New Jersey Department of Environmental Protection
Division of Fish and Wildlife
Marine Fisheries Administration
Bureau of Shellfisheries

DETERMINATION OF ABUNDANCE AND DISTRIBUTION OF BAY SCALLOPS (*ARGOPECTEN IRRADIANS*) IN LITTLE EGG HARBOR BAY.

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ABSTRACT

To determine the distribution and abundance of *Argopecten irradians* in Little Egg Harbor Bay, the New Jersey Bureau of Shellfisheries sampled 194 stations between the Route 72 causeway and Little Egg Harbor Inlet. All fieldwork was conducted between 31 October 2005 and 15 November 2005. Total *Argopecten* abundance (all sizes) is estimated at 528,538 individual scallops. The adult population (age 1+) is estimated at between 73 and 102 bushels, assuming 500 and 700 *Argopecten* bushel^{-1}, respectively. *Argopecten* abundances at individual stations ranged from 0.00 to 0.013 *Argopecten* foot^{-2}, or from 0.0 to 566 *Argopecten* acre^{-1}. In Little Egg Harbor Bay, most *Argopecten* occur in the shallow central and eastern portions of the bay. Significant associations existed between *Argopecten* and live *Zostera marina* (eelgrass) ($\chi^2 = 49.832$, $df = 1$, $p = 1.70 \times 10^{-12}$). Two dominant age classes emerged from our data: a juvenile age class with a mean shell height of 18.8 mm (SD = 5.4 mm), and an adult age class with a mean shell height of 53.3 mm (SD = 12.5 mm). Few *Argopecten* "boxes" (i.e., paired valves) were collected with a resultant low bay wide estimate of mortality. Over 90% of the *Argopecten* collected were age 0s, suggesting pre-survey harvest of adults or larval transport from adult stocks outside Little Egg Harbor Bay. Other explanations are proffered. The 2005 *Argopecten* survey of Little Egg Harbor Bay represents a positive step towards the management of New Jersey's *Argopecten* resource. Review of historical reported landings data for New Jersey along with studies documenting protracted *Argopecten* population recoveries demonstrate the delicate nature of *Argopecten* population dynamics. Before establishing a directed fishery in New Jersey, subsequent surveys are needed as well as a better understanding of *Argopecten* ecology in New Jersey.

INTRODUCTION

The bay scallop, *Argopecten irradians*, is an ecologically and economically important bivalve inhabiting coastal marine embayments where seagrasses are generally abundant (Gutsell 1930). Landings reported to the National Marine Fisheries Service indicate that this species was commercially harvested in New Jersey intermittently between 1956 and 1974 (Table 1). During this time, landings of 2.0 million pounds (mean/SD = 106,237 / 129,932 lbs) valued at $1.13 million (mean/SD = $59,717 / $72,236) were reported. Reports of abundant or even existent *Argopecten* were largely absent during the mid-1970s through the early 2000s. The reasons for *Argopecten*'s decline or absence are not known, though unsustainable levels of harvest or environmental factors (Gobler et al. 2005, Tettelbach and Wenczel 1993) might reasonably have contributed.

Beginning in the early-2000s the New Jersey Bureau of Shellfisheries began receiving periodic verbal reports that *Argopecten* was again becoming locally abundant in New Jersey coastal estuaries between Sea Isle City (Cape May County) and Barnegat Bay (Ocean County). These intermittent verbal reports combined with interest expressed by shellfishermen at Atlantic Coast Shellfisheries Council meetings were the impetus for the Bureau of Shellfisheries conducting the first quantitative, comprehensive *Argopecten* survey of Little Egg Harbor Bay. The goal of the present study is to determine the abundance and distribution of *Argopecten* in Little Egg Harbor Bay.

MATERIALS AND METHODS

Study Site

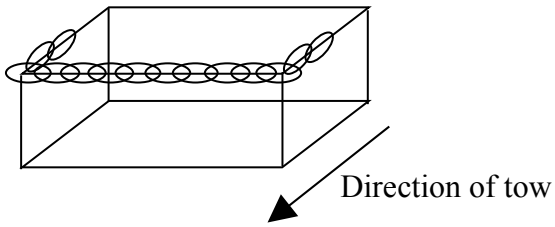
All fieldwork was conducted in Little Egg Harbor Bay, Ocean County, New Jersey (Figure 1). Little Egg Harbor Bay is one of three shallow microtidal bays that comprise the Barnegat Bay – Little Egg Harbor estuarine system (Barnegat Bay Estuary Program 1999). Seawater enters the system through the Point Pleasant Canal, Barnegat Inlet and Little Egg Inlet (Barnegat Bay Estuary Program 1999).

Sampling: Design, Equipment, and Protocol

Quantitative sampling was conducted from 31 October 2005 to 15 November 2005 in Little Egg Harbor Bay. We sampled all stations using a 20′ Privateer outboard vessel powered by a 115 hp outboard motor. All samples were collected with a single 1.00′ × 2.03′ × 0.83′ (D×W× H) scallop dredge, lined with 0.5″ × 0.5″ mesh wire. The anterior ventral dredge margin had a 4-pound weight (approximately 3/8″ diameter galvanized chain, approximately 17.5′ long) attached (Figure 2). Qualitative surveys conducted prior to the actual survey indicated that this weight enhanced the gear's ability to fish smoothly through submerged aquatic vegetation and algae.

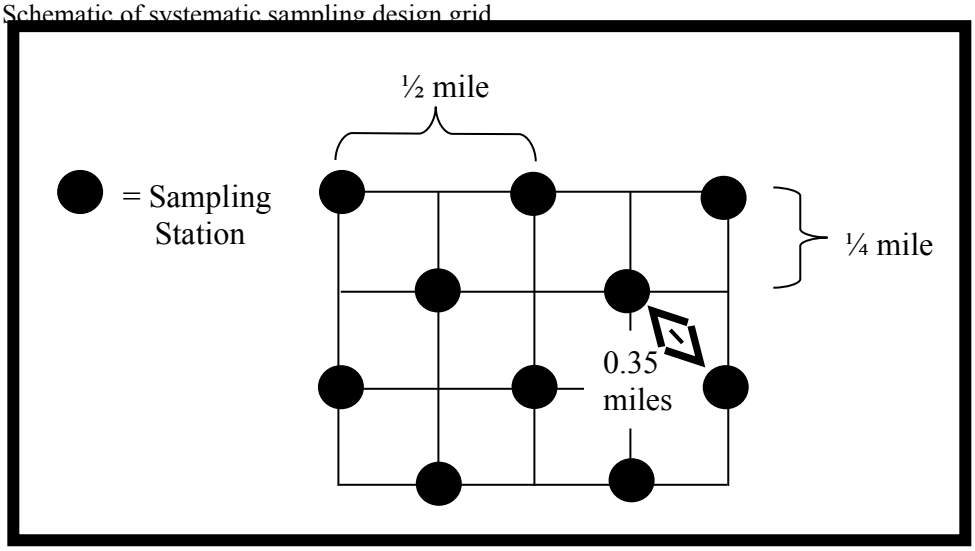
We towed the dredge using a 5/8″ diameter laid nylon line connected from the dredge bridle to a cleat located on the port stern. We used a towline length-to-depth ratio of 3:1 (mean/SD = 3.1:1 / 0.18:1) as measured from the cleat to the bottom, although, in several instances it was not possible to maintain this ratio because of changes in bathymetry. We recorded water depth from a Garmin Fishfinder 120 and the towline length was determined accordingly.

FIG. 2. Schematic of dredge equipped with weight.



To the best of our knowledge, no other quantitative data on *Argopecten* distribution or abundance span the entire study area. Therefore, to gain this baseline data we chose a systematic sampling design. Station locations were established at ½-mile intervals offset along east-west transects ¼-mile apart such that stations on adjacent transects were approximately 0.35 miles apart (see Figure 3, above). All stations were located using a Northstar 951X Differential GPS receiver chart plotter.

FIG. 3. Schematic of systematic sampling design grid.



After station position was established, a single one-minute dredge tow was conducted at each station. In instances where it was not possible to tow for the full minute, the duration of the tow was recorded. Each tow was made into or against the prevailing wind or tide to help maintain as straight a towpath as possible. We recorded geographic coordinates (latitude and longitude) at the start, at the approximate midpoint (i.e., after approximately 30 seconds), and at the end of the tow[1].

After completing the one-minute tow, the vessel was stopped (held as stationary as possible) and the dredge was retrieved either by hand or 12 V electric capstan windlass. The catch was sorted onboard the vessel. All live *Argopecten* and paired *Argopecten* valves ("boxes") collected in each tow were counted and measured (shell height; maximum distance from the umbo to the ventral margin) to the nearest whole millimeter using vernier calipers. We noted the presence or absence of a one-year growth ring, the presence of other animal and plant species collected in the dredge (e.g., submerged aquatic vegetation and *Argopecten* predators), and we also made qualitative descriptions of the substrate and vegetation (e.g., vascular plants and algae, live or dead, sparse or abundant). We developed distribution charts of *Argopecten* using ArcView v3.2a (2000).

We collected physico-chemical data at the first and last stations sampled in a day. We collected water samples with a Kemmerer water sampler for subsequent analysis of dissolved oxygen, salinity and pH at the New Jersey Division of Fish and Wildlife's Nacote Creek Research Laboratory, Port Republic, New Jersey. Water temperatures (surface and bottom) were recorded from a mercury thermometer in the field. Dissolved oxygen was determined by Winkler titration. Salinities were determined by a hand-held refractometer and pH readings were obtained using colorimetric visual analyses against known standards (Taylor® slide comparator).

[1] Tow midpoint coordinates were not collected on day 1 of the survey. No *Argopecten* were collected on day 1, therefore, abundance estimates for stations sampled on day 1 would not be affected by any curvature in the path of the tow.

Population Size/Age Structure

Two height-percent-frequency distribution graphs were constructed by appropriately grouping all *Argopecten* heights measured in the bay. Heights were combined into one- as well as five-millimeter groupings to help illustrate possible multiple spawning events and composite age classes, respectively. Low *Argopecten* abundances precluded preparation of height-percent-frequency distributions at all individual stations (all $n < 100$).

Argopecten Distribution and Abundance Estimation

Argopecten abundance indices for each station are expressed in terms of number of *Argopecten* per square feet. This index was calculated by dividing the total number of all live *Argopecten* by the total distance towed × 2.03 (the width of the dredge). We calculated the distance towed[2] as the distance from the start of the tow to the midpoint + the distance from the midpoint to the end of the tow. This method helps reduce the effect of any towpath curvature on the estimation of abundance.

