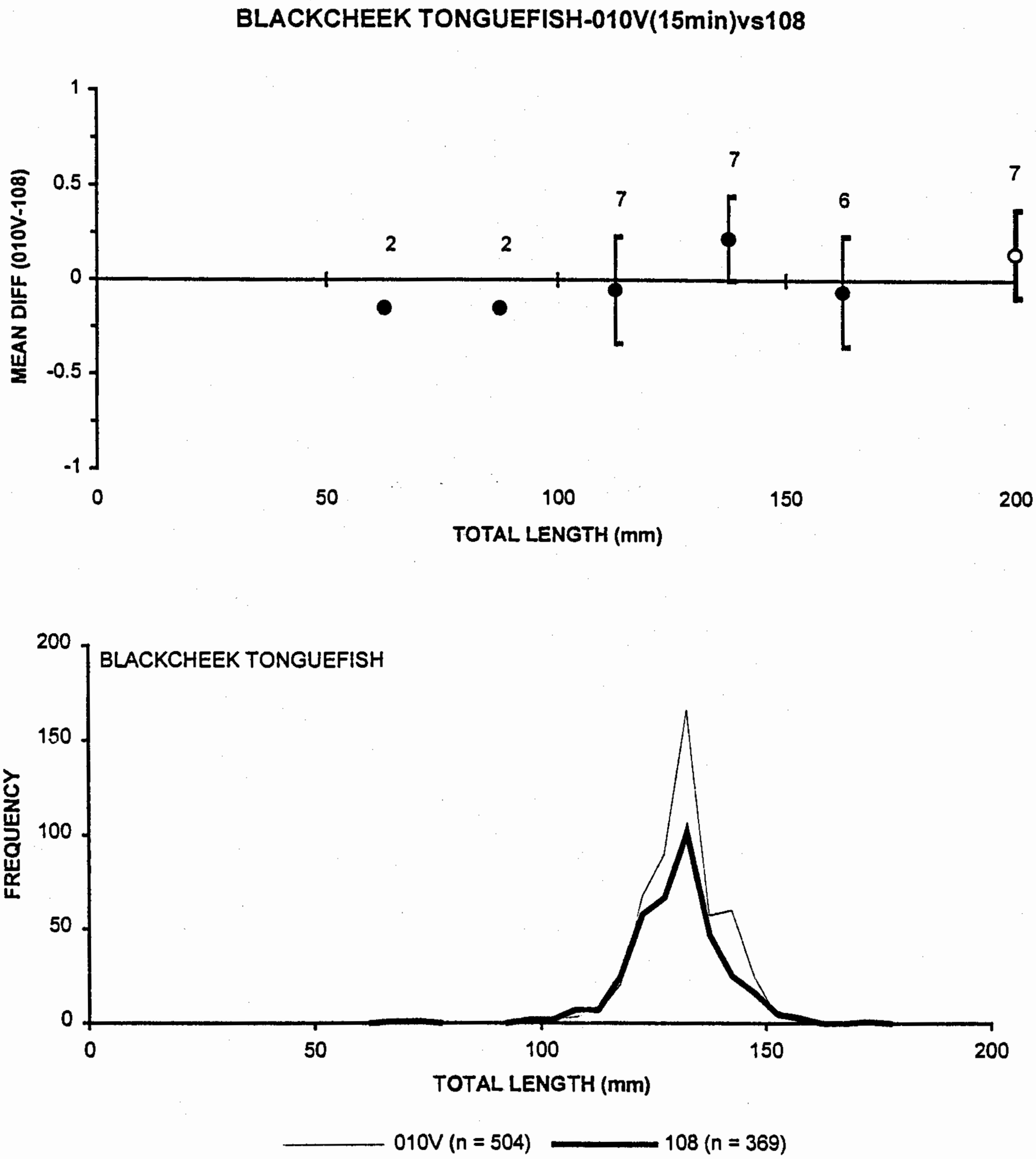
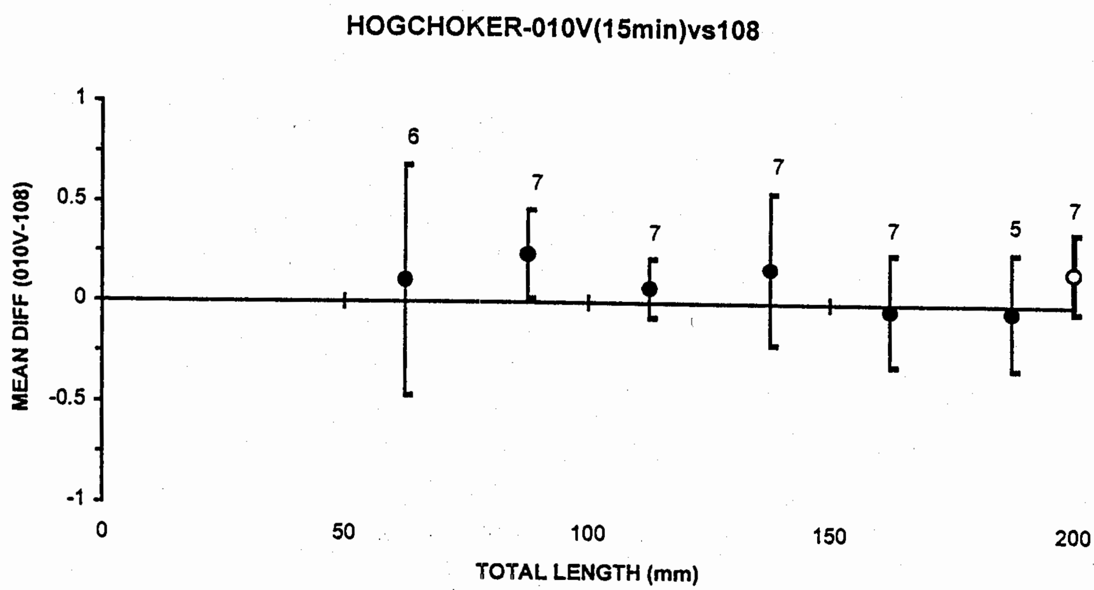


Figure 75. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (15 minute tows) and gear 108 for blackcheek tonguefish, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all tonguefish (5 mm increments) from the comparison trawls.



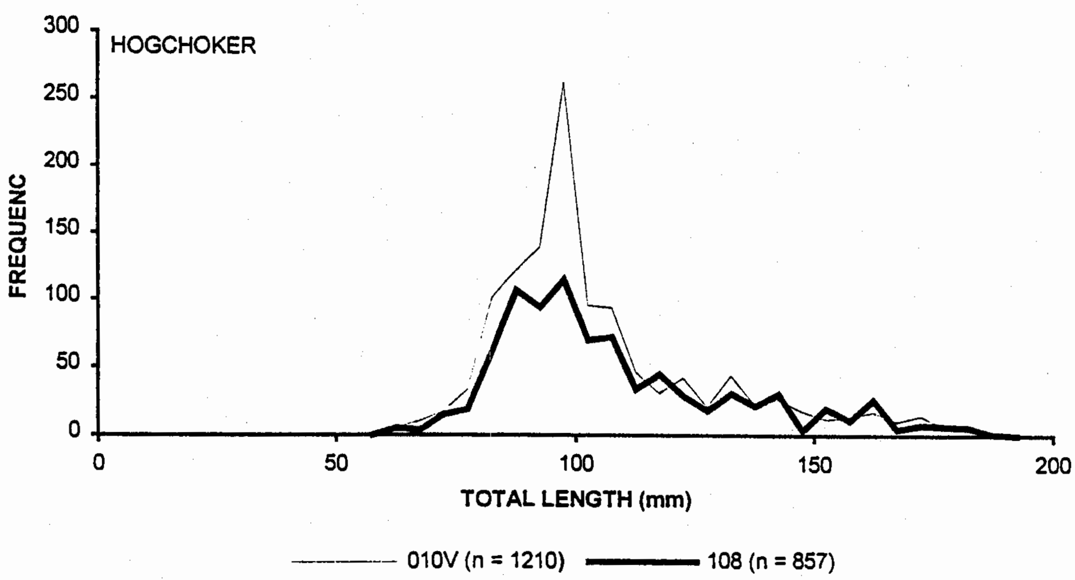


Figure 74. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for hogchokers, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all hogchokers (5 mm increments) from the comparison trawls.

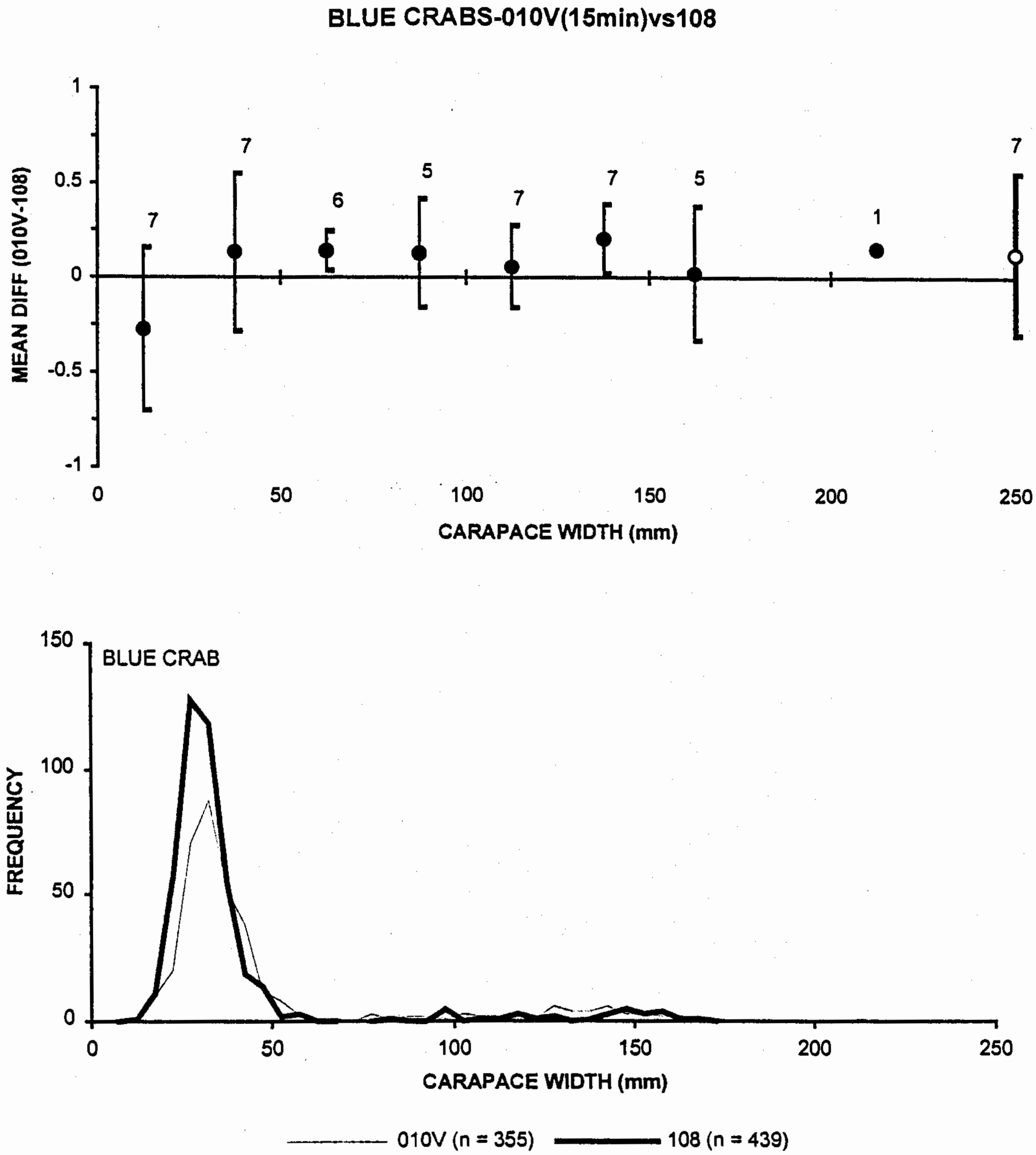


Figure 77. TOP: Mean catch differences ($\bar{D}_L$) between gear 010V (15 minute tows) and gear 108 for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all crabs (5 mm increments) from the comparison trawls.

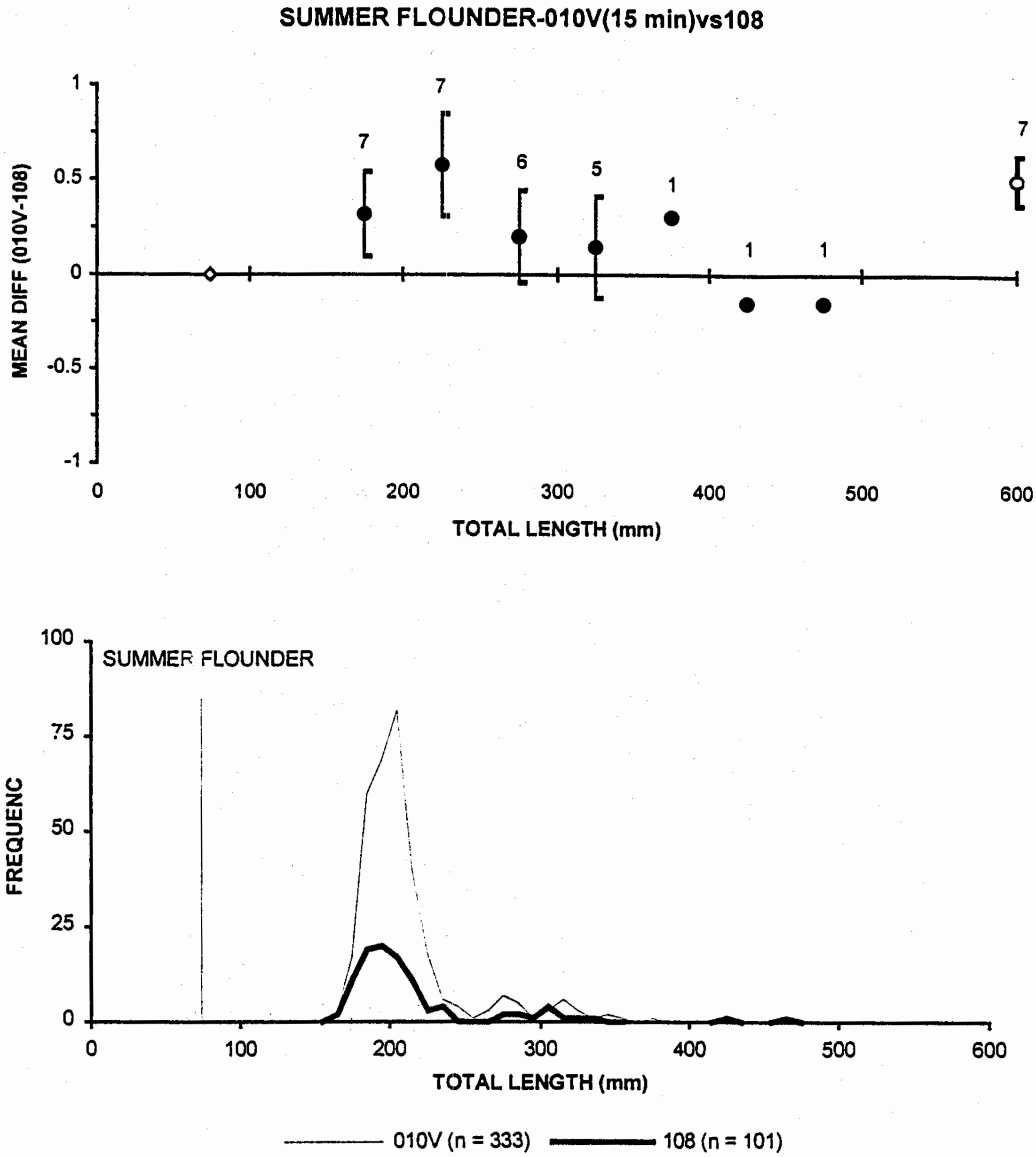
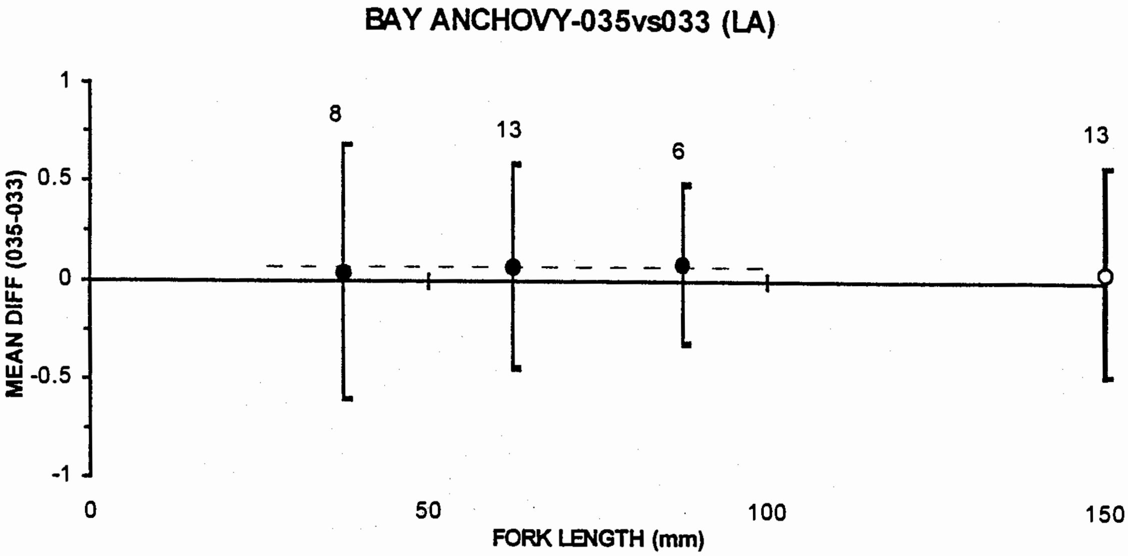


Figure 76. TOP: Mean catch differences ($\overline{D}_L$) between gear 010V (15 minute tows) and gear 108 for summer flounder, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl sets in which individuals of that size range were captured. The open diamond indicates the theoretical mean mesh retention size. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls. The vertical line indicates the theoretical mean mesh retention size.



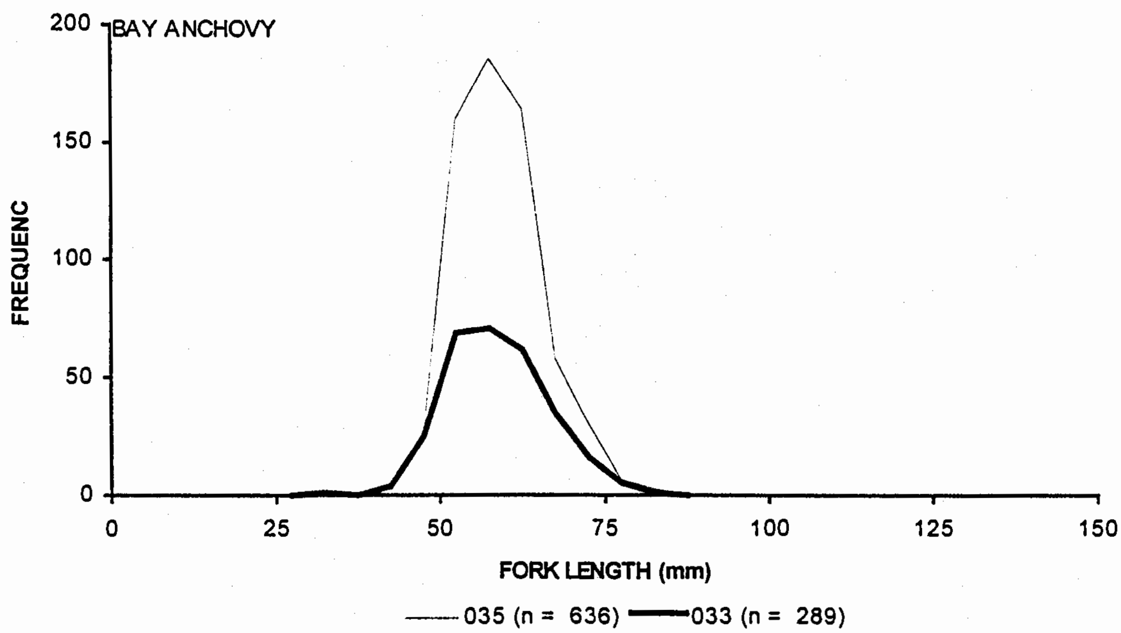
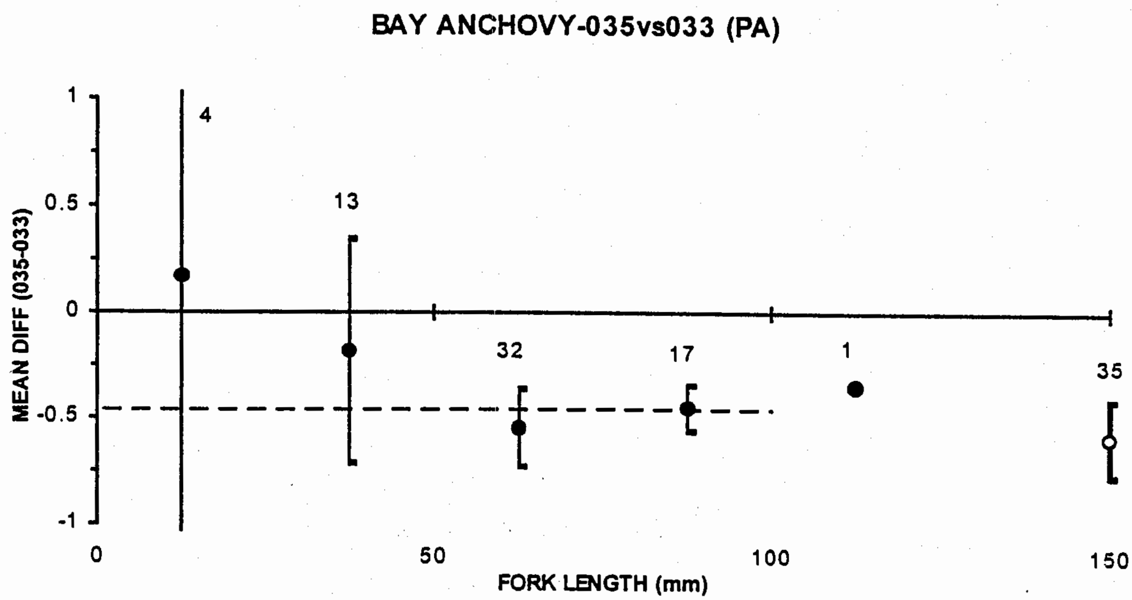


Figure 78b. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for bay anchovies, by size interval, for comparisons using the R/V *Langley*. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 26 - 100 mm size intervals. BOTTOM: Length frequency distributions of all anchovies (5 mm increments) from the comparison trawls.



