

2005 Juvenile Lobster Monitoring Program Report

The Lobster Conservancy's (TLC's) Juvenile Lobster Monitoring Program (JLMP) began in 1993. In 1995 the first volunteers were recruited. During 2005, TLC volunteers and staff censused 25 sites in the Gulf of Maine from Scituate, MA to Great Wass Island, ME (Figure 1). This work would not be possible without the financial support of the Lobster Advisory Council and the dedication of TLC Volunteer Coordinator Jane Roundy, Research Assistant Linda Archambault, and more than 100 volunteers.

The JLMP lobster census consists of visiting lobster nursery sites during the lowest tides of each month, stretching a tape measure along the waterline and using a one-meter square quadrat to count the number of lobsters per unit area. Lobsters are sampled by flipping rocks within 10 to 20 quadrats and capturing the lobsters hiding beneath the rocks. Each lobster is measured and its distinguishing characteristics are recorded. Lobsters are tagged at 2 sites (Bramhall Deep Cove on Friendship Long Island in Muscongus Bay and Lowells Cove on Orrs Island in Casco Bay).

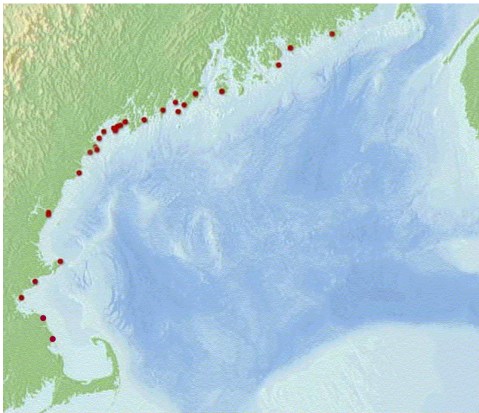


Figure 1. Map of locations (red dots) of sites censused for The Lobster Conservancy's Juvenile Lobster Monitoring Program.

After hatching from eggs, lobsters begin life as larvae that dwell in the water column. The third larval stage molts to become a postlarval lobster which is the first juvenile stage (Figure 2). The juvenile lobsters sampled by the JLMP fall into three size classes (settlers, first-year, and older juveniles) based on age, behavior and morphology. The smallest lobsters sampled are "postlarvae" or "settlers". They are called postlarvae because they occur after the last larval stage but are distinct from other juveniles in appearance and in making the transition from dwelling in the water column (pelagic) to settling on the bottom (benthic).



Figure 2. Postlarval lobster on fingertip.

The second size class consists of first-year lobsters defined as those who have settled within the last 12 months. They are morphologically distinct from larger juveniles in coloration and development of claw “handedness” and sex characteristics. During the first year, lobsters gradually lose the creamed coloration on tips of claws, rostrum, uropods, telson and sides of claws and abdomen (Figure 3). They also gradually differentiate their claws into crusher or seizer becoming right or left handed; and develop into either male or female.



Figure 3. Hand full lobsters in their first year of life on the bottom. None of the lobsters shown has yet reached one year of age.

Finally, older juveniles (Figure 4) closely resemble adults except that they are smaller in size and have not yet developed secondary sex characteristics such as the flared abdomen of adult females and bulky crusher claw of males.



Figure 4. Older juvenile lobsters from approximately age 1 to 4. Note yogurt container for scale. The lobsters are laid out on a bath towel.

Summary of 2005 Sampling Season

At most locations, juvenile lobster densities have increased over the years with many reaching their highest peaks in 2005. By far, the highest densities were recorded at Maine Zones D & F and lowest in Zone A. In 2005, settlement – defined as lobsters measuring <math><6.5\text{ mm CL}</math> – was observed at 11 and first-year lobsters (<math><17.5\text{ mm CL}</math>) were observed at 21 of 25 sites (Table 1). No settler or first-year lobsters were captured in Zone A and no settlement was observed in Zone B (Table 1). Older juvenile lobsters were captured at all sites.

Overall juvenile lobster densities (including all sizes) were lowest for Maine Zone A, higher for Zones B, C, E, G, NH and MA, and highest for Zones D & F (Figure 5).