To estimate total *Argopecten* abundance in Little Egg Harbor Bay, station location information was brought into ArcView v3.2a. Adjacent stations where *Argopecten* was colleted were grouped together and enclosed in polygons. These areas (feet^2 calculated in ArcView) were summed and multiplied by the mean *Argopecten* abundance calculated by summing all individual abundance indices greater than zero and dividing by that number of stations (Eq. 1). This method was chosen to maintain consistency with the method used for confidence interval estimation (see below). Our approach implicitly assumes that one tow was representative of a larger area (*i.e.,* an entire sampling cell; see Figure 3). Unfortunately, there are no data to either support or refute this assumption – limitations on time and funding precluded an investigation. However, to minimize this source of estimation error, sampling frequency was increased to the maximum extent practicable (see Figure 3).

$$\text{Total } \textit{Argopecten} \text{ Abundance} = \frac{\Sigma\,(\textit{Argopecten} \text{ abund. indices} > 0)}{N\,(\text{for } \textit{Argopecten} \text{ abund. indices} > 0)} \times \left(\begin{array}{c} \text{Total area (feet}^2\text{) where} \\ \textit{Argopecten} \text{ abund. indices} > 0 \end{array} \right) \quad \text{Eq. 1}$$

With this estimate of total *Argopecten* abundance in Little Egg Harbor Bay, we then estimated the number of age 0 and age 1+ *Argopecten* by multiplying the total *Argopecten* abundance in Little Egg Harbor Bay by the fraction of age 0 and age 1+ *Argopecten* collected in the survey, respectively. We define age 0 *Argopecten* as those *Argopecten* collected without the presence of a one-year growth ring. Conversely, age 1+ *Argopecten* are those with a one-year growth ring. Accordingly,

$$\text{Total abundance of Age 0 } \textit{Argopecten} = \frac{\text{Total no. of Age 0 } \textit{Argopecten} \text{ collected}}{\text{Total no. of all } \textit{Argopecten} \text{ collected}} \times \text{total } \textit{Argopecten} \text{ abundance calculated from equation 1}$$

Analogously,

$$\text{Total abundance of Age 1+ } \textit{Argopecten} = \frac{\text{Total no. of Age 1+ } \textit{Argopecten} \text{ collected}}{\text{Total no. of all } \textit{Argopecten} \text{ collected}} \times \text{total } \textit{Argopecten} \text{ abundance calculated from equation 1}$$

[2] Distance towed = 3963.189 * acos(sin(lat1) * sin(lat2) + cos(lat1) * cos(lat2) * cos(lon2 - lon1)).

We provide estimates of total and age 1+ *Argopecten* abundance as the number of individual *Argopecten* as well as bushels of *Argopecten*. No data are known to the author definitively equating the number of *Argopecten* to bushels[3]. Hence, estimates of bushels are provided assuming 500, 600, and 700 *Argopecten* per bushel based on comparisons with other estuarine shellfish species.

A 95% confidence interval around the point estimate of abundance was generated via Monte Carlo simulation. We used 4,999 simulations. Resampling for each simulation was limited to stations where *Argopecten* were actually collected (i.e., *Argopecten* abundance > 0.0). We believe this is the most ecologically realistic method that should then give rise to the most realistic abundance estimates used in generating the confidence interval. Alternate methods of confidence interval generation require either predicting *Argopecten* abundances or homogenization of the study area, both deemed undesirable.

Mortality

An index of natural *Argopecten* mortality was determined at each station. This index was based upon the percentage of empty paired valves ("boxes") in the entire sample of paired valves and live *Argopecten*: Mortality = {[(no. of boxes at station i) ÷ (no. of boxes at station i + no. of live *Argopecten* at station i)] × 100%}, for $i = 1,\ldots,194$. Our mortality index is independent of age and size of *Argopecten*.

Recruitment

For the purpose of this study, recruitment was defined as the percentage of *Argopecten* entering the fishery after approximately one year of life. To estimate annual recruitment, (*Argopecten* collected without the presence of a one-year growth ring) represented a single year class and would thus be expected to be recruited into the fishery within the coming year (assuming 100% survivorship). The recruitment index per station was calculated as: {[(no. of *Argopecten* collected not displaying a growth ring at station i) ÷ (total no. of *Argopecten* collected at station i)] × 100%}, for $i = 1, \ldots, 194$. The total number of age 0 *Argopecten* estimated to be present in the bay is also reported.

RESULTS

Description of Study Site

All sampling locations were characterized as having salinities between 24‰ and 28‰ ($\bar{x}$ = 25.8‰; SD = 1.1‰), water temperatures between 11.5° and 14°C ($\bar{x}$ = 12.8°C; SD = 0.6°C), and dissolved oxygen levels between 7.9 mg/l and 9.5 mg/l ($\bar{x}$ = 8.3 mg/l; SD = 0.4 mg/l). Salinity, temperature, and DO were relatively evenly distributed throughout the bay (note low SD's). Physico-chemical data are provided in Table 2.

<u>Argopecten</u> Abundance and Distribution

Station location (for station midpoint[4]), *Argopecten* abundance, mean length, percent age 0s (the measure of recruitment for purposes of this study), as well as station and tow statistics for

[3] Conversion factors would likely change at least annually.

[4] Station midpoints are provided for all stations except for 105, 108 - 110, 117 - 119, 137 -140, 144 - 147, 155, 162, 169, 173, 174, 176, 177, 189. Coordinates for these stations were overwritten due to DGPS unit storage limitations. For these stations, the coordinates provided in Table 3 are the initially desired sampling locations. Coordinates for stations 167 and 168 are the station starting points (midpoints were not recorded).

each station are presented in Table 3. The locations of the 194 stations sampled are presented in Figure 4.

The total *Argopecten* (all sizes) resource in Little Egg Harbor Bay is estimated at 528,538 individual scallops (Table 4). Stock estimates by age class are also presented in Table 4. Sampling tow statistics are provided in Table 5.

TABLE 5. Statistics on dredge tow distance and speed.

	Tow Distance (feet)	Tow Speed (knots)
Mean	113.0	1.2
SD	40.4	0.2

Figure 5 depicts the distribution and abundance of *Argopecten* in Little Egg Harbor Bay. *Argopecten* abundances ranged from 0.000 to 0.013 *Argopecten* foot^{-2}. These values may not possess immediate intuitive appeal and so can alternately be expressed as 0.0 to 566 *Argopecten* acre^{-1}.

Population Size/Age Structure

To illustrate *Argopecten* age/size structure in Little Egg Harbor Bay, height percent-frequency distribution graphs are presented in Figure 6. Plots are provided with one- and five-millimeter groupings. Summary composite (all *Argopecten* measured) shell height statistics are provided in Table 6.

TABLE 6. Summary composite shell height statistics for *Argopecten* collected in Little Egg Harbor Bay.

n =	31
$\bar{x}$ =	22.2 mm
SD =	12.0 mm

Recruitment

Recruitment indices were variable among stations in 2001, ranging from 0.0% to 100% with a bay-wide mean of 11.1% (Table 3). Figure 7 spatially depicts recruitment indices in Little Egg Harbor Bay.

Mortality

The bay-wide average *Argopecten* mortality for Little Egg Harbor Bay was 1.0%. Only three *Argopecten* boxes were collected with sizes of 66 mm (station 60), 69 mm (station 47), and 56 mm (station 32). Mortalities were variable, ranging from 0% to 100%. Mortalities were heavily weighted towards 0% as we collected boxes at less than 2% of the stations (3 of 194).

DISCUSSION AND CONCLUSIONS

The estimated standing stock of *Argopecten* in Little Egg Harbor Bay is 528,538 million individual scallops. Approximately 10% of the total estimated abundance consists of *Argopecten* age 1 or older (Table 4). This equates with between 73 and 102 bushels of adult *Argopecten,* assuming 500 and 700 scallops bushel^{-1}, respectively. No quantitative data are available on bay wide *Argopecten* abundances prior to the present survey.

In 2005, with no legal directed fishery, 101,614 pounds of *Argopecten* were landed from all New Jersey waters combined, as preliminarily reported by the National Marine Fishery Service. This figure represents the 6th largest in New Jersey's history (Table 1). This figure is also an increase over 2004's landings, when 16,746 pounds of *Argopecten* were landed. Landings from 2004 represented the first since 1974, when an approximately equal number of pounds were

reported (Table 1)[5]. Because harvest and landings statistics are not available by specific estuaries, we do not know the full impact of the illegal activity in 2004 and 2005 on the present survey abundance estimates. However, several individuals were caught illegally harvesting *Argopecten* in our survey area during the spring of 2005.

If we exclude 2005's landings, examination of historical reported landings (1950s through the 2000s) indicates fishery collapse (i.e., 0 pounds reported) in the years following those years where less than 17,000 pounds were landed (Table 1). The stock rebuilding period during those years, as measured by when reported landings exceeded 0 pounds, ranged from 1 to nearly 30 years. This slow rebuilding period is similar to that reported from North Carolina, where recovery rates from harvest and red tide ranged from 5 to 12 years (Peterson and Summerson 1992). Examination of National Marine Fishery Service landings data for other East Coast states (e.g., New York, Rhode Island) shows that a pattern of erratic landings, population crashes, and slow (or non-existent) recoveries, is common for *Argopecten*. Peterson and Summerson (1992) concluded that the slow recovery of *Argopecten irradians concentricus* in North Carolina might be due to recruitment limitation at low population sizes. The potential for recruitment limitation combined with the short life span of *Argopecten* calls for special care when managing *Argopecten*. The unpredictable nature of algal blooms (e.g., *Aurococcus anophagefferens*), with their concomitant direct and indirect impacts on *Argopecten* survival (Tettelbach and Wenczel 1993, Gobler et al. 2005), adds another layer of complexity to *Argopecten* management.

Mean *Argopecten* abundance among all stations sampled (bay wide average) was 0.0007 (SD = 0.0019) *Argopecten* foot^{-2}. Mean *Argopecten* abundance among stations where *Argopecten* was collected was 0.0053 (SD = 0.0024) *Argopecten* foot^{-2}, or 30.5 *Argopecten* acre^{-1} and 230.9 *Argopecten* acre^{-1}, respectively. While prior quantitative data on station-specific abundances are not available, Bologna et al. (2001) report densities similar to ours in the areas of Marshelder Islands and Ham Island (Figure 1, Table 7).