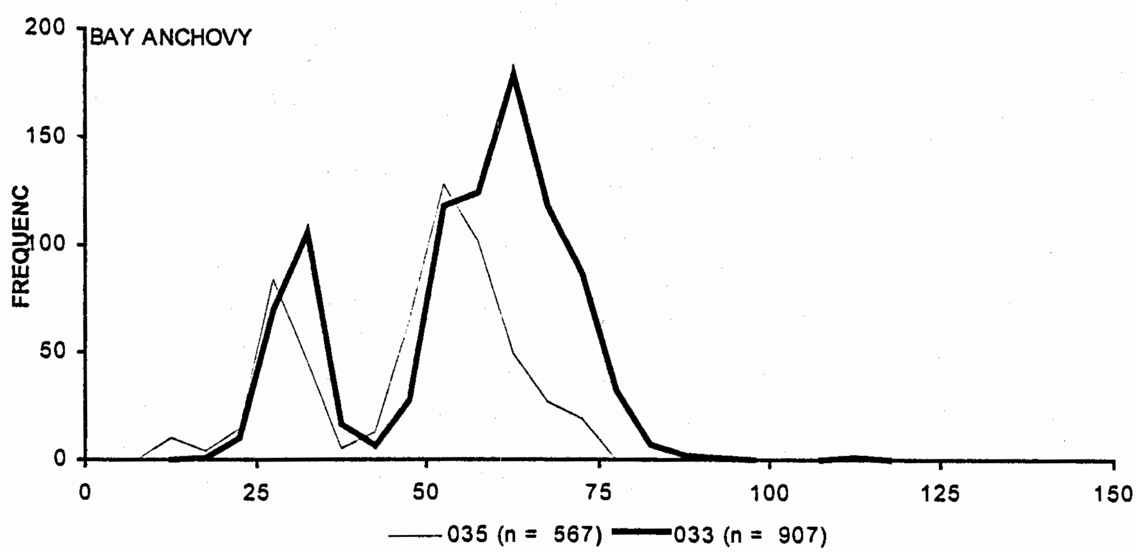


Figure 78a. TOP: Mean catch differences ($\overline{D}_L$) between gear 035 and gear 033 for bay anchovies, by size interval, for comparisons using the R/V *Pathfinder*. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 1 - 100 mm size intervals. BOTTOM: Length frequency distributions of all anchovies (5 mm increments) from the comparison trawls.

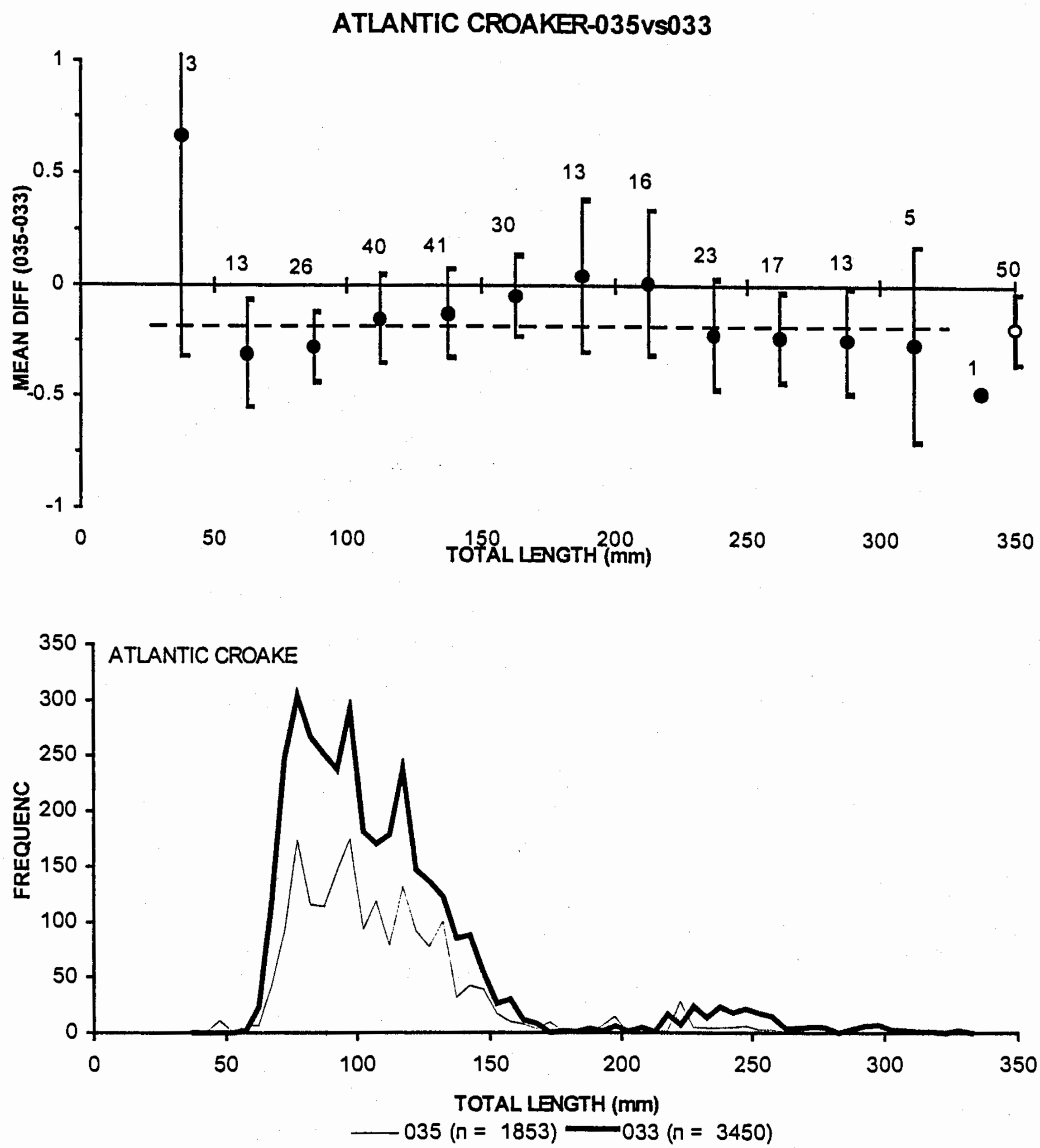


Figure 80. TOP: Mean catch differences ($\overline{D}_L$) between gear 035 and gear 033 for Atlantic croaker, by size interval, for comparisons using the R/V *Pathfinder*. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 26 - 325 mm size intervals. BOTTOM: Length frequency distributions of all croaker (5 mm increments) from the comparison trawls.

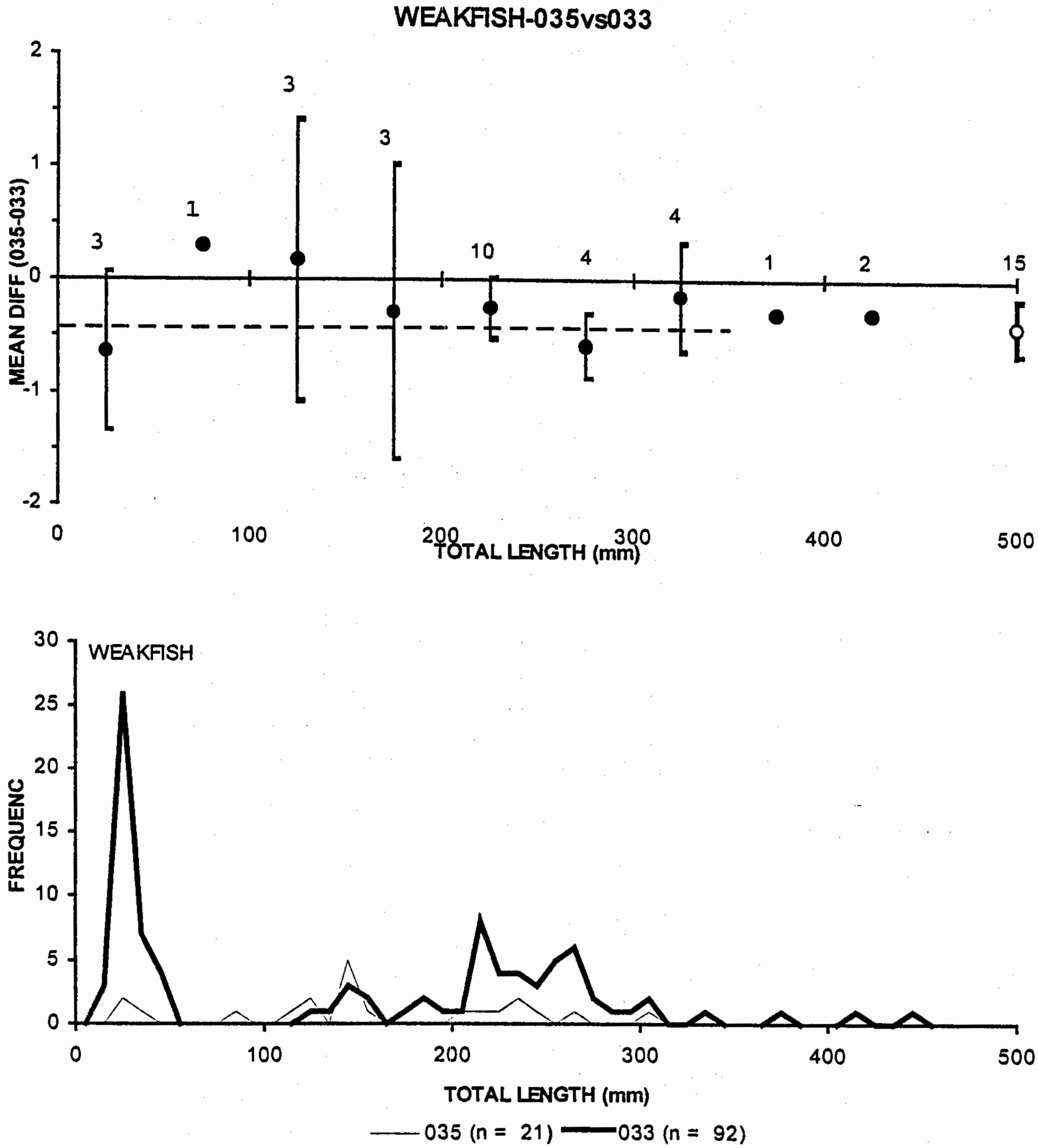


Figure 79. TOP: Mean catch differences ($\overline{D}_L$) between gear 035 and gear 033 for weakfish, by size interval, for comparisons using both vessels. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 151 - 350 mm size intervals. BOTTOM: Length frequency distributions of all weakfish (10 mm increments) from the comparison trawls.

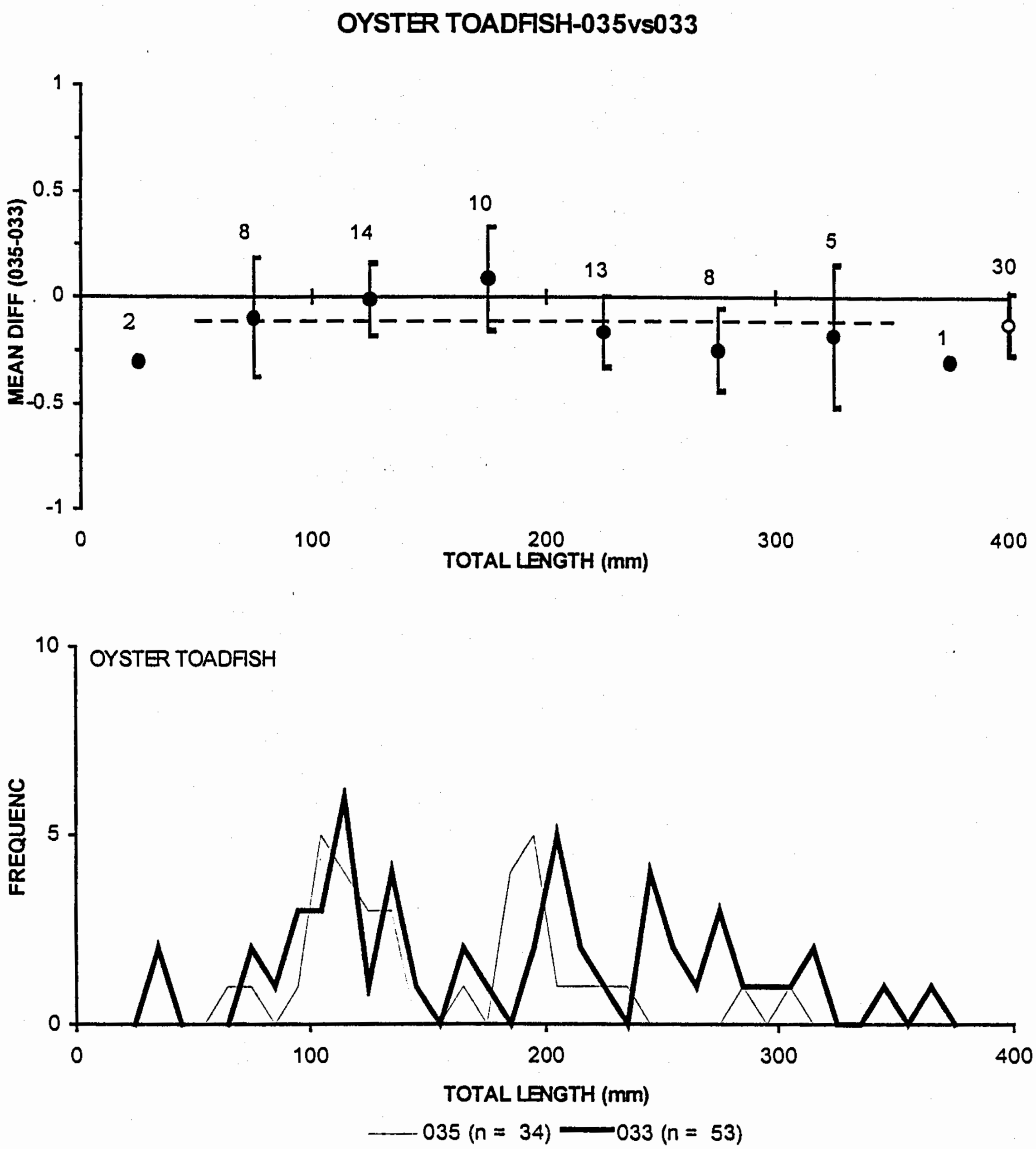


Figure 82. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for oyster toadfish, by size interval, for comparisons using the R/V *Pathfinder*. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all toadfish (5 mm increments) from the comparison trawls.

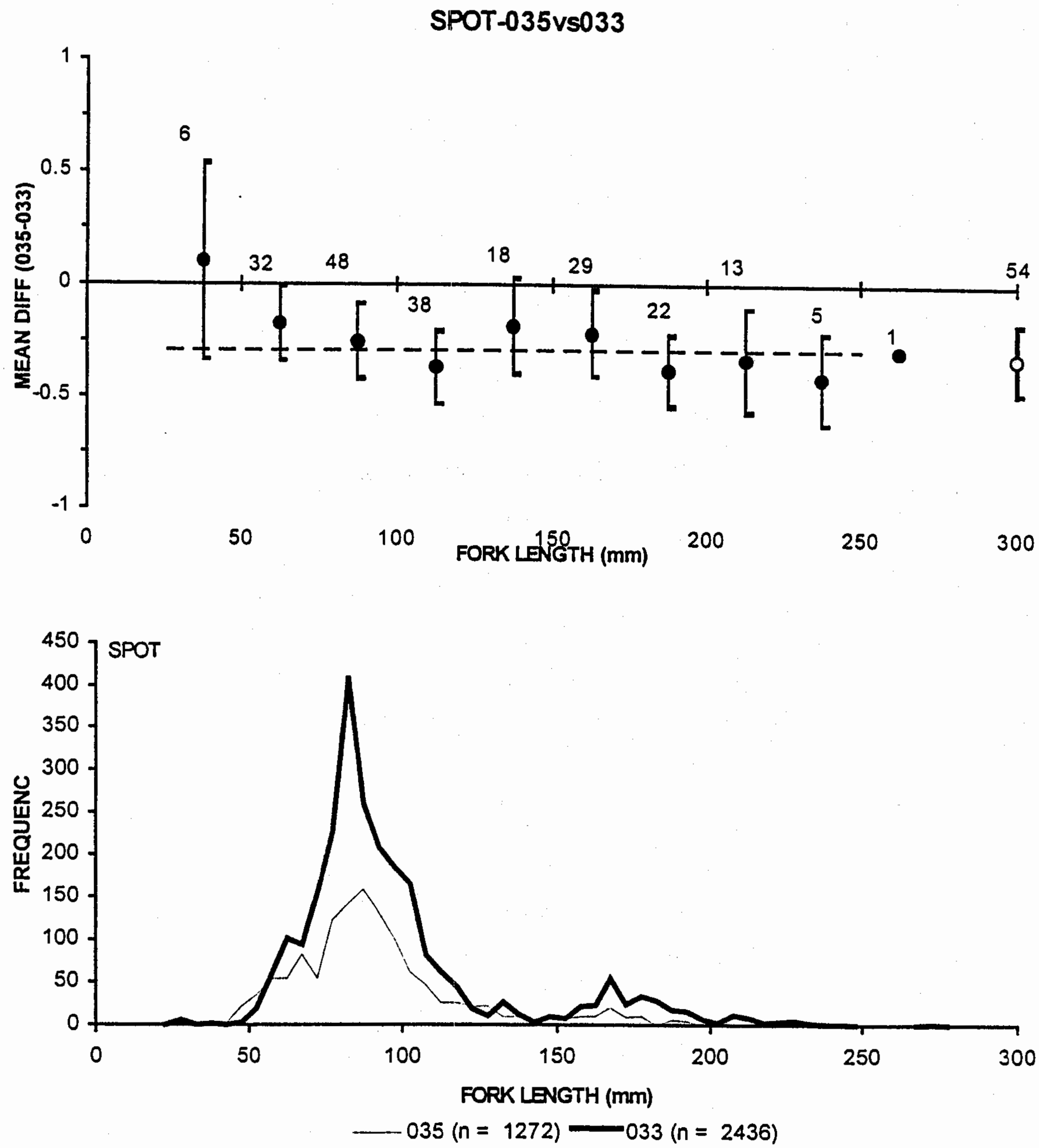
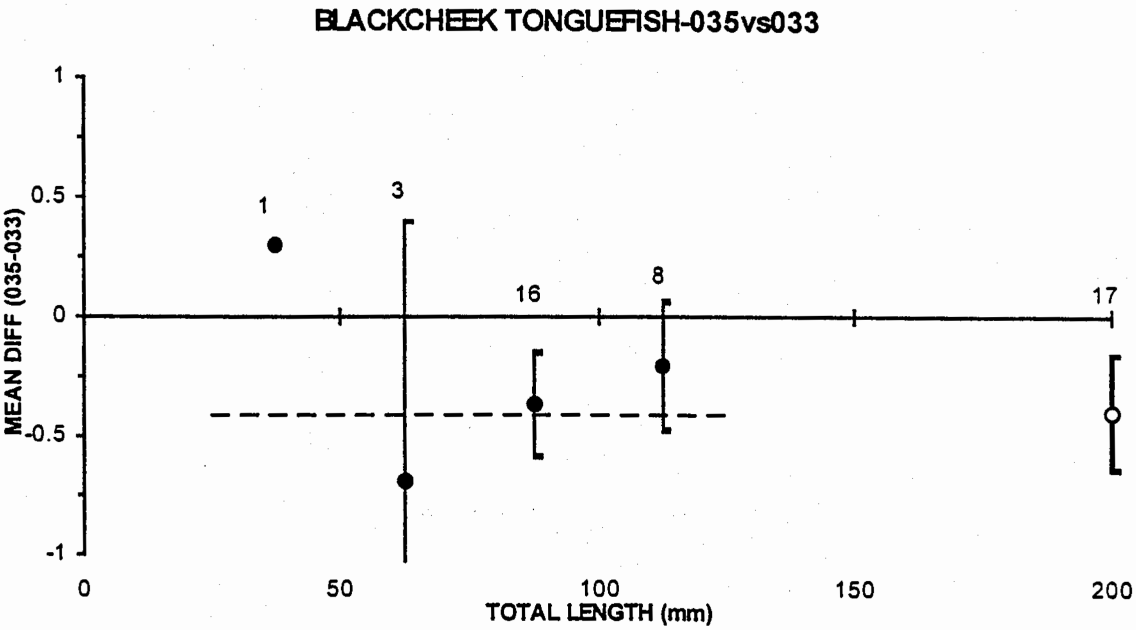


Figure 81. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for spot, by size interval. Vertical bars indicate 95% confidence intervals, for comparisons using both vessels. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 26 - 250 mm size intervals. BOTTOM: Length frequency distributions of all spot (5 mm increments) from the comparison trawls.



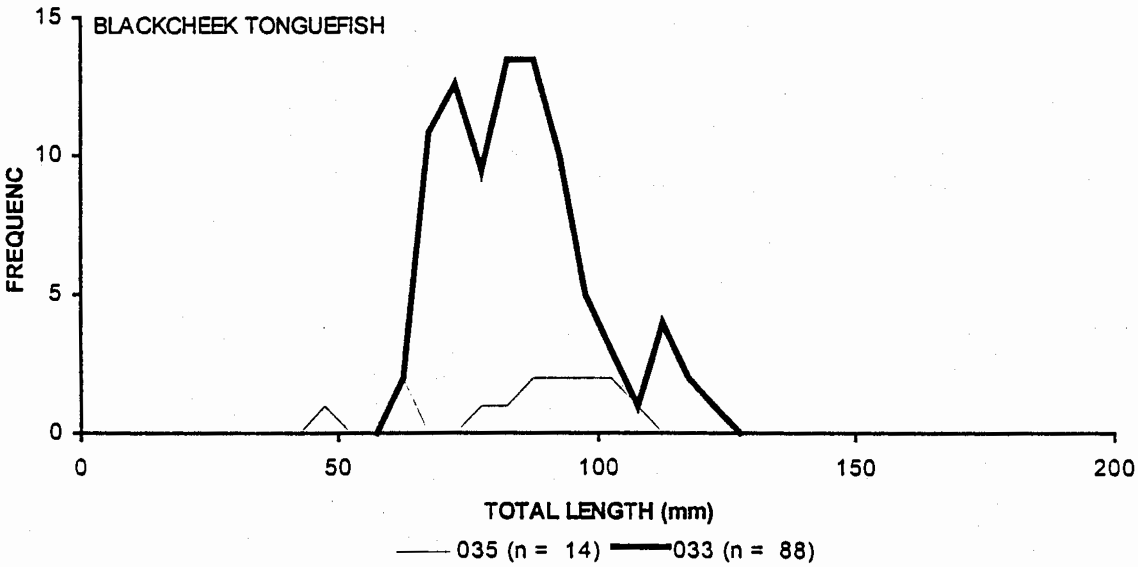


Figure 84. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for blackcheek tonguefish, by size interval, for comparisons using both vessels. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 51 - 125 mm size intervals. BOTTOM: Length frequency distributions of all tonguefish (5 mm increments) from the comparison trawls.

