

NOTE

Ecological Notes on the Juvenile Siganid (*Padas*) Harvest in Bolinao, Pangasinan, Philippines.

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Abstract Juvenile siganids or *padas* were observed in abundance during the months of August and September, 1985 and March to May, 1986. They were found to belong to three species: *S. fuscescens* (*pino padas*) and *S. spinus* and *S. argenteus* (collectively called *darigayos padas*). They are caught by bag nets in deep water, by beach seine and fish corral in shallow water.

The three species of *padas* were caught in commercial quantities from March to May; however, only *S. fuscescens* juveniles were caught in great number from August to September. The greater abundance of the latter species might be because of its year-round spawning habit and its very high fecundity.

The dates and times of appearance of *padas* seem to follow a semi-annual pattern correlated with a definite phase of the lunar cycle—one to four nights after the last quarter in *S. spinus* and *S. argenteus*, and two to five nights after the last quarter in *S. fuscescens*. *Padas* runs were observed when the tidal fluctuations were at a minimum, most of all in May.

Introduction

Cape Bolinao, lying on the southern entrance to Lingayen Gulf, is noted for its fishery of siganids (rabbit fishes). Of particular importance are the juveniles or *padas*, which become abundant at two seasons of the year—March to May and August to September (Ablan and Rosario, 1962; Calvelo and Ginon, 1977). Calvelo and Ginon (1977), describing the structure of the Bolinao fishery, state that “the waters surrounding the Santiago Island have the biggest *padas* resource.” However, the identity and relative abundance of the species were not determined.

The present paper recalls our observations on the *padas* runs in Bolinao, Pangasinan in connection with a two-year study of the biology of siganid fishes, including an account of how certain environmental factors—lunar cycle and tidal fluctuations—determine the periodicity of the *padas* runs.

Materials and Methods

Samples of *padas* were taken in the reef flat around Santiago Island during the in-shore migration of juvenile siganids from August–September, 1985 and March–May,

1986. Sampling was done twice daily, at 0600 h and 2100 h during the fishing operations of the local fishermen.

Abundance was determined by recording the total weight and the number of containers (1 container = 7 kg) filled up by the total catch of *padas* landed in the sampling sites. The fishing gear used in their capture was noted.

Seasonality was inferred from the months of local abundance of *padas*. Tidal fluctuations and moon phases during the observation period were determined from the Tide and Current Tables published by the Philippine Bureau of Coast and Geodetic Survey.

Results and Discussion

Our taxonomic study shows that the juveniles caught during the period of observation belong to three species: *Siganus fuscescens* (Houttuyn), *S. spinus* (Linnaeus) and *S. argenteus* (Quoy and Gaimard). *Siganus fuscescens* juveniles, locally called *pino padas*, have a standard length range of 20–29 mm. *Siganus spinus* and *S. argenteus* juveniles, both commonly called *darigayos padas*, have standard lengths of 20–40 and 47–55 mm, respectively.

The relative abundances of the *padas* for the five-month observation period (Table 1) shows the predominance of *S. fuscescens*.

From March to May, ebb tide fell between 1800 h and 2400 h, while flood tide was recorded between 0600 h and 1200 h. This pattern was reversed in August and September.

The *padas* appeared each month for four to five nights, between the last quarter and the new moon lunar phases (Figure 1). *S. spinus* and *S. argenteus* (*darigayos padas*) appeared first, but they gradually diminished as *S. fuscescens* (*pino padas*) made its appearance.

The total harvest over a five-month period of *padas* is as follows: 59,585 kg (bag net); 28,013 kg (beach seine); 19,448 kg (fish corral). The bag net appears to be the most effective fishing gear followed by the beach seine, while the fish corral appears to be the least effective. The bag net is a cubical net with a mesh size of around 2–3 cm., and is used at night in deeper waters of around 20 meters outside the reef flat and in the deeper portions. Capture is effected by a lifting motion with the use of booms on the boat and manipulated by at least five people. The beach seine, with a mesh size of about 2 cm. at the cod end, is operated at daytime from around six in the morning. Each wing is around 10 m. (20 m. total), and the body is 15 m (including the 3 m cod end). The net is dragged from the deeper to the shallower area and takes three hours to make one haul. The fish corrals have guiding barriers constructed of fine-meshed nets set by regularly-spaced posts in tidal flats

Table 1. Monthly relative abundance (%) of the three different *padas* species caught from August 1985 to May 1986.