Location of settlement and first-year lobsters in 2005			
Location	Site Name	Settlers	First Year
Zone A	Slate Island	-	-
Zone B	Windows	-	-
	Beach Street	-	+
Zone C	Vinalhaven	+	+
Zone D	Drift Inn	+	+
	Waterman	-	-
	Friendship	+	+
	Allen Island	-	+
Zone E	Pratt Island	+	+
Zone F	Broad Cove	-	+
	Kettle Cove	+	+
	Peak's Island	-	-
	Chebeague	-	+
	Pott's Point	+	+
	Lowells Cove	+	+
	Little Harbor	+	+
	Gun Point	-	+
	Cundy's Harbor	+	+
Zone G	Goose Rocks	-	+
NH	Odiorne	+	+
	Fort Stark	-	+
MA	Marblehead	+	+
	Gloucester	-	+
	Green Harbor	-	+
	Scituate	-	+

Table 1. Summary of locations where settler (<6.5 mm CL) and first-year (<17.5 mm CL) lobsters were captured in 2005. + represents lobsters present; - represents no lobsters present.

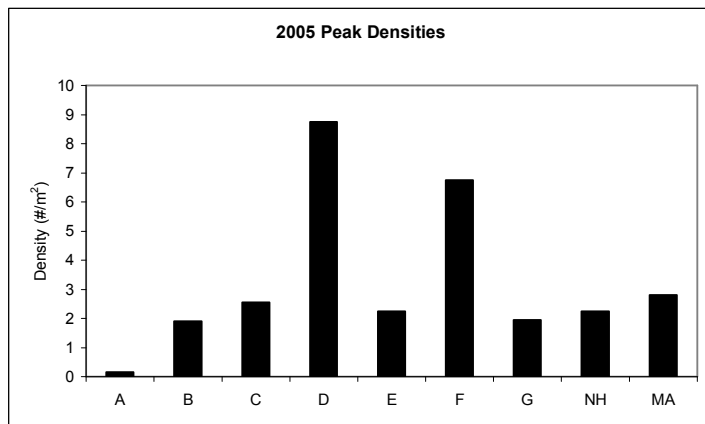
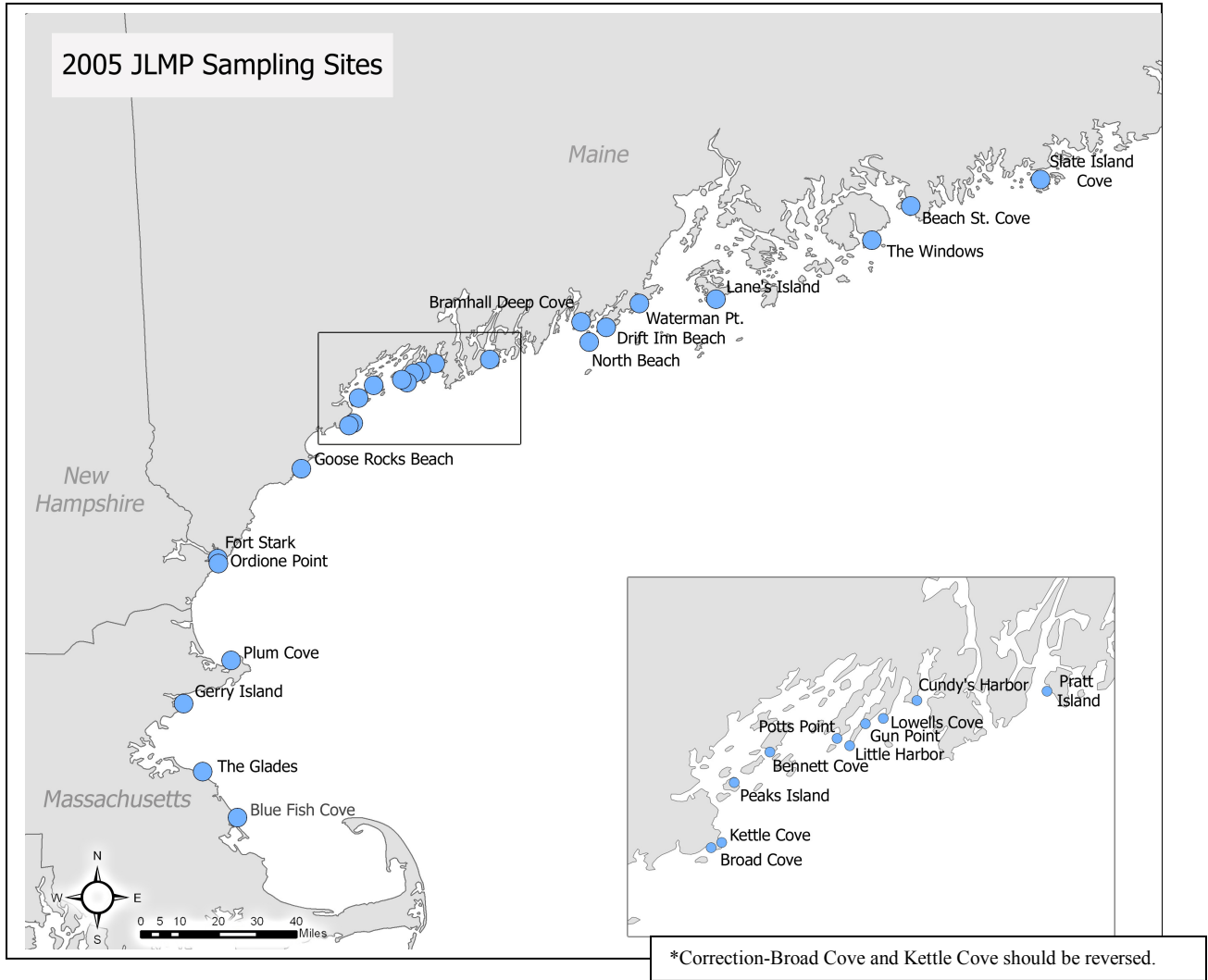