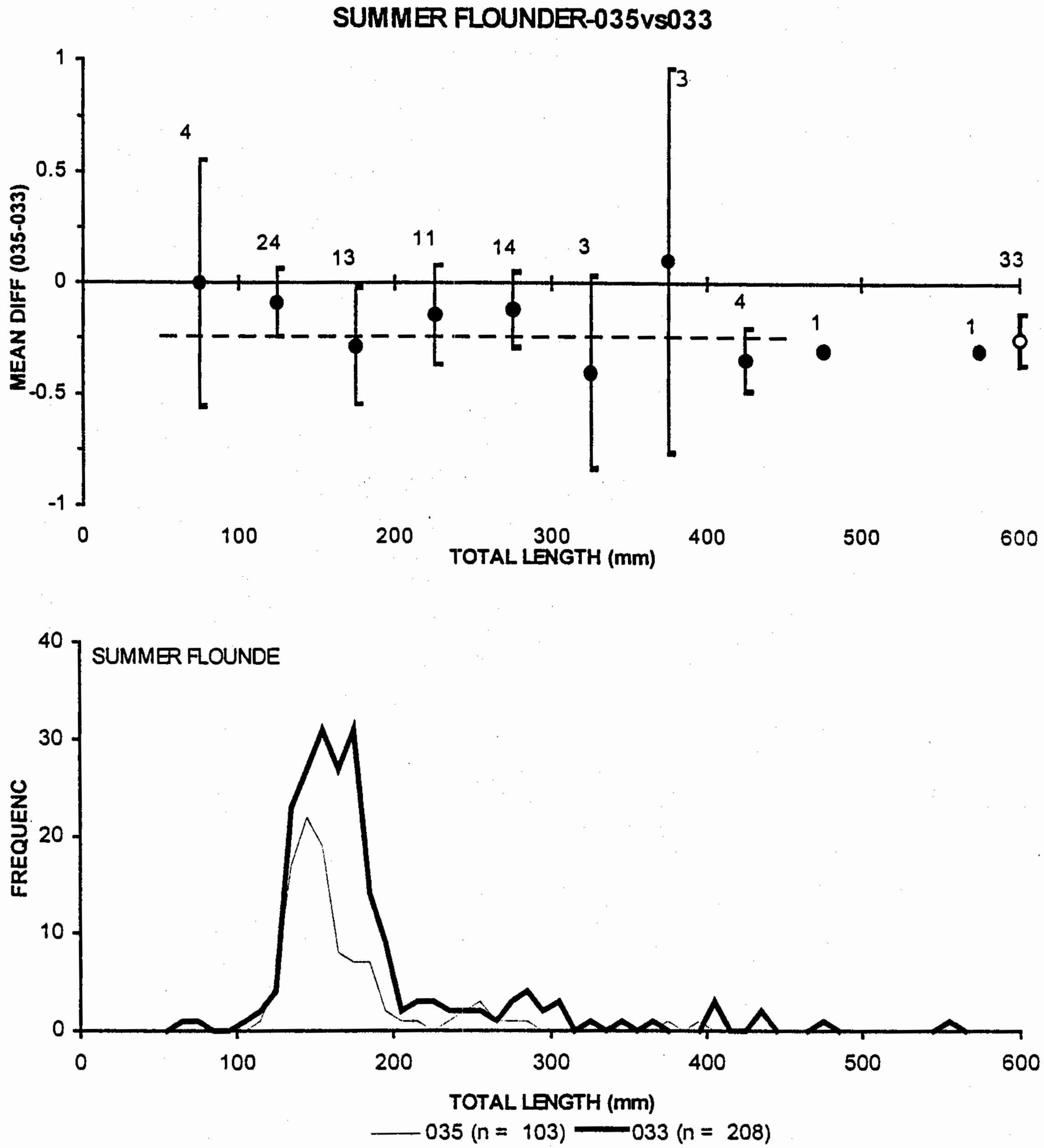
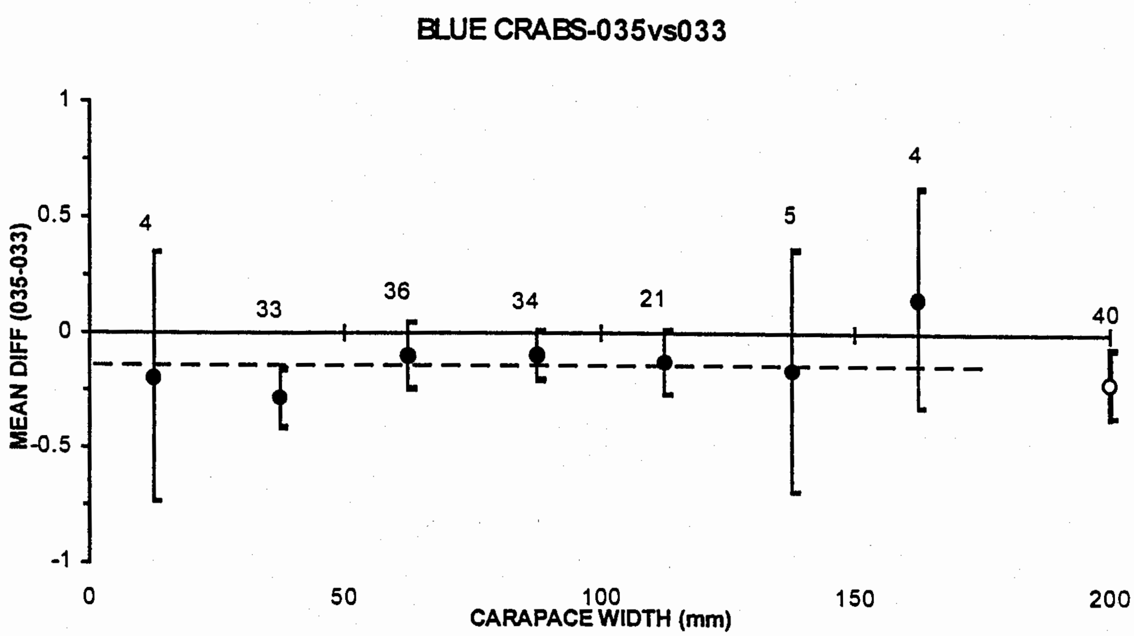


Figure 85. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for summer flounder, by size interval, for comparisons using both vessels. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 101 - 250 mm size intervals. BOTTOM: Length frequency distributions of all flounder (10 mm increments) from the comparison trawls.



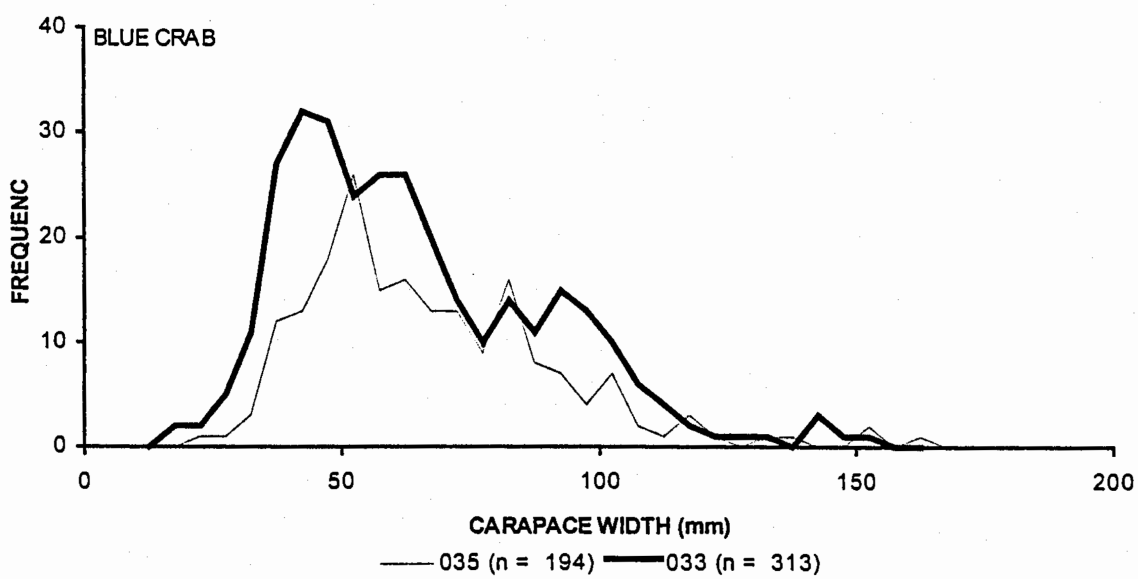


Figure 86. TOP: Mean catch differences ($\bar{D}_L$) between gear 035 and gear 033 for blue crabs, by size interval, for comparisons using both vessels. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\bar{D}$) calculated from the 1 - 175 mm size intervals. BOTTOM: Length frequency distributions of all crabs (5 mm increments) from the comparison trawls.

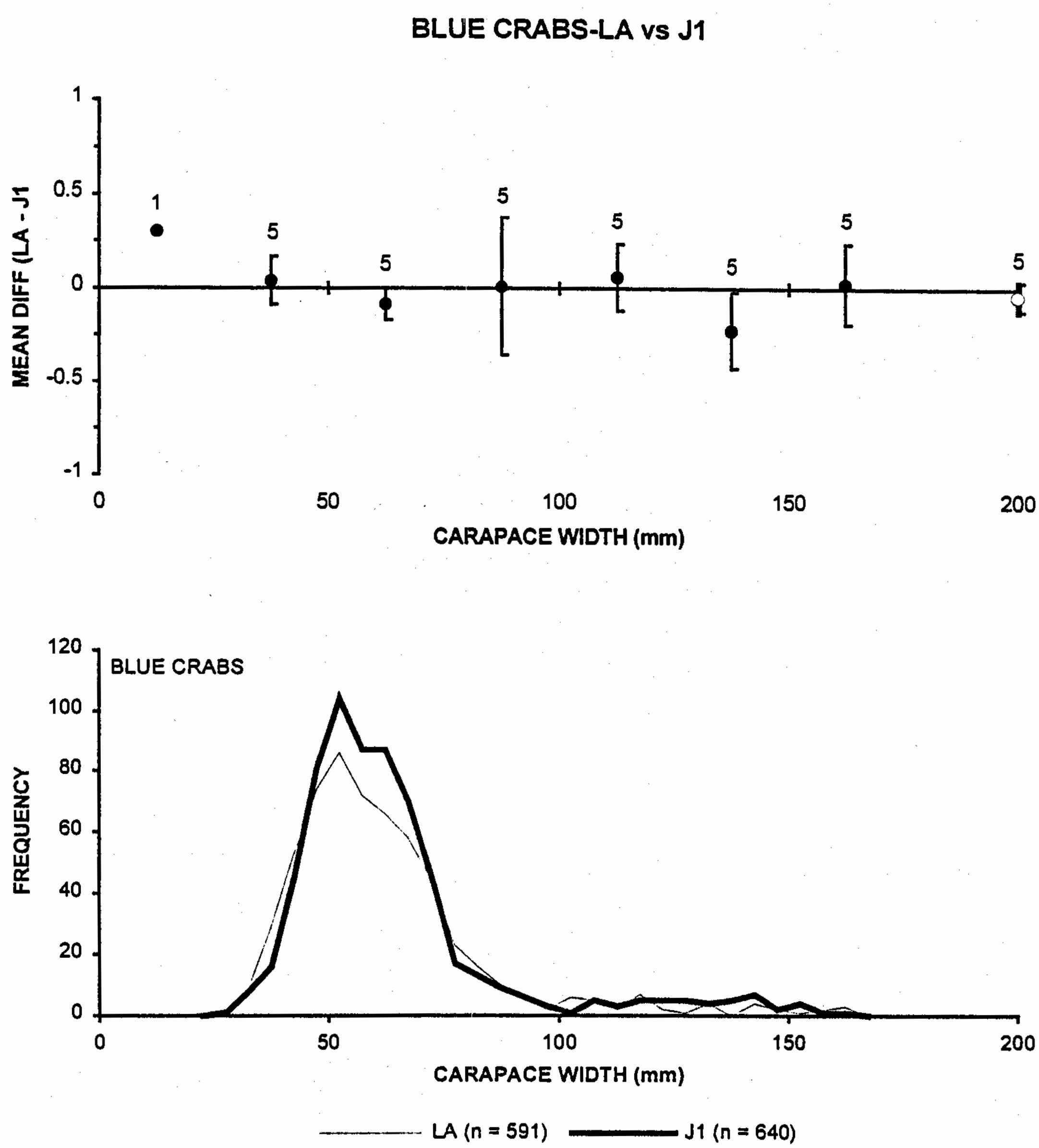
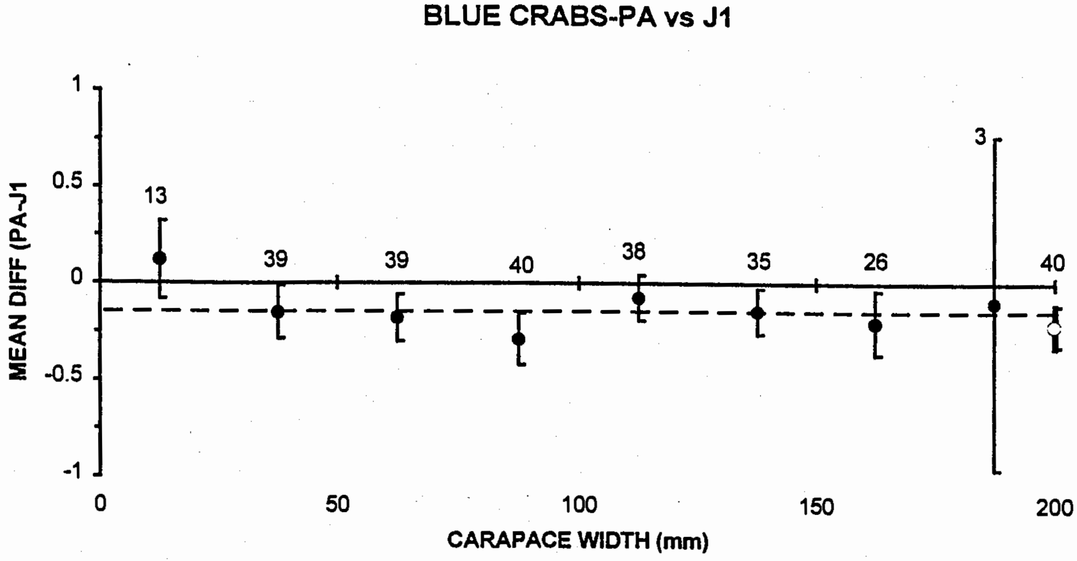


Figure 87. TOP: Mean catch differences ($\bar{D}_L$) between the *Langley* (LA) and old *Captain John Smith* (J1) for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.



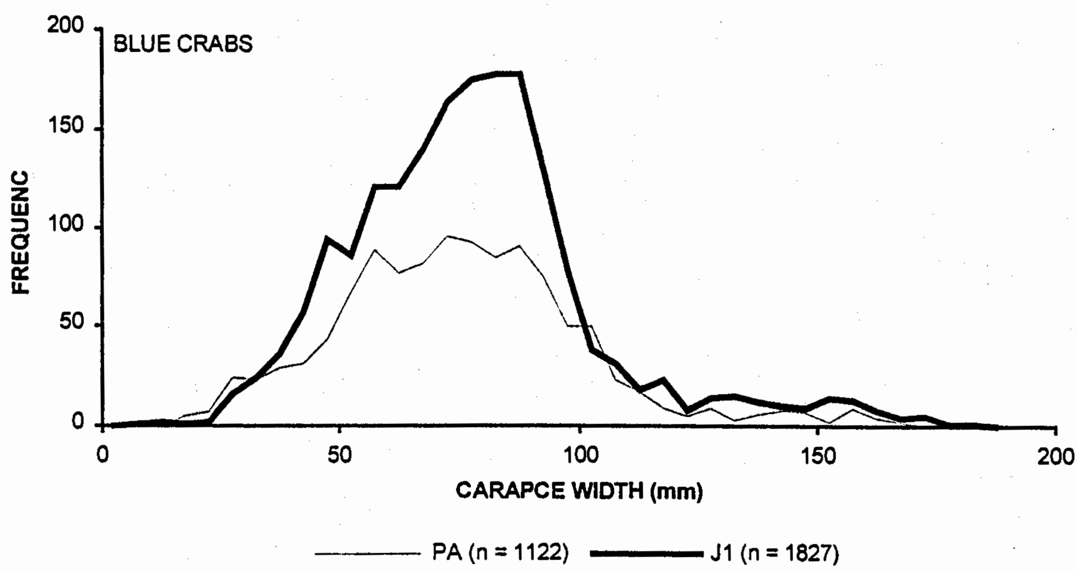


Figure 88. TOP: Mean catch differences ($\overline{D}_L$) between the *Pathfinder* (PA) and old *Captain John Smith* (J1) for blue crabs, by size interval. Vertical bars indicate 95% confidence intervals. The bold bar and open symbol at the right side of the length axis indicates the mean catch difference and confidence interval for all individuals, regardless of size. Numbers above the bars indicate the number of comparison trawl pairs in which individuals of that size range were captured. The dashed line indicates the weighted mean difference ($\overline{D}$) calculated from the 1 - 200 mm size intervals. BOTTOM: Length frequency distributions of all blue crabs (5 mm increments) from the comparison trawls.

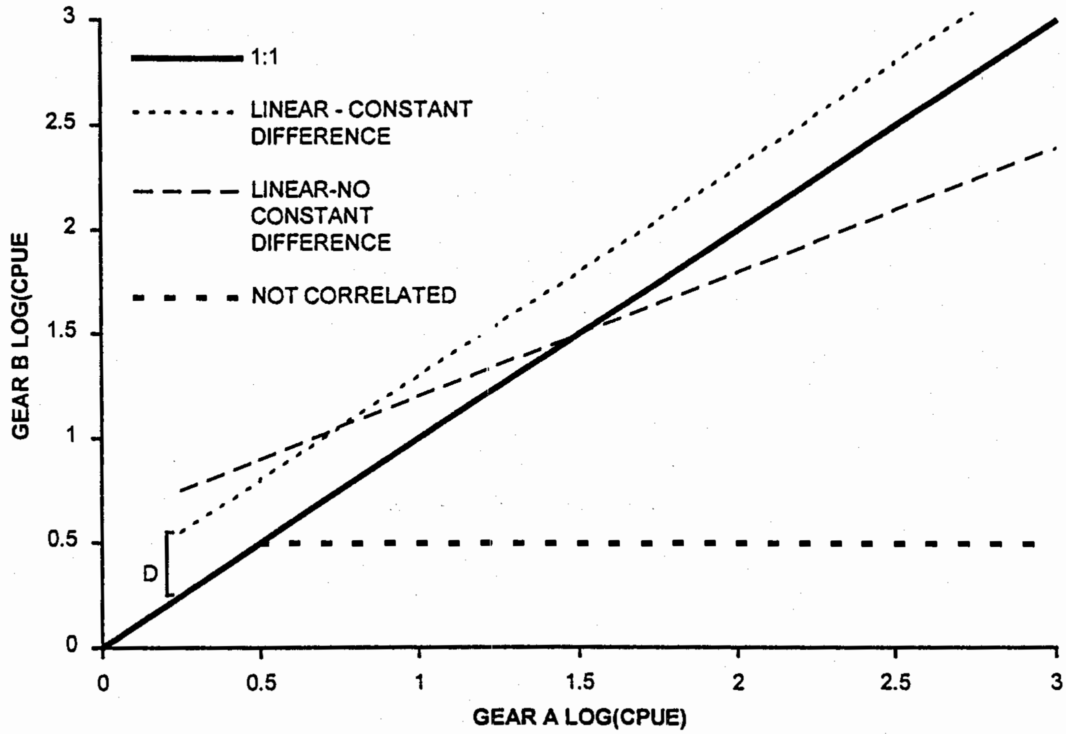


Figure 89. Graphic representation of paired catch differences, where gear A is the standard gear, and gear B is the compared gear. Catch differences, D, were assumed to be linear and constant over the range of catches. Catch differences may have varied over the range of catches: the effectiveness of gear B relative to gear A changed at low or high population levels , or been uncorrelated: the catch from gear B had no relationship to the catch from gear A for any population level.

Table 1. Dimensions of the trawl gear configurations used in this study. All nets were nylon, 4-seam otter trawls.

	GEAR CODE							
	010	010V	033	035	043	070	108	
Headrope length		9.4 m	9.4 m	9.4 m	4.9 m	9.4 m	9.4 m	9.4 m
Footrope length		11.3 m	11.3 m	11.3 m	6.1 m	11.3 m	11.3 m	11.3 m
Leg length		1.8 m	1.8 m	1.8 m	0.9 m	1.8 m	1.8 m	1.8 m
Height	1.5 m	1.5 m	1.5 m	?	1.5 m	1.5 m	1.5 m	
Body mesh		38 mm	38 mm	38 mm	38 mm	38 mm	38 mm	38 mm
Cod end mesh		32 mm	32 mm	32 mm	32 mm	32 mm	32 mm	32 mm
Cod end liner mesh		none	none	13 mm	13 mm	none	13 mm	13 mm
Floats		6	8	8	?	6	8	8
	38×76 mm	76×76 mm	76×76 mm		38×76 mm	76×76 mm	76×76 mm	
Doors		56×122 cm	49×71 cm	56×122 cm	30×61 cm	61×137 cm	61×137 cm	49×71 cm
	wooden	steel Vee	wooden	wooden	wooden	wooden	steel Vee	
Tickler chain		none	none	none	none	14.3 m	14.3 m	14.3 m
					6.4 mm link	6.4 mm link	6.4 mm link	
Bridle length		9.1 m	9.1 m	9.1 m	7 m	9.1 m	18.3 m	18.3 m

Table 2. Number of gear comparison sets performed each month with the various historical gear configurations and the current gear. Each set consisted of four trawl tows, two with each gear.

	MONTH									
GEAR	JAN	FEB	APR	MAY	JUN	JUL	SEP	OCT	NOV	TOTAL
010 (7.5 minutes)	4	-	-	-	-	-	2	4	2	12
010 (15 minutes)	-	-	-	-	-	-	5	5	-	10
010V (5 minutes)	-	5	-	-	1	3	9	-	-	18
010V (15 minutes)	-	-	-	-	-	-	-	7	-	7
033 (5 minutes)	6	4	-	-	17	9	-	-	-	36
043 (5 minutes)	-	-	-	-	-	-	8	5	-	13
070 (5 minutes)	4	-	1	4	7	-	6	5	-	27
TOTAL	14	9	1	4	25	12	30	26	2	123

Table 3. Mean differences, $\bar{D}$, and variances of the differences, between catches by the *R/V Fish Hawk* and *Captain John Smith* for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of trawl pairs used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 13-kingfish, 33-spot, 103-bay anchovy, 151-hogchoker, 152-blackcheek tonguefish, 154-oyster toadfish, 213-silver perch, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	75	0.301	.	1	.	
3	125	0.000	0.175	3	-0.500	NS
3	175	-0.389	0.071	4	0.746	NS
3	225	-0.301	.	1	.	
3	275	0.000	0.181	2	.	
3	325	0.301	0.000	2	.	
3	375	0.477	.	1	.	
3	425	0.477	.	1	.	
3	ALL	-0.122	0.096	6	0.662	NS
5	87.5	-0.389	0.016	2	.	
5	112.5	0.301	.	1	.	
5	137.5	0.008	0.127	4	0.462	NS
5	162.5	-0.102	0.126	7	0.688	NS
5	187.5	0.135	0.371	7	0.577	NS
5	212.5	-0.447	0.101	6	0.896	*
5	237.5	-0.468	0.047	4	-0.415	NS
5	262.5	-0.301	.	1	.	
5	ALL	-0.253	0.268	12	0.692	*
7	25	-0.166	0.561	20	0.515	*
7	75	-0.176	1.022	20	0.331	NS
7	125	-0.158	0.405	15	0.370	NS
7	175	0.035	0.089	7	0.665	NS
7	225	0.260	0.043	5	0.783	NS
7	275	0.152	0.160	3	-0.943	NS
7	ALL	-0.192	1.050	20	0.316	NS

Table 3 (Continued).

SP	SZINT	D	s^2	n	r	
13	12.5	0.452	0.045	2	.	
13	37.5	-0.028	0.403	8	-0.110	NS
13	62.5	-0.010	0.120	15	0.781	*
13	87.5	-0.150	0.259	14	0.292	NS
13	112.5	-0.117	0.092	6	0.276	NS
13	137.5	0.301	.	1	.	
13	ALL	-0.059	0.163	17	0.750	*
33	37.5	1.600	.	1	.	
33	62.5	0.666	4.668	2	.	
33	87.5	-0.082	1.256	12	-0.045	NS
33	112.5	0.020	0.541	19	0.585	*
33	137.5	-0.039	0.686	18	0.421	NS
33	162.5	-0.088	0.299	16	0.676	*
33	187.5	-0.403	0.335	8	-0.020	NS
33	212.5	-0.496	0.249	4	0.567	NS
33	237.5	-0.845	.	1	.	
33	ALL	-0.077	0.718	20	0.550	*
103	12.5	-0.208	0.305	4	-0.645	NS
103	37.5	-0.548	0.516	16	0.338	NS
103	62.5	-0.314	0.373	16	0.733	*
103	87.5	0.026	0.475	8	0.224	NS
103	ALL	-0.499	0.542	19	0.627	*
151	12.5	-1.386	0.066	2	.	
151	37.5	-0.231	1.692	4	-0.701	NS
151	62.5	0.426	0.323	14	0.777	*
151	87.5	0.055	0.313	17	0.689	*
151	112.5	0.068	0.351	17	0.695	*
151	137.5	0.005	0.631	12	-0.072	NS
151	162.5	-0.598	0.279	6	-0.736	NS
151	187.5	-0.816	.	1	.	
151	ALL	0.071	0.392	18	0.697	*
152	37.5	-0.180	0.173	6	-0.761	NS
152	62.5	-0.145	0.140	5	-0.479	NS
152	87.5	0.133	0.085	3	1.000	*
152	112.5	0.000	0.339	9	0.266	NS
152	137.5	-0.280	0.072	6	0.758	NS
152	162.5	0.000	.	1	.	
152	ALL	-0.179	0.370	13	0.253	NS

Table 3 (Continued).