TABLE 7. Comparison of *Argopecten* abundances from the Bureau of Shellfisheries (NJBS) and Bologna et al. (2001) in four Little Egg Harbor Bay locations.

Location	NJBS (*Argopecten* foot^{-2} / *Argopecten* acre^{-1})	Bologna et al. (2001)[6] (*Argopecten* foot^{-2} / *Argopecten* acre^{-1})
West Ham Island	0.0033 / 144	0.0011 / 48
North Ham Island	0.0036 / 157	0.0093 / 405
Northeast Ham Island	0.0038 / 166	0.0020 / 87
Marshelder Islands	0.0044 / 192	0.0023 / 100
Mean	0.0038 / 164	0.0037 / 160

Our survey revealed that most *Argopecten* occur in the shallow ($\bar{x}$ = 5.4′, Table 3) central and eastern portions of Little Egg Harbor Bay between Ship Bottom and Marshelder

[5] *Argopecten* regulations were allowed to "sunset" in 1981 due to the lack of fishery participation brought on by the virtual disappearance of *Argopecten* after 1974 (Table 1).

[6] Values reported for Bologna et al. (2001) represent the average abundance of between 8 and 17 samples taken at each of the four locations in 1998 via snorkeling. Bologna et al. (2001) report abundances of 0.0 *Argopecten* feet^{-2} in 1999 at all of the same locations (each location sampled 10 times).

Islands (Figure 5). Furthermore, our data suggest that *Argopecten* are more likely to occur in areas with live *Zostera marina* (eelgrass) than without (Figures 8 and 9, $\chi^2 = 49.832$, $df = 1$, $p = 1.70 \times 10^{-12}$).

Two dominant age classes emerge from the height-percent-frequency plots in Figure 6. The mean height of the age 0s is 18.8 mm (SD = 5.4 mm), with a range of 9 to 31 mm. We could not find data on juvenile growth rates for New Jersey, yet a juvenile size range of 23 mm is consistent with several spawning events (Figure 6). Bologna et al. (2001) found evidence of *Argopecten* spawning in Little Egg Harbor Bay from late spring, through late summer and early fall (September-October). These results are similar to Tettelbach et al. (1999), who found evidence of spawning peaks during June to July and again in late August to September in New York. Tettelbach et al. (1999) also report evidence of a November spawn.

The mean height of the age 1+s is 53.3 mm (SD = 12.5 mm; range = 39-62 mm). Mean height of age 1+ scallops from Bologna et al. (2001) in November 1998 was 64.5 mm. Our results are similar to those of Bologna et al. (2001).

FIG. 8. Table of *Argopecten-Zostera* associations from the 2005 survey of Little Egg Harbor Bay.

Argopecten		*Zostera*	
		Present	Absent
Present		19	5
Absent		25	145

A reasonable estimate of instantaneous natural mortality for *Argopecten* is M = 1.5 (i.e., 78% annual loss based on a 2 year life span; Hoenig 1983). However, only three "boxes" were collected during our survey. Consequently, the bay wide mortality estimate was exceedingly low (1%). Our low box count may be attributable simply to the lack of adults in the bay during the previous year, or high disarticulation rates. Alternately, the low box count may have resulted from passive burial. Bologna et al. (2001, pg. 94) reports in his November 1998 sampling that "substantial passive burial was occurring. Specifically, adults were frequently located within a recessed pit approximately 5-8 cm deep or adjacent to one with sediment fouling apparent on the dorsal shell." Bologna et al. (2001) suggests that this passive burial was significantly impacting winter survival of adult *Argopecten*. It will be difficult to account for these buried individuals using our sampling gear under any experimental design (systematic or random sampling). This buried population would presumably also be unavailable to dredge fishery participants as well.

Over 90% of the *Argopecten* collected were age 0. There are several possible explanations for the preponderance of juveniles despite the relatively low number of adults. First, a significant fraction of the adult population may have been harvested prior to our survey (no legal directed fishery in New Jersey). As noted previously, several individuals were caught illegally harvesting (via dredge) *Argopecten* in Little Egg Harbor Bay in the spring of 2005. Given the timing of the illegal activity, and assuming none occurred subsequent to its discovery,

the size distribution of the juveniles (9-31 mm) suggests other factors must also exist. Some fraction of the collected juveniles may have been imported into Little Egg Harbor Bay from adult stocks outside of the bay (e.g., Manahawkin or Barnegat Bay), but in New Jersey waters [(see Bologna et al. (2001)]. Bologna et al. (2001) reports a larval duration of 10-14 days making larval transport a reasonable hypothesis. Alternately, perhaps few resident adults are all that is necessary to account for the observed juvenile abundances. Finally, the adult population may simply be what Bologna et al. (2001, pg. 94) characterize as "resident, albeit cryptic."

The 2005 *Argopecten* survey of Little Egg Harbor Bay represents a positive step towards the management of New Jersey's *Argopecten* resource. Relatively low adult abundances, uncertainties regarding the ultimate and proximal factors controlling the abundance and distribution of *Argopecten*, combined with a single bay wide abundance estimate combine to complicate fishery development. These factors certainly prompt caution. Review of historical reported landings data for New Jersey along with studies documenting protracted *Argopecten* population recoveries demonstrates the delicate nature of *Argopecten* population dynamics. Before establishing a directed fishery in New Jersey, subsequent surveys are needed as well as a better understanding of *Argopecten* ecology in New Jersey.

ACKNOWLEDGEMENTS

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Table 1. *Argopecten* landings from all New Jersey State waters reported by the National Marine Fisheries Service.

Year	Pounds	Dollars
1956	314,100	287,300
1957	71,600	39,785
1958	93,500	50,546
1959	4,400	3,162
1960	0	0
1961	70,800	66,494
1962	364,700	129,438
1963	273,900	112,172
1964	376,300	154,911
1965	95,500	45,000
1966	174,600	85,314
1967	85,500	40,292
1968	16,800	24,216
1969	0	0
1970	0	0
1971	0	0
1972	0	0
1973	60,600	71,628
1974	16,200	24,372
1975 *	0	0
2003 *	0	0
2004	16,791	98,660
2005 **	101,614	Not Avail.
Total (1956-2005)	2,136,905	1,233,290

Summary statistics (1956-1974, inclusive)$^{\Delta}$

Minimum	0	0
Maximum	376,300	287,300
Mean	106,237	59,717
SD	129,932	72,236

Δ Statistics for this time series are for ilustrative purposes only.

* No landings reported between 1975 and 2003.

** 2005 landings are preliminary. Dollar amount not yet available.

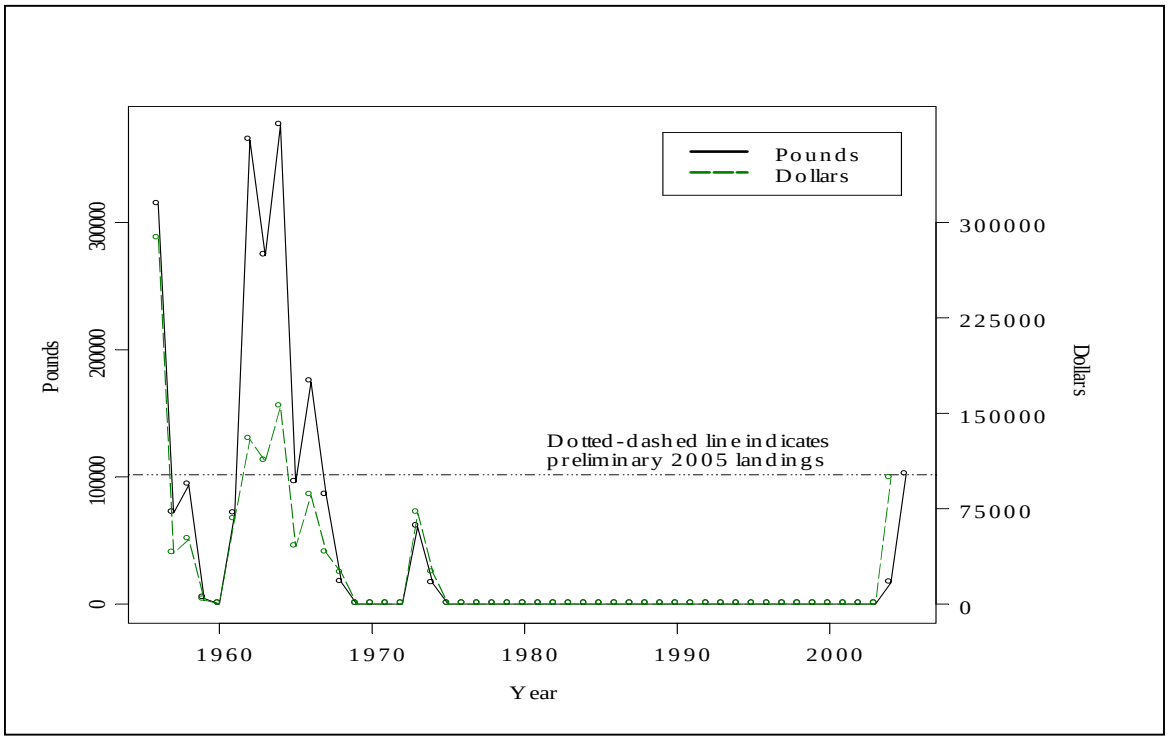


Table 2. Physico-chemical data collected during the 2005 *Argopecten* survey of Little Egg Harbor Bay.

