Prey Composition of Spotted Scat, *Scatophagus argus* (Linnaeus, 1766) from Madong - Sei Nyirih Waters, Tanjungpinang, Riau Island, Indonesia

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Abstract. Food habits and feeding ecology research are a fundamental tool to understand fish roles within their ecosystems. Fish sampling was conducted from May to July 2024 in Madong – Sei Nyirih waters. 85 fish samples were analysed by prey item, occurrence frequency, and volume of prey. The spotted scat showed flexibility in their feeding ecology was based on prey composition. The gut contents showed an ontogenetic shift in diet with an increase in length, the main food of the smaller specimens (<100 mm SL) consisted of different species of algae, while larger sized (>100 mm SL) fish have the most diversified prey items in their diet, although algae were predominant.

1 Introduction

Study on diets, availability of food, and feeding behaviour of fish were fundamental to understanding of the community structure, distribution patterns, and life history strategies [1,2]. Furthermore, biological controls such availability of food and competition, both interspecific and intraspecific and between fish and other predators. The controls include predation by fish on the prey and other predators on fish. These may be regarded as bottom-up controls and top-down controls [3–5]. Thus, it is necessary to understand the food and feeding habit.

Madong – Sei Nyirih waters has fish diversity highly and spotted scat is one of them, which has play roles in its ecosystems. *Scatophagus argus* also known as spotted scat, inhabit brackish estuaries, the lower reaches of freshwater streams, and natural embayments, frequently occurring among mangroves of Indo-Pacific including Indonesia [6]. The spotted scat is well-adapted to waters by fluctuations in temperature, salinity, dissolved oxygen, river runoff, tidal movement, turbidity, and turbulence.

Study on biology of spotted scat was limited. Studies on spotted scat in Indonesia i.e., estimation of population parameters and fishery status [7], reproductive biology [8], food

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habit [9]. Furthermore, research on the food and feeding habit of spotted scat by [10,11]. The lack of information on spotted scat biology provides an opportunity for this study to describe the prey composition of spotted scat in Madong - Sei Nyirih waters.

2 Materials and Methods

Sampling by artisanal fisherman was conducted May – July 2024 in three area, which is located in the lower, middle, and upper Madong – Sei Nyirih waters (Fig. 1). The fishing gear commonly used by fishermen was gillnet, whose mess size ranged from ¼ to 2 inches. Samples were transported to the Marine Biology Laboaratory, Maritime University of Raja Ali Haji in ice cold condition. Standard length (SL) and body weight were recorded to the nearest 1 mm and 0.01 g respectively.

Fish samples dissected and internal organs was removed, as well as fixed in 10% formaldehyde solution for later analysis. Gut contents was removed from the digestive tract and identified to the lowest possible taxon. The main food is determined by the highest value of index of preponderance [12]. For prey such as microorganism, items were identified and counted by using a microscope (Nikon e-200, zoom 100X). For analysis of gut contents, fish were sized into two different size groups, small-fish (<100 mm) and large-fish (>100 cm).

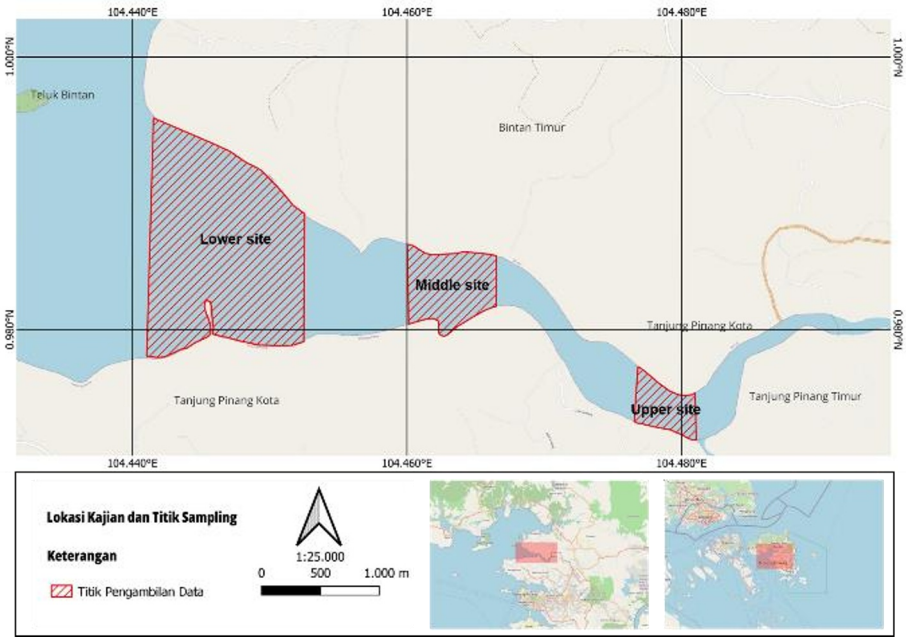

Fig. 1. Sampling site in Madong – Sei Nyirih waters

3 Results and Discussion

85 fish were caught in the three months. The size of scat varied between 85 – 150 mm (98±15). The smaller sized were dominant in the catches (about 59%) (fig. 2). The results of this study are in line with [7], which is also dominated by small-fish. The dominance of small-fish was influenced by the fishing location in around the mangrove, which is the nursery area of the most mangrove-associated fishes [13,14]. The common size of scats is 20 cm in total length [6].