Figure 5. Peak monthly juvenile lobster density recorded in Maine (lobster Zones A to G), New Hampshire (NH) and Massachusetts (MA) during 2005.

Data from individual sites that have been censused by volunteers for at least 3 consecutive years are plotted in Figures 6, 7 & 8. At most locations, juvenile lobster densities have increased over the years reaching their highest peaks in 2004 or 2005. Use the map below to identify site locations listed in table and figures.



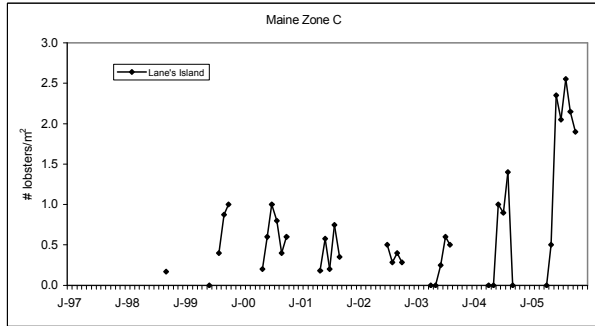
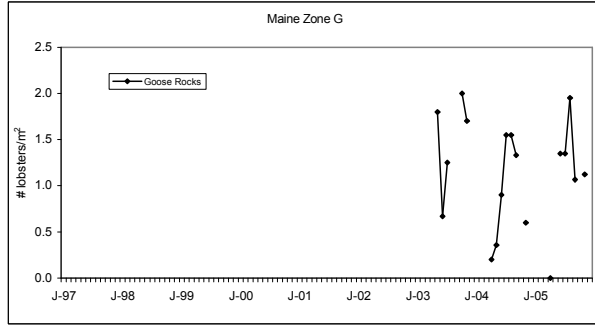