SP	SZINT	D	s^2	n	r	
154	25	-0.301	0	3	.	
154	75	0.080	0.089	6	-0.066	NS
154	125	-0.291	0.083	9	0.417	NS
154	175	0.067	0.188	9	0.114	NS
154	275	-0.284	0.096	6	0.417	NS
154	325	0.151	0.045	2	.	
154	375	-0.301	.	1	.	
154	ALL	-0.181	0.168	12	0.412	NS
213	37.5	-0.186	0.132	7	-0.788	*
213	62.5	-0.409	0.306	9	-0.406	NS
213	87.5	-0.278	0.334	7	-0.735	NS
213	112.5	-0.075	0.083	4	-0.577	NS
213	162.5	-0.349	0.033	2	.	
213	ALL	-0.440	0.418	10	-0.272	NS
614	12.5	-0.697	0.446	24	0.349	NS
614	37.5	0.030	0.290	29	0.574	*
614	62.5	-0.075	0.132	32	0.739	*
614	87.5	0.099	0.083	34	0.816	*
614	112.5	0.162	0.076	32	0.795	*
614	137.5	0.085	0.089	32	0.834	*
614	162.5	0.138	0.120	29	0.769	*
614	187.5	0.111	0.136	18	0.433	NS
614	212.5	-0.301	.	1	.	
614	ALL	-0.041	0.073	34	0.894	*

Table 4. Mean differences, $\overline{D}$, and variances of the differences, between catches by gear 033 and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 2-black seabass, 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 31-striped bass, 32-white perch, 33-spot, 103-bay anchovy, 151-hogchoker, 614-blue crab.

SP	SZINT	$\overline{D}$	s^2	n	r	
2	62.5	-0.151	.	1	.	
2	87.5	-0.108	0.022	5	0.672	NS
2	112.5	-0.350	0.028	7	0.809	*
2	137.5	-0.196	0.065	8	0.829	*
2	162.5	-0.179	0.067	4	0.866	NS
2	187.5	-0.151	.	1	.	
2	ALL	-0.314	0.070	12	0.793	*
3	75	-0.301	.	1	.	
3	125	-0.218	0.043	11	0.715	*
3	175	-0.080	0.017	11	0.827	*
3	225	-0.116	0.059	26	0.225	NS
3	275	-0.125	0.041	19	0.125	NS
3	325	-0.134	0.014	9	-0.750	*
3	375	0.301	.	1	.	
3	425	-0.075	0.034	6	-0.857	*
3	475	-0.151	.	1	.	
3	525	0.151	.	1	.	
3	ALL	-0.230	0.063	29	0.553	*
5	12.5	0.052	0.269	7	0.553	NS
5	37.5	-0.365	0.174	10	0.810	*
5	62.5	-0.202	0.248	10	0.494	NS
5	87.5	-0.113	0.130	19	0.761	*
5	112.5	-0.157	0.099	17	0.826	*
5	137.5	-0.176	0.101	15	0.785	*
5	162.5	0.045	0.049	14	0.794	*
5	187.5	-0.099	0.030	19	0.938	*
5	212.5	-0.017	0.0491	19	0.898	*
5	237.5	0.114	0.0924	18	0.744	*
5	262.5	0.104	0.0652	15	0.702	*
5	287.5	0.078	0.0555	8	-0.082	NS

Table 4 (Continued).

SP	SZINT	D	s^2	n	r	
5	312.5	0.038	0.0510	4	-0.905	NS
5	337.5	0.239	.	1	.	
5	362.5	0.151	.	1	.	
5	387.5	0.151	.	1	.	
5	ALL	-0.107	0.106	32	0.882	*
7	25	-0.226	0.058	8	0.887	*
7	75	-0.279	0.162	8	0.770	*
7	125	-0.114	0.111	7	0.711	NS
7	175	0.042	0.062	13	0.803	*
7	225	0.160	0.032	14	0.903	*
7	275	-0.018	0.037	15	0.656	*
7	325	0.075	0.038	4	-0.707	NS
7	375	0.151	.	1	.	
7	425	-0.151	.	1	.	
7	ALL	-0.063	0.116	22	0.810	*
31	75	0.020	0.124	5	-0.575	NS
31	125	-0.050	0.025	6	0.886	*
31	175	0.016	0.058	7	0.457	NS
31	225	0.060	0.042	8	0.604	NS
31	275	0.070	0.069	7	0.404	NS
31	325	-0.050	0.053	3	.	
31	425	0.151	.	1	.	
31	ALL	0.036	0.060	10	0.752	*
32	62.5	-0.153	0.131	7	0.907	*
32	87.5	-0.130	0.089	8	0.912	*
32	112.5	-0.069	0.071	8	0.875	*
32	137.5	-0.084	0.101	9	0.820	*
32	162.5	-0.029	0.116	10	0.629	*
32	187.5	0.015	0.189	10	-0.177	NS
32	212.5	0.010	0.104	10	0.566	NS
32	237.5	0.077	0.045	8	0.783	*
32	262.5	0.130	0.001	3	1.000	*
32	ALL	-0.115	0.205	10	0.773	*
33	62.5	-0.100	0.008	3	.	
33	87.5	-0.079	0.056	17	0.802	*
33	112.5	-0.082	0.197	17	0.036	NS
33	137.5	-0.188	0.178	11	0.135	NS
33	162.5	-0.399	0.069	17	0.805	*
33	187.5	-0.442	0.090	16	0.285	NS
33	212.5	-0.151	0	2	.	
33	262.5	-0.151	.	1	.	
33	ALL	-0.356	0.213	25	0.583	*

Table 4 (Continued).

SP	SZINT	D	s^2	n	r	
103	37.5	-0.013	0.590	26	0.532	*
103	62.5	0.056	0.334	26	0.700	*
103	87.5	0.087	0.238	19	0.389	NS
103	ALL	0.084	0.433	29	0.707	*
151	37.5	0.312	0.026	3	.	
151	62.5	-0.229	0.169	21	0.766	*
151	87.5	-0.435	0.149	28	0.675	*
151	112.5	-0.360	0.093	30	0.701	*
151	137.5	-0.225	0.093	25	0.523	*
151	162.5	-0.096	0.057	12	0.540	NS
151	187.5	-0.541	.	1	.	
151	ALL	-0.477	0.220	33	0.734	*
614	12.5	-0.357	0.068	8	0.909	*
614	37.5	-0.314	0.068	24	0.834	*
614	62.5	-0.282	0.112	19	0.319	NS
614	87.5	-0.308	0.111	22	0.091	NS
614	112.5	-0.187	0.046	23	0.305	NS
614	137.5	-0.128	0.045	19	-0.484	*
614	162.5	-0.173	0.002	4	.	
614	ALL	-0.401	0.133	33	0.726	*

Table 5. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 070 and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 31-striped bass, 32-white perch, 33-spot, 151-hogchoker, 152-blackcheek tonguefish, 154-oyster toadfish, 213-silver perch, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	25	-0.180	0.003	3	.	
3	75	-0.048	0.097	11	0.421	NS
3	125	0.008	0.037	11	0.911	*
3	175	-0.005	0.094	17	0.058	NS
3	225	0.030	0.043	20	0.689	*
3	275	-0.075	0.066	14	-0.579	*
3	325	0.035	0.053	11	-0.510	NS
3	375	0.075	0.023	4	-1	
3	425	-0.009	0.025	7	-0.673	NS
3	475	0.075	0.023	4	-1	
3	525	0.050	0.030	3	-1	
3	ALL	-0.002	0.059	26	0.719	*
5	12.5	0.021	0.296	9	0.485	NS
5	37.5	-0.121	0.095	11	0.954	*
5	62.5	-0.098	0.094	8	0.942	*
5	87.5	0.017	0.232	9	0.398	NS
5	112.5	-0.084	0.245	12	0.424	NS
5	137.5	0.071	0.063	12	0.846	*
5	162.5	0.214	0.082	17	0.800	*
5	187.5	0.189	0.037	18	0.961	*
5	212.5	0.114	0.066	16	0.898	*
5	237.5	0.138	0.069	13	0.372	NS
5	262.5	0.031	0.036	6	-0.947	*
5	287.5	-0.151	.	1	.	
5	ALL	0.152	0.137	21	0.844	*
7	25	-0.082	0.089	3	0.935	NS
7	75	-0.040	0.047	7	0.970	*

Table 5 (Continued).

SP	SZINT	D	s^2	n	r	
7	125	0.013	0.038	11	0.950	*
7	175	0.170	0.174	15	0.517	*
7	225	0.192	0.172	14	0.301	NS
7	275	0.188	0.114	13	0.387	NS
7	325	0.071	0.078	3	-0.866	NS
7	375	0.151	.	1	.	
7	ALL	0.152	0.126	16	0.809	*
31	125	0.226	0.011	2	.	
31	175	-0.075	0.197	2	.	
31	225	0.206	0.149	4	0.244	NS
31	275	0.307	0.074	5	0.515	NS
31	325	-0.080	0.042	3	-0.931	NS
31	375	0.000	0.045	2	.	
31	525	-0.151	.	1	.	
31	ALL	0.208	0.148	7	0.620	NS
32	62.5	0.220	0.013	3	0.932	NS
32	87.5	0.212	0.057	3	0.705	NS
32	112.5	0.073	0.047	3	0.871	NS
32	137.5	0.055	0.295	4	0.159	NS
32	162.5	0.147	0.098	5	0.410	NS
32	187.5	0.219	0.148	5	0.065	NS
32	212.5	0.141	0.129	5	0.616	NS
32	237.5	0.126	0.087	5	-0.504	NS
32	262.5	-0.151	.	1	.	
32	ALL	0.169	0.102	5	0.758	NS
33	37.5	0.119	0.040	4	-0.653	NS
33	62.5	0.073	0.017	5	0.280	NS
33	87.5	0.130	0.046	10	0.367	NS
33	112.5	0.095	0.038	16	0.973	*
33	137.5	0.121	0.055	18	0.955	*
33	162.5	0.116	0.082	19	0.842	*
33	187.5	0.143	0.067	18	0.657	*
33	212.5	0.025	0.121	13	0.518	NS
33	237.5	0.021	0.141	3	-0.551	NS
33	ALL	0.165	0.080	27	0.946	*
151	37.5	-0.151	.	1	.	
151	62.5	-0.142	0.227	15	0.733	*
151	87.5	-0.039	0.262	25	0.762	*
151	112.5	0.116	0.233	22	0.530	*
151	137.5	0.183	0.280	20	-0.232	NS
151	162.5	0.058	0.135	16	-0.313	NS
151	187.5	0.050	0.030	3	-1	
151	ALL	-0.034	0.301	25	0.746	*

Table 5 (Continued).

SP	SZINT	D	s^2	n	r	
152	37.5	-0.100	0.008	3	.	
152	62.5	0.040	0.055	6	-0.819	*
152	87.5	-0.143	0.062	13	-0.167	NS
152	112.5	-0.107	0.064	11	-0.314	NS
152	137.5	-0.052	0.021	15	0.122	NS
152	162.5	-0.175	0.010	3	0.945	NS
152	187.5	0.151	0.000	2	.	
152	ALL	-0.150	0.088	22	-0.079	NS
154	37.5	0.151	.	1	.	
154	62.5	0.000	0.027	6	-1	
154	87.5	0.105	0.023	6	0.393	NS
154	112.5	0.001	0.043	8	0.610	NS
154	137.5	0.093	0.045	9	-0.211	NS
154	162.5	-0.060	0.038	10	-0.215	NS
154	187.5	-0.001	0.014	11	0.670	*
154	212.5	-0.038	0.029	7	0.636	NS
154	237.5	-0.115	0.101	6	-0.680	NS
154	262.5	-0.052	0.029	7	0.000	
154	287.5	0.017	0.025	9	-0.290	NS
154	312.5	-0.019	0.035	8	-0.475	NS
154	337.5	0.038	0.051	4	-0.905	NS
154	362.5	-0.151	.	1	.	
154	ALL	0.001	0.050	18	0.794	*
213	37.5	0.151	.	1	.	
213	62.5	0.126	0.061	2	.	
213	87.5	0.144	0.045	4	0.945	*
213	112.5	0.097	0.060	8	0.626	NS
213	137.5	0.137	0.064	12	0.540	NS
213	162.5	0.223	0.062	13	0.624	*
213	187.5	0.152	0.028	11	0.615	*
213	212.5	0.188	0.021	4	-0.577	NS
213	ALL	0.261	0.072	15	0.730	*
614	12.5	-0.002	0.072	17	0.948	*
614	37.5	-0.195	0.199	26	0.649	*
614	62.5	-0.082	0.075	22	0.654	*
614	87.5	-0.032	0.065	20	0.695	*
614	112.5	0.027	0.064	23	0.780	*
614	137.5	0.123	0.065	17	0.892	*
614	162.5	0.098	0.095	10	0.781	*
614	187.5	0.130	0.015	3	-0.500	NS
614	ALL	-0.067	0.148	27	0.824	*

Table 6. Length-girth regression equations for selected finfish species. Log-transformed girths (LGIR), total lengths (LTL), and fork lengths (LFL) are in millimeters. Lengths and calculated 95% prediction limits estimated from girths corresponding to the mean cod end mesh circumference are denoted by $\hat{L}_M$ and $\hat{L}_{M95L}$ - $\hat{L}_{M95U}$.

SPECIES	EQUATION	n	r^2	s^2	SIZE RANGE	$\hat{L}_M$	$\hat{L}_{M95L}$	$\hat{L}_{M95U}$
Atlantic croaker	LGIR = -0.5056 + 1.1230(LTL)	139	0.996	0.0003	45 - 268	101.5	101.4	101.6
black seabass	LGIR = -0.3493 + 1.0651(LTL)	34	0.946	0.0006	51 - 144	93.0	92.8	93.3
silver perch	LGIR = -0.4082 + 1.1088(LTL)	57	0.994	0.0004	43 - 217	87.9	87.7	88.1
southern kingfish	LGIR = -0.5247 + 1.1048(LTL)	18	0.996	0.0028	50 - 347	113.9	112.5	115.4
spot	LGIR = -0.4794 + 1.1566(LFL)	133	0.970	0.0003	73 - 202	84.2	84.1	84.3
summer flounder	LGIR = -0.0890 + 0.9834(LTL)	149	0.974	0.0008	51 - 502	73.7	73.4	74.0
weakfish	LGIR = -0.4621 + 1.0851(LTL)	125	0.983	0.0007	49 - 294	108.7	108.4	109.0
white perch	LGIR = -0.6365 + 1.2453(LFL)	152	0.990	0.0006	55 - 260	82.1	82.0	82.2

Table 7. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 043 and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 151-hogchoker, 154-oyster toadfish, 213-silver perch, 614-blue crab.

SP	SZINT	$\bar{D}$	s^2	n	r	
3	125	0.000	0.068	3	-1	
3	175	0.015	0.048	7	0.737	NS
3	225	-0.211	0.104	8	0.179	NS
3	275	-0.239	.	1	.	
3	325	0.151	0.000	2	.	
3	375	0.000	0.030	4	-1	
3	ALL	-0.114	0.081	10	0.606	NS
5	12.5	-0.532	0.134	8	0.488	NS
5	37.5	-0.481	0.061	7	.	
5	137.5	0.006	0.103	11	0.144	NS
5	162.5	0.223	0.043	12	0.857	*
5	187.5	0.235	0.037	12	0.926	*
5	212.5	0.065	0.061	6	-0.560	NS
5	237.5	0.090	0.020	6	0.566	NS
5	262.5	0.000	0.000	3	.	
5	312.5	-0.151	.	1	.	
5	337.5	-0.239	.	1	.	
5	ALL	0.102	0.121	12	0.478	NS
7	25	-0.120	0.074	5	0.889	*
7	75	-0.329	0.144	11	0.572	NS
7	125	-0.146	0.187	12	0.512	NS
7	175	-0.177	0.182	12	0.198	NS
7	225	-0.240	0.058	12	0.558	NS
7	275	-0.160	0.067	12	0.380	NS
7	325	-0.105	0.054	8	-0.657	NS
7	375	-0.020	0.042	4	-0.952	*
7	ALL	-0.254	0.233	12	0.281	NS

Table 7 (Continued).

SP	SZINT	D	s^2	n	r	
33	112.5	0.070	0.146	11	0.843	*
33	137.5	0.114	0.066	12	0.918	*
33	162.5	0.033	0.151	13	0.428	NS
33	187.5	-0.027	0.061	11	0.814	*
33	212.5	0.189	0.052	11	0.832	*
33	237.5	0.216	0.023	3	0.958	NS
33	ALL	0.159	0.064	13	0.937	*
151	37.5	0.239	.	1	.	
151	62.5	0.020	0.297	9	0.734	*
151	87.5	0.216	0.246	13	0.455	NS
151	112.5	0.125	0.183	13	0.523	NS
151	137.5	0.197	0.080	13	0.725	*
151	162.5	0.168	0.105	12	0.350	NS
151	187.5	-0.169	0.059	5	-0.609	NS
151	ALL	0.244	0.238	13	0.545	NS
154	87.5	0.201	0.008	3	.	
154	112.5	0.033	0.025	6	-0.102	NS
154	137.5	0.034	0.031	11	0.535	NS
154	162.5	0.009	0.069	11	0.139	NS
154	187.5	0.010	0.012	9	0.803	*
154	212.5	0.022	0.054	11	0.453	NS
154	237.5	0.037	0.040	11	0.445	NS
154	262.5	0.082	0.051	10	0.028	NS
154	287.5	0.012	0.020	7	0.751	*
154	312.5	0.025	0.087	4	-0.071	NS
154	337.5	0.068	0.012	8	0.092	NS
154	ALL	0.127	0.051	12	0.792	*
213	87.5	0.014	0.037	5	-0.959	*
213	112.5	-0.237	0.091	9	0.107	NS
213	137.5	-0.130	0.087	10	0.762	*
213	162.5	-0.277	0.089	8	-0.022	NS
213	187.5	-0.292	0.116	8	-0.011	NS
213	212.5	-0.209	0.012	3	-0.500	NS
213	ALL	-0.251	0.153	11	0.642	*
614	12.5	-0.030	0.105	11	0.500	NS
614	37.5	0.049	0.079	12	0.644	*
614	62.5	0.153	0.067	9	0.336	NS
614	87.5	0.081	0.013	7	0.360	NS
614	112.5	0.110	0.054	10	0.325	NS
614	137.5	0.020	0.042	10	-0.652	*
614	162.5	0.239	.	1	.	
614	ALL	0.110	0.147	13	0.472	NS

Table 8. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 010 (7.5 minutes) and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 31-striped bass, 32-white perch, 33-spot, 151-hogchoker, 154-oyster toadfish, 213-silver perch, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	125	0.151	.	1	.	
3	175	-0.036	0.042	6	0.351	NS
3	225	0.057	0.063	7	-0.464	NS
3	275	-0.151	.	1	.	
3	325	-0.075	0.011	2	.	
3	425	0.000	0.045	2	.	
3	ALL	-0.005	0.084	8	0.094	NS
5	12.5	-0.697	0.477	12	-0.338	NS
5	37.5	-0.775	0.359	11	0.555	NS
5	62.5	-0.438	0.225	7	0.740	*
5	87.5	-0.055	0.268	6	0.408	NS
5	112.5	0.270	0.071	5	0.838	NS
5	137.5	0.087	0.011	4	0.333	NS
5	162.5	0.168	0.065	10	0.786	*
5	187.5	0.270	0.085	9	0.630	NS
5	212.5	0.173	0.047	6	-0.449	NS
5	237.5	0.151	0.000	4	.	
5	262.5	-0.075	0.011	2	.	
5	ALL	-0.320	0.315	12	0.313	NS
7	25	-0.195	0.076	2	.	
7	75	-0.148	0.136	7	0.279	NS
7	125	-0.126	0.088	8	0.860	*
7	175	-0.102	0.110	6	0.695	NS
7	225	0.027	0.032	7	0.864	*
7	275	0.140	0.037	8	0.827	*
7	325	-0.088	0.041	6	0.056	NS
7	375	0.151	0.000	2	.	
7	425	-0.151	.	1	.	
7	ALL	-0.088	0.053	8	0.913	*

Table 8 (Continued).

SP	SZINT	D	s^2	n	r	
31	75	-0.063	0.305	3	-0.823	NS
31	125	0.167	0.016	3	-0.844	NS
31	175	0.100	0.053	3	0.158	NS
31	225	0.070	0.036	5	0.803	NS
31	275	0.250	0.014	4	0.896	NS
31	325	0.151	0.000	3	.	
31	375	0.151	0.000	2	.	
31	ALL	0.175	0.018	5	0.948	*
32	62.5	-0.022	0.061	4	0.904	NS
32	87.5	0.036	0.059	4	0.847	NS
32	112.5	0.173	0.078	5	0.865	*
32	137.5	0.175	0.116	5	0.856	*
32	162.5	0.409	0.053	4	0.809	NS
32	187.5	0.203	0.132	6	0.934	*
32	212.5	0.414	0.036	4	0.926	*
32	237.5	0.342	0.227	3	-0.847	NS
32	262.5	0.389	.	1	.	
32	287.5	0.151	.	1	.	
32	ALL	0.132	0.149	6	0.948	*
33	87.5	-0.119	0.065	3	-0.818	NS
33	112.5	0.127	0.243	9	0.799	*
33	137.5	0.028	0.296	9	0.660	*
33	162.5	0.039	0.431	8	-0.290	NS
33	187.5	0.057	0.149	5	-0.504	NS
33	212.5	-0.080	0.038	3	-0.413	NS
33	ALL	0.061	0.294	11	0.766	*
151	62.5	0.219	0.215	11	0.625	*
151	87.5	0.181	0.425	12	0.165	NS
151	112.5	0.067	0.289	12	0.245	NS
151	137.5	0.132	0.128	10	0.415	NS
151	162.5	0.093	0.212	8	0.090	NS
151	187.5	-0.009	.	1	.	
151	ALL	0.194	0.463	12	0.164	NS
152	62.5	-0.455	0.094	2	.	
152	87.5	-0.255	0.023	8	.	
152	112.5	-0.241	0.026	7	-0.377	NS
152	137.5	-0.240	0.052	5	0.538	NS
152	162.5	-0.157	0.052	4	-0.227	NS
152	ALL	-0.362	0.108	9	0.263	NS

Table 8 (Continued).

