THE STATUS OF THE EXOTIC FISH SPECIES IN THE GULF OF ANTALYA, TURKEY (LEVANTINE SEA)

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Abstract
This paper presents the abundance and biomass of the 18 exotic fish species caught during the bottom trawl survey carried out in the Gulf of Antalya in the summer period of 2009. Among 76 teleost species identified, exotics constituted 9.74% of the average abundance and 7.93% of the average biomass of the teleosteans.
Keywords: Trawl Surveys, Demersal, Teleostei, Biomass, Levantine Basin

Introduction
The Gulf of Antalya locates in the Norteastern Levantine Basin and is highly susceptible to invasions by aliens due to the proximity to the Suez Canal. 120 established and casual alien fish were reported from the Mediterranean Sea [1] and 50 of them were recorded from the Levantine coast of Turkey [1,2]. Except for the species records, the studies concerning the biomass and abundance of the exotic fish community in the Northeastern Levant Sea are limited to [3,4]. This paper presents the first detailed information on the exotic fish community of the Gulf of Antalya.

Material and Methods
This research was carried out in August 2009, in the Gulf of Antalya, between the depths of 25-200 m, using a commercial bottom trawler. The cod-end mesh size 22 mm (knot to knot). The samples were collected day time with 2.5 n.m./h average trawling speed. The geographical coordinates of 30 trawling stations vary between N36° 52' 48.5 - 36° 23' 00.0'' - E31° 32 32.2' - E30° 31' 11.3''. The total catch from each haul was identified to species, counted, weighed and standardized to unit trawling hour. The stock amount is calculated according to the swept area method [5].

Results
A total of 30 hauls were carried out at the depths of 25, 50, 75, 100, 150, 200 m. The overall average abundance of the 18 exotic species was 4942±1371 ind./nm^2 (±se) and average biomass was 229,67±49,58 kg/nm^2 (±se) (Tab.1).

Tab. 1. The number of hauls, average biomass (kg/nm^2 ±se), abundance (ind./nm^2 ±se) and number of exotic species and percentages of exotics in among teleosteans at six depth levels in the Gulf of Antalya.

Depth (m)	Number of hauls	Average Biomass kg/nm^2±se (%)	Average Abundance ind./nm^2±se (%)	Number of Species (%)
25	6	348.30 ±151.88 **(14.47)**	15342 ±4560 **(17.42)**	15 **(29.41)**
50	6	409.11 ±112.36 **(17.81)**	5291 ±1546 **(9.81)**	12 **(22.22)**
75	6	156.06 ±71.61 **(6.99)**	1683 ±608 **(3.13)**	10 **(20.83)**
100	6	170.3 ±112.19 **(6.21)**	1691 ±1122 **(2.81)**	3 **(9.38)**
150	4	96.51 ±49.52 **(3.52)**	1036 ±665 **(1.49)**	7 **(19.44)**
200	2	0.69 ±0.69 **(0.08)**	40 ±40 **(0.14)**	1 **(4.76)**
Total	30	229.67 ±49.58 **(9.74)**	4942 ±1371 **(7.93)**	18 **(23.68)**

The highest biomass of the exotic species was recorded at the depth of 50 m and the abundance decreased with depth. The most frequent species was *Saurida undosquamis* (Linnaeus, 1758) (83,3%), *Upeneus moluccensis* (Bleeker, 1855) (83,3%), *Lagocephalus suezensis* Clark & Gohar, 1953 (36,7%), *Lagocephalus sceleratus* (Gmelin, 1789) (36,7%), and *Equulites klunzingeri* (Steindachner, 1898) (30%). In the total average of 30 hauls, *S. undosquamis* (Linnaeus, 1758), *L. suezensis* Clark & Gohar, 1953, *U. moluccensis* (Bleeker, 1855), *L. sceleratus* (Gmelin, 1789), and *E. klunzingeri* (Steindachner, 1898) are the species that have the highest biomass. *E. klunzingeri* (Steindachner, 1898), *U. moluccensis* (Bleeker, 1855), *S. undosquamis* (Linnaeus, 1758), *L. suezensis* Clark & Gohar, 1953, and *Upeneus pori* Ben-Tuvia & Golani, 1989have the highest abundance, respectively. The average biomass (kg/nm^2 (±se)), and abundance (ind./nm^2 (±se)) of 18 exotic species at six depth levels are given in Table 2.

Tab. 2. The average biomass (kg/nm^2 (±se)), and abundance (ind./nm^2 (±se)) of 18 exotic species caught by trawl, at six depth levels in the Gulf of Antalya.

