



Bibliography

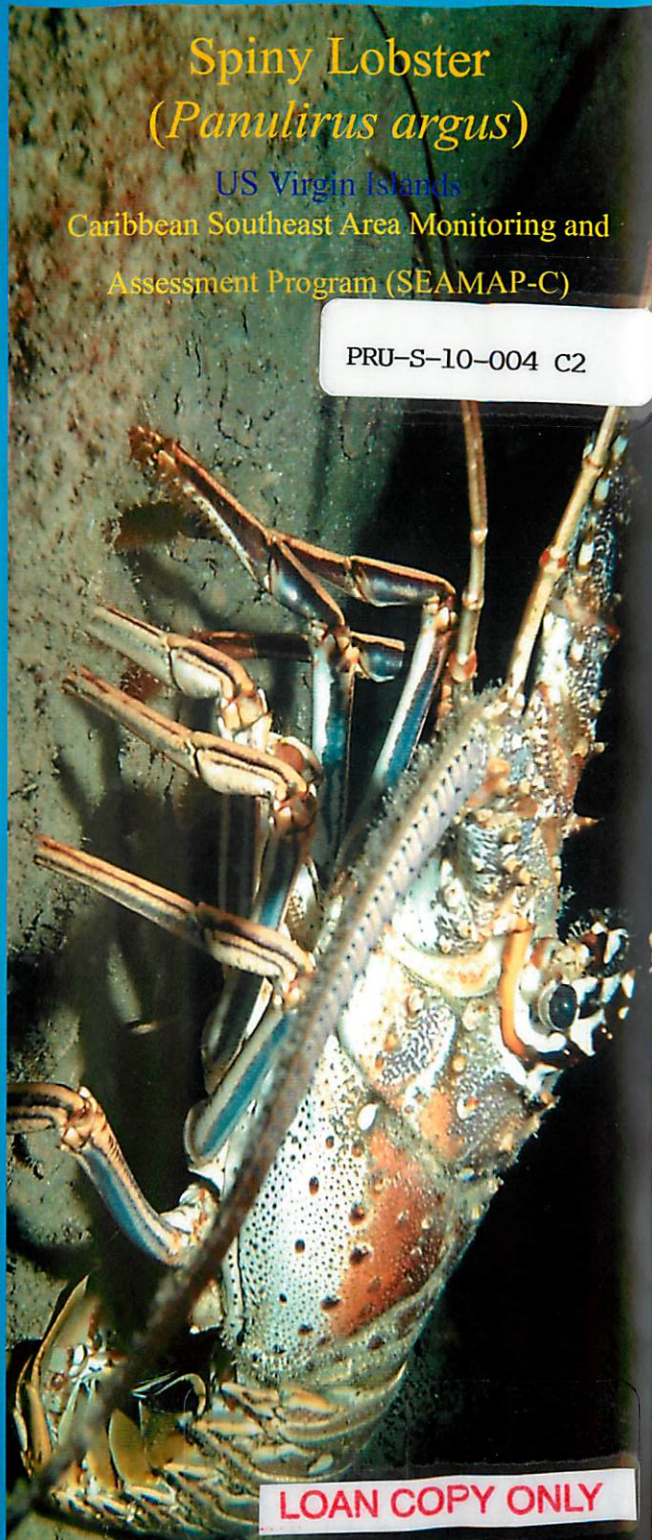
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Spiny Lobster (*Panulirus argus*)

US Virgin Islands
 Caribbean Southeast Area Monitoring and
 Assessment Program (SEAMAP-C)

PRU-S-10-004 C2

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Introduction

The Caribbean spiny lobster (*Panulirus argus*), supports an important commercial and recreational fishery in the US Virgin Islands (USVI). Lobster commercial landings have increased in St. Croix and St. Thomas/St. John from the early 1970's; of less than 5,000 pounds per year to approximately 150,000 and 120,000 pounds per year, respectively, in 2007. Landings by the recreational sector are unknown, but are believed to be considerable. To understand adult *P. argus* population trends, postlarvae settlement and juvenile recruitment must be studied. Long term monitoring can detect trends and changes in populations over time, thereby revealing information about spiny lobster stocks and sustainability of harvests.

Nevertheless, it is not enough to study trends in settlement and recruitment. Juvenile habitat requirements must also be identified since, juvenile and adult *P. argus* use a variety of benthic marine habitats. Postlarval phase juveniles move out of vegetated areas and seek refuge crevices when they reach 15-20 mm CL (carapace length). The availability of refuge structures influences survival, distribution and abundance of small benthic crustaceans. Crevices and other interstices for evading predators are especially important to vulnerable early benthic stages of spiny lobster. Insufficient sheltering structure is thought to limit early recruitment in some areas. Artificial shelters placed in benthic habitats deprived of hardbottom (natural shelter) enhanced juvenile populations. However, the effect of habitat characteristics on juvenile dispersal is unclear.

Understanding and collecting information of the two adult lobster precursor stages, "postlarvae and juveniles", is essential for knowing the lobster fishery status and how management could help to improve it. Therefore, besides surveying pueruli lobster in this study, an effort was made to investigate artificial shelters for juvenile *P. argus* in areas devoid of appropriate juvenile habitat.