Species	Aug.	Sept.	Mar.	Apr.	May
<i>S. fuscescens</i>	90.0	95.0	70.20	70.10	69.70
<i>S. spinus</i>	5.0	2.5	19.90	19.95	20.15
<i>S. argenteus</i>	5.0	2.5	9.90	9.95	10.15

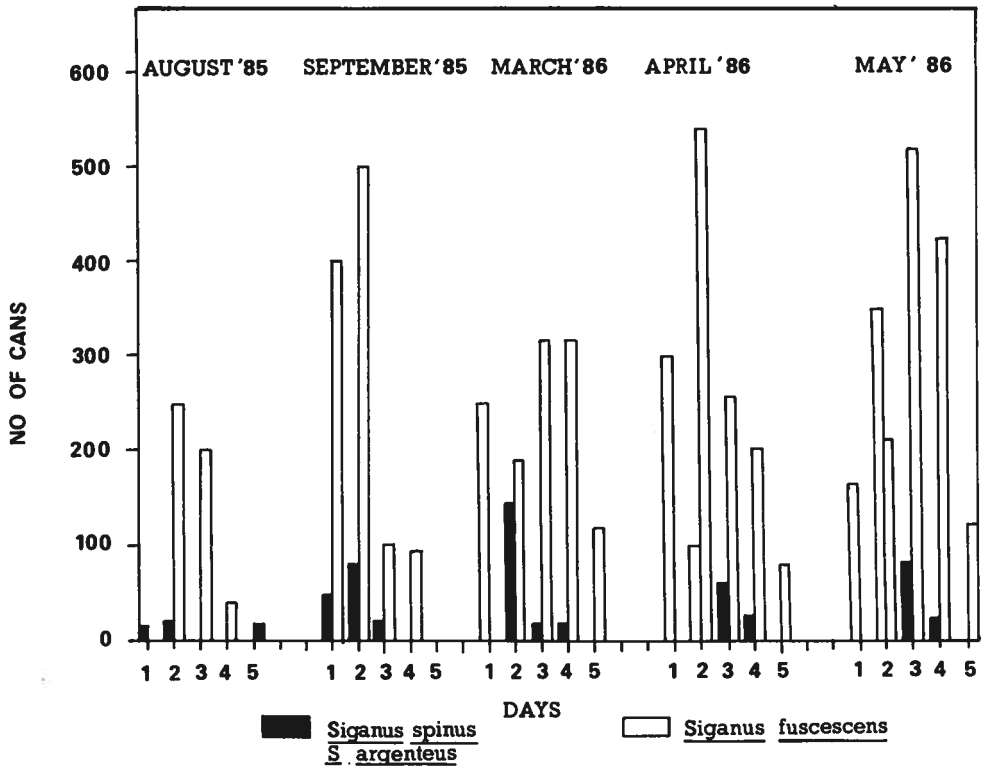


Figure 1. Amount of *padas* (in number of cans) caught daily during the *padas* run.

or along natural pathways of fish; their shape is such as to direct the voluntary movement of the juveniles into the impounding section.

Our data show that of the ten species of siganid fishes that occur in Bolinao (de la Paz and Aragones, unpublished data), only three produce abundant *padas* the most abundant of which is *S. fuscescens* (See also Lavina and Alcalá, 1976 as *Siganus* sp.; Tahil, 1978 as *S. canaliculatus*). *S. fuscescens* occurs widely in the three stations sampled. On the other hand, *S. spinus* and *S. argenteus* have a more restricted local distribution. In Guam, the most abundant juvenile siganids (termed *manahac*) belong to the two latter species (Kami and Ikehara, 1976). Presently it will be noted that the catch of *darigayos padas* is actually a mixture of *S. spinus* and *S. argenteus*. The greater abundance of *S. fuscescens* may be a reflection of its spawning habit and fecundity.

We did not expect *S. argenteus* to produce abundant *padas* because it is rare in Bolinao as an adult, (de la Paz and Aragones, unpublished data). Part of the reason for the rarity of the adult is probably the fact that the fish normally live at greater depth on the reef front (Burgan *et al.*, 1979), whereas the adults of the two other species normally live in the shallow water of the reef flat. Presently, our study shows that the juveniles, which are distinctly larger than those of the two other species, also spend their growing period in the seagrass bed, although probably for a very short period only.

Kami and Ikehara (1976) report that the juveniles of *S. spinus* and *S. argenteus* "appear in the reef flats a few days before or after the last quarter of the moon . . . in April and May" and "occasionally a third or fourth run may occur in June and October, again during the last phase of the moon. In this study, *S. spinus* and *S. argenteus* juveniles made their appearance one to four nights after the last quarter, whereas *S. fuscescens* juveniles became evident two to five nights after the last quarter. Thereafter, no *padas* were caught in large quantities.

The above observations clearly show that the periodic appearance of the *padas* is intimately associated with the lunar cycle, which influence the timing of the tides. We have observed for instance that the *padas* runs did not coincide with the spring tides and that the greatest number of *padas* were caught in the month of May, when the tidal currents are weakest. The timing of the inshore migration of the *padas* is probably calculated to reduce offshore transport of the juveniles and to improve their chances of encountering shallow water (Johannes, 1981).

The results of the present study have resolved certain questions and revealed new observations relating to the ecology of the juvenile siganids in the Philippines, as follows:

1. *S. fuscescens* appears to be the dominant species.
2. The *padas* run is limited to a period of four to five days each month of the *padas* season (March to May, August to September).
3. The appearance of *padas* shows some correlation with the last quarter and new moon lunar phases.

Padas are the mainstay of the artisanal fishermen in Bolinao; they have brought prosperity to the municipality (Calvelo and Ginon, 1974). The semi-annual seasonality of their appearance is signalled by the character of the moon and the tides—relationships that are not known to the *padas* catchers.

Acknowledgements

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