

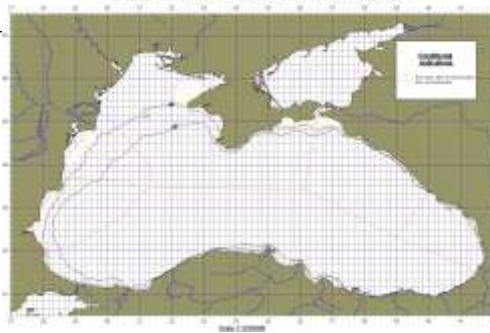
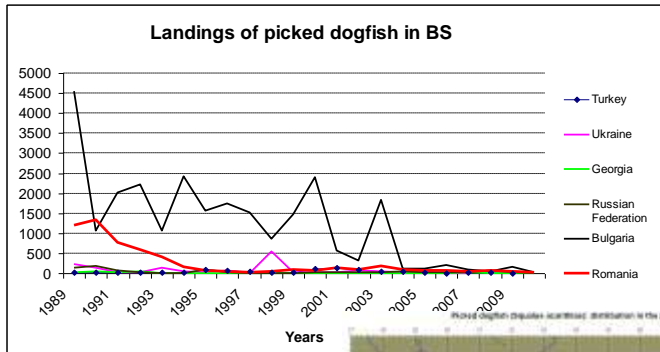
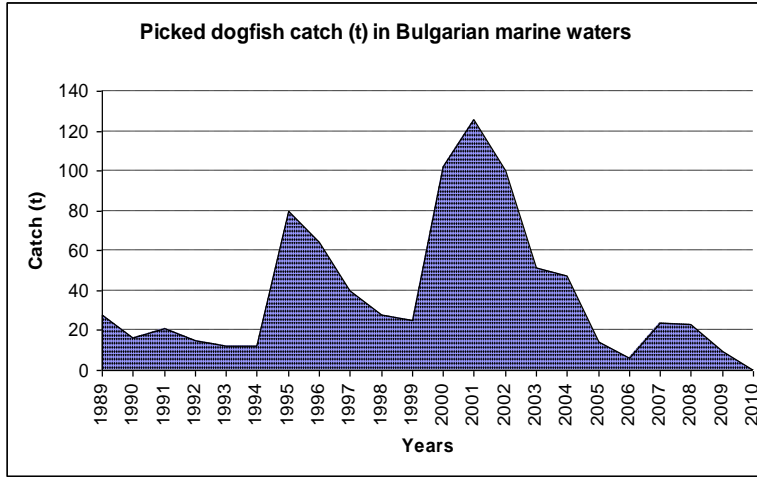
Length-Weight relationship of *Sq.acanthias* and *R.clavata* from scientific surveys in the Black Sea

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IO-BAS

Introduction

The WLRs have several applications, namely on fish biology, physiology, ecology and fisheries assessment. In a given geographic region, the WLRs are useful for the estimation of weight-at-age from total reported catch weight and length-frequency distributions (PETRAKIS and STERGIU, 1995).

Furthermore, the WLR is useful for estimating condition (SAFRAN, 1992), production and biomass of a population (ANDERSON and GUTREUTER, 1983) or comparisons of populations from different regions (GONCALVES *et al.*, 1997).



Picked dogfish fishery

LOA	31.12.2010			% from total catch 2010							Blue fish sh h B L U
	Ships	GBT	Power(kW)	Sprat SPR	Rapana RPN	Gobies GPA	Mediterranean horse mackerel HMM	Anchovy ANE	Picked dogfish DGS	Turbot TUR	
0 < 6	762	546	5 943	0.4	5.1	40.6	7.7	6.2	5.1	7.6	10.9
6<12	1 471	3 199	39 925	2.0	51.6	58.9	20.6	23.8	22.0	30.7	16.1
12<18	67	1 308	9 275	5.9	30.7	0.5	20.5	12.3	69.0	29.4	15.9
18<24	27	1 214	4 424	9.4	10.0	0.0	18.6	2.1	3.7	20.1	11.1
24<40	13	1 665	3 878	82.3	2.6	0.0	32.5	55.6	0.2	12.3	45.9
Total	2 340	7 931	63 444								

