4-5-2002

Sea Stewards: A Volunteer Ecological Monitoring Program

Nicole D. Fogarty
The Nature Conservancy - Summerland Key, fogartyn@uncw.edu

Mary Enstrom
The Nature Conservancy - Summerland Key

Project Title: **Sea Stewards: A Volunteer Ecological Monitoring Program**

Researchers: Nicole D. Fogarty and Mary Enstrom, The Nature Conservancy, Summerland Key, FL.

Goals: In 1998, The Nature Conservancy initiated the Sea Stewards volunteer program to participate in monitoring the Florida Keys National Marine Sanctuary. The objectives of the program are to: 1) target species and ecological processes that are not being monitored by other studies, 2) contribute useful data to the evaluation of the Sanctuary's zoning program, and 3) engage Keys residents and Sanctuary users in evaluating resource condition and the effectiveness of management actions.

Methods: Ten teams of volunteer divers, boat operators, and photographers monitor assigned permanent sites in both Sanctuary fully protected zones and nearby reference areas. Selected targets include: 1) all species of reef-dwelling sea urchins (mainly *Diadema antillarum*, *Eucidaris tribuloides*, *Echinometra viridis*, and *E. lucunter*), 2) adult three-spot damselfish (*Stegastes planifrons*), 3) juvenile and adult yellowtail damselfish (*Microspathodon chrysurus*), and 4) all known fish cleaning species, mainly neon goby (*Gobiosoma oceanops*), Pederson cleaner shrimp (*Perclimenes pedersoni*), spotted cleaner shrimp (*P. yucatanicus*), scarlet-striped cleaner shrimp (*Lysmata grabhami*), juvenile porkfish (*Anisotremus viginicus*), juvenile Spanish hogfish (*Bodianus rufus*), and juvenile bluehead wrasse (*Thalassoma bifasciatum*). Teams collected data on these selected targets every year both during the dry (November-April) and wet (May-October) seasons; due to weather conditions and other constraints, not all of the teams completed data collections for each season.

Sea urchins and target damselfish were identified and counted in 20, one-m^2 quadrats radiating out from the sites' central feature in belts of five quadrats. In addition, the size of each sea urchin was categorized and recorded. Beginning in May 2000, quantitative data on the number of fish cleaners, active cleaning stations, and clients were collected within two meters on either side of each belt transect, covering a total area of 400 square meters. In addition, the location of fish cleaners and active fish cleaning stations were mapped for future comparisons.

Findings to Date: No statistically significant difference was found between the fully protected zones and reference areas for any of the four targets (Figs. 1-4). The data document an overall low density of sea urchins; due to these low numbers all sea urchin species were combined for statistical analysis (Fig. 1). The vast majority of the sea urchins recorded were slate-pencil urchins (*Eucidaris tribuloides*). Extremely low densities of long-spined urchins (*Diadema antillarum*) indicate populations have still not recovered from the 1983-1984 massive die-off.

The only target that showed a nearly significant difference ($P = 0.09$) between the fully protected zones and reference areas was adult three-spot damselfish during the 1999-2000 dry season (Fig. 2). The apparent trend for three-spot damselfish suggests greater densities in the fully protected zones. Densities of adult yellowtail damselfish appear comparable in the fully protected zones and in reference areas, while juvenile yellowtail damselfish did not seem to follow any particular pattern (Figs. 3 and 4).

Sea Stewards collected data on fish cleaners and fish cleaning stations for the first time using the belt transect method during the 2000 wet season. Six active cleaning stations with thirteen active cleaners were documented. Grunts and snappers were the only "clients" observed being cleaned. Examining the data by the two types of cleaners, obligate (relying entirely on fish cleaning for their food supply) and facultative (part-time cleaners, usually juveniles), revealed the following trend. Facultative cleaner densities were much higher than obligate cleaners; however, obligate cleaners were twice as likely to be active. The most common cleaner and most abundant obligate cleaner was the neon goby. The vast amount of juvenile bluehead wrasses made them the most abundant facultative cleaner by far. Given that these two species made up the majority of the cleaners, they were combined for the statistical analysis. The results of the t-test showed no significant difference between the fully protected zones and reference areas for the neon goby/bluehead wrasse or for all other cleaners combined.

After five seasons of data collection, some trends in urchin and damselfish densities when comparing fully protected zones and reference areas are beginning to develop; however, it is still too early to speculate about the density differences of these targets. Continued monitoring of all four targets is imperative to discern any significant differences or actual trends between the fully protected zones and reference areas.