				Surface				Bottom			
Station	Date	Latitude midpoint	Longitude midpoint	Temperature (C)	Salinity (°/oo)	DO (mg/l)	pH	Temperature (C)	Salinity (°/oo)	DO (mg/l)	pH
147	31-Oct-05	39 31.750	74 17.290	13	26	8.5	-	12	26	8	-
168 *	31-Oct-05	39 34.761	74 16.655	12	24	8.4	-	11.5	25	8.5	-
142	1-Nov-05	39 32.444	74 16.983	14	27	8.3	-	14	26	8.1	8
158	3-Nov-05	39 33.742	74 19.246	13	25	8.5	-	13	25	8.5	-
99	3-Nov-05	39 34.223	74 17.321	13	25	8.2	-	13	25	8.1	-
192	4-Nov-05	39 31.509	74 17.155	13	28	8.3	8	13	28	8.1	8
121	4-Nov-05	39 36.715	74 12.533	13	24	9.5	8	-	-	-	-
66	9-Nov-05	39 36.743	74 12.773	13.5	25	7.9	8	-	-	-	-
16	14-Nov-05	39 38.489	74 12.451	12	26	8	8	12	26	8	8
178	14-Nov-05	39 34.751	74 15.993	13	26	8.7	8	13	28	8.6	8.2
59	15-Nov-05	39 36.738	74 13.430	13	26	7.9	8	12.5	26	8.1	8
123	15-Nov-05	39 36.005	74 16.323	13	25	8.5	8	13	26	8.3	8
n				12	12	12	7	10	10	10	6
Minimum				12	24	7.9	8	11.5	25	8	8
Maximum				14	28	9.5	8	14	28	8.6	8.2
Mean				13.0	25.6	8.4	8	12.7	26.1	8.2	8.0
SD				0.5	1.2	0.4	0	0.7	1.1	0.2	0.1

* Midpoint not available. Coordinates provided are from the start of the tow.

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
1	9-Nov-05	39 39.760	74 12.810	123.7	4.3	1.2	0.00	NA^{n}	NA^{0}	0
2	9-Nov-05	39 39.516	74 12.808	150.6	5.5-4.3	1.5	0.00	NA^{n}	NA^{0}	0
3	9-Nov-05	39 39.255	74 12.802	140.0	5.4-5.1	1.4	0.00	NA^{n}	NA^{0}	0
4	9-Nov-05	39 39.020	74 12.771	189.2	11.0-7.0	1.9	0.00	NA^{n}	NA^{0}	0
5	9-Nov-05	39 39.270	74 12.160	177.1	4.3	1.7	0.00	NA^{n}	NA^{0}	1
6.1	9-Nov-05	39 39.729	74 12.514	147.9	4.5	1.5	0.00	NA^{n}	NA^{0}	0
6.2	9-Nov-05	39 39.705	74 12.473	75.8	7.0	0.7	0.00	NA^{n}	NA^{0}	0
7	9-Nov-05	39 39.520	74 12.475	164.4	5.5	1.6	0.00	NA^{n}	NA^{0}	0
8	9-Nov-05	39 38.994	74 12.472	20.0	5.5	0.2	0.00	NA^{n}	NA^{0}	0
9	9-Nov-05	39 38.761	74 12.171	164.3	4.1	1.6	0.00	NA^{n}	NA^{0}	1
10	9-Nov-05	39 38.752	74 11.524	109.7	2.5	1.1	0.0045	16.0	100.00	1
11	9-Nov-05	39 38.966	74 11.410	79.9	10.0	0.8	0.00	NA^{n}	NA^{0}	0
11.5	9-Nov-05	39 39.040	74 11.290	21.5	3.0-2.7	0.3	0.00	NA^{n}	NA^{0}	1
12	9-Nov-05	39 39.284	74 11.408	98.1	14.0	1.0	0.00	NA^{n}	NA^{0}	0
12.5	9-Nov-05	39 39.249	74 11.348	108.1	2.6-2.3	1.1	0.00	NA^{n}	NA^{0}	1
13	9-Nov-05	39 39.001	74 11.181	4.7	9.0-8.0	0.1	0.00	NA^{n}	NA^{0}	0
14	9-Nov-05	39 38.491	74 11.236	133.5	8.0	1.3	0.00	NA^{n}	NA^{0}	0
15	9-Nov-05	39 38.502	74 11.815	128.0	2.5	1.3	0.00	NA^{n}	NA^{0}	1
16	14-Nov-05	39 38.489	74 12.451	161.9	5.9	1.6	0.00	NA^{n}	NA^{0}	1
17	14-Nov-05	39 38.749	74 14.086	135.3	4.9	1.3	0.00	NA^{n}	NA^{0}	0
18	14-Nov-05	39 38.250	74 13.430	104.5	4.9	1.0	0.00	NA^{n}	NA^{0}	1
19	14-Nov-05	39 38.097	74 12.946	155.3	3.9	1.5	0.00	NA^{n}	NA^{0}	1
20	14-Nov-05	39 37.986	74 13.738	151.7	5.3	1.5	0.0032	21.0	100.00	1
21	14-Nov-05	39 37.491	74 13.764	146.7	5.7	1.4	0.0034	19.0	100.00	1
22	14-Nov-05	39 37.744	74 14.080	125.9	5.1	1.2	0.0039	15.0	100.00	1
23	14-Nov-05	39 38.002	74 14.402	116.8	4.9	1.2	0.00	NA^{n}	NA^{0}	0
24	14-Nov-05	39 37.500	74 14.401	98.2	3.9	1.0	0.00	NA^{n}	NA^{0}	1

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
25	14-Nov-05	39 37.738	74 14.713	139.4	5.3	1.4	0.00	NA^n	NA^0	0
26	14-Nov-05	39 37.244	74 14.726	127.7	5.1	1.3	0.00	NA^n	NA^0	1
27	14-Nov-05	39 36.756	74 14.730	77.5	5.5	0.8	0.00	NA^n	NA^0	0
28	14-Nov-05	39 36.485	74 15.007	133.8	5.5	1.3	0.00	NA^n	NA^0	0
29	14-Nov-05	39 36.992	74 14.382	29.1	5.5	0.3	0.00	NA^n	NA^0	0
30	14-Nov-05	39 37.239	74 14.060	150.5	5.1	1.5	0.00	NA^n	NA^0	1
31	15-Nov-05	39 36.738	74 14.084	117.6	7.2	1.2	0.0126	21.3	100.00	1
32	15-Nov-05	39 36.499	74 13.732	136.1	5.9	1.3	0.0036	14.0	100.00	1
33	15-Nov-05	39 36.489	74 14.395	95.5	7.0	0.9	0.0052	25.0	100.00	1
34	14-Nov-05	39 36.993	74 15.049	86.8	5.9	0.9	0.00	NA^n	NA^0	0
35	14-Nov-05	39 36.732	74 15.343	89.9	6.6	0.9	0.00	NA^n	NA^0	0
36	14-Nov-05	39 37.005	74 15.659	140.6	5.1	1.4	0.00	NA^n	NA^0	0
37	14-Nov-05	39 37.236	74 15.350	104.5	5.9	1.0	0.00	NA^n	NA^0	0
38	14-Nov-05	39 37.234	74 15.030	138.1	8.5	1.4	0.00	NA^n	NA^0	0
39	14-Nov-05	39 37.730	74 15.269	56.5	4.9	0.6	0.00	NA^n	NA^0	0
40	14-Nov-05	39 38.241	74 14.706	126.2	5.7	1.2	0.00	NA^n	NA^0	0
41	14-Nov-05	39 38.254	74 14.077	79.8	4.5	0.8	0.00	NA^n	NA^0	0
42	14-Nov-05	39 38.482	74 14.394	180.5	6.4	1.8	0.00	NA^n	NA^0	0
43	14-Nov-05	39 38.498	74 13.747	77.5	5.3	0.8	0.00	NA^n	NA^0	0
44	14-Nov-05	39 38.505	74 13.110	106.1	10.2	1.0	0.00	NA^n	NA^0	0
45	9-Nov-05	39 38.242	74 12.150	140.8	3.3	1.4	0.00	NA^n	NA^0	1
46	9-Nov-05	39 37.987	74 12.006	123.3	2.9	1.2	0.00	NA^n	NA^0	1
47	9-Nov-05	39 38.002	74 12.460	114.2	3.9	1.1	0.00	NA^n	NA^0	0
48	14-Nov-05	39 37.746	74 12.809	111.7	4.7	1.1	0.0088	20.0	100.00	1
49	14-Nov-05	39 37.487	74 13.105	118.1	6.4	1.2	0.0083	19.5	100.00	1
50	14-Nov-05	39 37.243	74 13.505	148.9	5.7	1.5	0.0033	16.0	100.00	1
51	14-Nov-05	39 36.984	74 13.737	153.5	5.9	1.5	0.00	NA^n	NA^0	1

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
52	9-Nov-05	39 37.504	74 12.458	59.5	4.1	0.6	0.00	NA^{n}	NA^{0}	1
53	9-Nov-05	39 37.497	74 12.142	89.5	4.3	0.9	0.00	NA^{n}	NA^{0}	0
54	9-Nov-05	39 37.740	74 12.163	29.4	6.3-6.1	0.3	0.00	NA^{n}	NA^{0}	0
55	9-Nov-05	39 37.853	74 11.802	121.6	3.3-3.1	1.2	0.00	NA^{n}	NA^{0}	1
56	14-Nov-05	39 37.740	74 13.428	98.7	4.9	1.0	0.0050	13.0	100.00	1
57	14-Nov-05	39 37.235	74 12.782	140.3	5.7	1.4	0.00	NA^{n}	NA^{0}	1
58	14-Nov-05	39 36.991	74 13.106	121.8	4.9	1.2	0.0040	18.0	100.00	1
59	15-Nov-05	39 36.738	74 13.430	90.0	5.9	0.9	0.0055	9.0	100.00	1
60	4-Nov-05	39 36.493	74 13.134	129.0	5.9	1.3	0.0038	11.0	100.00	0
61	15-Nov-05	39 36.249	74 14.066	57.9	5.9	0.6	0.00	NA^{n}	NA^{0}	1
62	15-Nov-05	39 36.251	74 14.699	124.7	5.5	1.2	0.00	NA^{n}	NA^{0}	1
63	14-Nov-05	39 36.000	74 15.033	31.6	5.7	0.3	0.00	NA^{n}	NA^{0}	0
64	9-Nov-05	39 37.686	74 11.800	70.6	13-16	0.7	0.00	NA^{n}	NA^{0}	0
65	9-Nov-05	39 37.000	74 12.386	144.5	3.7-3.9	1.4	0.00	NA^{n}	NA^{0}	1
66	9-Nov-05	39 36.743	74 12.773	138.4	3.7-3.9	1.4	0.00	NA^{n}	NA^{0}	1
67	4-Nov-05	39 35.994	74 13.127	114.2	6.6	1.1	0.00	NA^{n}	NA^{0}	0
68	4-Nov-05	39 35.766	74 13.423	183.2	7.1	1.8	0.00	NA^{n}	NA^{0}	0
69	4-Nov-05	39 35.522	74 13.734	167.8	12.0	1.7	0.00	NA^{n}	NA^{0}	0
70	4-Nov-05	39 35.512	74 13.422	159.3	12.0	1.6	0.00	NA^{n}	NA^{0}	0
71	4-Nov-05	39 35.243	74 14.062	169.7	5.9	1.7	0.00	NA^{n}	NA^{0}	0
72	4-Nov-05	39 35.093	74 14.005	104.6	7.8	1.0	0.00	NA^{n}	NA^{0}	0
73	4-Nov-05	39 35.488	74 14.386	120.9	6.6	1.2	0.0081	21.0	100.00	0
74	14-Nov-05	39 35.481	74 15.031	134.1	5.9	1.3	0.00	NA^{n}	NA^{0}	0
75	15-Nov-05	39 35.697	74 14.713	97.2	5.5	1.0	0.0051	28.0	100.00	1
76	15-Nov-05	39 35.997	74 14.400	121.2	5.7	1.2	0.00	NA^{n}	NA^{0}	1
77	4-Nov-05	39 35.741	74 14.059	100.3	5.5	1.0	0.0049	21.0	100.00	0
78	4-Nov-05	39 35.999	74 13.727	147.3	4.1	1.5	0.0033	62.0	0.00	0