Objectives

- Examine spatial and temporal variability in *P. argus* pueruli settlement, recruitment and the relative abundance within the marine reserve habitats, located on the east end of St. Thomas, USVI.
- Compare the trends in relative abundance and settlement of postlarvae between 1992-93, 1997-98, and 2002-03 in St. Thomas, USVI.
- Evaluate the use of artificial habitat shelters on juvenile lobster occupancy and abundance.

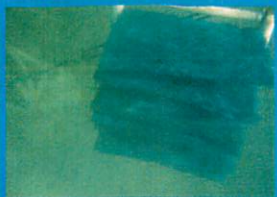


• Postlarvae collectors
 ■ Juvenile shelters

Methodology

Collector Design:

Pueruli collectors were modified from the original Whithman design. The frames were made from PVC pipes and elbows. Each collector had four “hogs hair” air conditioning filters cut to 40.5 cm x 61.0 cm pieces supported to the PVC pipes.

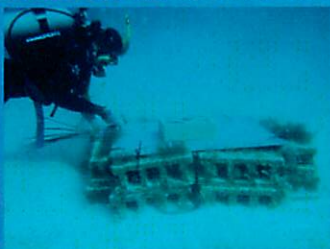


Pueruli Sampling

Collectors were sampled twice a month for over a year. The collectors were brought to the surface, enclosed in a bag made from 1 mm size mesh. The pueruli were counted, staged and then returned at each site. Pueruli were staged as follows: transparent, semi-pigmented, pigmented, and algal-phase juvenile.

Juvenile Lobster Shelter Sites

The area for shelter installation was located east-southeast of Cow and Calf Rocks and south of Great St. James with a depth of approximately 20 m. Ten sets of lobster shelters were constructed from 16 large concrete cement blocks with three square holes per block. The blocks were arranged in a two-level quadrangular structure with an open central area. Because only one juvenile lobster was encountered from July-October 2002, it was decided during October 2002 that half of the artificial shelters should be covered.



Findings on Pueruli Assessments

Of a total of 202 postlarvae observed during the study, ten individuals (5%) were transparent phase, 19 (9%) were semi-pigmented, 28 (14%) were pigmented, and 145 (72%) were early algal-phase juveniles. During a single sampling day, a maximum of 40 pueruli settled across all collectors.

Spatial Variation

Pueruli abundance at most sites was low. However, overall pueruli abundance in Nazareth Bay (127 pueruli) was higher than in other sites. The abundance of pueruli was similar between Mangrove Lagoon and Cas Cay sites (19 and 18 pueruli, respectively).

Temporal Variation

Lunar cycles were separated in four phases. The highest CPUE values were recorded between new moon and first quarter phases with a 73% of settlement occurring during this period.

Peak settlement occurred primarily in spring and early summer (April-June). The collectors at Mangrove Lagoon, Cas Cay, and northwest Great St. James had low settlement rates, not exceeding 0.15 pueruli/day/collector (CPUE) on any particular sample date.

Two collectors located at southwest Great St. James had high settlement rates during summer months, which decreased and stayed below a CPUE of 0.08 pueruli/day/collector during the rest of the year.

The greatest recorded settlement occurred during May 6, 2003, at Nazareth Bay, with a peak CPUE of 1.54 pueruli/day/collector over a single sample period. This is mainly due to the large number of pueruli (40 pueruli) that were observed at that sampling day.

The settlement of pueruli had steadily declined from 1992-1993 through 1997-1998 to 2002-2003 in all four sampling sites (Mangrove Lagoon, Cas Cay, Nazareth Bay and Great St. James). The combined mean annual CPUE \pm SD observed were 0.20 ± 0.29 , 0.15 ± 0.30 , 0.07 ± 0.19 pueruli/day/collector, respectively, for Mangrove Lagoon, Cas Cay, Nazareth Bay and Great St. James.

Artificial Shelter Assessment for Juvenile “Casitas”

Only two juvenile lobsters were observed during the one year study. One was found in an uncovered “casita” and the other in a covered shelter. Although few lobsters were encountered in the shelters, the shelters were densely occupied by other marine organisms. The low juvenile recruitment may be the result of pueruli settlement occurring a considerable distance away, and thus limiting the supply of juvenile lobster to the shelters.



The success of shelters in attracting and concentrating juvenile lobsters may be affected by the proximity of the “casitas” to local habitat features and the bottom physical characteristics.



Recommendations for Pueruli Study

- Coordinate sampling between PR, US and British Virgin Islands to detect correlations and variations among pueruli distribution, settlement and recruitment on a larger spatial scale.
- Develop and conduct studies to clarify the relationship and transitions between settlement and recruitment, to better understand and manage adult lobster stocks.
- Investigate the role of habitats on the recruitment of juvenile lobster, particularly in mangrove and coral reef habitats.
- Integrate the participation of other Caribbean islands in data collecting to develop local and regional population dynamics studies for the development of a robust regional lobster fishery management program.
- Obtain data on habitat preferences and selection, hydrological factors affecting such selection and the extent of the resource harvesting in the territory.