Fish communities of the Arade Estuary

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INTRODUCTION

Estuaries have long been recognised as areas which naturally support high densities and production levels of fish, as permanent residents, during migration, or during specific life stages, particularly as juveniles (Haedrich, 1983, Rodríguez-Romero *et al.,* 1998,Mathieson *et al.*, 2000). These ecosystems are important to fisheries because of their roles in production and biological cycles of many marine species(Rodríguez-Romero *et al.,1992 in* Rodríguez-Romero *et al.,* 1998; Mathieson *et al.*, 2000

Each estuary has its own geographical, hydraulic, sedimentological and biological characteristics. These specific features influence the makeup and structure of the fish assemblages and the dynamic of fish populations(Lobry *et al., 2003).*

The estuary of the river Arade is located in the central part of the Algarve (south Portugal), near the city of Portimão, and is the second biggest estuary of this region.

The present study aims to characterise the dynamics of the fish assemblages of the Arade estuary, focusing on the species with commercial value.

MATERIAL AND METHODS

Monthly sampling surveys are being carried in the Arade Estuary beginning in January 2004 and will continue for an year, using several sampling methods (beach seine (a), beam trawl (b), Riley's pushnet (c), trammel net (d), fish traps (e) and visual census (f)), in different types of habitats (saltmarsh creeks, main river channel, margins, seagrass beds, rocky bottoms). Visual census surveys started only in June, therefore results from this sampling method are not presented in this presentation.
Abiotic parameters, temperature, dissolved oxygen, salinity and depth were recorded *in situ* with an multiparameter meter (YSI M85), and an acoustic depth meter. Fishes are preserved by freezing. At the laboratory each specimen was identified to the lowest taxonomic level, measured (total length) and weighted.

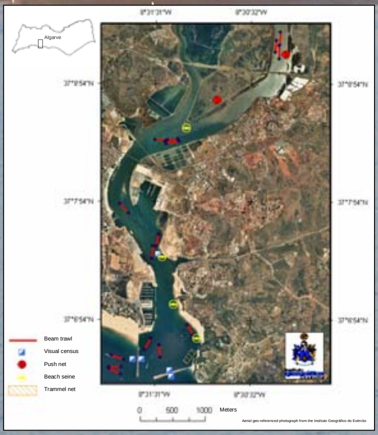
Relative abundances and weight were determined for each fish species.

The *Economic importance* and *Conservation status* of each fish species was attributed, based in the fish landings data (DGPA, 2004) and Portuguese vertebrate red list (ICN, 1993), respectively.

d)

Trammel net - Trammel nets are used near the mouth of the estuary; Catches were mainly larger individuals that avoid other sampling gears.

d)



f)

Underwater census - Allows counting and identification of cryptic and demersal fish species not caught by other gears.

Sampling strategy: 1) Cryptic species- 3 transects (10mX 1m); 2)Demersal species- 3 transects (30mX 4m)

b)

Beam Trawl - Used on the deeper and wider areas of the estuary. It mainly catches benthonic and demersal fishes.

Sampling strategy: 3 trawls- 200m long at each sampling area

a)

Beach seine - Sampling gear used in the shallow water margins of the Arade estuary.

Sampling strategy: 3 fishing trials in each sampling area

c)

Riley's Pushnet - This sampling gear is used to catch individuals that use the saltmarsh creeks of the Arade estuary.

Sampling: 3 trawls- 30m long at each sampling area

e)

Fish traps - Fish traps are used on rocky bottoms, where other sampling gears cannot operate. Mussels are used as bait to attract fish.

Table I - Conservation Status (CS), Economic importance (EI), percentage in number (%N) and Weight (%W) and occurrence (•) in the different sampling gears, of the fish species caught in Arade estuary from February to June 2004. (••) Most abundant species at each gear. (V) - Vulnerable; (CT) - Commercially Threatened; (U) - Undetermined.