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
79	4-Nov-05	39 36.237	74 13.439	128.4	4.8	1.3	0.00	NA^{n}	NA^{0}	0
80	4-Nov-05	39 36.552	74 12.569	152.2	5.5	1.5	0.0032	59.0	0.00	1
81	9-Nov-05	39 37.013	74 12.125	126.7	3.3	1.3	0.00	NA^{n}	NA^{0}	0
82	9-Nov-05	39 37.993	74 11.507	99.6	3.7	1.0	0.00	NA^{n}	NA^{0}	1
83	9-Nov-05	39 38.256	74 11.350	127.7	3.5-3.3	1.3	0.00	NA^{n}	NA^{0}	1
84	9-Nov-05	39 37.262	74 12.062	169.0	8.0	1.7	0.00	NA^{n}	NA^{0}	0
85	4-Nov-05	39 35.772	74 13.152	173.0	11.0	1.7	0.00	NA^{n}	NA^{0}	0
86	14-Nov-05	39 36.248	74 15.351	58.9	7.6	0.6	0.00	NA^{n}	NA^{0}	0
87	15-Nov-05	39 35.258	74 15.340	98.8	7.2	1.0	0.00	NA^{n}	NA^{0}	0
88	15-Nov-05	39 35.021	74 15.662	90.6	7.5	0.9	0.00	NA^{n}	NA^{0}	0
89	15-Nov-05	39 34.753	74 15.212	67.8	4.5	0.7	0.00	NA^{n}	NA^{0}	1
90	15-Nov-05	39 34.989	74 15.045	126.7	5.7	1.3	0.0078	31.5	50.00	1
91	15-Nov-05	39 35.248	74 14.715	113.1	7.8	1.1	0.0044	22.0	100.00	0
92	4-Nov-05	39 34.755	74 14.728	120.1	5.7	1.2	0.0041	31.0	100.00	1
93	4-Nov-05	39 34.508	74 14.403	98.9	5.5	1.0	0.00	NA^{n}	NA^{0}	0
94	4-Nov-05	39 34.770	74 13.880	78.9	12.0-15.0	0.8	0.00	NA^{n}	NA^{0}	0
95	14-Nov-05	39 35.750	74 15.323	91.0	7.5	0.9	0.00	NA^{n}	NA^{0}	0
96	14-Nov-05	39 36.000	74 15.662	31.6	7.5	0.3	0.00	NA^{n}	NA^{0}	0
97	14-Nov-05	39 35.503	74 15.676	44.9	7.0	0.4	0.00	NA^{n}	NA^{0}	0
98	3-Nov-05	39 34.501	74 17.625	106.1	8.5	1.0	0.00	NA^{n}	NA^{0}	0
99	3-Nov-05	39 34.223	74 17.321	NA****	7.1	1.1	0.00	NA^{n}	NA^{0}	0
100	3-Nov-05	39 34.255	74 17.954	134.3	7.0	1.3	0.00	NA^{n}	NA^{0}	0
101	1-Nov-05	39 34.236	74 18.550	145.4	5.9	1.4	0.00	NA^{n}	NA^{0}	0
102	3-Nov-05	39 33.786	74 18.584	157.9	5.5	1.6	0.00	NA^{n}	NA^{0}	0
103	3-Nov-05	39 33.991	74 18.893	139.2	6.4	1.4	0.00	NA^{n}	NA^{0}	0
104	3-Nov-05	39 34.015	74 17.686	121.6	5.1	1.2	0.00	NA^{n}	NA^{0}	0
105	31-Oct-05	39 34.25	74 16.65	NA*	5.9	1.5	0.00	NA^{n}	NA^{0}	0

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
106	1-Nov-05	39 33.514	74 16.320	155.9	5.3	1.5	0.00	NA^n	NA^0	0
107	1-Nov-05	39 33.270	74 16.018	125.5	5.5	1.2	0.00	NA^n	NA^0	0
108	31-Oct-05	39 34.00	74 15.03	NA*	4.9	1.4	0.00	NA^n	NA^0	0
109	31-Oct-05	39 34.25	74 15.25	NA*	6.8-5.3	1.3	0.00	NA^n	NA^0	0
110	31-Oct-05	39 33.75	74 15.35	NA*	14.0	1.1	0.00	NA^n	NA^0	0
111	1-Nov-05	39 33.507	74 15.671	71.4	7.5	0.7	0.00	NA^n	NA^0	0
112	4-Nov-05	39 33.008	74 15.681	98.8	9.3	1.0	0.00	NA^n	NA^0	0
113	4-Nov-05	39 32.705	74 15.812	93.8	6.1	0.9	0.00	NA^n	NA^0	0
114	4-Nov-05	39 32.494	74 15.749	93.4	5.9	0.9	0.00	NA^n	NA^0	0
115	4-Nov-05	39 32.250	74 16.017	106.1	6.6	1.0	0.00	NA^n	NA^0	0
116	1-Nov-05	39 32.000	74 16.968	150.3	3.7	1.5	0.00	NA^n	NA^0	0
117	31-Oct-05	39 33.35	74 15.30	NA*	3.1	1.3	0.00	NA^n	NA^0	0
118	31-Oct-05	39 33.75	74 16.01	NA*	5.9	1.3	0.00	NA^n	NA^0	0
119	31-Oct-05	39 34.00	74 15.67	NA*	7.2	1.4	0.00	NA^n	NA^0	0
120	4-Nov-05	39 35.298	74 13.777	138.3	5.8	1.4	0.00	NA^n	NA^0	0
121	4-Nov-05	39 36.715	74 12.533	187.4	4.1	1.9	0.0026	14.0	100.00	1
122	4-Nov-05	39 36.294	74 12.796	128.7	6.5	1.3	0.00	NA^n	NA^0	0
123	15-Nov-05	39 36.005	74 16.323	99.2	8.2	1.0	0.00	NA^n	NA^0	0
124	15-Nov-05	39 36.250	74 16.650	46.7	7.2	0.5	0.00	NA^n	NA^0	0
125	15-Nov-05	39 36.493	74 16.975	68.9	7.0	0.7	0.00	NA^n	NA^0	0
126	15-Nov-05	39 36.240	74 17.307	83.3	7.2	0.8	0.00	NA^n	NA^0	0
127	15-Nov-05	39 35.997	74 16.987	37.4	8.4	0.4	0.00	NA^n	NA^0	0
128	15-Nov-05	39 35.737	74 16.653	77.3	9.4	0.8	0.00	NA^n	NA^0	0
129	15-Nov-05	39 35.489	74 16.334	53.5	7.8	0.5	0.00	NA^n	NA^0	0
130	14-Nov-05	39 35.256	74 16.015	139.5	4.9	1.4	0.00	NA^n	NA^0	0
131	15-Nov-05	39 35.256	74 16.672	83.0	7.8	0.8	0.00	NA^n	NA^0	0
132	15-Nov-05	39 35.499	74 16.957	76.1	9.4	0.8	0.00	NA^n	NA^0	0

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
133	15-Nov-05	39 35.745	74 17.295	100.9	9.2	1.0	0.00	NA^n	NA^0	0
134	15-Nov-05	39 36.011	74 17.606	118.7	8.5	1.2	0.00	NA^n	NA^0	0
135	15-Nov-05	39 35.989	74 18.260	118.5	8.0	1.2	0.00	NA^n	NA^0	0
136	15-Nov-05	39 35.744	74 17.940	94.2	7.2	0.9	0.00	NA^n	NA^0	0
137	31-Oct-05	39 31.709	74 17.813	NA*	16.0	2.0	0.00	NA^n	NA^0	0
138	31-Oct-05	39 32.50	74 17.61	NA*	6.5	1.3	0.00	NA^n	NA^0	0
139	31-Oct-05	39 32.60	74 17.94	NA*	3.5	1.5	0.00	NA^n	NA^0	0
140	31-Oct-05	39 32.50	74 18.26	NA*	9.0-8.0	1.1	0.00	NA^n	NA^0	0
141	1-Nov-05	39 32.743	74 16.697	176.8	3.1	1.7	0.00	NA^n	NA^0	0
142	1-Nov-05	39 32.444	74 16.983	31.2	2.9	0.3	0.00	NA^n	NA^0	0
143	1-Nov-05	39 32.737	74 17.299	184.0	3.0	1.8	0.00	NA^n	NA^0	0
144	31-Oct-05	39 32.00	74 17.71	NA*	7.0	1.1	0.00	NA^n	NA^0	0
145	31-Oct-05	39 32.25	74 17.84	NA*	6.5	1.6	0.00	NA^n	NA^0	0
146	31-Oct-05	39 32.25	74 17.29	NA*	6.5- 5.5	1.4	0.00	NA^n	NA^0	0
147	31-Oct-05	39 31.75	74 17.29	NA*	19.0	0.8	0.00	NA^n	NA^0	0
148	1-Nov-05	39 34.490	74 18.253	163.0	5.9	1.6	0.00	NA^n	NA^0	0
149	1-Nov-05	39 34.485	74 18.887	125.4	7.2	1.2	0.00	NA^n	NA^0	0
150	1-Nov-05	39 34.370	74 19.190	120.9	6.5	1.2	0.00	NA^n	NA^0	0
151	1-Nov-05	39 34.052	74 19.970	149.9	5.5	1.5	0.00	NA^n	NA^0	0
152	1-Nov-05	39 33.992	74 19.906	155.3	5.5	1.5	0.00	NA^n	NA^0	0
153	1-Nov-05	39 33.742	74 19.855	154.5	4.7	1.5	0.00	NA^n	NA^0	0
154	1-Nov-05	39 33.488	74 19.553	96.7	3.1	1.0	0.00	NA^n	NA^0	0
155	31-Oct-05	39 33.00	74 18.90	NA*	17.0	1.2	0.00	NA^n	NA^0	0
156	3-Nov-05	39 33.271	74 18.672	166.4	3.7	1.6	0.00	NA^n	NA^0	0
157	3-Nov-05	39 33.488	74 18.899	150.9	3.7	1.5	0.00	NA^n	NA^0	0
158	3-Nov-05	39 33.742	74 19.246	103.4	4.0	1.0	0.00	NA^n	NA^0	0
159	1-Nov-05	39 33.248	74 19.203	186.2	3.3	1.8	0.00	NA^n	NA^0	0

