

FOOD AND FEEDING HABITS OF NINE ELASMOBRANCH SPECIES IN THE N AEGEAN SEA

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Abstract

We present diet composition for nine elasmobranch species the N Aegean Sea. These species fed mainly on Crustacea, Cephalopoda and fishes, and to a lesser extent on Polychaeta. Based on their feeding habits, they form two distinct groups: one including species with streamline body shape and *Raja miraleetus* and the other one all the remaining dorso-ventral flattened species.

Keywords: *Elasmobranchii*, *Diet*, *Aegean Sea*

Introduction

In this study we present the feeding habits of nine elasmobranch species from the N Aegean Sea. Out of those nine species information from the Aegean Sea exist only for four species (i.e. *Dasyatis pastinaca* [1]; *Raja clavata* [2]; *Raja radula* [3]; and *Scyliorhinus canicula* [2]). These data are useful for studying the Mediterranean marine food webs and developing local ecosystem models.

Materials and Methods

Seasonal samples (spring 2001-winter 2006) were collected, using commercial fishing vessels (for a detailed account on samplings see [4]). Diet data were analysed with multivariate analyses ([5]) in order to identify groups of species with similar diets. Additionally, SIMPER analysis [5] was employed to identify food items responsible for group formation.

Results and Discussion

Overall, the stomach content of 172 individuals, belonging to 9 different elasmobranch species were examined (Table 1). The small number of individuals is attributed to the fact that many of these species are rare in the study area, or were caught in low abundances with the fishing gears used. *Dalatis licha*, *Galeus melastomus* and *Scyliorhinus canicula* fed mainly on Cephalopoda (97.3, 93.6 and 50.2%, respectively), *T. marmorata* on fish (99.3%), whereas all the remaining species preyed mainly on Crustacea (*Dasyatis pastinaca*: 74.6; *Dipturus oxyrinchus*: 100.0; *Raja clavata*: 63.7; *Raja miraleetus*: 68.7; and *Raja radula*: 53.3%) (Table 1). The diets of the species in the present study were similar to those reported from other areas ([1], [2], [3], [6]), except for *D. oxyrinchus*. The latter preys mainly upon fish [6], whereas in the present study we only caught one individual which fed on *Natantia* (Table 1).

Tab. 1. Food items and their contribution (expressed as % wet weight) for nine elasmobranchs in the N-NW Aegean Sea, Greece, spring 2001- winter 2006. N=number of individuals; TL=total body length; VC=vacuity coefficient

Taxa	Charcharhiniformes		Squaliformes		Rajiformes			Torpediniformes	
	<i>Galeus melastomus</i>	<i>Scyliorhinus canicula</i>	<i>Dalatis licha</i>	<i>Dasyatis pastinaca</i>	<i>Dipturus oxyrinchus</i>	<i>Raja clavata</i>	<i>Raja miraleetus</i>	<i>Raja radula</i>	<i>Torpedo marmorata</i>
Cymodocea		3.2		25.4				0.4	
Polychaeta									
Mollusca	93.6	50.2	97.3				31.3		0.3
Cephalopoda									
Decapoda				74.6	100.0	38.5	7.8	17.3	
Natantia		0.4				23.8	60.9	28.1	
Brachyura		3.5							
Isopoda									
n.i. Crustacea			0.2				1.4	7.9	0.3
Chordata -Vertebrata									
Pisces									
<i>Capota macrophthalma</i>		0.4							
<i>Eggnatus encrinurus</i>									6.0
Gobiidae									11.1
Gobioidae sp.									12.7
<i>Lesueurigobius sseeri</i>		4.3							1.7
Glyphichthyidae		2.5							26.8
<i>Sardinia pilchardus</i>									41.0
n.i. Pisces	6.4	35.4	2.5			36.3		46.3	116
N	3	34	2	1	1	7	3	3	116
TL range (cm)	23.3-54.0	24.1-45.1	38.0-40.2	50.1	81.2	25.6-46.5	22.6-33.9	21.8-32.0	8.8-37.3

Multivariate analysis showed the formation of two distinct groups (cluster analysis: 11.56% similarity; multi-dimensional scaling: stress <0.01, figure not shown) (Fig. 1): one included Charcharhiniformes, Squaliformes and *R. miraleetus* (average similarity=50.55%) and the other one the Torpediniformes and all the remaining Rajiformes (average similarity=34.23%). According to SIMPER, the food items responsible for the dissimilarity of these two groups (average dissimilarity=88.44%) were Cephalopoda and *Natantia* (average contribution=38.47% and 25.36%, respectively). The main food item for the first group was Cephalopoda (average contribution=94.95%). Cephalopoda were almost absent from the diet of the second group, in which the main prey items were *Natantia* (average contribution=59.44%) and not identified fish (average contribution=33.19%). Presumably, the consumption of such food items, with different morphological and ecological characteristics, requires swimming ability and morphological features (i.e., dentition, mouth position and large gape) that differ among the species of the two groups. Indeed, the streamlined body shape of the majority of species included in the first group probably allows them to attain higher speeds and accelerations. Conversely, the flattened body form of the species in the second group fit for movement by undulation [6] allowing them to lay on the sandy bottoms and prey upon

organisms with low swimming ability. The fact that *R. miraleetus* was included in the first group could be attributed to the large proportions of Cephalopoda in its diet, combined with the small number of individuals examined.

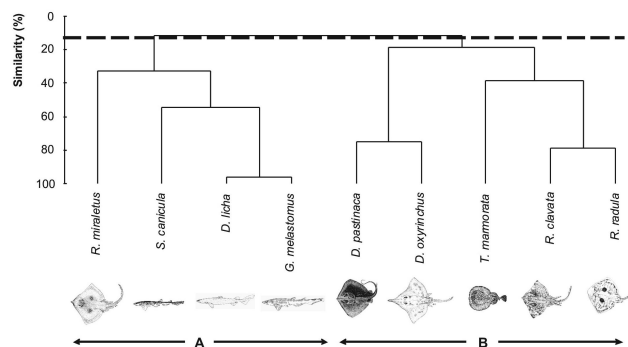


Fig. 1. Cluster analysis for seven flatfishes, based on their feeding habits, from the NW Aegean Sea, Greece, spring 2001- winter 2006. Fish drawings from FishBase (www.fishbase.org; [6])

The trophic level estimates of these species, based on the feeding habits presented here, are given elsewhere [4]. They ranged from 3.46 ± 0.53 , for *D. pastinaca*, to 4.50 ± 0.41 , for *G. melastomus*. Seven of these species had trophic levels >3.7, a fact that classifies them as carnivores [7], thus playing an important role in the trophic structure of marine ecosystems (see also e.g. [8], [9]).

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