Species	*CS* (1)	*EI* (2)	%N	%W	Beam Trawl	Fish Traps	Pushnet	Beach seine	Trammel net
Alosa fallax (Lacepède, 1803)	V	+	0,0	1,4					•
Ammodytes tobianus Linnaeus, 1758	CT		0,1	0,1				•	
Anguilla anguilla (Linnaeus, 1758)	CT	+	0,1	2,8	•			•	
Aphia minuta De Buen, 1931			0,5	0,1	•				
Arnoglossus laterna (Walbaum, 1792)			0,1	0,4	•				
Atherina presbyter Cuvier, 1829			1,7	1,9	•		•	•	
Belone belone (Linnaeus, 1761)		+	0,0	0,3				•	
Callionymus maculatus Rafinesque Schmaltz, 1810			0,0	0,1	•			•	
Callionymus reticulatus Valenciennes, 1837			0,1	0,0	•				
Callionymus risso Lesueur, 1814			0,1	0,0	•				
Chelidonichthys lastoviza (Bonnaterre, 1788)		+	0,0	0,0	•				
Chelidonichthys lucernus Linnaeus, 1758		+	0,1	0,8	•			•	•
Chelon labrosus (Risso, 1827)		+	0,0	0,6				•	
Conger conger (Linnaeus, 1758)	CT	+	0,0	0,4	•				
Dicentrarchus labrax (Linnaeus, 1758)	CT	+	0,5	8,8	•			•	
Dicologoglossa cuneata (Moreau, 1881)	CT	+	0,0	0,4	•				
Diplodus annularis (Linnaeus, 1758)		+	0,0	0,2	•				
Diplodus bellottii (Steindachner, 1882)	CT	+	0,1	2,4	•			•	•
Diplodus sargus (Linnaeus, 1758)	CT	+	0,2	2,1	•	•		•	•
Diplodus vulgaris (Geoffroy St.Hilaire, 1817)	CT	+	1,8	4,4	•	••		•	
Echiichthys vipera (Cuvier, 1829)			0,2	0,3	•			•	
Engraulis encrasicolus (Linnaeus, 1758)		+	0,1	0,2				•	
Gobius niger Linnaeus, 1758			4,0	2,9	••			•	
Halobatrachus didactylus (Bloch & Schneider, 1801)			4,0	34,1	•	•		•	••
Hippocampus guttulatus Cuvier 1829	U		0,0	0,1	•			•	•
Hippocampus hippocampus (Linnaeus, 1758)	U		0,0	0,0	•			•	•
Lithognathus mormyrus (Linnaeus, 1758)	CT	+	0,0	0,0	•				
Liza aurata (Risso, 1810)		+	0,2	0,6			•	•	
Liza ramada (Risso, 1810)		+	0,2	0,2			•	•	
Liza spp. (Risso, 1810)		+	0,1	0,0				•	
Microchirus azevia (Capello, 1867)	CT	+	0,3	1,3	•				•
Microchirus boscanion (Chabanaud, 1926)			3,3	2,1	•				
Monochirus hispidus Rafinesque, 1814			0,2	0,3	•			•	
Mugil cephalus Linnaeus, 1758		+	0,0	0,0				•	
Mugilidae n.id.			0,0	0,0			•		
Pagellus acarne (Risso, 1826)	CT	+	0,0	0,0	•				
Pegusa lascaris (Risso, 1810)	CT	+	0,1	0,8	•			•	
Pomatoschistus microps (KrØyer, 1838)			24,2	1,0	•		••	•	
Pomatoschistus minutus (Pallas, 1770)			1,6	0,3	•			•	
Pomatoschistus pictus (Malm, 1865)			0,1	0,0	•			•	
Raja brachyura Lafont, 1873		+	0,0	0,1	•			•	
Raja undulata Lacepede, 1802		+	0,0	0,1	•				
Sardina pilchardus (Walbaum, 1792)		+	55,3	8,0			•	••	•
Sarpa salpa (Linnaeus, 1758)	CT	+	0,1	6,8	•				•
Scomber japonicus Houttuyn, 1782		+	0,0	0,4					•
Scophthalmus rhombus (Linnaeus, 1758)	CT	+	0,0	3,6	•			•	•
Scorpaena notata Rafinesque, 1810		+	0,0	0,3					•
Scorpaena porcus Linnaeus, 1758		+	0,0	0,6		•			•
Solea solea (Linnaeus, 1758)	CT	+	0,0	0,2	•				
Solea senegalensis Kaup, 1858	CT	+	0,1	2,2	•				•
Sparus aurata Linnaeus, 1758	CT	+	0,0	1,4	•		•		•
Symphodus bailloni (Valenciennes, 1839)			0,0	0,3		•			
Symphodus roissali (Risso, 1810)			0,0	0,3		•			
Syngnathus abaster Risso, 1827			0,0	0,0			•		
Syngnathus acus Linnaeus, 1758			0,1	0,2	•		•	•	
Torpedo torpedo (Linnaeus, 1758)		+	0,0	3,9	•				•
Trachurus trachurus (Linnaeus, 1758)		+	0,0	0,0	•				
Trisopterus luscus (Linnaeus, 1758)	CT	+	0,0	0,0	•				
Total		36	18782	78824,5	41	6	9	30	17

Source:
(1) ICN (1993)
(2) DGPA (2004)

RESULTS AND DISCUSSION

To date a total of 18782 fish specimens, comprising 56 species and 26 families were caught. The most abundant species were *Sardina pilchardus* (55,3%) and *Pomatoschistus microps* (24,2%), together accounting for 79,5% of the total catch. *Halobatrachus didactylus* contributed 34,1% of the total biomass, followed by *Dicentrarchus labrax* (8,8%), *Sardina pilchardus* (8,0%) and *Sarpa salpa* (6,8%). Fish composition is similar to other estuaries in Portugal and Europe (Rebelo, 1992; Mathieson *et al*., 2000 & Thiel *et al.,* 2003). As reported by other authors (Cattrijsse et al., 1994; Rodriguez-Romero, 1998; Cabral *et al*., 2000), the ichthyofauna is dominated by a few species.

Commercial value is reported for 36 species, of which 18 have conservation status, according with the National vertebrate red list (ICN, 1993). Some are mainly represented by juveniles, which may give this ecosystem an important role as nursery for many commercial species, especially those from the families Sparidae and Soleidae.

The bream trawl captured the majority of species (41), followed by beach seine (30) and trammel net (17). *H. didactylus* occurred in all sampling gears/habitats, with the exception pushnet/saltmarsh, probably suggesting a wider distribution than most of the other species present in the Arade estuary.

S. pilchardus (only juveniles) was the most abundant species caught by the beach seine, while *P. microps* dominated the captures from the pushnet catches and *Diplodus vulgaris* the catches of fish traps.

Gobius niger dominated, in abundance, the beam trawl catch, and *H. didactylus* was the most important species caught with the trammel net.

These results appear to be mostly related not only with the sampling gear behaviour but also with the species distribution within the estuary.

Although the impact for local fisheries is still unknown, the Arade estuary seems to be relatively important for many species with economic value, especially in the early stages of their life cycles.

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