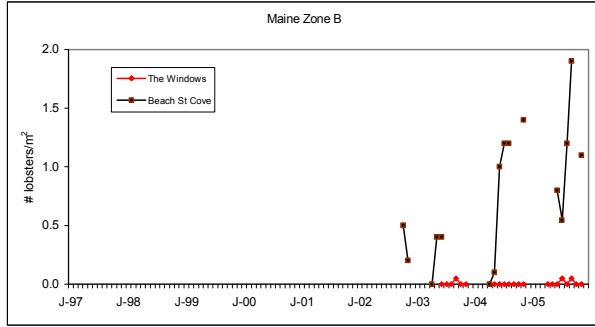
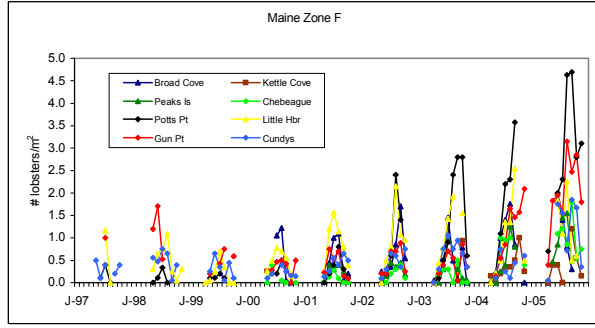
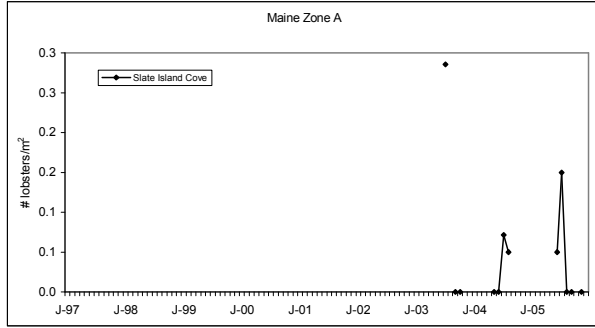
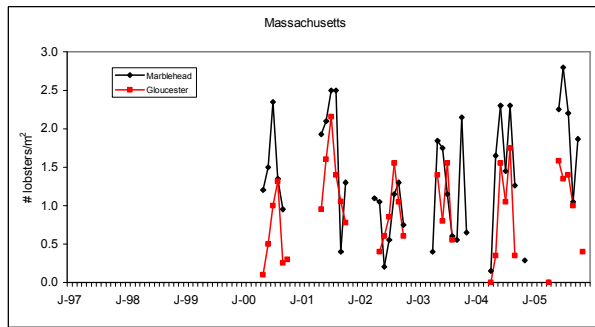
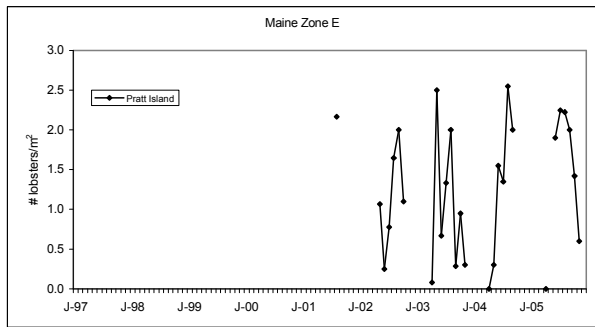
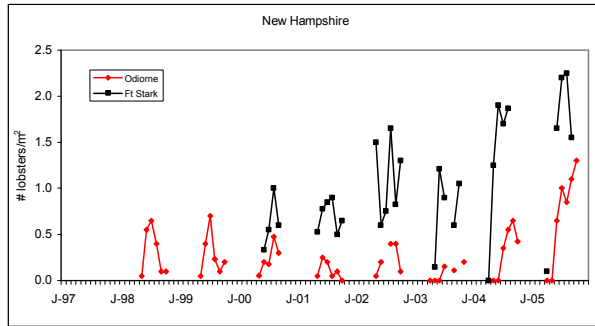
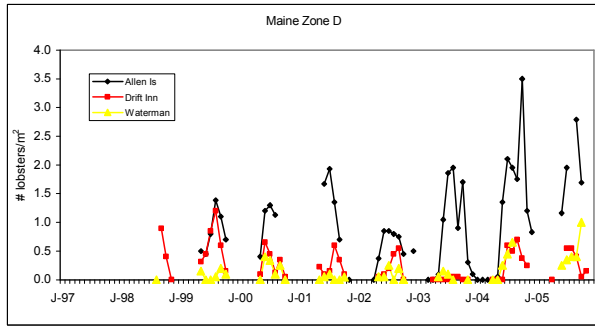


Figure 6. Time series of juvenile lobster densities (all size classes) recorded monthly by volunteers at Maine Zones A to G, New Hampshire and Massachusetts. Each site within the zone or state is plotted separately. Note that the scale on the X-axis is, but Y-axis is not the same for all locations.