SP	SZINT	D	s^2	n	r	
154	75	-0.151	0.000	2	.	
154	125	-0.108	0.012	7	0.116	NS
154	175	-0.176	0.089	9	0.027	NS
154	225	-0.160	0.082	9	0.081	NS
154	275	-0.060	0.066	8	0.312	NS
154	325	-0.157	0.013	4	0.333	NS
154	ALL	-0.254	0.139	10	0.342	NS
213	112.5	0.253	0.075	6	-0.688	NS
213	137.5	0.094	0.022	8	0.880	*
213	162.5	0.109	0.042	4	0.797	NS
213	187.5	0.044	0.116	7	0.577	NS
213	212.5	-0.050	0.008	3	0.782	NS
213	ALL	0.105	0.068	8	0.796	*
614	12.5	-0.259	0.078	11	0.271	NS
614	37.5	-0.185	0.091	12	0.542	NS
614	62.5	-0.040	0.042	5	0.520	NS
614	87.5	-0.233	0.020	3	0.968	NS
614	112.5	-0.016	0.034	4	0.960	*
614	137.5	0.021	0.024	3	0.365	NS
614	ALL	-0.230	0.082	12	0.622	*

Table 9. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 010 (15 minutes) and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 151-hogchoker, 213-silver perch, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	75	-0.151	.	1	.	
3	125	-0.168	0.002	5	.	
3	175	-0.297	0.115	9	-0.754	*
3	225	-0.290	0.081	9	0.191	NS
3	275	-0.151	0.000	3	.	
3	325	-0.060	0.041	5	-0.873	*
3	375	0.000	0.045	2	.	
3	425	-0.109	0.050	3	-1.000	*
3	475	-0.151	.	1	.	
3	575	-0.151	.	1	.	
3	ALL	-0.494	0.111	9	-0.330	NS
5	12.5	-0.432	0.080	5	.	
5	37.5	-0.485	0.170	8	0.004	NS
5	62.5	-0.480	0.025	3	.	
5	87.5	-0.151	.	1	.	
5	137.5	0.038	0.065	4	-0.905	NS
5	162.5	0.335	0.165	10	0.702	*
5	187.5	0.257	0.103	9	0.809	*
5	212.5	0.232	0.014	7	0.774	*
5	237.5	0.153	0.025	7	0.083	NS
5	262.5	0.095	0.012	4	.	
5	287.5	0.151	0.000	2	.	
5	312.5	0.151	.	1	.	
5	337.5	0.151	.	1	.	
5	ALL	0.159	0.038	10	0.928	*

Table 9 (Continued).

SP	SZINT	D	s^2	n	r	
7	25	-0.408	0.078	3	-0.260	NS
7	75	-0.361	0.055	8	0.780	*
7	125	-0.180	0.079	9	0.776	*
7	175	0.186	0.152	9	0.814	*
7	225	0.593	0.110	10	0.784	*
7	275	0.558	0.112	9	0.052	NS
7	325	0.157	0.098	5	-0.835	NS
7	375	0.151	0.000	2	.	
7	ALL	0.212	0.039	10	0.942	*
33	87.5	-0.133	0.109	3	-0.926	NS
33	112.5	-0.423	0.129	10	0.816	*
33	137.5	-0.441	0.153	10	0.721	*
33	162.5	-0.452	0.113	9	0.328	NS
33	187.5	-0.130	0.082	8	-0.007	NS
33	212.5	-0.114	0.095	6	-0.294	NS
33	262.5	-0.151	.	1	.	
33	ALL	-0.428	0.138	10	0.678	*
151	62.5	0.360	0.072	3	0.756	NS
151	87.5	-0.447	0.127	9	0.727	*
151	112.5	-0.452	0.208	10	0.521	NS
151	137.5	-0.243	0.090	8	0.547	NS
151	162.5	-0.104	0.082	8	0.138	NS
151	187.5	0.013	0.102	2	.	
151	ALL	-0.558	0.210	10	0.785	*
213	87.5	0.031	0.066	2	.	
213	112.5	0.221	0.037	10	0.825	*
213	137.5	0.211	0.067	9	0.708	*
213	162.5	0.357	0.026	7	0.597	NS
213	187.5	0.400	0.131	7	0.265	NS
213	212.5	0.091	0.108	7	-0.208	NS
213	ALL	0.384	0.040	10	0.882	*
614	12.5	-0.159	0.141	4	-0.425	NS
614	37.5	-0.229	0.081	9	0.621	NS
614	62.5	-0.192	0.141	7	0.238	NS
614	87.5	-0.176	0.062	8	0.036	NS
614	112.5	-0.207	0.056	9	0.712	*
614	137.5	-0.361	0.040	6	0.637	NS
614	162.5	-0.151	.	1	.	
614	ALL	-0.410	0.053	10	0.799	*

Table 10. Mean differences, $\overline{D}$, and variances of the differences, between catches by gear 010V (5 minutes) and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 31-striped bass, 32-white perch, 33-spot, 103-bay anchovy, 151-hogchoker, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	175	0.155	0.022	6	0.100	NS
3	25	-0.007	0.025	7	-0.090	NS
3	275	0.030	0.027	5	-1	
3	325	0.080	0.042	3	-0.931	NS
3	375	-0.078	0.053	5	-0.791	NS
3	425	-0.135	0.034	4	-0.577	NS
3	475	-0.151	.	1	.	
3	525	-0.151	.	1	.	
3	ALL	-0.006	0.045	10	0.373	NS
5	12.5	-0.151	.	1	.	
5	37.5	-0.345	0.091	6	0.628	NS
5	62.5	-0.305	0.163	7	0.265	NS
5	87.5	0.375	.	1	.	
5	112.5	0.268	0.119	7	0.896	*
5	137.5	0.115	0.076	9	0.770	*
5	162.5	0.017	0.072	11	0.930	*
5	187.5	0.053	0.096	11	0.771	*
5	212.5	0.148	0.026	9	0.981	*
5	237.5	-0.078	0.059	9	0.918	*
5	262.5	0.078	0.023	4	0.394	NS
5	287.5	0.151	.	1	.	
5	ALL	-0.064	0.116	14	0.847	*

Table 10 (Continued).

SP	SZINT	D	s^2	n	r	
7	25	-0.691	0.036	4	0.840	NS
7	75	-0.064	0.396	8	0.713	*
7	125	0.125	0.629	6	0.277	NS
7	175	-0.025	0.149	9	-0.186	NS
7	225	-0.050	0.071	10	0.480	NS
7	275	0.019	0.054	6	0.171	NS
7	325	0.000	0.023	3	-0.500	NS
7	ALL	0.028	0.321	11	0.734	*
31	25	0.151	.	1	.	
31	75	-0.363	0.273	5	0.498	NS
31	125	-0.104	0.022	5	0.935	*
31	175	0.025	0.059	5	0.405	NS
31	225	-0.075	0.011	2	.	
31	275	0.151	.	1	.	
31	325	-0.151	0.000	2	.	
31	375	-0.151	.	1	.	
31	425	0.151	.	1	.	
31	ALL	-0.204	0.049	5	0.883	*
32	62.5	-0.381	0.106	3	0.998	*
32	87.5	-0.053	0.061	5	0.960	*
32	112.5	0.017	0.025	4	0.895	NS
32	137.5	0.000	0.068	3	-1	
32	162.5	-0.014	0.070	4	0.683	NS
32	187.5	-0.038	0.067	5	0.528	NS
32	212.5	0.031	0.061	5	0.419	NS
32	237.5	0.000	0.005	4	-0.333	NS
32	262.5	-0.151	.	1	.	
32	ALL	-0.122	0.055	5	0.874	*
33	62.5	-0.442	0.028	3	0.539	NS
33	87.5	0.040	0.038	6	0.981	*
33	112.5	-0.055	0.132	10	0.838	*
33	137.5	0.108	0.033	11	0.987	*
33	162.5	-0.003	0.192	11	0.717	*
33	187.5	0.067	0.249	9	0.147	NS
33	212.5	0.066	0.081	9	-0.139	NS
33	ALL	0.081	0.016	13	0.988	*
103	12.5	-0.521	0.040	2	.	
103	37.5	-1.419	0.350	17	0.858	*
103	62.5	-0.998	0.344	17	0.869	*
103	87.5	-0.092	0.228	5	-0.694	NS
103	ALL	-1.388	0.366	17	0.839	*

Table 10 (Continued).

SP	SZINT	D	s^2	n	r	
151	62.5	0.069	0.071	9	0.772	*
151	87.5	0.074	0.126	15	0.520	*
151	112.5	0.036	0.135	15	0.486	NS
151	137.5	-0.067	0.090	13	0.294	NS
151	162.5	0.022	0.023	6	0.883	*
151	187.5	-0.151	.	1	.	
151	ALL	0.052	0.166	16	0.620	*
614	12.5	-0.220	0.388	11	0.223	NS
614	37.5	-0.032	0.258	17	0.547	*
614	62.5	0.003	0.098	15	0.456	NS
614	87.5	-0.065	0.067	17	0.754	*
614	112.5	-0.149	0.083	18	0.366	NS
614	137.5	0.058	0.063	13	0.111	NS
614	162.5	-0.100	0.008	3	0.500	NS
614	ALL	-0.034	0.279	18	0.465	NS

Table 11. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 010V (15 minutes) and gear 108 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 103-bay anchovy, 151-hogchoker, 152-blackcheek tonguefish, 154-oyster toadfish, 614-blue crab.

SP	SZINT	D	s^2	n	r	
3	175	0.316	0.058	7	0.937	*
3	225	0.577	0.086	7	0.689	NS
3	275	0.198	0.053	6	0.035	NS
3	325	0.143	0.046	5	0.190	NS
3	375	0.301	.	1	.	
3	425	-0.151	.	1	.	
3	475	-0.151	.	1	.	
3	ALL	0.502	0.020	7	0.940	*
5	12.5	-0.738	0.086	6	.	
5	37.5	-1.338	0.208	7	-0.058	NS
5	62.5	-0.149	0.004	5	0.810	NS
5	112.5	0.151	.	1	.	
5	137.5	0.270	0.028	2	.	
5	162.5	0.199	0.103	7	-0.248	NS
5	187.5	0.375	0.025	7	0.883	*
5	212.5	0.172	0.136	5	0.591	NS
5	287.5	0.151	.	1	.	
5	ALL	-0.223	0.056	7	0.640	NS
7	75	0.057	0.072	7	0.861	*
7	125	0.197	0.072	7	0.990	*
7	175	0.373	0.149	7	0.915	*
7	225	-0.058	0.012	6	0.812	*
7	275	-0.046	0.015	7	0.560	NS
7	325	-0.050	0.053	3	0.341	NS
7	375	0.0	.	1	.	
7	ALL	0.227	0.011	7	0.992	*

Table 11 (Continued).

SP	SZINT	D	s^2	n	r	
13	87.5	-0.090	0.007	5	.	
13	112.5	-0.085	0.053	5	0.048	NS
13	137.5	0.063	0.100	7	0.268	NS
13	162.5	0.113	0.035	6	0.192	NS
13	187.5	0.151	0.000	3	.	
13	212.5	0.151	.	1	.	
13	ALL	0.093	0.048	7	0.695	NS
33	112.5	0.012	0.023	5	0.130	NS
33	137.5	0.226	0.031	7	0.923	*
33	162.5	0.472	0.079	7	0.782	*
33	187.5	0.244	0.156	7	-0.238	NS
33	212.5	0.219	0.063	6	0.416	NS
33	237.5	0.000	.	1	.	
33	ALL	0.382	0.149	7	0.609	NS
103	37.5	-1.591	0.415	7	0.640	NS
103	62.5	-1.456	0.505	7	-0.075	NS
103	87.5	-0.268	0.723	5	-0.524	NS
103	ALL	-1.562	0.533	7	0.060	NS
151	62.5	0.108	0.301	6	-0.339	NS
151	87.5	0.241	0.058	7	0.257	NS
151	112.5	0.071	0.025	7	0.396	NS
151	137.5	0.171	0.169	7	0.265	NS
151	162.5	-0.032	0.090	7	0.580	NS
151	187.5	-0.035	0.055	5	-0.457	NS
151	ALL	0.165	0.046	7	0.319	NS
152	62.5	-0.151	0.000	2	.	
152	87.5	-0.151	0.000	2	.	
152	112.5	-0.055	0.095	7	0.484	NS
152	137.5	0.219	0.058	7	-0.294	NS
152	162.5	-0.062	0.078	6	-0.688	NS
152	ALL	0.141	0.064	7	-0.049	NS
154	87.5	0.500	.	1	.	
154	112.5	0.092	0.030	5	0.767	NS
154	137.5	0.000	0.071	7	0.490	NS
154	162.5	0.103	0.053	7	0.284	NS
154	187.5	-0.054	0.022	7	0.716	NS
154	212.5	0.092	0.060	7	0.646	NS
154	237.5	0.111	0.027	7	0.423	NS
154	262.5	0.137	0.066	7	0.034	NS
154	287.5	0.140	0.051	7	0.232	NS
154	312.5	0.075	0.043	6	0.174	NS
154	337.5	0.188	0.046	6	0.053	NS
154	362.5	0.151	.	1	.	
154	ALL	0.193	0.054	7	0.629	NS

Table 11 (Continued).

SP	SZINT	D	s^2	n	r	
213	87.5	-0.050	0.038	6	-0.900	*
213	112.5	0.268	0.050	7	0.494	NS
213	137.5	0.326	0.065	7	0.655	NS
213	162.5	0.273	0.022	6	0.846	*
213	187.5	0.204	0.069	7	0.387	NS
213	212.5	0.226	0.011	2	.	
213	ALL	0.344	0.063	7	0.665	NS
614	12.5	-0.274	0.214	7	0.231	NS
614	37.5	0.134	0.205	7	0.471	NS
614	62.5	0.140	0.010	6	0.855	*
614	87.5	0.127	0.053	5	-0.474	NS
614	112.5	0.056	0.054	7	-0.490	NS
614	137.5	0.203	0.039	7	0.465	NS
614	162.5	0.020	0.081	5	0.065	NS
614	212.5	0.151	.	1	.	
614	ALL	0.124	0.213	7	0.180	NS

Table 12. Results of two-factor analyses of variance for mean catch differences, D, of important species, for gear 035 and 033 comparisons. Factors examined were YEAR, 1975 and 1977, and size interval (SZINT), with interaction. Factor sums of squares are Type III. Significant differences are denoted by an asterisk.

Summer flounder

Source	DF	SS	MS	F	p
Model	15	1.4516	0.0968	0.77	0.701
YEAR	1	0.0076	0.0076	0.06	0.806
SZINT	9	0.7628	0.0848	0.68	0.727
YEAR*SZINT	5	0.4538	0.0908	0.72	0.607
Error	62	7.7617	0.1252		
Corrected Total	77	9.2133			

Atlantic croaker

Source	DF	SS	MS	F	p
Model	20	5.6810	0.2841	0.96	0.514
YEAR	1	0.0256	0.0256	0.09	0.769
SZINT	12	4.5048	0.3754	1.27	0.240
YEAR*SZINT	7	1.1111	0.1587	0.54	0.807
Error	220	65.1913	0.2963		
Corrected Total	240	70.8724			

Weakfish

Source	DF	SS	MS	F	p
Model	12	2.0832	0.1736	1.20	0.351
YEAR	1	0.0320	0.0320	0.22	0.643
SZINT	8	1.7797	0.2225	1.54	0.211
YEAR*SZINT	3	0.1730	0.0577	0.40	0.755
Error	18	2.5969	0.1443		
Corrected Total	30	4.6800			

Spot

Source	DF	SS	MS	F	p
Model	17	4.0917	0.2407	1.03	0.423
YEAR	1	0.3043	0.3043	1.31	0.254
SZINT	9	1.5741	0.1749	0.75	0.661
YEAR*SZINT	7	0.7560	0.1080	0.46	0.860
Error	194	45.1333	0.2326		
Corrected Total	211	49.2251			

Table 12 (continued).

Bay anchovy

Source	DF	SS	MS	F	p
Model	7	6.9835	0.9976	2.57	0.019 *
YEAR	1	3.5751	3.5751	9.21	0.003 *
SZINT	4	1.6302	0.4076	1.05	0.387
YEAR*SZINT	2	0.5177	0.2588	0.67	0.516
Error	86	33.3960	0.3883		
Corrected Total	93	40.3795			

Hogchoker

Source	DF	SS	MS	F	p
Model	14	4.4814	0.3201	0.94	0.521
YEAR	1	0.0714	0.0714	0.21	0.648
SZINT	8	3.4521	0.4315	1.26	0.265
YEAR*SZINT	5	1.4836	0.2967	0.87	0.504
Error	211	72.1803	0.3421		
Corrected Total	225	76.6617			

Oyster toadfish

Source	DF	SS	MS	F	p
Model	10	1.6054	0.1605	2.12	0.040 *
YEAR	1	0.6296	0.6296	8.32	0.006 *
SZINT	7	0.9167	0.1310	1.73	0.123
YEAR*SZINT	2	0.0580	0.0290	0.38	0.684
Error	50	3.7819	0.0756		
Corrected Total	60	5.3873			

Table 13. Mean differences, $\overline{D}$, and variances of the differences, between catches by gear 035 and gear 033 for important species, by size intervals (SZINT), indicated by the interval mid-point. The number of sets used in calculating mean differences, n, are those in which fish of a given size interval occurred. Coefficients of correlation between catches by the gears, r, are given for each size interval and for all sizes combined (ALL). Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 103-bay anchovy, 151-hogchoker, 152-blackcheek tonguefish, 154-oyster toadfish, 614-blue crab.

SP	SZINT	D	s^2	n	r	
Brooks vs Pathfinder						
103	12.5	0.170	0.611	4	0.046	NS
103	37.5	-0.184	0.774	13	0.227	NS
103	62.5	-0.549	0.261	32	0.586	*
103	87.5	-0.457	0.044	17	0.418	NS
103	112.5	-0.350	.	1	.	
103	ALL	-0.597	0.264	35	0.658	*
Brooks vs Langley						
103	37.5	0.039	0.591	8	-0.340	NS
103	62.5	0.070	0.719	13	0.368	NS
103	87.5	0.085	0.145	6	0.129	NS
103	ALL	0.048	0.773	13	0.339	NS
Combined						
3	75	-0.553	0.121	4	-1	
3	125	-0.237	0.124	25	0.329	NS
3	175	-0.547	0.190	13	0.553	*
3	225	-0.369	0.111	11	-0.427	NS
3	275	-0.289	0.086	14	-0.463	NS
3	325	-0.833	0.030	3	.	
3	375	-0.763	0.121	3	-1	
3	425	-0.485	0.008	4	.	
3	475	-0.301	.	1	.	
3	575	-0.301	.	1	.	
3	ALL	-0.247	0.098	34	0.713	*

Table 13 (Continued).

SP	SZINT	D	s^2	n	r	
5	12.5	0.301	.	1	.	
5	37.5	-0.323	0.158	3	.	
5	62.5	-0.552	0.162	13	0.842	*
5	87.5	-0.444	0.157	26	0.872	*
5	112.5	-0.382	0.407	40	0.276	NS
5	137.5	-0.350	0.394	41	0.178	NS
5	162.5	-0.254	0.250	30	-0.173	NS
5	187.5	-0.295	0.292	13	-0.679	*
5	212.5	-0.237	0.306	16	-0.515	*
5	237.5	-0.386	0.252	23	-0.123	NS
5	262.5	-0.332	0.098	17	0.043	NS
5	287.5	-0.372	0.103	13	-0.779	*
5	312.5	-0.527	0.081	5	-1	*
5	337.5	-0.485	.	1	.	
5	ALL	-0.209	0.310	50	0.621	*
7	25	-1.342	0.080	3	1	*
7	75	0.301	.	1	.	
7	125	-1.072	0.252	3	-0.818	NS
7	175	-1.596	0.276	3	-0.951	NS
7	225	-0.524	0.144	10	-0.235	NS
7	275	-0.874	0.032	4	0.184	NS
7	325	-0.629	0.091	4	-1	
7	375	-0.301	.	1	.	
7	425	-0.301	0.000	2	.	
7	ALL	-0.413	0.199	15	0.317	NS
33	37.5	-0.337	0.147	6	0.573	NS
33	62.5	-0.302	0.184	32	0.692	*
33	87.5	-0.396	0.304	48	0.446	*
33	112.5	-0.478	0.223	38	0.525	*
33	137.5	-0.452	0.186	18	0.399	NS
33	162.5	-0.441	0.247	29	0.151	NS
33	187.5	-0.551	0.133	22	0.481	*
33	212.5	-0.573	0.149	13	-0.298	NS
33	237.5	-0.679	0.037	5	.	
33	262.5	-0.364	.	1	.	
33	ALL	-0.309	0.322	54	0.575	*

Table 13 (Continued).

SP	SZINT	D	s^2	n	r	
151	12.5	0.301	.	1	.	
151	37.5	-0.354	0.206	7	0.496	NS
151	62.5	-0.198	0.283	42	0.269	NS
151	87.5	-0.346	0.304	49	0.440	*
151	112.5	-0.286	0.252	40	0.425	*
151	137.5	-0.266	0.266	40	0.349	*
151	162.5	-0.273	0.231	34	-0.053	NS
151	187.5	-0.091	0.292	10	-0.606	NS
151	212.5	-1.075	0.202	3	-1	*
151	ALL	-0.161	0.354	53	0.438	*
152	37.5	0.301	.	1	.	
152	62.5	-1.770	0.190	3	0.425	NS
152	87.5	-0.585	0.166	16	-0.015	NS
152	112.5	-0.476	0.104	8	-0.300	NS
152	ALL	-0.401	0.217	17	0.123	NS
154	25	-0.301	0.000	2	.	
154	75	-0.378	0.112	8	-0.946	*
154	125	-0.185	0.090	14	-0.004	NS
154	175	-0.155	0.115	10	-0.434	NS
154	225	-0.331	0.075	13	-0.601	*
154	275	-0.440	0.053	8	-0.882	*
154	325	-0.515	0.073	5	-1	
154	375	-0.301	.	1	.	
154	ALL	-0.126	0.149	30	-0.029	NS
614	12.5	-0.737	0.116	4	-0.908	NS
614	37.5	-0.414	0.128	33	0.251	NS
614	62.5	-0.245	0.180	36	0.021	NS
614	87.5	-0.204	0.091	34	0.262	NS
614	112.5	-0.269	0.095	21	-0.471	*
614	137.5	-0.695	0.182	5	-1	
614	162.5	-0.328	0.091	4	-1	
614	ALL	-0.216	0.227	40	0.233	NS

Table 14. Mean differences, $\bar{D}$, and variances of the differences, between catches by gear 010 and gear 043 for important species, all sizes combined. Significant differences are in bold type. The number of sets used in calculating mean differences, n, are those in which a given species occurred. Coefficients of correlation between catches by the gears, r, are given for all individuals. Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 32-white perch, 33-spot, 45-catfish species, 103-bay anchovy, 151-hogchoker, 154-oyster toadfish, 614-blue crab.

SP	D	s^2	n	r	
3	**-0.301**	0.000	2	.	
5	-0.110	0.119	8	0.486	NS
7	-0.175	0.113	6	0.184	NS
32	-0.170	0.150	4	-0.333	NS
33	-0.018	0.116	8	-0.313	NS
45	**0.420**	0.067	4	0.897	NS
103	-0.285	0.237	6	-0.340	NS
151	-0.143	0.862	8	0.591	NS
154	0.089	0.361	7	-0.809	*
614	**0.286**	0.056	8	0.909	*

Table 15. Mean differences, $\bar{D}$, and variances of the differences, between catches by the R/V *Langley* and old *Captain John Smith* for important species, all sizes combined. Significant differences are in bold type. The number of sets used in calculating mean differences, n, are those in which a given species occurred. Coefficients of correlation between catches by the gears, r, are given for all individuals. Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 103-bay anchovy, 151-hogchoker, 154-oyster toadfish, 614-blue crab.

SP	D	s^2	n	r	
3	**0.276**	0.048	5	0.307	NS
5	-0.057	0.131	5	0.225	NS
7	-0.114	0.106	5	0.938	*
33	**0.307**	0.010	5	0.960	*
103	0.327	0.045	2	.	
151	-0.172	0.145	5	-0.117	NS
154	-0.088	0.131	4	0.020	NS
614	-0.041	0.004	5	0.921	*

Table 16. Mean differences, $\bar{D}$, and variances of the differences, between catches by the R/V *Pathfinder* and old *Captain John Smith* for important species, all sizes combined. Significant differences are in bold type. The number of sets used in calculating mean differences, n, are those in which a given species occurred. Coefficients of correlation between catches by the gears, r, are given for all individuals. Significance of the correlation coefficients, at $\alpha = 0.05$, is denoted by '*'; non-significance is indicated by 'NS'. Species codes are: 3-summer flounder, 5-Atlantic croaker, 7-weakfish, 33-spot, 103-bay anchovy, 151-hogchoker, 154-oyster toadfish, 614-blue crab.