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
161	1-Nov-05	39 34.742	74 20.204	98.1	5.1	1.0	0.00	NA^n	NA^0	0
162	31-Oct-05	39 32.75	74 18.58	NA*	3.9	1.4	0.00	NA^n	NA^0	0
163	1-Nov-05	39 34.744	74 17.939	89.6	8.5	0.9	0.00	NA^n	NA^0	0
164	15-Nov-05	39 35.246	74 17.818	46.9	9.2	0.5	0.00	NA^n	NA^0	0
165	15-Nov-05	39 34.876	74 17.452	33.9	8.8	0.3	0.00	NA^n	NA^0	0
166	15-Nov-05	39 34.749	74 17.305	62.2	8.6	0.6	0.00	NA^n	NA^0	0
167	31-Oct-05	39 34.509**	74 16.965**	141.3***	7.2	1.5	0.00	NA^n	NA^0	0
168	31-Oct-05	39 34.761**	74 16.655**	151.3***	6.5	1.4	0.00	NA^n	NA^0	0
169	31-Oct-05	39 34.00	74 16.33	NA*	5.9	1.3	0.00	NA^n	NA^0	0
170	1-Nov-05	39 32.982	74 16.330	165.1	4.7	1.6	0.00	NA^n	NA^0	0
171	1-Nov-05	39 32.506	74 16.327	51.0	4.1	0.5	0.00	NA^n	NA^0	0
172	1-Nov-05	39 32.212	74 16.592	141.2	3.1	1.4	0.00	NA^n	NA^0	0
173	31-Oct-05	39 33.75	74 14.95	NA*	2.1	0.7	0.00	NA^n	NA^0	0
174	31-Oct-05	39 33.55	74 14.85	NA*	3.1	1.4	0.00	NA^n	NA^0	0
175	4-Nov-05	39 34.277	74 14.365	207.0	4.6	2.0	0.00	NA^n	NA^0	0
176	31-Oct-05	39 34.25	74 16.01	NA*	8.2	0.9	0.00	NA^n	NA^0	0
177	31-Oct-05	39 34.50	74 16.33	NA*	7.8	1.1	0.00	NA^n	NA^0	0
178	14-Nov-05	39 34.751	74 15.993	66.2	9.2	0.7	0.00	NA^n	NA^0	0
179	14-Nov-05	39 34.994	74 16.319	121.2	6.8	1.2	0.00	NA^n	NA^0	0
180	15-Nov-05	39 34.989	74 16.961	37.0	7.5	0.4	0.00	NA^n	NA^0	0
181	15-Nov-05	39 35.242	74 17.282	87.3	9.2	0.9	0.00	NA^n	NA^0	0
182	15-Nov-05	39 35.492	74 17.624	87.7	9.4	0.9	0.00	NA^n	NA^0	0
183	15-Nov-05	39 35.490	74 18.261	101.7	8.6	1.0	0.00	NA^n	NA^0	0
184	15-Nov-05	39 35.681	74 18.400	110.2	8.2	1.1	0.00	NA^n	NA^0	0
185	15-Nov-05	39 36.243	74 17.931	59.8	7.0	0.6	0.00	NA^n	NA^0	0
186	15-Nov-05	39 35.486	74 18.889	121.0	7.2	1.2	0.00	NA^n	NA^0	0
187	1-Nov-05	39 34.964	74 19.451	91.5	7.5	0.9	0.00	NA^n	NA^0	0

Table 3. Station location, tow and station statistics, mean shell height, recruitment indices, and SAV from the 2005 *Argopecten* survey of Little Egg Harbor Bay.

Station	Date	Latitude	Longitude	Distance Towed (feet)	Depth (feet)	Average Speed (knots)	Abundance (*Argopecten* /foot^2)	Mean Height (mm)	Percent Age 0	Live *Zostera* collected$^{\Delta}$?
188	4-Nov-05	39 34.494	74 15.034	128.3	2.9	1.3	0.0077	12.5	100.00	1
189	31-Oct-05	39 34.500	74 15.350	NA*	2.7	1.4	0.00	NA^n	NA^0	0
190	4-Nov-05	39 32.004	74 16.310	118.7	13-16	1.2	0.00	NA^n	NA^0	0
191	4-Nov-05	39 31.747	74 16.632	110.2	14-18	1.1	0.00	NA^n	NA^0	0
192	4-Nov-05	39 31.509	74 17.155	67.8	15.0	0.7	0.00	NA^n	NA^0	0

NA* = Not available. Due to DGPS unit storage limitations, coordinates for this station were overwritten. Latitude and longitude provided are the initially desired sampling locations (actual sampling location may have deviated 'slightly' from the specified coordinates).

** = Coordinates are for station start point (not midpoint, which was not recorded)

*** = Distance provided was derived from start and end points only (midpoint was not recorded).

**** = Distance not available as only start and midpoint coordinates were recorded.

NA^0 = Not available because no *Argopecten* were collected. Therefore, calculating % Age 0 results in division by 0.

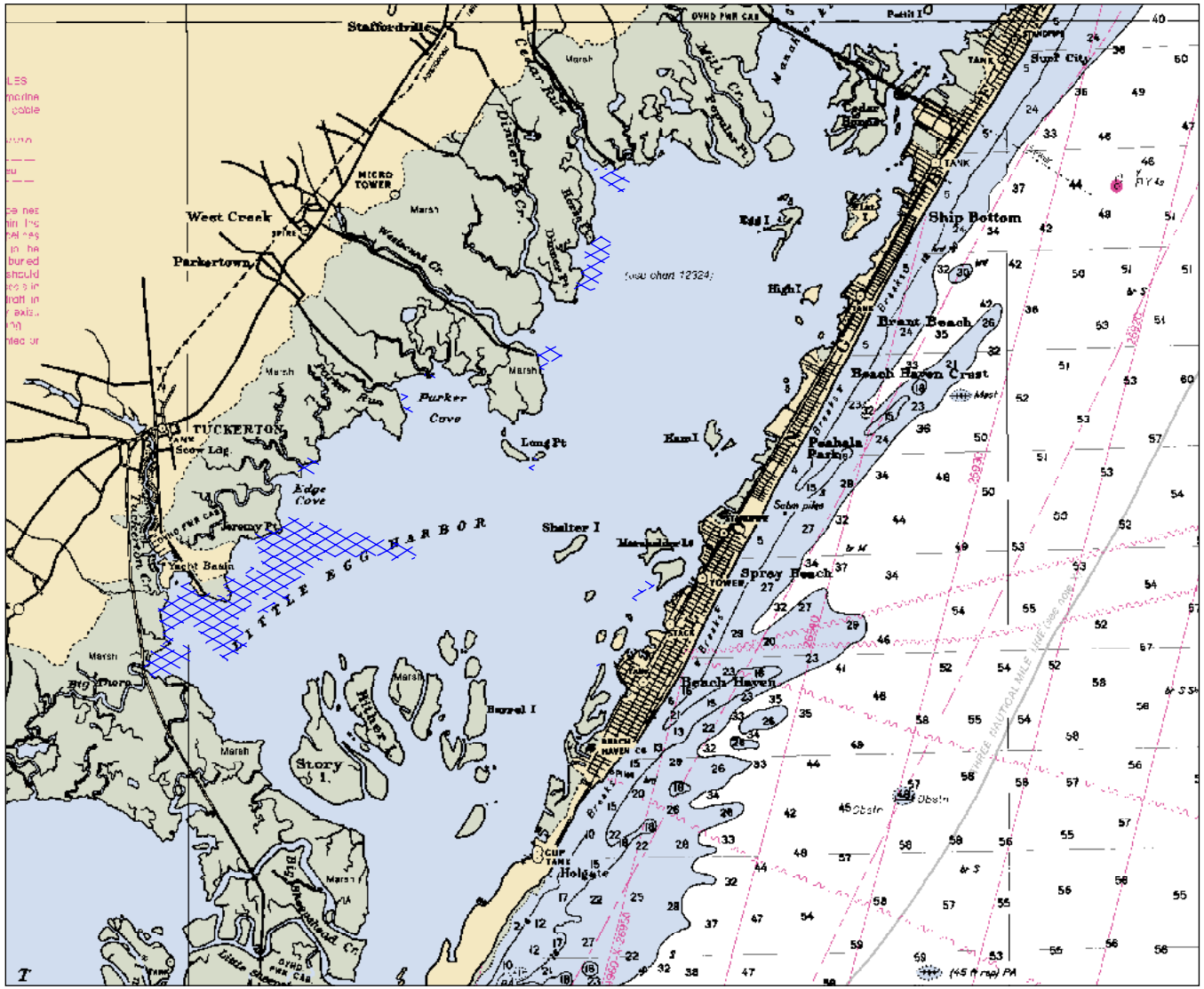
NA^n = Not available (station n = 0).

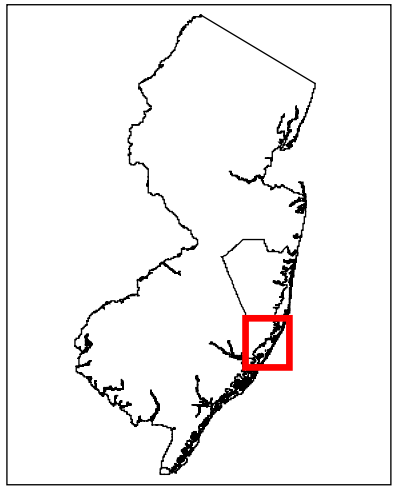
Δ = Live *Zostera marina* collected = 1, Live *Z. marina* not collected = 0.