The two sites sampled year-round by TLC scientists are summarized to further examine the data by graphing the densities for each of the 3 size classes separately.

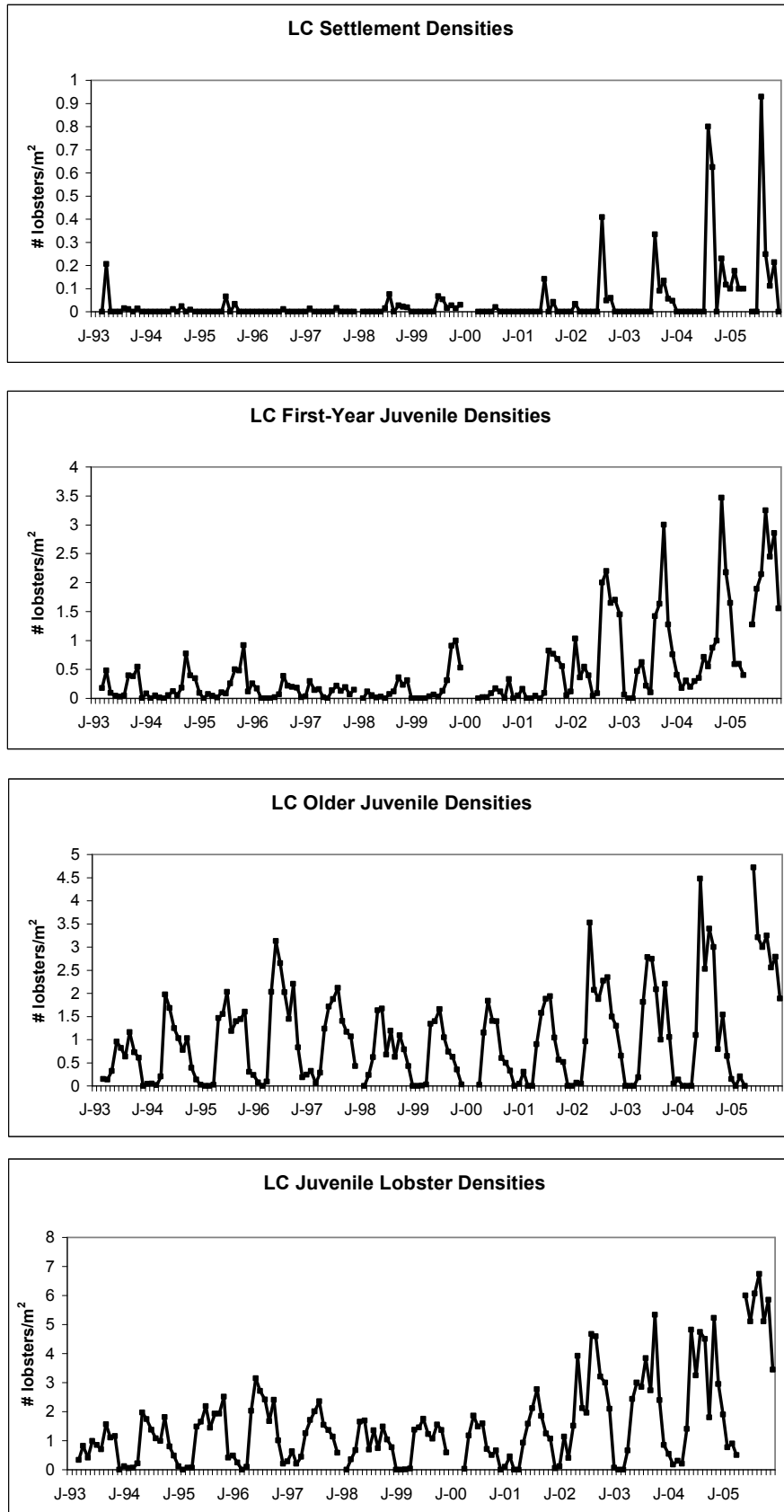


Figure 7. Juvenile lobster densities recorded at a depth of -0.3 m at Lowells Cove in Casco Bay, Zone F. Settlement refers to lobsters measuring <6.5 mm CL; first year 6.5 – 17.4 mm CL; older juveniles >17.4 mm CL. The fourth graph plots a total including all size classes. Note that the scale on Y-axis is not the same for each size class.