SP	D	s^2	n	r	
3	-0.027	0.178	12	-0.393	NS
5	**-0.285**	0.287	29	0.534	*
7	0.029	0.226	39	0.170	NS
32	-0.169	0.165	16	-0.673	*
33	**-0.240**	0.272	38	0.455	*
45	-0.083	0.285	26	-0.067	NS
103	-0.085	0.255	19	-0.595	*
151	**-0.460**	0.981	40	-0.136	NS
154	-0.121	0.375	36	-0.213	NS
614	**-0.218**	0.107	40	0.522	*

Table 17. Observed or recommended corrections for converting historical catches to equivalent catches by the current gear. Size ranges are the observed ranges, in 25 mm (fork or total length) intervals, for which the corrections, D, were derived. Positive values of D indicate that the test gear or vessel (listed first) caught more than the standard gear/vessel (listed second) - '0' indicates no correction recommended. Catches below the mesh retention size denoted with a '*', are not recommended (NR) for conversions. Although corrections are given for some gears, they may not be reliable.

SPECIES	SIZE RANGE	D
VESSEL modified *Captain John Smith - Fish Hawk*		
Bay anchovy	ALL	0
Weakfish	1-300	0
Atlantic croaker	76-250	0
Spot	51-225	0
Silver perch	26-175	0
Kingfish	1-125	0
Oyster toadfish	26-350	0.1511
Hogchoker	1-175	0
Blackcheek tonguefish	26-150	0
Summer flounder	101-300	0
Blue crabs	26-200	-0.0903
VESSEL *Langley* - old *Captain John Smith*		
Bay anchovy	ALL	0
Weakfish	ALL	0
Atlantic croaker	ALL	0
Spot	ALL	0
Hogchoker	ALL	0
Summer flounder	ALL	0
Blue crabs	ALL	0
VESSEL *Pathfinder* - old *Captain John Smith*		
Bay anchovy	ALL	0
Weakfish	ALL	0
Atlantic croaker	ALL	-0.2845
Spot	ALL	-0.2397
Oyster toadfish	ALL	0
Hogchoker	ALL	-0.4600
Summer flounder	ALL	0
Blue crabs	ALL	-0.2183

Table 17 (continued).

SPECIES	SIZE RANGE	D
GEAR 035 - 033		
Bay anchovy (BR vs LA)	26-100	0
Bay anchovy (BR vs PA)	1-100	-0.4615
Weakfish	1-350	-0.4346
Atlantic croaker	26-325	-0.1836
Spot	26-250	-0.2913
Oyster toadfish	51-350	-0.1130
Hogchoker	26-225	0
Blackcheek tonguefish	51-150	-0.4128
Summer flounder	51-450	-0.2405
Blue crabs	1-175	-0.1414
GEAR 033 - 108		
Bay anchovy	ALL	0
Weakfish	1-350	-0.3174 + 0.0015(L)
Atlantic croaker	1-325	-0.2694 + 0.0012(L)
Spot	51-200	0.1350 - 0.0030(L)
Black seabass	76-175	-0.2230
Striped bass	51-350	0
White perch	51-275	-0.2613 + 0.0015(L)
Hogchoker	26-175	-0.2210
Summer flounder	101-450	-0.1203
Blue crab	1-175	-0.3538 + 0.0012(L)
GEAR 070 - 108		
Bay anchovy	ALL	0.3189
Weakfish	1-350	-0.0964 + 0.0010(L)
Atlantic croaker	1-275	-0.1743 + 0.0015(L)
Spot	26-250	0.1053
Silver perch	51-225	0.1600
Striped bass	101-400	0
White perch	51-250	0
Oyster toadfish	51-350	0
Hogchoker	51-200	0
Blackcheek tonguefish	26-175	0
Summer flounder	1-550	0
Blue crab	1-200	-0.1229 + 0.0014(L)
GEAR 010 - 043		
Bay anchovy	ALL	0
Weakfish	ALL	0
Atlantic croaker	ALL	0
Spot	ALL	0
Catfish spp.	ALL	-0.4203
Hogchoker	ALL	0

Table 17 (continued).

SPECIES	SIZE RANGE	D
Summer flounder	ALL	0
Blue crabs	ALL	-0.2862
GEAR 043 - 108		
Bay anchovy	ALL	-1.0336
Weakfish	< 109*	NR
	151-400	-0.1544
Atlantic croaker	< 102*	NR
	126-250	0.1558
Spot	< 84*	NR
	101-250	0.1061
Silver perch	< 88*	NR
	101-225	-0.2177
Oyster toadfish	76-350	0
Hogchoker	51-200	0.1125
Summer flounder	< 74*	NR
	101-400	0
Blue crab	1-150	0
GEAR 010:7.5 minutes - 108		
Bay anchovy	ALL	-0.7319
Weakfish	< 109*	NR
	151-350	0
Atlantic croaker	< 102*	NR
	126-275	0.1022
Spot	< 84*	NR
	101-225	0
Silver perch	< 88*	NR
	101-225	0
Striped bass	101-400	0.1759
White perch	< 82*	NR
	101-250	0.3096
Oyster toadfish	101-325	-0.1261
Hogchoker	51-200	0.1390
Summer flounder	< 74*	NR
	151-350	0
Blue crab	1-150	-0.1268

Table 17 (continued).

SPECIES	SIZE RANGE	D
GEAR 010:15 minutes - 108		
Bay anchovy	ALL	-0.8204
Weakfish	< 109*	NR
	151-350	0.4179
Atlantic croaker	< 102*	NR
	126-275	0.1784
Spot	< 84*	NR
	101-225	-0.3071
Silver perch	< 88*	NR
	101-225	0.2670
Hogchoker	51-175	-0.1906
Summer flounder	< 74*	NR
	101-450	-0.1679
Blue crab	1-150	-0.2378

LIST OF APPENDICES

Appendix 1. Specifications for the major vessels used in the VIMS trawl surveys. Some values are unknown or estimated.

LENGTH is overall. TRAWL designates location of trawling block and height off water.

VESSEL	CODE	YEARS	LENGTH	BEAM	DRAFT	HULL	TRAWL	ENGINE	WHEEL
Virginia Lee	VL	1955-57	35'	7'	2'	launch-wood	?	?	?
Pathfinder	PA	1957-81	55'	16'6"	6'8"	trawler-wood	side: 10'	diesel-250 HP	?
Langley	LA	1962-79	80'	32'	5'6"	ferry-steel	stern: 20'	diesel-250 HP	40"
Investigator	IN	1970	28'	8'	2'6"	launch-wood	?	?	?
outboard skiff	SK	1970-71	?	?	?	?	?	?	?
Restless	RE	1971-79	31'9"	9'6"	3'3"	deadrise-wood	stern: 8-9'	gasoline-225 HP	19"
W. K. Brooks	BR	1971-79	36'8"	10'	3'	deadrise-wood	stern: 8-9'	gasoline-225 HP	19"
Aquarius	AQ	1978	35'	?	?	launch-fiberglass	?	?	?
Three Daughters	TD	1978	40-42'	13'	3'	launch-wood	?	?-300 HP	?
Capt. John Smith (old)	J1	1978-86	42'	14'	4'	launch-fiberglass	side: 4'	diesel-200 HP	22"
Judith Ann	JA	1981	42'	?	?	launch-fiberglass	?	?-200 HP	?
Sally Jean	SJ	1981	36'	?	?	launch-wood	?	?-200 HP	?
Langley II	LN	1985	44'	?	?	launch-fiberglass		?-200 HP	22"
Capt. John Smith (modified)	JS	1986-90	42'	14'	4'	launch-fiberglass	stern: 8-10'	diesel-350 HP	26"
Fish Hawk	FH	1990-	28'	10'	1'10"	trawler-aluminum	stern: 7'	diesel-210 HP	?

Appendix 2. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 033 and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), catfishes (Ictaluridae), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 033					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
scup	109.5	74	139	27.6	4	94.6	65	118	25.4	5
black seabass	132.5	83	170	24.7	22	131.7	72	185	23.1	101
summer flounder	216.3	110	527	70.7	104	209.1	97	492	72.8	222
butterfish	100.8	18	168	53.5	24	86.2	21	173	60.0	29
Atlantic croaker	93.3	12	397	136.3	5485	82.9	8	309	128.9	7186
weakfish	162.1	31	361	84.2	618	126.6	18	401	88.9	803
bluefish	194.3	188	200	6.0	3	233	.	.	.	1
harvestfish	36.8	13	159	38.2	19	37.6	15	67	17.8	17
kingfish	155.4	42	252	72.4	9	117.3	47	305	78.8	9
squid	37.9	25	68	11.5	22	40.4	21	63	10.8	20
searobins	106.0	73	150	20.3	31	110.4	35	167	23.1	287
alewife	123.4	110	133	9.5	5	110.6	100	119	9.8	5
blueback herring	.	.	.	.	0	69	.	.	.	1
Atlantic herring	271	.	.	.	1	.	.	.	.	0
American shad	.	.	.	.	0	129	.	.	.	1
striped bass	204.3	70	416	67.8	115	199.4	73	336	71.5	99
white perch	111.1	56	271	72.6	1263	102.7	52	272	64.9	1398
spot	132.4	72	195	39.3	188	146.5	66	259	43.1	684
Atlantic menhaden	58.5	32	165	29.3	108	54.7	28	134	34.8	30
Atl. thread herring	50.3	43	61	9.5	3	53	.	.	.	1
Spanish mackerel	.	.	.	.	0	103.0	36	170	94.8	2
catfishes	287.6	179	417	77.3	20	334.4	225	451	63.6	30
northern puffer	.	.	.	.	0	127.0	101	153	36.8	2
gizzard shad	201.7	105	381	72.7	21	192.2	132	326	47.9	24
pigfish	172.0	166	177	5.6	3	168.5	161	176	10.6	2
American eel	640	.	.	.	1	.	.	.	.	0
windowpane	167	.	.	.	1	157.0	140	168	9.5	7
Atlantic spadefish	.	.	.	.	0	477.0	417	512	52.2	3
spotted hake	82.2	55	216	42.5	33	95.6	57	211	51.3	28
sea lamprey	146.4	131	164	10.0	10	161.4	140	181	14.3	7
longnose gar	.	.	.	.	0	878	.	.	.	1
striped anchovy	76.9	48	125	31.2	85	90.8	48	123	27.9	61
bay anchovy	56.5	27	92	46.3	14036	54.0	32	89	51.0	17579
lined seahorse	106.0	104	108	2.8	2	114.5	104	125	14.8	2

Appendix 2 (Continued).

	Gear 033					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
feather blenny	98	.	.	.	1	83.0	81	85	2.8	2
hogchoker	86.5	37	171	36.7	1042	94.6	52	186	36.7	2142
blackcheek tonguefish	113.6	55	147	30.6	8	114.6	32	174	37.2	61
skilletfish	.	.	.	.	0	57	.	.	.	1
oyster toadfish	195.0	138	302	62.7	5	172.7	77	295	65.3	15
pipefish	199.2	169	257	36.7	5	157.1	77	199	35.6	12
smooth dogfish	.	.	.	.	0	382	.	.	.	1
clearnose skate	457	.	.	.	1	423.2	315	455	53.4	6
southern stingray	.	.	.	.	0	535	.	.	.	1
bluntnose stingray	372	.	.	.	1	385.0	270	500	162.6	2
spiny butterfly ray	545	.	.	.	1	564.0	531	597	46.7	2
bullnose ray	740	.	.	.	1	.	.	.	.	0
inshore lizardfish	.	.	.	.	0	136.0	125	143	7.8	6
conger eel	.	.	.	.	0	422	.	.	.	1
silver perch	175.6	144	214	20.2	31	166.6	71	220	32.7	18
banded drum	.	.	.	.	0	159	.	.	.	1
smallmouth flounder	101.0	98	104	4.2	2	103.3	49	123	20.7	10
planehead filefish	94	.	.	.	1	.	.	.	.	0
striped burrfish	161	.	.	.	1	200.0	174	226	36.8	2
gobies	33	.	.	.	1	36.7	27	49	11.2	3
penaeid shrimp	115	.	.	.	1	126	.	.	.	1
blue crab	49.5	13	150	36.6	302	47.5	11	161	45.3	1161

Appendix 3. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 070 and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), catfishes (Ictaluridae), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 070					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
scup	183.8	144	210	23.2	6	148.5	122	188	28.0	4
black seabass	125.5	5	218	82.9	6	110.8	47	195	55.3	14
summer flounder	169.3	60	506	93.0	305	160.3	44	501	86.3	335
butterfish	100.2	33	137	50.7	6	120.0	108	132	17.0	2
Atlantic croaker	94.8	19	272	164.3	5279					
weakfish	135.6	19	360	83.1	1332	114.3	21	306	84.3	1441
bluefish	214.7	131	381	144.0	3	141.5	139	144	3.5	2
harvestfish	63.5	39	88	34.6	2	86.4	33	167	50.8	5
kingfish	83.2	34	121	36.0	6	98.1	61	153	39.3	7
squid	32.4	19	79	15.7	19	43.0	25	61	25.5	2
searobins	79.8	44	190	32.5	24	81.9	37	212	40.2	60
alewife	102.0	90	132	20.1	4	117.6	109	131	9.5	5
blueback herring	44.3	41	48	3.7	6	39.5	37	42	3.5	2
American shad	76	.	.	.	1	.	.	.	.	0
striped bass	244.1	108	354	43.1	73	250.4	105	533	64.1	45
white perch	158.9	57	248	58.2	226	156.0	65	252	58.2	102
spot	136.4	30	232	46.6	3042	135.4	41	234	41.9	2327
Atlantic menhaden	177.8	127	275	69.1	4	101.7	83	127	16.1	10
Spanish mackerel	.	.	.	.	0	321	.	.	.	1
catfishes	281.4	106	436	106.3	31	303.8	112	451	110.4	20
northern puffer	138.9	77	213	39.6	11	135.4	78	191	42.4	7
gizzard shad	145	.	.	.	1	169.0	151	187	25.5	2
tautog	.	.	.	.	0	139	.	.	.	1
pigfish	147.8	114	210	16.9	42	148.0	125	174	12.7	49
American eel	558	.	.	.	1	319.8	130	561	210.6	4
windowpane	192	.	.	.	1	210.5	208	213	3.5	2
Atlantic spadefish	109.0	98	121	11.5	3	110	.	.	.	1
spotted hake	95.5	48	224	46.7	68	94.3	65	226	40.3	39
sea lamprey	155.5	150	161	7.8	2	138.5	119	162	17.7	4
longnose gar	.	.	.	.	0	681	.	.	.	1
striped anchovy	88.4	79	105	10.8	5	100	.	.	.	1
lined seahorse	76.0	52	119	37.3	3	92.0	74	110	25.5	2

Appendix 3 (Continued).

	Gear 070					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
yellow perch	.	.	.	.	0	118	.	.	.	1
feather blenny	76.8	49	111	20.4	14	73.2	45	105	23.7	5
hogchoker	91.0	56	186	58.9	3604	88.5	48	182	55.4	4015
blackcheek tonguefish	114.4	50	178	36.6	39	109.0	38	168	30.2	84
skilletfish	53.5	48	56	4.5	4	49.0	48	50	1.4	2
oyster toadfish	178.5	45	337	73.1	111	193.0	66	362	68.8	127
pipefish	181.6	122	305	63.4	7	146.9	103	183	25.8	10
clearnose skate	439.0	406	472	46.7	2	367.0	206	460	140.0	3
Atlantic stingray	475	.	.	.	1	382	.	.	.	1
inshore lizardfish	189.2	77	297	45.9	19	185.7	88	246	42.4	16
conger eel	.	.	.	.	0	413.3	389	427	21.1	3
blue runner	157	.	.	.	1	.	.	.	.	0
lookdown	128	.	.	.	1	85	.	.	.	1
Atlantic moonfish	71	.	.	.	1	121	.	.	.	1
silver perch	140.0	40	214	37.8	255	133.2	61	204	36.3	112
banded drum	.	.	.	.	0	97	.	.	.	1
Atlantic cutlassfish	449	.	.	.	1	565	.	.	.	1
northern stargazer	.	.	.	.	0	21	.	.	.	1
striped cusk-eel	213	.	.	.	1	.	.	.	.	0
fringed flounder	84	.	.	.	1	115	77	144	32.4	5
smallmouth flounder	71.3	39	141	23.6	31	74.8	45	144	19.8	33
gobies	42.7	32	56	7.0	10	46.9	38	55	7.2	7
silver jenny	.	.	.	.	0	84	.	.	.	1
bay whiff	.	.	.	.	0	117	.	.	.	1
penaeid shrimp	121.2	92	169	19.8	20	118.8	80	155	19.3	16
blue crab	54.7	6	185	79.1	2331	52.3	9	177	57.8	1627

Appendix 4. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 043 and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), catfishes (Ictaluridae), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 043					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
scup	143.8	138	151	5.0	5	142.0	140	144	2.8	2
black seabass	179	.	.	.	1	140.5	86	183	43.9	4
summer flounder	202.3	140	363	53.0	39	205.9	132	375	42.4	68
butterfish	124.0	118	132	8.7	4	.	.	.	.	0
Atlantic croaker	169.4	19	273	25.1	842	141.9	2	330	76.4	602
weakfish	129.3	39	386	63.8	649	135.4	25	353	75.2	1042
bluefish	141.5	141	142	0.7	2	.	.	.	.	0
harvestfish	68.0	63	70	3.4	6	76.0	41	95	30.3	3
kingfish	111.9	50	270	54.9	30	71.7	19	136	38.9	40
squid	39.3	26	56	15.3	3	25	.	.	.	1
searobins	157.1	44	200	39.2	15	109.4	37	190	62.7	9
alewife	.	.	.	.	0	43	.	.	.	1
striped bass	725	.	.	.	1	.	.	.	.	0
spot	136.5	103	235	46.6	2199	138.0	108	234	40.3	1702
Atlantic menhaden	.	.	.	.	0	181	.	.	.	1
catfishes	338.3	321	354	16.6	3	.	.	.	.	0
northern puffer	142.7	89	220	68.6	3	93.0	78	106	14.1	3
gizzard shad	.	.	.	.	0	337	.	.	.	1
pigfish	140.6	114	162	12.1	51	147.1	125	174	13.3	44
American eel	355.5	311	400	62.9	2	358.5	313	404	64.3	2
windowpane	.	.	.	.	0	210.5	208	213	3.5	2
Atlantic spadefish	.	.	.	.	0	80.0	73	84	6.1	3
spotted hake	200	.	.	.	1	.	.	.	.	0
striped anchovy	78	.	.	.	1	.	.	.	.	0
inland silverside	62	.	.	.	1	.	.	.	.	0
hogchoker	104.5	35	182	68.9	2032	106.3	60	186	51.4	1622
blackcheek tonguefish	142.0	96	168	12.1	32	136.9	82	168	20.1	24
oyster toadfish	207.7	77	343	60.8	211	212.4	107	348	56.6	168
pipefish	.	.	.	.	0	129	.	.	.	1
clearnose skate	.	.	.	.	0	367.0	206	460	140.0	3
Atlantic stingray	.	.	.	.	0	382	.	.	.	1
inshore lizardfish	219.3	155	345	55.3	17	176.2	88	246	46.8	14
Atlantic moonfish	.	.	.	.	0	121	.	.	.	1

Appendix 4 (Continued).

	Gear 043					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
silver perch	142.5	82	205	25.0	72	150.5	85	208	31.4	219
Atlantic cutlassfish	.	.	.	.	0	611.3	577	662	44.8	3
fringed flounder	86	.	.	.	1	80.5	77	84	4.9	2
smallmouth flounder	73.3	54	91	13.5	12	71.3	45	92	12.2	31
gobies	.	.	.	.	0	30.5	25	36	7.8	2
silver jenny	81	.	.	.	1	84	.	.	.	1
bay whiff	.	.	.	.	0	117	.	.	.	1
penaeid shrimp	132.4	99	171	18.8	34	135.9	90	168	17.4	62
blue crab	53.2	9	151	39.9	262	45.0	12	149	36.3	237

Appendix 5. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 010 (7.5 minute tows) and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 010					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
summer flounder	215.0	123	450	63.1	22	228.1	157	415	65.3	20
Atlantic croaker	118.9	9	272	73.3	567	44.0	9	257	90.7	2808
weakfish	176.0	45	382	76.0	407	158.3	25	416	75.4	473
harvestfish	.	.	.	.	0	99	.	.	.	1
kingfish	96.8	53	132	25.4	6	78.1	31	139	26.4	27
searobins	65.0	58	72	9.9	2	62.0	57	67	7.1	2
alewife	117.3	102	142	9.8	18	112.1	99	141	14.4	7
American shad	103	.	.	.	1	99	.	.	.	1
striped bass	217.1	84	356	69.0	83	196.8	73	286	64.7	56
white perch	147.0	64	280	78.7	744	116.3	57	243	58.9	450
spot	126.3	94	207	39.8	1337	128.6	87	213	32.4	485
Atlantic menhaden	170.8	98	205	49.0	4	214	.	.	.	1
catfishes	286.7	161	404	54.7	54	289.9	231	437	51.4	56
gizzard shad	176.4	104	305	59.7	13	149.0	113	185	50.9	2
spotted seatrout	.	.	.	.	0	195	.	.	.	1
American eel	.	.	.	.	0	265.0	151	369	109.3	3
spotted hake	72.5	66	81	6.9	4	159.4	70	305	108.9	8
sea lamprey	.	.	.	.	0	146.4	128	160	15.0	9
feather blenny	73	.	.	.	1	.	.	.	.	0
Atlantic silverside	.	.	.	.	0	79	.	.	.	1
hogchoker	90.8	53	184	49.8	1626	96.2	57	179	41.2	931
blackcheek tonguefish	144.0	114	162	15.1	8	104.9	61	161	35.3	91
oyster toadfish	219.3	113	337	53.1	56	213.1	51	324	56.7	101
silver perch	156.9	108	205	31.6	135	166.9	112	214	32.1	90
fringed flounder	.	.	.	.	0	134.5	125	144	13.4	2
gobies	.	.	.	.	0	44.0	43	45	1.4	2
penaeid shrimp	133.6	96	174	19.2	57	142.3	103	173	17.2	33
blue crab	39.8	12	147	26.4	140	36.5	15	144	25.1	258

Appendix 6. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 010 (15 minute tows) and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 010					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
scup	169.5	147	191	19.1	11	173	.	.	.	1
black seabass	.	.	.	.	0	169.7	138	202	32.0	3
summer flounder	238.6	155	425	82.2	17	221.1	63	561	79.6	91
butterfish	126.2	58	186	28.7	32	135.2	71	172	31.2	10
Atlantic croaker	178.4	28	343	28.8	837	151.7	14	262	73.7	553
weakfish	191.4	39	358	71.0	1171	145.5	24	325	57.9	617
bluefish	220	.	.	.	1	132	.	.	.	1
harvestfish	95.5	79	112	11.0	6	.	.	.	.	0
kingfish	176.5	114	239	88.4	2	83.8	25	279	76.5	19
squid	40.9	32	53	7.4	7	35.0	32	38	4.2	2
searobins	.	.	.	.	0	81.8	57	199	35.8	13
striped bass	224.7	211	235	8.1	6	215	.	.	.	1
white perch	192.2	181	208	11.1	9	.	.	.	.	0
spot	129.2	97	213	23.3	943	131.0	93	260	32.3	3716
northern puffer	.	.	.	.	0	153.7	76	256	63.1	6
tautog	.	.	.	.	0	137.3	131	147	7.4	4
pigfish	162.5	162	163	0.7	2	156.9	127	176	12.4	24
American eel	373	.	.	.	1	.	.	.	.	0
Atlantic spadefish	91.0	80	109	9.3	7	112.5	93	132	27.6	2
spotted hake	.	.	.	.	0	237	.	.	.	1
striped anchovy	94.7	90	101	5.7	3	77.5	69	93	10.6	4
lined seahorse	.	.	.	.	0	115	.	.	.	1
hogchoker	104.6	65	183	36.2	300	105.6	65	181	29.0	470
blackcheek tonguefish	142.3	137	147	4.3	4	132.1	92	159	22.5	14
oyster toadfish	236.3	160	344	67.9	13	194.8	38	298	64.7	31
pipefish	.	.	.	.	0	258.0	177	339	114.6	2
clearnose skate	.	.	.	.	0	432.3	396	469	33.6	4
bluntnose stingray	142.0	75	209	94.8	2	.	.	.	.	0
inshore lizardfish	232.3	182	295	57.5	3	195.3	109	281	40.1	19
Atlantic moonfish	87.0	86	88	1.4	2	.	.	.	.	0
silver perch	160.3	95	215	37.3	378	152.3	84	211	34.1	117
banded drum	.	.	.	.	0	101.7	85	113	14.7	3
pinfish	144.8	136	154	7.2	10	141.7	136	150	5.5	19

Appendix 6 (Continued).