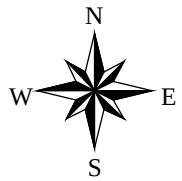
Table 4. Estimated *Argopecten* abundance in Little Egg Harbor Bay (2005).

	Lower Confidence Interval	Point Estimate of Abundance	Upper Confidence Interval
Total scallop abundance (Ages 0 and 1+)	439,831	528,538	630,744
Abundance of age 1+ scallops only	42,564	51,149	61,040
Bushels of age 1+ scallops (500 scallops/bu.)	85	102	122
Bushels of age 1+ scallops (600 scallops/bu.)	71	85	102
Bushels of age 1+ scallops (700 scallops/bu.)	61	73	87

Figure 1. Map of study area for the 2005 Argopecten irradians survey of Little Egg Harbor Bay.







LEGEND

Aquaculture Lease Areas

Figure 4. Station locations for the 2005 survey of Argopecten irradians in Little Egg Harbor Bay.

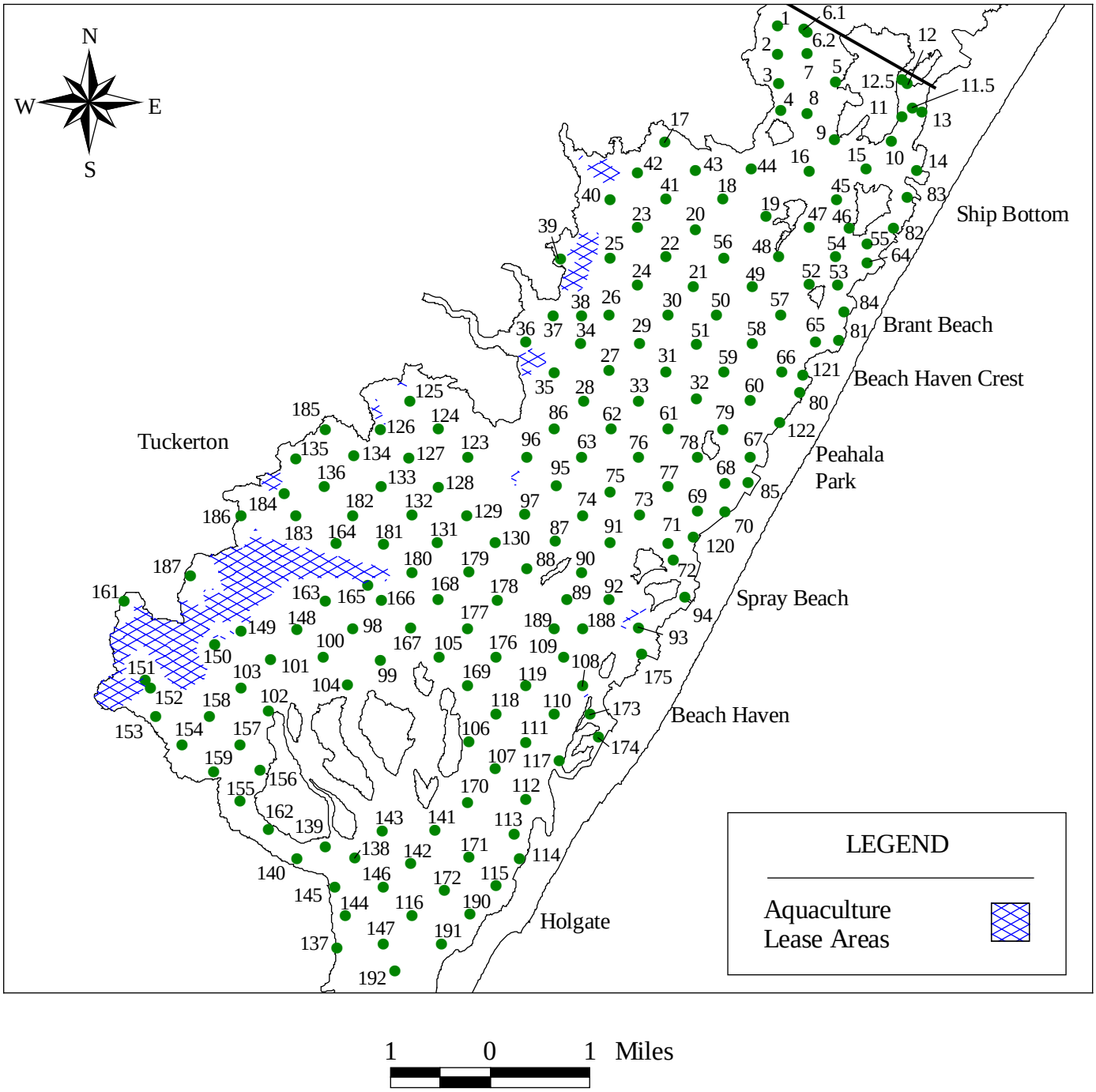


Figure 5. Argopecten irradians distribution and abundance in Little Egg Harbor Bay (2005).

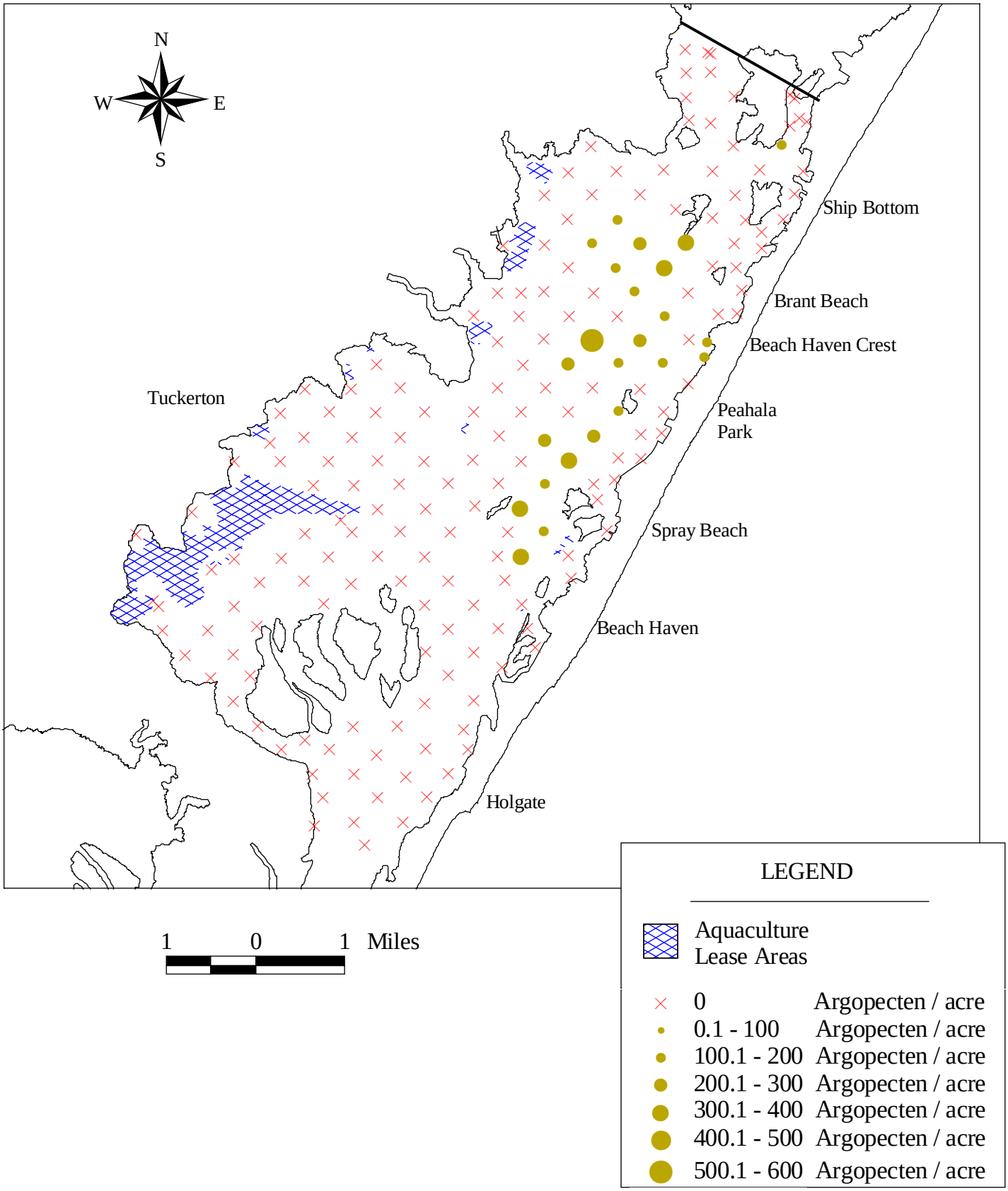


Figure 6. a) *Argopecten* shell height-frequency plot with 1-mm groupings. b) *Argopecten* shell height-percent-frequency plot with 1-mm groupings. c) *Argopecten* shell height-frequency plot with 5-mm groupings. d) *Argopecten* shell height-percent-frequency plot with 5-mm groupings.