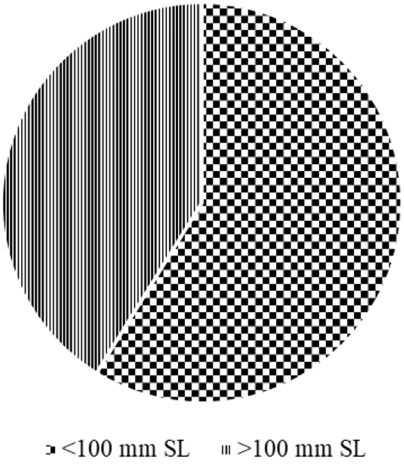

Fig. 2. Size composition of scats in Madong – Sei Nyirih waters

A total 85 stomach examined, only 5 stomach emptiness. Stomach emptiness of caught specimens was low as indicates that the fishing time coincides with the active feeding of the fish. This allows prey to be identified easily. In contrast to high stomach emptiness, such as the study by [15], where is advanced digestion prohibited most prey from being identified with high precision, as preys were metabolised within the digestive tract.

Overall, spotted scats consume a prey consist of nine groups, namely: algae, detritus, fish scales, fish eggs, bivalves, crustaceans, polychaetes, copepods, and rotifers. Algae was the most important food of spotted scat, besides detritus. Both predominant in all study month. (Table 1). The components of detritus were mud, sand, and other inorganic matter; while the algae consisted of species *Planktothrix* sp., *Amphora* sp., *Bacteriastrum* sp., *Coscinodiscus* sp., *Flagillaria* sp., *Navicula* sp., *Nitzschia* sp., *Pleurosigma* sp., *Rhizosolenia* sp., *Skeletonema* sp., and *Surirella* sp.

Table 1. Prey composition in the monthly variation

Prey items	May	June	July
Algae	97.8405	93.2845	98.1568
Detritus	1.0706	4.7557	1.5100
Fish scales	0.0475	0.3234	0.0002
Fish eggs	0.1826	0.6566	0.0610
Bivalves	0.0020	0.0002	-
Crustaceans	0.1279	0.1332	0.0111
Polychaetes	0.1024	0.1330	0.0442
Copepods	0.5343	0.5468	0.2034
Rotifers	0.0921	0.1667	0.0133

Variation in diet by length group showed a phenomenon of dietary shifts in the two groups of small and large fish (Table 2). The prey composition of the small-fish consisted of algae, detritus, copepods, fish eggs, and fish scales. The index of preponderance of algae (98.39%)

and detritus (1.46%) were higher than copepods (0.14%), fish eggs (0.0046%), and fish scales (0.0002%) were also observed.

Large-fish possess the most diversified diet. Nevertheless, algae were predominant food throughout the period of observation. Algae (91.66%), copepods (1.79%), fish eggs (1.66%), rotifers (1.57%), crustaceans (1.36%), polychaetes (1.09%), bivalves (0,09%), fish scales (0.58%), and detritus (0.21%) were found in the gut contents. Dietary variation implies an improvement in the requirement for diet quantity and quality. In addition, the diet of spotted scats largely depended by food availability and daily migratory capacity. The spotted scat consumes the prey which they happened to encounter [10,11]. On the other hand, [16] clearly explains that daily vertical migration of anchovies closely follows the movement of its prey.

Table 2. Prey composition in the sized variation of scat

Prey items	Small-fish	Large-fish
Algae	98.3936	91.6594
Detritus	1.4641	0.2075
Fish scales	0.0002	0.5816
Fish eggs	0.0046	1.6590
Bivalves	-	0.0870
Crustaceans	-	1.3590
Polychaetes	-	1.0872
Copepods	0.1375	1.7938
Rotifers	-	1.5655

The wide variety of prey types suggests that scats provide an indication of likely ontogenetic diet shifts (ODS). The small-fish predominantly feed algae that occurs in the water column, while large-fish feed in the benthic area consumes the whole food items including the crustaceans and polychaetes. Although algae remained the predominant diet for small- and large-fish, the percentage of algae has decreased in large-fish. The ODS has widely discussed by fish bio-ecology researcher, such as [17–21].

This study provides an information baseline for ecosystem-based management. Understanding the prey-predator relationship begins with knowledge of food and feeding habits. Furthermore, various management policies could be developed, when there is overfishing pressure on fishery resources, the impact could be determined through food web in the ecosystem.

4 Conclusions

The spotted scat consumes algae as the main food every month. This study was confirmed the ontogenetic dietary shift of spotted scats. This information provides the basis for ecosystem-based management.

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