	Gear 010					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
fringed flounder	.	.	.	.	0	111.8	96	128	14.0	5
smallmouth flounder	.	.	.	.	0	89.2	58	118	21.6	6
gobies	.	.	.	.	0	32.3	27	39	6.1	3
penaeid shrimp	139.3	109	168	19.3	15	121.7	84	161	19.9	48
blue crab	52.1	14	135	33.8	79	67.5	13	162	42.0	236

Appendix 7. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 010V (5 minute tows) and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 010V					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
scup	156.6	116	191	23.6	17	135.5	118	157	13.6	8
black seabass	185.0	.	.	.	1	188.0	.	.	.	1
summer flounder	247.4	152	418	78.0	29	304.1	164	505	103.9	30
butterfish	148.0	148	148	.	1	91.2	28	146	42.1	6
Atlantic croaker	159.9	22	298	66.8	1147	154.5	20	261	79.6	1162
weakfish	111.1	38	333	76.0	1131	100.4	28	316	84.5	1408
bluefish	.	.	.	.	0	50.0	.	.	.	1
harvestfish	74.5	48	100	14.8	18	78.9	60	100	9.8	57
kingfish	84.1	37	135	29.7	11	77.9	28	194	25.8	109
squid	61.3	27	82	18.1	16	41.5	24	78	15.2	22
searobins	.	.	.	.	0	136.0	78	194	82.0	2
blueback herring	70.8	65	77	4.5	5	66.0	58	73	4.9	14
striped bass	117.0	30	418	41.5	238	114.4	67	392	42.3	334
white perch	148.3	63	246	58.2	147	122.2	63	270	70.3	276
spot	125.4	71	219	56.5	2760	125.5	61	225	56.5	2625
Atlantic menhaden	.	.	.	.	0	122.0	.	.	.	1
Atlantic thread herring	62.2	52	68	5.5	6	55.1	46	93	14.7	9
Spanish mackerel	130.3	53	183	68.4	3	115.0	38	158	66.8	3
catfishes	177.0	70	284	151.3	2	.	.	.	.	0
northern puffer	141.4	75	266	60.7	14	101.1	48	218	42.3	22
gizzard shad	177.0	113	337	63.3	23	180.0	97	364	75.3	44
spotted seatrout	.	.	.	.	0	231.0	.	.	.	1
pigfish	185.0	.	.	.	1	183.0	166	193	14.8	3
windowpane	282.0	.	.	.	1	282.0	.	.	.	1
Atlantic spadefish	77.4	59	91	10.6	8	86.5	63	115	12.3	18
spotted hake	171.0	.	.	.	1	168.0	.	.	.	1
sea lamprey	.	.	.	.	0	169.8	158	187	12.8	5
striped anchovy	71.5	53	98	16.4	11	80.5	50	117	18.3	78
bay anchovy	49.8	26	79	17.1	1045	46.4	24	83	86.5	55313
mummichog	.	.	.	.	0	86.0	.	.	.	1
striped killifish	.	.	.	.	0	128.0	.	.	.	1
feather blenny	48.0	.	.	.	1	.	.	.	.	0
rough silverside	.	.	.	.	0	87.1	74	97	10.5	8

Appendix 7 (Continued).

	Gear 010V					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
Atlantic silverside	88.0	.	.	.	1	85.3	73	94	10.5	4
hogchoker	94.1	61	174	24.1	602	95.1	37	181	30.6	653
blackcheek tonguefish	123.6	38	155	25.4	16	135.3	70	156	14.6	48
skilletfish	52.0	.	.	.	1	.	.	.	.	0
oyster toadfish	200.2	55	333	69.7	18	168.3	55	294	55.1	26
pipefish	.	.	.	.	0	111.0	85	172	41.0	4
Atlantic stingray	473.0	.	.	.	1	267.0	.	.	.	1
inshore lizardfish	212.7	117	320	50.5	23	181.4	89	293	47.4	39
conger eel	.	.	.	.	0	437.5	423	452	20.5	2
blue runner	123.5	107	135	11.1	6	120.7	104	138	8.7	16
silver perch	144.3	63	202	32.1	36	161.5	49	208	41.3	52
Atlantic cutlassfish	.	.	.	.	0	294.3	260	325	35.1	4
northern stargazer	.	.	.	.	0	52.0	28	76	33.9	2
fringed flounder	143.0	.	.	.	1	.	.	.	.	0
gobies	.	.	.	.	0	34.0	32	37	2.2	4
gray snapper	.	.	.	.	0	86.0	.	.	.	1
penaeid shrimp	158.0	.	.	.	1	155.0	134	176	29.7	2
blue crab	60.4	13	154	37.1	487	51.0	5	172	43.1	1005

Appendix 8. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 010V (15 minute tows) and 108 comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), pipefish (*Sygnathus* spp.), gobies (Gobiidae), and penaeid shrimp (*Penaeus* spp.) were combined.

	Gear 010V					Gear 108				
	mean	min	max	s	n	mean	min	max	s	n
black seabass	187.2	150	220	26.9	5	162.0	132	192	42.4	2
summer flounder	211.5	161	378	40.5	333	215.2	162	468	54.1	101
butterfish	98.5	75	122	33.2	2	89.2	51	110	24.2	5
Atlantic croaker	180.6	35	283	31.5	461	68.0	12	214	104.8	922
weakfish	131.4	67	352	64.3	2717	123.4	56	355	61.0	1552
harvestfish	81.3	72	97	7.0	47	79.9	66	107	8.7	36
kingfish	144.4	92	222	26.4	52	129.4	79	175	23.0	53
squid	50.0	44	56	8.5	2	53.0	53	53	.	1
searobins	66.0	42	81	21.0	3	81.3	47	151	48.8	4
spot	160.3	116	235	25.0	617	157.2	116	230	23.5	274
black drum	219.0	212	226	9.9	2	.	.	.	.	0
spotted seatrout	221.5	193	250	40.3	2	.	.	.	.	0
American eel	734.0	.	.	.	1	322.0	.	.	.	1
Atlantic spadefish	79.6	75	86	5.4	5	74.0	68	80	8.5	2
bay anchovy	60.8	27	89	16.8	176	50.0	28	81	65.4	12872
feather blenny	81.0	.	.	.	1	.	.	.	.	0
hogchoker	105.7	64	185	44.2	1210	108.7	63	186	41.1	857
blackcheek tonguefish	132.5	105	161	12.8	504	130.6	68	171	13.7	369
oyster toadfish	222.5	90	352	70.4	214	219.2	109	339	62.3	113
inshore lizardfish	221.0	172	273	30.0	19	206.3	152	258	34.4	10
conger eel	463.0	437	509	39.9	3	432.0	427	437	7.1	2
lookdown	76.0	63	100	17.0	4	89.3	72	103	15.8	3
silver perch	137.4	95	221	25.9	464	134.4	93	196	22.3	210
gobies	64.0	35	93	41.0	2	47.3	33	70	19.9	3
spotfin mojarra	94.0	.	.	.	1	.	.	.	.	0
penaeid shrimp	127.7	102	168	13.3	31	132.3	110	158	14.2	22
blue crab	47.9	16	212	42.2	355	38.9	14	168	42.7	439

Appendix 9. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for comparisons between gear 035 and 033 using the R/V *Pathfinder* and *Langley*. Searobins (*Prionotus* spp.), catfishes (Ictaluridae) and pipefish (*Sygnathus* spp.) were combined.

	Gear 035					Gear 033/Pathfinder				
	mean	min	max	s	n	mean	min	max	s	n
black seabass	139.0	103	157	20.1	7	133.5	87	165	26.4	11
summer flounder	189.5	122	397	78.3	24	231.5	75	560	110.5	49
Atlantic croaker	109.1	36	312	60.8	1823	109.4	56	330	88.2	3389
weakfish	201.0	160	225	35.7	3	256.3	180	445	69.7	29
searobins	105.5	97	114	12.0	2	157.0	117	222	56.8	3
alewife	185.5	122	249	89.8	2	187.2	50	286	76.2	12
blueback herring	.	.	.	.	0	55.5	55	56	0.7	2
white perch	165.0	165	165	.	1	143.5	45	204	59.3	8
spot	81.8	45	223	36.6	848	90.0	28	275	62.8	1634
Atlantic menhaden	66.3	57	75	7.9	4	71.7	53	139	16.9	51
catfishes	215.9	172	324	51.6	7	193.1	87	352	60.9	52
spotted seatrout	207.7	135	245	34.3	9	.	.	.	.	0
American eel	231.2	100	465	98.9	15	270.3	140	570	108.3	50
bay anchovy	48.3	12	82	30.7	567	56.0	20	114	26.9	907
feather blenny	.	.	.	.	0	104.0	104	104	.	1
hogchoker	102.3	22	225	61.2	1581	97.7	29	204	51.9	1480
blackcheek tonguefish	85.9	47	109	18.5	14	85.3	61	125	15.8	88
oyster toadfish	158.2	67	303	59.3	33	191.9	73	365	81.2	42
pipefish	.	.	.	.	0	151.5	96	182	39.0	4
bluntnose stingray	495.0	495	495	.	1	.	.	.	.	0
conger eel	475.0	475	475	.	1	438.0	438	438	.	1
lookdown	.	.	.	.	0	83.0	83	83	.	1
silver perch	.	.	.	.	0	124.5	75	174	70.0	2
blue crab	68.1	24	165	25.3	194	64.9	16	155	25.8	313

	Gear 035					Gear 033/Langley				
summer flounder	159.7	63	275	36.6	79	170.0	63	370	42.7	159
butterfish	23.3	20	25	2.2	4	.	.	.	.	0
Atlantic croaker	221.8	126	282	48.0	30	238.5	95	315	38.6	61
weakfish	151.8	22	302	82.6	18	99.1	18	305	118.1	63
harvestfish	.	.	.	.	0	22.5	20	25	3.5	2
searobins	.	.	.	.	0	130.0	130	130	.	1
spot	113.5	80	195	42.8	424	115.2	73	243	46.4	802

Appendix 9 (Continued).

	Gear 035					Gear 033/Langley				
	mean	min	max	s	n	mean	min	max	s	n
Atlantic menhaden	210.0	210	210	.	1	155.0	155	155	.	1
American eel	.	.	.	.	0	390.0	390	390	.	1
striped anchovy	68.8	62	72	4.6	4	.	.	.	.	0
bay anchovy	59.6	45	82	15.2	636	59.7	35	83	11.2	289
Atlantic silverside	70.0	70	70	.	1	.	.	.	.	0
hogchoker	113.2	62	181	39.3	439	111.7	76	175	32.4	435
oyster toadfish	190.0	190	190	.	1	163.8	37	292	90.0	11
pipefish	231.0	231	231	.	1	.	.	.	.	0
inshore lizardfish	.	.	.	.	0	216.0	216	216	.	1
cusk-eel	252.0	252	252	.	1	.	.	.	.	0

Appendix 10. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by gear for the gear 010 (5 minutes) and 043 comparisons. Kingfish (*Menticirrhus* spp.) and searobins (*Prionotus* spp.) were combined.

	Gear 010					Gear 043				
	mean	min	max	s	n	mean	min	max	s	n
black seabass	179.0	172	186	9.9	2	.	.	.	.	0
summer flounder	218.4	91	389	63.3	20	213.2	160	450	62.0	30
butterfish	59.6	47	82	9.3	20	64.1	52	80	7.9	13
Atlantic croaker	129.8	125	140	6.9	4	.	.	.	.	0
weakfish	191.0	47	280	33.7	64	172.5	27	230	54.3	29
bluefish	195.0	185	205	14.1	2	173	.	.	.	1
kingfish	.	.	.	.	0	303	.	.	.	1
searobins	52	.	.	.	1	.	.	.	.	0
spot	116.2	90	210	16.2	299	118.5	90	225	19.8	310
winter flounder	90.2	84	93	3.7	5	88.5	76	94	5.7	8
northern puffer	204.5	188	230	13.8	8	199.2	175	231	13.3	24
pigfish	166.3	113	202	37.9	4	.	.	.	.	0
striped anchovy	140	.	.	.	1	.	.	.	.	0
bay anchovy	66.5	61	72	7.8	2	56.5	54	59	3.5	2
feather blenny	91	.	.	.	1	105	.	.	.	1
oyster toadfish	136.3	35	305	61.1	22	124.1	35	280	56.5	33
silver perch	163.7	73	205	22.7	148	152.4	85	195	27.5	161
blue crab	95.9	27	165	31.3	280	92.8	27	164	32.5	675

Appendix 11. Mean, minimum and maximum lengths (mm), standard deviations and numbers caught of each species, by vessel for the *Captain John Smith* and *Fish Hawk* comparisons. Kingfish (*Menticirrhus* spp.), searobins (*Prionotus* spp.), catfishes (Ictaluridae), pipefish (*Sygnathus* spp.), and gobies (Gobiidae), were combined.

	Captain John Smith					*Fish Hawk*				
	mean	min	max	s	n	mean	min	max	s	n
scup	138.0	124	191	15.3	35	144.4	140	147	2.9	5
black seabass	118.0	52	150	45.3	6	154.5	140	170	12.9	4
summer flounder	173.2	137	289	35.1	20	255.7	100	414	117.2	13
Atlantic croaker	196.5	88	254	36.7	213	192.1	106	228	37.9	184
weakfish	66.2	23	259	50.6	2565	64.6	15	265	64.0	2970
harvestfish	56.5	18	86	21.4	35	59.1	17	93	22.0	49
kingfish	68.4	28	121	24.4	217	63.4	23	134	23.5	171
searobins	154.8	78	188	52.2	5	141.8	105	168	21.8	6
blueback herring	.	.	.	.	0	63.0	.	.	.	1
striped bass	557.0	547	567	14.1	2	.	.	.	.	0
white perch	161.6	109	205	27.5	24	155.6	129	184	16.5	25
spot	125.9	65	241	65.2	2916	119.0	32	222	63.7	2912
Atlantic menhaden	114.9	102	132	10.3	11	123.5	119	128	6.4	2
Atlantic thread herring	86.0	80	91	4.5	4	.	.	.	.	0
catfishes	258.2	103	597	92.2	37	215.6	98	457	94.6	46
northern puffer	91.0	76	106	21.2	2	98.7	82	118	18.1	3
pigfish	162.7	59	219	89.9	3	197.0	194	200	4.2	2
American eel	259.4	145	534	65.3	153	255.2	122	598	76.9	177
windowpane	124.0	.	.	.	1	.	.	.	.	0
Atlantic spadefish	53.4	23	80	17.6	31	50.0	33	79	12.6	60
striped anchovy	80.2	62	89	8.9	13	75.0	65	86	11.0	4
bay anchovy	53.0	23	93	24.2	905	57.4	23	93	24.7	1055
feather blenny	.	.	.	.	0	113.0	.	.	.	1
hogchoker	84.7	15	182	62.0	3863	83.5	31	169	69.4	4047
blackcheek tonguefish	106.6	46	160	32.5	85	110.6	43	160	22.3	70
oyster toadfish	182.6	48	369	76.1	74	170.6	61	312	65.8	43
pipefish	202.0	.	.	.	1	.	.	.	.	0
southern stingray	.	.	.	.	0	315.0	.	.	.	1
inshore lizardfish	115.4	111	126	6.1	5	127.0	.	.	.	1
silver perch	75.5	40	172	32.3	80	84.0	47	157	33.4	17
fawn cusk-eel	149.0	138	168	14.0	5	196.0	.	.	.	1
striped cusk-eel	139.0	.	.	.	1	.	.	.	.	0
smallmouth flounder	61.0	.	.	.	1	97.5	79	116	26.2	2

Appendix 11 (Continued).

	Captain John Smith					*Fish Hawk*				
	mean	min	max	s	n	mean	min	max	s	n
gobies	33.3	29	38	4.5	3	.	.	.	.	0
blue crab	84.3	8	220	67.9	3152	102.0	15	192	63.8	3257

Appendix 12. Mean, minimum and maximum lengths (mm), standard deviations and numbers of blue crabs caught, by vessel for the R/V *Langley* - *Captain John Smith* and R/V *Pathfinder* - *Captain John Smith* comparisons. Fish species were not measured.

	mean	min	max	s	n	mean	min	max	s	n
			Langley					*Captain John Smith*		
blue crab	62.9	25	164	22.0	591	64.4	30	163	22.7	640
			Pathfinder					*Captain John Smith*		
blue crab	76.0	17	187	26.1	1122	78.4	7	185	25.8	1827

Appendix 13. Weighted mean catch difference between gears 033 and 108, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
scup	-0.018	0.200	-0.236	0.031	5	0.109	NS
black seabass	-0.314	-0.146	-0.483	0.070	12	0.793	*
summer flounder	-0.230	-0.135	-0.325	0.063	29	0.553	*
butterfish	-0.014	0.089	-0.117	0.026	12	0.649	*
Atlantic croaker	-0.107	0.010	-0.225	0.106	32	0.882	*
weakfish	-0.063	0.088	-0.214	0.116	22	0.810	*
bluefish	0.080	0.586	-0.427	0.042	3	-0.930	NS
harvestfish	-0.045	0.260	-0.350	0.037	4	0.868	NS
kingfish	0.015	0.252	-0.223	0.051	6	0.380	NS
squid	-0.083	0.206	-0.371	0.054	5	0.772	NS
searobins	-0.457	-0.286	-0.628	0.111	17	0.805	*
Atlantic herring	0.151	.	.	.	1	.	
striped bass	0.036	0.210	-0.139	0.060	10	0.752	*
white perch	-0.115	0.209	-0.439	0.205	10	0.773	*
spot	-0.356	-0.165	-0.546	0.213	25	0.583	*
Atlantic menhaden	0.143	0.425	-0.138	0.134	9	0.686	*
Atlantic thread herring	0.100	0.316	-0.116	0.008	3	.	
Spanish mackerel	-0.151	-0.151	-0.151	0.000	2	.	
catfishes	-0.161	0.012	-0.333	0.043	8	0.730	*
northern puffer	-0.151	-0.151	-0.151	0.000	2	.	
gizzard shad	-0.021	0.189	-0.232	0.075	9	0.416	NS
pigfish	0.029	0.424	-0.365	0.025	3	-0.150	NS
American eel	0.151	.	.	.	1	.	

Appendix 13 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
windowpane	-0.140	0.040	-0.320	0.029	6	-0.650	NS
Atlantic spadefish	-0.195	0.365	-0.754	0.004	2	.	
spotted hake	0.046	0.144	-0.052	0.029	14	0.774	*
river herrings	-0.038	0.123	-0.198	0.037	8	-0.210	NS
sea lamprey	0.028	0.208	-0.151	0.038	7	-0.210	NS
longnose gar	-0.151	.	.	.	1	.	
striped anchovy	0.050	0.367	-0.267	0.170	9	0.566	NS
bay anchovy	0.084	0.334	-0.166	0.433	29	0.707	*
lined seahorse	0.000	0.277	-0.277	0.030	4	-1.000	
feather blenny	-0.050	0.382	-0.482	0.030	3	-1.000	
hogchoker	-0.477	-0.310	-0.643	0.220	33	0.734	*
blackcheek tonguefish	-0.265	-0.150	-0.380	0.053	18	0.000	NS
skilletfish	-0.151	.	.	.	1	.	
oyster toadfish	-0.109	0.012	-0.231	0.033	11	-0.110	NS
pipefish	-0.108	0.008	-0.224	0.026	10	0.062	NS
smooth dogfish	-0.151	.	.	.	1	.	
clearnose skate	-0.173	0.083	-0.428	0.026	4	-0.330	NS
Dasyatis spp.	-0.100	0.471	-0.672	0.053	3	-0.870	NS
spiny butterfly ray	-0.050	0.382	-0.482	0.030	3	-1.000	
bullnose ray	0.151	.	.	.	1	.	
inshore lizardfish	-0.602	.	.	.	1	.	
conger eel	-0.151	.	.	.	1	.	
silver perch	0.077	0.199	-0.045	0.041	13	0.121	NS
banded drum	-0.151	.	.	.	1	.	
smallmouth flounder	-0.186	-0.041	-0.331	0.014	5	0.053	NS
planehead filefish	0.151	.	.	.	1	.	
striped burrfish	-0.050	0.382	-0.482	0.030	3	-1.000	
gobies	-0.100	0.116	-0.316	0.008	3	.	
penaeid shrimp	0.000	1.912	-1.910	0.045	2	.	
blue crab	-0.401	-0.271	-0.530	0.133	33	0.726	*

Appendix 14. Weighted mean catch difference between gears 070 and 108, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
scup	0.060	0.270	-0.150	0.029	5	0.064	NS
black seabass	-0.088	0.016	-0.191	0.027	12	-0.100	NS
summer flounder	-0.002	0.096	-0.100	0.059	26	0.719	*
butterfish	0.090	0.216	-0.036	0.014	6	-0.210	NS
Atlantic croaker	0.152	0.320	-0.017	0.137	21	0.844	*
weakfish	0.152	0.341	-0.038	0.126	16	0.809	*
bluefish	0.038	0.267	-0.192	0.021	4	-0.580	NS
harvestfish	-0.082	0.395	-0.558	0.090	4	-0.810	NS
kingfish	-0.012	0.185	-0.210	0.025	5	-0.130	NS
squid	0.264	0.798	-0.269	0.112	4	0.577	NS
searobins	-0.175	-0.018	-0.332	0.055	11	0.713	*
striped bass	0.208	0.564	-0.148	0.148	7	0.620	NS
white perch	0.169	0.565	-0.226	0.102	5	0.758	NS
spot	0.165	0.277	0.053	0.080	27	0.946	*
Atlantic menhaden	-0.060	0.456	-0.576	0.105	4	-0.850	NS
Spanish mackerel	-0.151	.	.	.	1	.	
catfishes	0.070	0.368	-0.229	0.058	5	0.458	NS
northern puffer	0.075	0.353	-0.203	0.070	6	0.147	NS
gizzard shad	-0.050	0.382	-0.482	0.030	3	-1.000	
tautog	-0.151	.	.	.	1	.	
pigfish	-0.024	0.250	-0.298	0.049	5	0.911	*
American eel	-0.130	0.170	-0.429	0.015	3	-0.500	NS
windowpane	-0.151	.	.	.	1	.	