Species / Depth	25M	50M	75M	100M	150M	200M
Average Biomass (kg/nm^2±se)						
Callionymus filamentosus	4.4±4.1	0.5±0.4	0.1±0.1	-	-	-
Dussumieria elopsoides	-	0.4±0.4	-	-	-	-
Equulites klunzingeri	37.3±24.7	12.9±9.0	1.5±1.4	-	-	-
Etrumeus teres	-	-	-	-	0.9±0.9	-
Fistularia commersonii	0.2±0.2	-	-	-	-	-
Lagocephalus sceleratus	15.4±15.1	35.0±20.4	4.4±4.4	20.2±13.0	21.1±18.0	-
Lagocephalus spadiceus	5.0±3.2	0.1±0.1	1.6±1.6	-	14.3±10.1	-
Lagocephalus suezensis	135.2±89.3	18.1±10.1	3.2±3.2	-	3.2±3.2	-
Nemipterus randalli	1.7±1.7	0.8±0.7	-	-	-	-
Oxyurichthys papuensis	0.5±0.3	0.3±0.2	0.3±0.2	-	0.5±0.5	-
Saurida undosquamis	111.7±59.1	293.9±100.1	102.1±72.1	38.5±17.1	25.3±10.4	-
Sigamus rivulatus	-	-	1.8±1.8	-	-	-
Sillago sihama	1.4±1.4	0.2±0.2	-	-	-	-
Sphoeroides pachygaster	0.2±0.2	-	-	-	-	-
Sphyraena chrysotaenia	0.6±0.6	-	1.4±1.4	-	-	-
Stephanolepis diaspros	0.9±0.9	-	-	-	-	-
Upeneus moluccensis	23.6±8.4	42.7±14.9	39.7±20.3	111.6±87.2	31.2±20.6	0.7±0.7
Upeneus pori	10.1±4.4	4.3±4.0	-	-	-	-
Average Abundance (ind./nm^2±se)						
Callionymus filamentosus	474±430	38±29	9±9	-	-	-
Dussumieria elopsoides	-	30±30	-	-	-	-
Equulites klunzingeri	9558±4739	1369±901	327±209	-	-	-
Etrumeus teres	-	-	-	-	14±14	-
Fistularia commersonii	83±53	-	-	-	-	-
Lagocephalus sceleratus	84±53	94±47	18±18	113±74	55±41	-
Lagocephalus spadiceus	160±141	6±6	28±28	-	25±15	-
Lagocephalus suezensis	2863±1767	646±364	64±64	-	72±72	-
Nemipterus randalli	38±38	19±12	-	-	-	-
Oxyurichthys papuensis	24±17	20±13	19±12	-	29±29	-
Saurida undosquamis	837±411	1881±764	532±312	266±103	172±77	-
Sigamus rivulatus	-	-	35±35	-	-	-
Sillago sihama	41±41	6±6	-	-	-	-
Sphoeroides pachygaster	7±7	-	-	-	-	-
Sphyraena chrysotaenia	7±7	-	10±10	-	-	-
Stephanolepis diaspros	29±22	-	-	-	-	-
Upeneus moluccensis	555±150	1017±416	641±277	1313±988	669±437	40±40
Upeneus pori	582±283	166±150	-	-	-	-

Discussion This paper presents the first detailed information on the exotic fish community of the Gulf of Antalya. This research was conducted in the "pre-fishing" season both in the fishing-prohibited and open areas. For the "pre-fishing" season, [3] reported that the Red Sea teleosteans constituted 51.91% of the average percentage of the teleosteans and decreased to 34.85% in the post fishing season in Gulfs of Iskenderun and Mersin. The keystone species responsible for this fluctuation was shown as *E. klunzingeri* (Steindachner, 1898) which was also found as the most abundant species in this study. Invading species have been found to comprise 62% of the demersal fish biomass in the Gulf of Iskenderun and 34% in Mersin Bay, Turkey [4]. Notwithstanding, definite changes in fish communities in the Levantine ecosystem have been attributed to Lessepsian migrants. Thus long-term approaches are required to monitor of the exotics in proportion to local species; determine the seasonal and spatial distribution and status of the populations of alien species. **Acknowledgements** The authors greatly indepted to Prof.Dr.Erhan MUTLU, Prof.Dr.Gülsen ALTUG, Assoc.Prof.Dr.Saadet F. KARAKULAK and Assoc.Prof.Dr.Murat BILECENOGLU for their valuable comments and support and Captain Akin AKYAR for his help on the field works.

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