CPUE kg*h-1

Species	Fleet segment		CPUE ¹		
	Pu6. ype0	length/LOA	2008	2009	2010
Anchovy ANE	FPO	LOA > 0 < 6	500	31.2	63.12
		LOA => 6<12	96.95	159.2	60.25
		LOA > 0 < 6	30.15	36.46	35.08
	SB	LOA => 6<12	68.67	28.75	39.77
Species	Fleet segment		CPUE ¹		
	Pu6. ype0	Fish.gear	2008	2009	2010
Anchovy ANE	OTM	LOA => 6<12	34	--	--
		LOA => 12<18	790	1356.25	1967.54
		LOA => 18<24	--	651.86	175
		LOA => 24<40	690	3803.33	1956.44
European sprat SPR	FPO	LOA > 0 < 6	422.44	49.79	150.94
		LOA => 6<12	425	250.8	294.9
	SB	LOA > 0 < 6	174.77	113.95	45.56
		LOA => 6<12	195.1	142	74.63
		LOA => 6<12	107.8	142.2	241.25
		LOA => 12<18	790	1356.25	1967.54
OTM	LOA => 18<24	1418.84	1650.86	656.99	
	LOA => 24<40	2442.48	2457.01	2035.4	
Mediterranean horse mackerel HMM	FPO	LOA > 0 < 6	344.98	101.56	51.22
		LOA => 6<12	130.4	97.62	77.67
		LOA => 12<18	209.73	43.33	--
	OTM	LOA => 6<12	149.8	95.54	105.28
		LOA => 12<18	273.78	112.44	202.42
		LOA => 18<24	456.47	294.84	321.25
Turbot TUR	GNS	LOA > 0 < 6	30.4	32.5	21.86
		LOA => 6<12	58.32	53.91	34.5
		LOA => 12<18	125.26	71.62	65.48
		LOA => 18<24	83.05	95.86	102.95
		LOA => 24<40	--	--	250
Piked dogfish DGS	LLS & LLD	LOA > 0 < 6	--	222.4	--
		LOA => 6<12	116	102.6	141.1
		LOA => 12<18	51.73	61.14	261.42
		LOA => 18<24	96.85	8.33	71.85
Rapana RPN	Other gears	LOA > 0 < 6	304.7	278.17	317.54
		LOA => 6<12	465.5	520.7	571.6
		LOA => 12<18	710.34	577.37	1229.87
		LOA => 18<24	767.61	752.64	1098.29

Trophic index

	2001	2002	2003	2004	2005	2006	2007	2008	Trophic level	S.E.
Main pelagic species										
<i>E. encrasicolus</i>	78%	77%	82%	86%	45%	73%	87%	69%	3.11	±0,45
<i>S. sprattus</i>	15%	16%	18%	14%	19%	11%	8%	18%	3	±0,4
<i>T. mediterraneus</i>	5%	2%			5%	5%	4%	9%	3.59	±0,41
<i>S. sarda</i>	1%	1%			23%	9%	1%	2%	4.5	±0,74
<i>P. saltatrix</i>	1%	3%			6%	2%	1%	1%	4.5	±0,55
<i>Alosa sp.</i>		1%			1%			1%	3.93	±0,63
<i>A. boyeri</i>					1%				2.32	±0,26
Main demersal species										
<i>P. maxima</i>	10%	3%	10%	5%	2%	4%	3%	3%	3.96	±0,63
<i>Mytilus sp.</i>		1%	4%	3%		1%	1%	2%	3	
<i>R. venosa</i>	25%	33%	28%	67%	40%	59%	51%	44%	3.2	
Gobiidae	1%	2%	16%	6%	1%	1%	1%	1%	4.3	
<i>S. acanthias</i>	1%	1%	13%	4%					4.3	±0,67
<i>M. merlangus</i>	34%	39%	12%	6%	25%	34%	33%	38%	4.37	±0,66
Mugilidae	29%	21%	17%	9%	32%	1%	11%	12%	2.543333333	±0,16

PREVIOUS RESEARCH (Yankova et al., 2011)