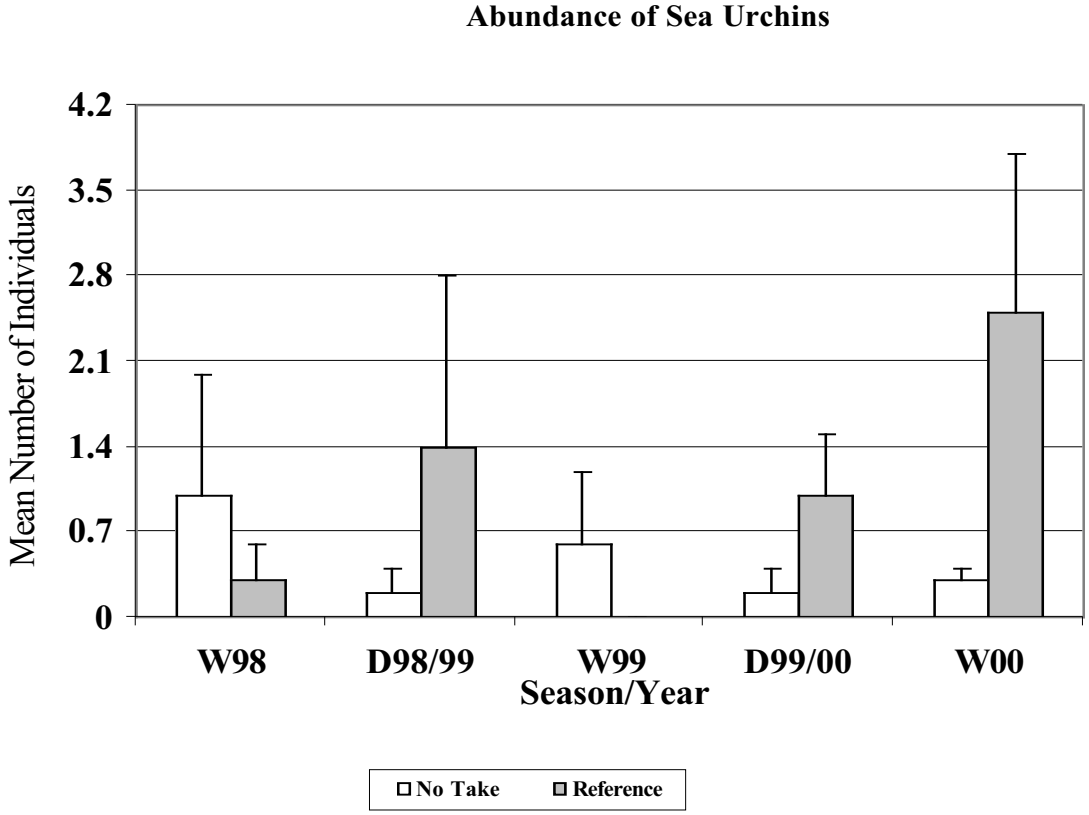

Figure 1. Mean number of individuals per 20 m^2 of sea urchins across all seasons. W: wet season (May-October); D: dry season (November-April). Results of t-test showed no statistically significant differences ($P < 0.05$) between fully protected zones and their reference sites.

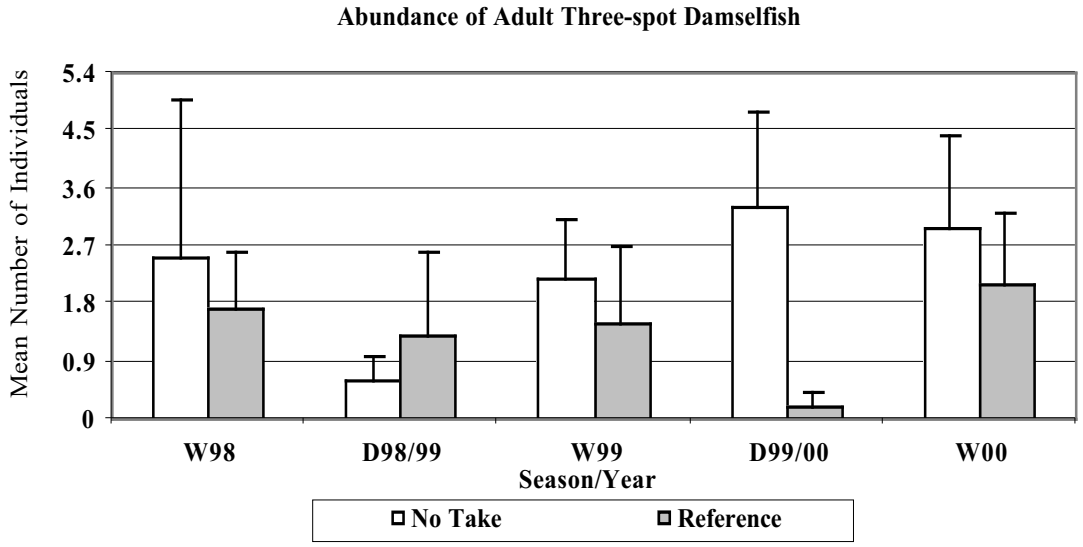

Figure 2. Mean number of individuals per 20 m^2 of adult three-spot damselfish across all seasons. W: wet season (May-October); D: dry season (November-April). Results of t-test showed no statistically significant differences ($P < 0.05$) between fully protected zones and their reference sites; however, the 1999-2000 dry season showed a nearly significant difference ($P=0.086$).