Appendix 14 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
Atlantic spadefish	0.119	0.516	-0.278	0.002	2	.	
spotted hake	0.103	0.249	-0.044	0.064	14	0.574	*
river herrings	0.014	0.223	-0.195	0.051	7	-0.420	NS
sea lamprey	-0.050	0.382	-0.482	0.030	3	0.000	
longnose gar	-0.151	.	.	.	1	.	
striped anchovy	0.180	0.575	-0.215	0.025	3	-0.910	NS
bay anchovy	0.319	0.519	0.109	0.256	27	0.876	*
lined seahorse	0.044	1.397	-1.310	0.023	2	.	
yellow perch	-0.151	.	.	.	1	.	
feather blenny	0.144	0.368	-0.080	0.045	6	-0.310	NS
hogchoker	-0.034	0.192	-0.261	0.301	25	0.746	*
blackcheek tonguefish	-0.150	-0.018	-0.281	0.088	22	-0.079	NS
skilletfish	0.080	0.586	-0.427	0.042	3	0.130	NS
oyster toadfish	0.001	0.113	-0.110	0.050	18	0.794	*
pipefish	-0.033	0.078	-0.144	0.024	10	-0.240	NS
clearnose skate	-0.151	.	.	.	1	.	
Atlantic stingray	0.000	1.912	-1.910	0.045	2	.	
inshore lizardfish	0.004	0.325	-0.317	0.067	5	0.592	NS
conger eel	-0.195	0.365	-0.754	0.004	2	.	
blue runner	0.151	.	.	.	1	.	
lookdown	0.000	1.912	-1.910	0.045	2	.	
Atlantic moonfish	0.000	1.912	-1.910	0.045	2	.	
silver perch	0.261	0.410	0.112	0.072	15	0.730	*
banded drum	-0.151	.	.	.	1	.	
Atlantic cutlassfish	0.000	1.912	-1.910	0.045	2	.	
northern stargazer	-0.151	.	.	.	1	.	
striped cusk-eel	0.151	.	.	.	1	.	
fringed flounder	-0.151	-0.151	-0.151	0.000	4	1.000	
smallmouth flounder	-0.054	0.155	-0.262	0.007	3	0.993	*
gobies	0.034	0.161	-0.093	0.019	7	0.520	NS
silver jenny	-0.151	.	.	.	1	.	
bay whiff	-0.151	.	.	.	1	.	
penaeid shrimp	0.008	0.186	-0.171	0.071	11	0.143	NS
blue crab	-0.067	0.085	-0.219	0.148	27	0.824	*

Appendix 15. Weighted mean catch difference between gears 043 and 108, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
scup	0.301	.	.	.	1	.	
black seabass	-0.301	.	.	.	1	.	
summer flounder	-0.114	0.090	-0.318	0.081	10	0.606	NS
butterfish	0.349	.	.	.	1	.	
Atlantic croaker	0.102	0.323	-0.119	0.121	12	0.478	NS
weakfish	-0.254	0.053	-0.561	0.233	12	0.281	NS
bluefish	0.151	0.151	0.151	0.000	2	.	
harvestfish	-0.007	0.449	-0.463	0.082	4	-1.000	
kingfish	-0.042	0.266	-0.350	0.161	9	-0.200	NS
squid	0.151	.	.	.	1	.	
searobins	0.027	0.228	-0.174	0.026	5	0.833	NS
alewife	-0.151	.	.	.	1	.	
striped bass	0.151	.	.	.	1	.	
spot	0.159	0.312	0.006	0.064	13	0.937	*
Atlantic menhaden	-0.151	.	.	.	1	.	
catfishes	0.389	.	.	.	1	.	
northern puffer	-0.088	.	.	.	1	.	
gizzard shad	-0.151	.	.	.	1	.	
pigfish	-0.030	0.209	-0.268	0.037	5	0.947	*
American eel	0.021	0.579	-0.537	0.050	3	-1.000	NS
windowpane	-0.301	.	.	.	1	.	
Atlantic spadefish	-0.226	0.730	-1.180	0.011	2	.	
spotted hake	0.151	.	.	.	1	.	
striped anchovy	0.151	.	.	.	1	.	
bay anchovy	-1.034	-0.759	-1.308	0.187	12	0.763	*
inland silverside	0.151	.	.	.	1	.	

Appendix 15 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
hogchoker	0.244	0.540	-0.052	0.238	13	0.545	NS
blackcheek tonguefish	0.029	0.222	-0.165	0.064	9	0.364	NS
oyster toadfish	0.127	0.270	-0.017	0.051	12	0.792	*
pipefish	-0.151	.	.	.	1	.	
clearnose skate	-0.389	.	.	.	1	.	
Atlantic stingray	-0.151	.	.	.	1	.	
inshore lizardfish	0.067	0.159	-0.024	0.012	8	0.898	*
Atlantic moonfish	-0.151	.	.	.	1	.	
silver perch	-0.251	0.012	-0.513	0.153	11	0.642	*
Atlantic cutlassfish	-0.195	0.365	-0.754	0.004	2	.	
fringed flounder	-0.151	.	.	.	1	.	
smallmouth flounder	-0.374	.	.	.	1	.	
gobies	-0.301	.	.	.	1	.	
silver jenny	0	.	.	.	1	.	
bay whiff	-0.151	.	.	.	1	.	
penaeid shrimp	-0.165	0.020	-0.349	0.058	9	0.744	*
blue crab	0.110	0.342	-0.121	0.147	13	0.472	NS

Appendix 16. Weighted mean catch difference between gears 010 (7.5 minutes) and 108, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
summer flounder	-0.005	0.237	-0.247	0.084	8	0.094	NS
Atlantic croaker	-0.320	0.037	-0.676	0.315	12	0.313	NS
weakfish	-0.088	0.104	-0.281	0.053	8	0.913	*
harvestfish	-0.151	.	.	.	1	.	
kingfish	-0.232	0.071	-0.535	0.083	6	-0.340	NS
searobins	0.031	1.547	-1.480	0.028	2	.	
striped bass	0.175	0.341	0.009	0.018	5	0.948	*
white perch	0.132	0.537	-0.273	0.149	6	0.948	*
spot	0.061	0.425	-0.303	0.294	11	0.766	*
Atlantic menhaden	0.090	0.257	-0.077	0.018	5	-1.000	
catfishes	0.038	0.283	-0.207	0.070	7	0.850	*
gizzard shad	0.292	0.405	0.178	0.005	4	0.860	NS
spotted seatrout	-0.151	.	.	.	1	.	
American eel	-0.151	-0.151	-0.151	0.000	3	.	
spotted hake	-0.113	0.246	-0.472	0.051	4	-0.900	NS
river herrings	0.226	0.487	-0.034	0.027	4	0.794	NS
sea lamprey	-0.464	1.611	-2.540	0.053	2	.	
feather blenny	0.151	.	.	.	1	.	
bay anchovy	-0.732	-0.483	-0.980	0.153	12	0.418	NS
Atlantic silverside	-0.151	.	.	.	1	.	
hogchoker	0.194	0.627	-0.238	0.463	12	0.164	NS
blackcheek tonguefish	-0.362	-0.109	-0.614	0.108	9	0.263	NS
oyster toadfish	-0.254	0.013	-0.521	0.139	10	0.342	NS
silver perch	0.105	0.323	-0.113	0.068	8	0.796	*

Appendix 16 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
fringed flounder	-0.239	.	.	.	1	.	
gobies	-0.151	-0.151	-0.151	0.000	2	.	
penaeid shrimp	0.090	0.407	-0.227	0.118	7	0.577	NS
blue crab	-0.230	-0.049	-0.412	0.082	12	0.622	*
specimen unidentified	-0.151	.	.	.	1	.	

Appendix 17. Weighted mean catch difference between gears 010 (15 minutes) and 108, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
scup	0.294	5.942	-5.350	0.395	2	.	
black seabass	-0.195	0.365	-0.754	0.004	2	.	
summer flounder	-0.494	-0.237	-0.750	0.111	9	-0.330	NS
butterfish	0.267	0.547	-0.014	0.092	7	0.171	NS
Atlantic croaker	0.159	0.298	0.020	0.038	10	0.928	*
weakfish	0.212	0.353	0.071	0.039	10	0.942	*
bluefish	0.000	.	.	.	1	.	
harvestfish	0.251	0.467	0.035	0.008	3	.	
kingfish	-0.318	-0.105	-0.530	0.041	6	-0.100	NS
squid	0.163	1.120	-0.793	0.011	2	.	
searobins	-0.306	-0.111	-0.501	0.025	5	.	
striped bass	0.250	1.514	-1.010	0.020	2	.	
white perch	0.500	.	.	.	1	.	
spot	-0.428	-0.162	-0.694	0.138	10	0.678	*
northern puffer	-0.251	0.181	-0.683	0.030	3	.	
tautog	-0.270	1.246	-1.790	0.028	2	.	
pigfish	-0.449	0.222	-1.120	0.073	3	0.976	*
American eel	0.151	.	.	.	1	.	
Atlantic spadefish	0.180	0.938	-0.579	0.093	3	-0.610	NS
spotted hake	-0.151	.	.	.	1	.	
striped anchovy	-0.031	3.397	-3.46	0.146	2	.	
bay anchovy	-0.820	-0.286	-1.355	0.559	10	0.264	NS
lined seahorse	-0.151	.	.	.	1	.	
hogchoker	-0.558	-0.230	-0.886	0.210	10	0.785	*

Appendix 17 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
blackcheek tonguefish	-0.154	0.017	-0.324	0.042	8	-0.380	NS
oyster toadfish	-0.220	0.016	-0.457	0.066	7	0.439	NS
pipefish	-0.151	-0.151	-0.151	0.000	2	.	
clearnose skate	-0.239	-0.239	-0.239	0.000	2	.	
bluntnose stingray	0.239	.	.	.	1	.	
inshore lizardfish	-0.271	-0.075	-0.467	0.035	6	0.360	NS
Atlantic moonfish	0.239	.	.	.	1	.	
silver perch	0.384	0.527	0.240	0.040	10	0.882	*
banded drum	-0.151	-0.151	-0.151	0.000	3	.	
pinfish	-0.106	0.453	-0.666	0.004	2	.	
fringed flounder	-0.314	1.761	-2.390	0.053	2	.	
smallmouth flounder	-0.210	-0.020	-0.400	0.014	4	.	
gobies	-0.151	-0.151	-0.151	0.000	3	.	
penaeid shrimp	-0.230	-0.023	-0.438	0.084	10	0.286	NS
blue crab	-0.410	-0.245	-0.575	0.053	10	0.799	*

Appendix 18. Weighted mean catch difference between gears 035 and 033 (vessels combined), $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
black seabass	-0.151	0.308	-0.609	0.191	6	-0.136	NS
summer flounder	-0.247	-0.137	-0.356	0.098	34	0.713	*
butterfish	0.301	0.301	0.301	0.000	4	.	
Atlantic croaker	-0.209	-0.050	-0.369	0.310	50	0.621	*
weakfish	-0.413	-0.165	-0.660	0.199	15	0.317	NS
harvestfish	-0.301	-0.301	-0.301	0.000	2	.	
white perch	-0.314	0.410	-1.037	0.207	4	-0.796	NS
spot	-0.309	-0.153	-0.465	0.322	54	0.575	*
Atlantic menhaden	-0.416	-0.038	-0.794	0.354	12	-0.689	*
catfishes	-0.505	-0.154	-0.856	0.241	10	-0.496	NS
spotted seatrout	0.432	0.593	0.271	0.017	5	.	
American eel	-0.263	-0.060	-0.465	0.166	18	0.047	NS
searobins	-0.100	0.226	-0.423	0.097	6	-1.000	
river herrings	-0.310	-0.027	-0.592	0.114	8	0.619	NS
striped anchovy	0.452	2.364	-1.461	0.045	2	.	
bay anchovy	-0.417	-0.231	-0.603	0.408	48	0.442	*
northern pipefish	-0.181	0.154	-0.515	0.073	5	-1.000	
feather blenny	-0.301	.	.	.	1	.	
Atlantic silverside	0.301	.	.	.	1	.	
hogchoker	-0.161	0.004	-0.326	0.354	53	0.438	*
blackcheek tonguefish	-0.401	-0.162	-0.641	0.217	17	0.123	NS
oyster toadfish	-0.126	0.018	-0.271	0.149	30	-0.029	NS
bluntnose stingray	0.301	.	.	.	1	.	

Appendix 18 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
inshore lizardfish	-0.301	.	.	.	1	.	
conger eel	0.000	3.825	-3.825	0.181	2	.	
lookdown	-0.301	.	.	.	1	.	
silver perch	-0.301	-0.301	-0.301	0.000	2	.	
cusk-eel	0.301	.	.	.	1	.	
blue crab	-0.216	-0.063	-0.368	0.227	40	0.233	NS

Appendix 19. Weighted mean catch difference between gears 010 (5 minutes) and 043, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two gears, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
summer flounder	-0.301	-0.301	-0.301	0.000	2	.	
Atlantic croaker	-0.110	0.178	-0.398	0.119	8	0.486	NS
weakfish	-0.175	0.177	-0.528	0.113	6	0.184	NS
bluefish	-0.301	.	.	.	1	.	
American shad	-0.301	.	.	.	1	.	
white perch	-0.170	0.447	-0.787	0.150	4	-0.333	NS
spot	-0.018	0.267	-0.303	0.116	8	-0.313	NS
Atlantic menhaden	0.564	1.515	-0.386	1.056	7	0.077	NS
catfishes	0.420	0.833	0.008	0.067	4	0.897	NS
spotted seatrout	0.301	.	.	.	1	.	
American eel	-0.181	0.154	-0.515	0.073	5	0.000	
spotted hake	0.000	7.650	-7.650	0.725	2	.	
striped searobin	-0.301	.	.	.	1	.	
bay anchovy	-0.285	0.226	-0.796	0.237	6	-0.340	NS
hogchoker	-0.143	0.633	-0.919	0.862	8	0.591	NS
blackcheek tonguefish	0.588	1.997	-0.821	0.025	2	.	
oyster toadfish	0.089	0.644	-0.467	0.361	7	-0.809	*
fawn cusk-eel	0.389	1.508	-0.730	0.016	2	.	
blue crab	0.286	0.483	0.089	0.056	8	0.909	*

Appendix 20. Weighted mean catch difference between the R/V *Captain John Smith* and *Fish Hawk*, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two vessels, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
scup	-0.560	2.734	-3.850	0.134	2	.	
black seabass	-0.059	1.489	-1.610	0.388	3	-0.610	NS
summer flounder	-0.122	0.203	-0.447	0.096	6	0.662	NS
Atlantic croaker	-0.253	0.076	-0.582	0.268	12	0.692	*
weakfish	-0.192	0.287	-0.672	1.050	20	0.316	NS
harvestfish	0.015	0.210	-0.179	0.143	17	0.267	NS
kingfish	-0.059	0.148	-0.267	0.163	17	0.750	*
searobins	0.000	2.237	-2.240	0.062	2	.	
blueback herring	0.301	.	.	.	1	.	
striped bass	-0.301	-0.301	-0.301	0.000	2	.	
white perch	-0.021	0.344	-0.387	0.087	5	0.678	NS
spot	-0.077	0.320	-0.473	0.718	20	0.550	*
Atlantic menhaden	-0.433	1.240	-2.110	0.035	2	.	
Atlantic thread herring	-0.699	.	.	.	1	.	
catfishes	0.105	0.541	-0.331	0.173	6	0.662	NS
northern puffer	0.125	.	.	.	1	.	
pigfish	-0.151	1.762	-2.060	0.045	2	.	
American eel	0.045	0.370	-0.281	0.124	7	0.886	*
windowpane	-0.301	.	.	.	1	.	
Atlantic spadefish	0.096	0.529	-0.337	0.318	9	0.170	NS
striped anchovy	-0.327	-0.214	-0.441	0.002	3	1.000	*
bay anchovy	-0.499	-0.144	-0.854	0.542	19	0.627	*
feather blenny	0.301	.	.	.	1	.	
hogchoker	0.071	0.382	-0.241	0.392	18	0.697	*

Appendix 20 (Continued).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
blackcheek tonguefish	-0.179	0.188	-0.547	0.370	13	0.253	NS
oyster toadfish	-0.181	0.080	-0.441	0.168	12	0.412	NS
pipefish	-0.301	.	.	.	1	.	
southern stingray	0.301	.	.	.	1	.	
inshore lizardfish	-0.301	0.447	-1.050	0.091	3	-0.500	NS
silver perch	-0.440	0.023	-0.902	0.418	10	-0.272	NS
cusk-eel	-0.389	0.730	-1.508	0.016	2	.	
smallmouth flounder	0.088	5.032	-4.860	0.303	2	.	
gobies	-0.301	-0.301	-0.301	0.000	3	.	
blue crab	-0.041	0.054	-0.135	0.073	34	0.894	*

Appendix 21. Weighted mean catch difference between the R/V *Langley* and *Captain John Smith*, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two vessels, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
summer flounder	0.276	0.549	0.003	0.048	5	0.307	NS
Atlantic croaker	-0.057	0.393	-0.507	0.131	5	0.225	NS
weakfish	-0.114	0.291	-0.518	0.106	5	0.938	*
searobins	0.000	.	.	.	1	.	
white perch	0.000	3.825	-3.825	0.181	2	.	
spot	0.307	0.434	0.180	0.010	5	0.960	*
Atlantic menhaden	-0.276	0.257	-0.809	0.184	5	-0.435	NS
American eel	0.259	0.439	0.080	0.005	3	1.000	
spotted hake	0.106	0.726	-0.513	0.151	4	-1.000	
bay anchovy	0.327	2.239	-1.586	0.045	2	.	
hogchoker	-0.172	0.300	-0.645	0.145	5	-0.117	NS
oyster toadfish	-0.088	0.488	-0.664	0.131	4	0.020	NS
blue crab	-0.041	0.036	-0.119	0.004	5	0.921	*

Appendix 22. Weighted mean catch difference between the R/V *Pathfinder* and *Captain John Smith*, $\bar{\bar{D}}$, for all species caught, over all sizes. Also presented are the upper (UCL) and lower (LCL) 95% confidence limits of $\bar{\bar{D}}$, variance (s^2), the number of sets in which the species was collected (n), the coefficient of correlation (r) between catches by the two vessels, and significance of correlation ('*' = significance at $\alpha = 0.05$, 'NS' = not significant).

Species	$\bar{\bar{D}}$	UCL	LCL	s^2	n	r	
black seabass	-0.301	.	.	.	1	.	
summer flounder	-0.027	0.241	-0.294	0.178	12	-0.393	NS
Atlantic croaker	-0.285	-0.081	-0.488	0.287	29	0.534	*
weakfish	0.029	0.185	-0.126	0.226	39	0.170	NS
searobins	-0.301	.	.	.	1	.	
American shad	0.088	5.032	-4.860	0.303	2	.	
striped bass	0.301	.	.	.	1	.	
white perch	-0.169	0.047	-0.386	0.165	16	-0.673	*
spot	-0.240	-0.067	-0.412	0.272	38	0.455	*
Atlantic menhaden	-0.103	0.148	-0.353	0.237	17	-0.501	*
catfishes	-0.083	0.132	-0.299	0.285	26	-0.067	NS
gizzard shad	2.281	.	.	.	1	.	
sheepshead	0.602	.	.	.	1	.	
American eel	-0.113	0.158	-0.385	0.221	14	-0.012	NS
spotted hake	-0.108	0.147	-0.362	0.143	11	0.532	NS
river herrings	0.095	0.554	-0.363	0.136	5	-0.939	*
bay anchovy	-0.085	0.158	-0.329	0.255	19	-0.595	*
hogchoker	-0.460	-0.140	-0.780	0.981	40	-0.136	NS
oyster toadfish	-0.121	0.088	-0.329	0.375	36	-0.213	NS
fawn cusk-eel	0.301	.	.	.	1	.	
blue crab	-0.218	-0.114	-0.323	0.107	40	0.522	*

Appendix 23. Number of tows made with historical vessel and gear combinations from 1955 to 1996. When the vessel was not recorded, it was listed as unknown. (These numbers are subject to change pending extensive error checking of historical data.)

VESSEL	010	033	035	043	068	070	108	TOTAL
Aquarius (AQ)	0	0	0	18	0	0	0	18
W. K. Brooks (BR)	0	71	874	0	0	0	0	945
Fish Hawk (FH)	0	0	0	0	0	279	5834	6113
Investigator (IN)	6	0	28	0	0	0	0	34
old Capt. John Smith (J1)	0	0	0	0	0	1668	0	1668
Judith Ann (JA)	0	0	0	0	0	84	0	84
new Capt. John Smith (JS)	0	122	24	26	4	3765	0	3941
Langley (LA)	463	2395	49	261	76	0	0	3244
Langley II (LN)	0	0	0	0	0	37	0	37
Pathfinder (PA)	2546	420	22	923	207	100	0	4218
Restless (RE)	0	0	1850	0	0	0	0	1850
Sally Jean (SJ)	0	0	0	0	0	47	0	47
outboard skiff (SK)	0	0	20	0	0	0	0	20
Three Daughters (TD)	0	0	141	0	0	0	0	141
Virginia Lee (VL)	222	0	0	0	0	0	0	222
unknown	130	0	0	48	0	12	12	202
TOTAL	3367	3008	3008	1276	287	5992	5846	22784

Appendix 24. Steps for converting catches (x) from a particular gear/vessel combination (GR/VS) to the current combination of gear 108 and the *Fish Hawk* (108/FH). Vessel codes and dimensions, if known, are given in Appendix 1.

$$x''_{(GR/VS)} = \log_{10}(x_{(GR/VS)} + 1)$$
$$x''_{(108/FH)} = x''_{(GR/VS)} - D$$
$$x_{(108/FH)} = 10^{x''} - 1$$

where D is the conversion factor for a particular comparison, and length if necessary. Conversions assume J1 = JS, so vessel comparisons for PA-J1 (from *Pathfinder* to old *Captain John Smith*), and LA-J1 are compatible with JS-FH. No conversions are available for some vessels, so they are assumed equivalent to the *Fish Hawk*.

original GR/VS

010/PA	$D = [D_{(010-108)} + D_{(PA-J1)} + D_{(JS-FH)}]$
010/LA	$D = [D_{(010-108)} + D_{(LA-J1)} + D_{(JS-FH)}]$
010/VL,IN	$D = [D_{(010-108)}]$ (assume VL = IN = FH)
	$D_{(010-108)} = [D_{(010-043)} + D_{(043-108)}]$ may be used for tow durations of 5 minutes
033/PA	$D = [D_{(033-108)} + D_{(PA-J1)} + D_{(JS-FH)}]$
033/LA	$D = [D_{(033-108)} + D_{(LA-J1)} + D_{(JS-FH)}]$
033/JS	$D = [D_{(033-108)} + D_{(JS-FH)}]$
033/BR	$D = [D_{(033-108)}]$ (assume BR = FH)
035/BR,RE,IN,JS,SK,TD	$D = [D_{(035-033)} + D_{(033-108)}]$ (assume BR = RE = IN = JS = SK = TD = FH)
035/LA	$D = [D_{(035-033)} + D_{(033-108)} + D_{(LA-J1)} + D_{(JS-FH)}]$
035/PA	$D = [D_{(035-033)} + D_{(033-108)} + D_{(PA-J1)} + D_{(JS-FH)}]$

Conversions of bay anchovy catches from gear 035 to gear 033 probably should use the *Langley* vessel correction, since that vessel was used more often with gear 033 in the historical data. When the *Pathfinder* was used with gear 035, the *Pathfinder* conversion should be used to convert from that vessel.

043/PA	$D = [D_{(043-108)} + D_{(PA-J1)} + D_{(JS-FH)}]$
043/LA	$D = [D_{(043-108)} + D_{(LA-J1)} + D_{(JS-FH)}]$
043/JS	$D = [D_{(043-108)} + D_{(JS-FH)}]$
043/AQ	$D = [D_{(043-108)}]$ (assume AQ = FH)
assume gear 068 = 070	
070/PA	$D = [D_{(070-108)} + D_{(PA-J1)} + D_{(JS-FH)}]$
070/LA	$D = [D_{(070-108)} + D_{(LA-J1)} + D_{(JS-FH)}]$
070/JS,J1	$D = [D_{(070-108)} + D_{(JS-FH)}]$
070/FH,JA,SJ,LN	$D = [D_{(070-108)}]$ (assume JA = SJ = LN = FH)