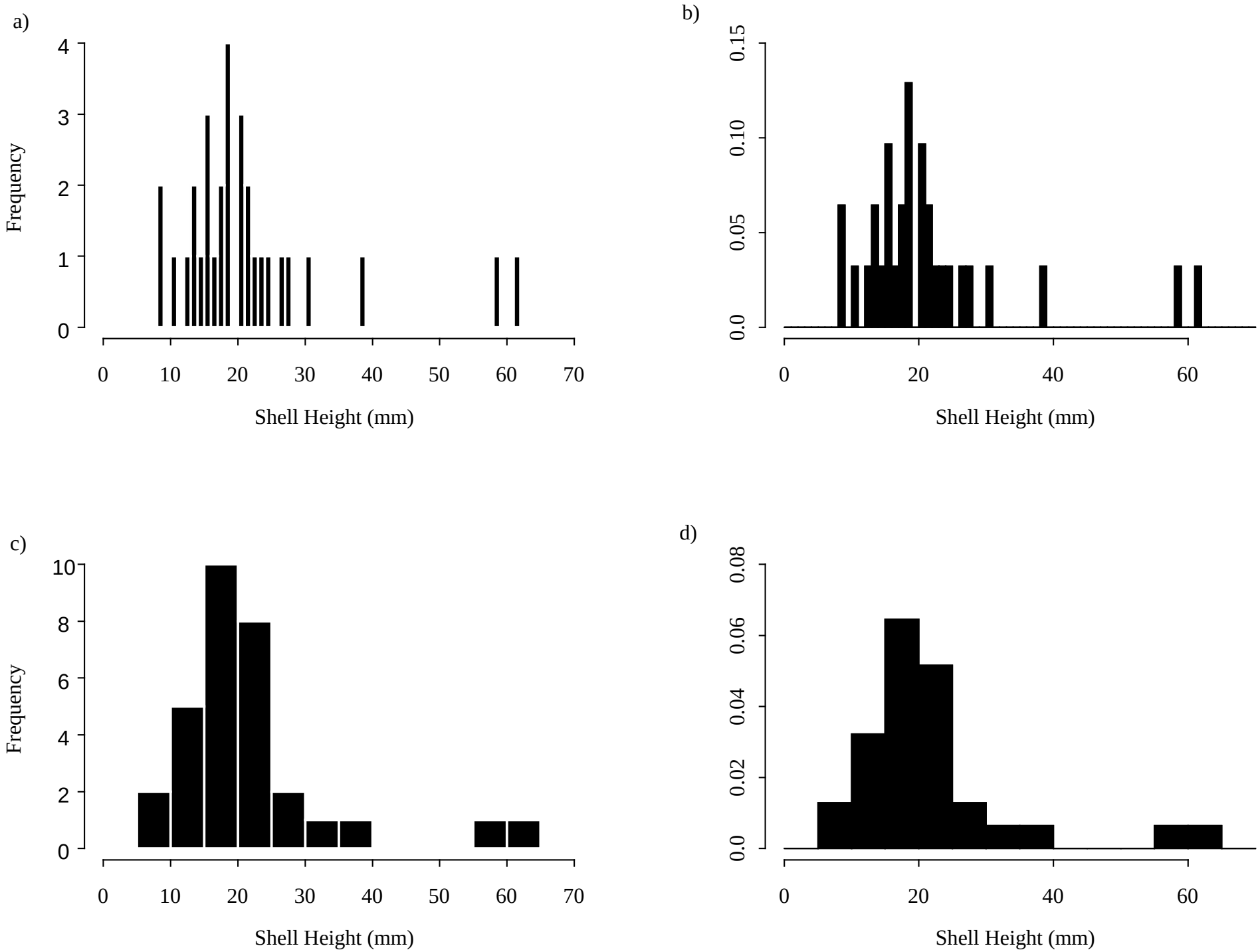


Figure 7. Recruitment indices for the 2005 survey of Argopecten irradians in Little Egg Harbor Bay.

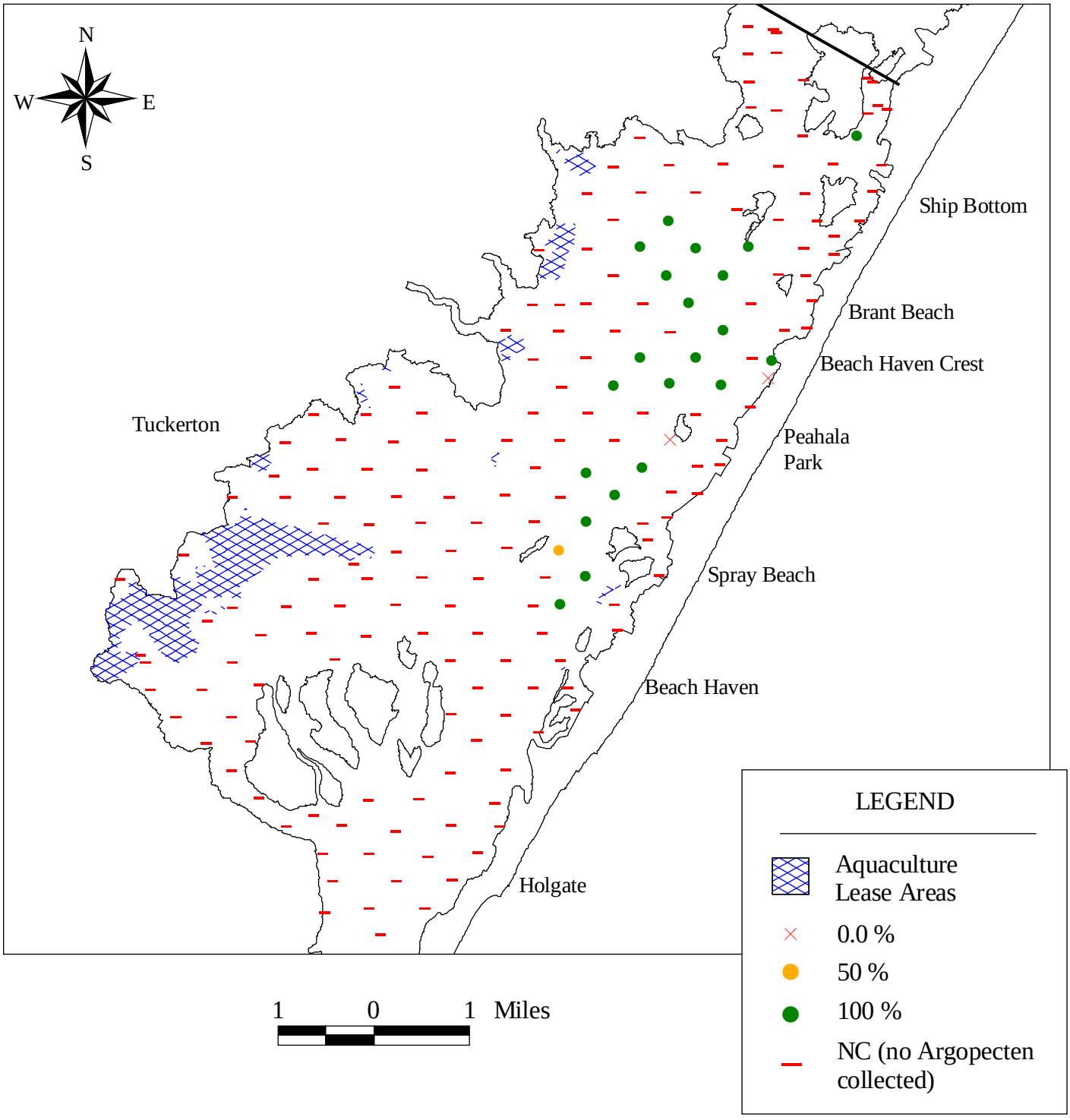
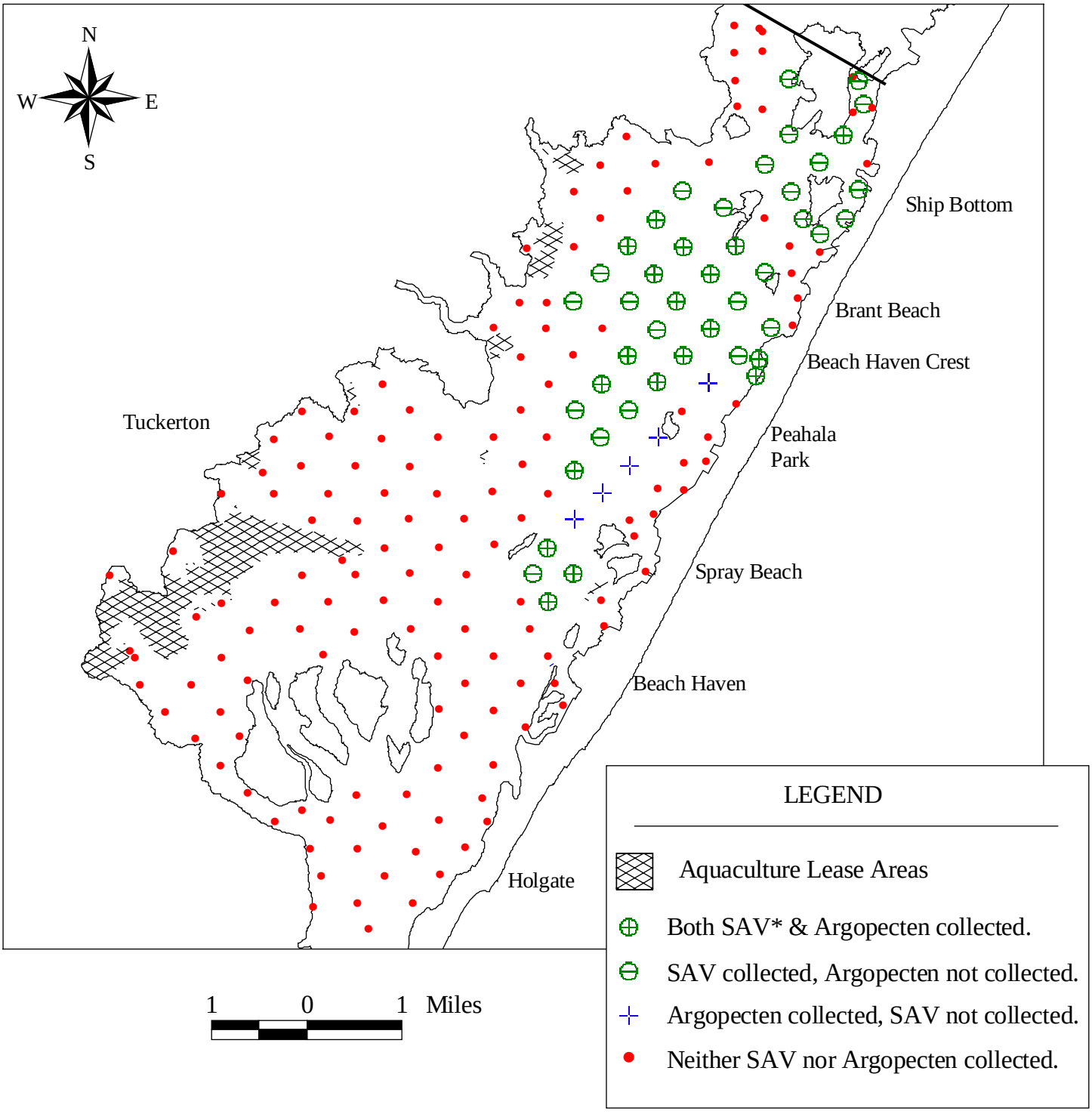


Figure 9. Occurrences of submerged aquatic vegetation and Argopecten irradians for the 2005 survey of A. irradians in Little Egg Harbor Bay.



* SAV = Submerged aquatic vegetation.