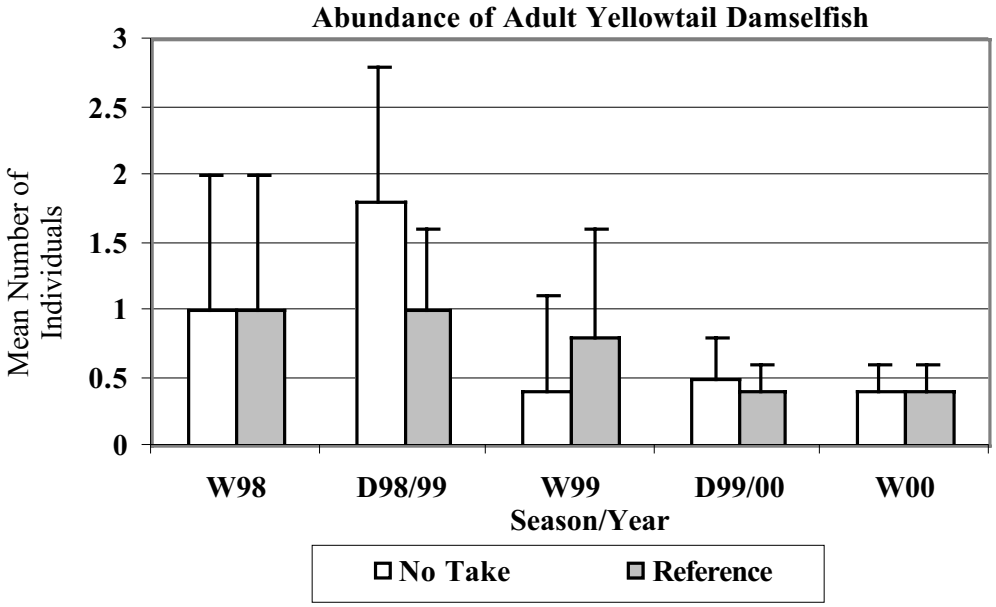

Figure 3. Mean number of individuals per 20 m^2 of adult yellowtail damselfish across all seasons. W: wet season (May-October); D: dry season (November-April). Results of t-test showed no statistically significant differences ($P < 0.05$) between fully protected zones and their reference sites.

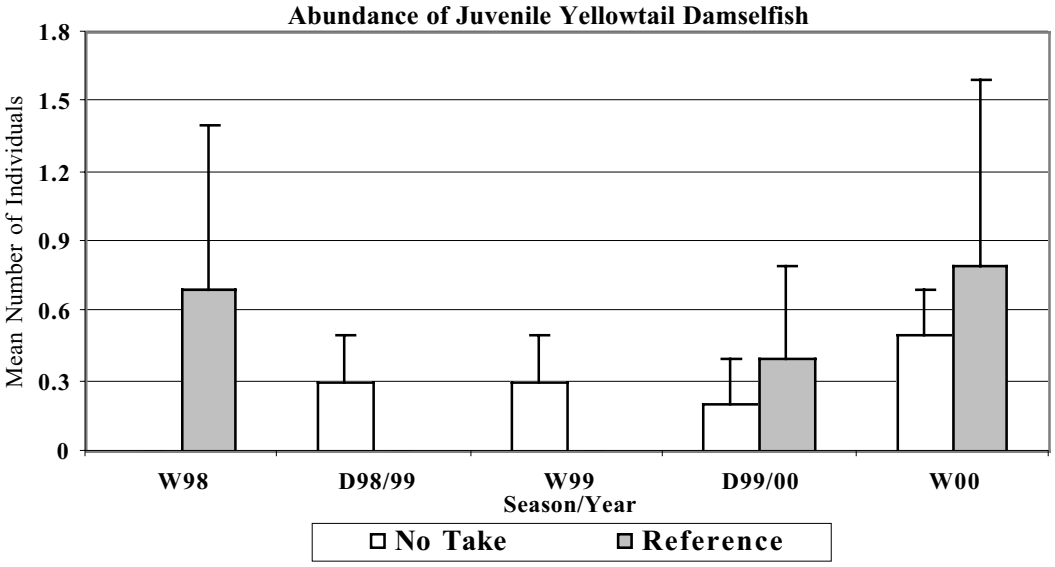

Figure 4. Mean number of individuals per 20 m^2 of juvenile yellowtail damselfish. W: wet season (May-October); D: dry season (November-April). Results of t-test showed no statistically significant differences ($P < 0.05$) between fully protected zones and their reference sites.