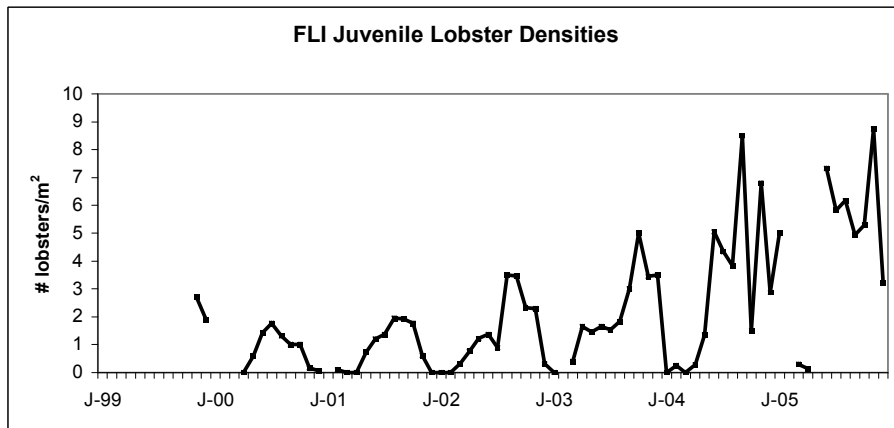
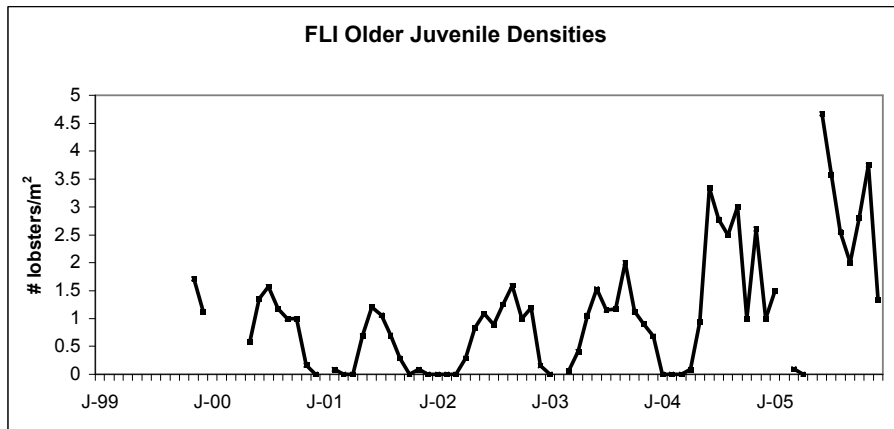
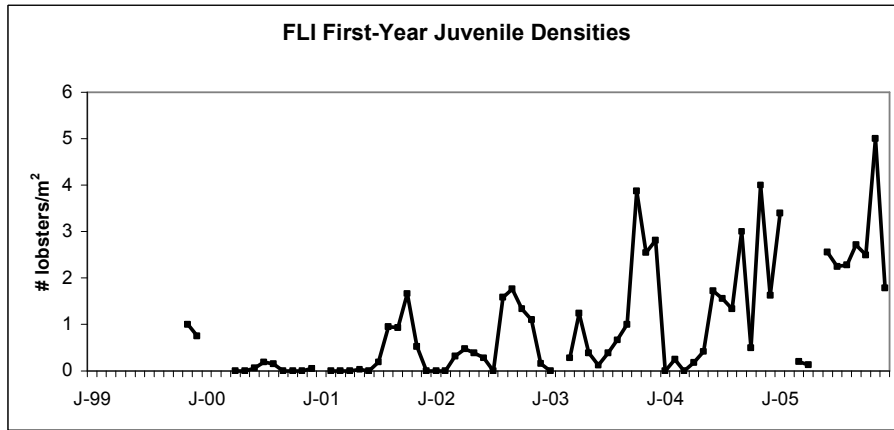
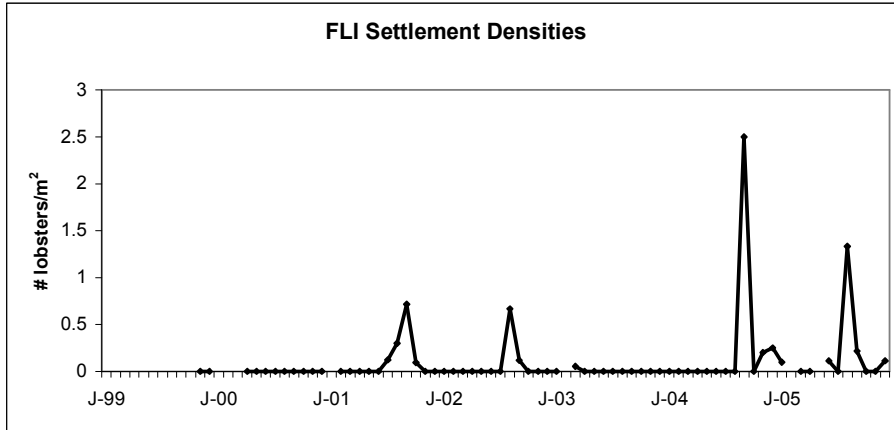


Figure 8. Juvenile lobster densities recorded at a depth of -0.3 m at Friendship Long Island in Muscongus Bay, Zone D. Settlement refers to lobsters measuring <6.5 mm CL; first year 6.5 – 17.4 mm CL; older juveniles >17.4 mm CL. The fourth graph plots a total including all size classes. Note that the scale on Y-axis is not the same for each size class.

Densities of all size classes at Lowells Cove and Friendship Long Island have reached their highest peaks for all size classes in 2004 & 2005 – doubling to quadrupling peaks in previous years. For Lowells Cove – the longest time series – there has been a remarkable increasing trend in abundance – especially for settlers who were scarce during the first decade. There continues to be a strong seasonal cycle with the highest lobster densities observed in the summer and fall. It is notable that first-year lobster densities were higher at Lowells Cove in the 2004 & 2005 winter months than in previous years – when juvenile lobsters were barely detectable. It is also interesting that we found the first postlarvae to be recorded in January. To date, we have observed settlement in each month of the year with the exception of May and June. Although most settlement occurs in August of each year, finding postlarvae from July to April indicates that embryos must be hatching throughout most of the year. These results are intriguing and warrant further investigation. They also point out the benefits of sampling throughout the year most notably by allowing us to detect shifts in the timing of events.

As a final note, shell disease was reported at five sites: Lanes Island on Vinalhaven, Bramhall Deep Cove on Friendship Long Island (FLI), Lowells Cove (LC) on Orrs Island, Goose Rocks in Biddeford and Plum Cove in Gloucester. Most were mild cases with barely noticeable blemishes that were in many cases confirmed to be shell disease by a marine specialist Doctor of Veterinary Medicine. Although relatively few lobsters with shell disease were found, early signs of shell disease are difficult to detect. Local volunteers and lobstermen were trained to recognize early stages of shell disease. It is important to monitor for shell disease – particularly in juvenile and new shell lobsters because it is unlikely that these animals have traveled far since molting which could indicate local contraction of the disease.

In conclusion, the consistent nature of the results and the JLMP's ability to detect trends in settlement and juvenile lobster abundance indicate that this program provides a high-quality tool for keeping track of the well being of juvenile lobsters. At this point in time, it is comforting to know that high numbers of lobsters are settling and growing up at these sites. This bodes well for the future because the juvenile lobsters of today will become the parents of future generations and represent future landings.

Respectively submitted,

Diane F. Cowan, Ph.D.