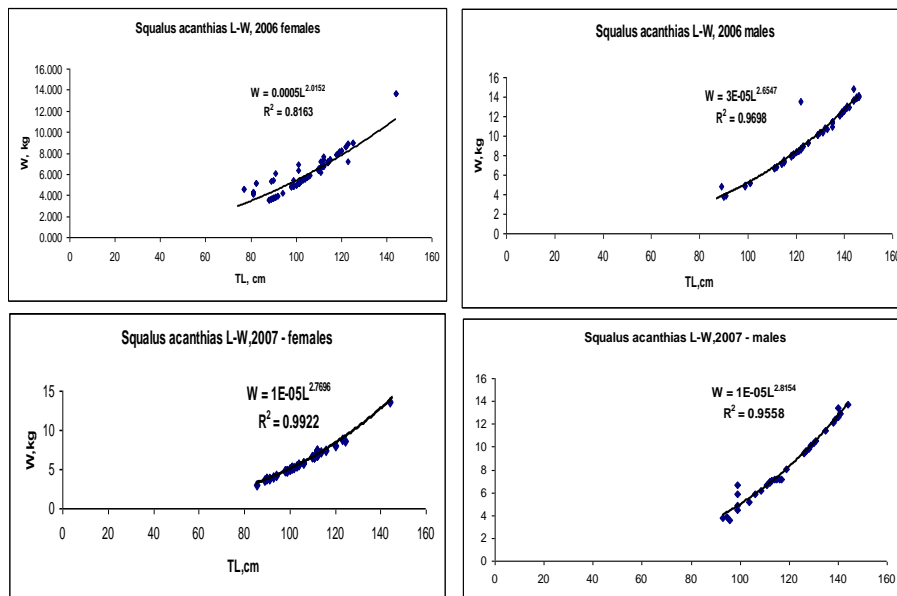
Fig. 1 - Scheme of area investigated

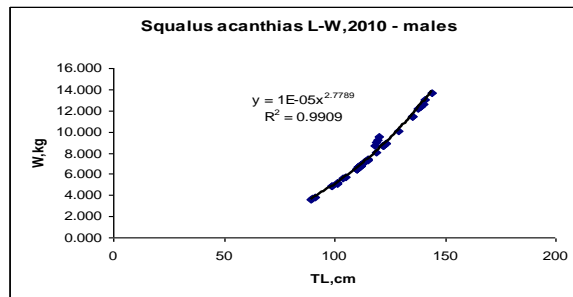
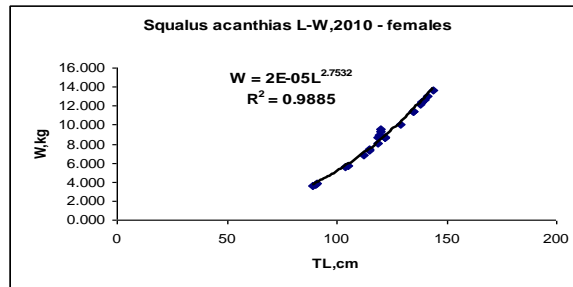
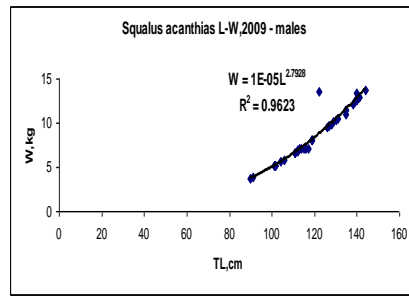
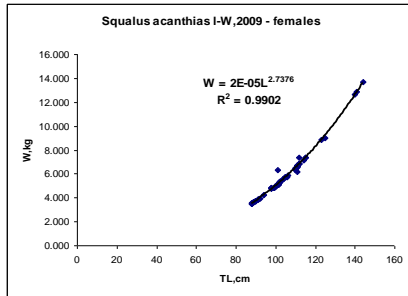
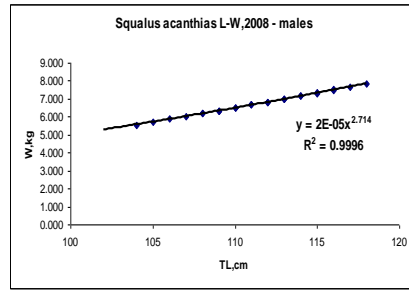
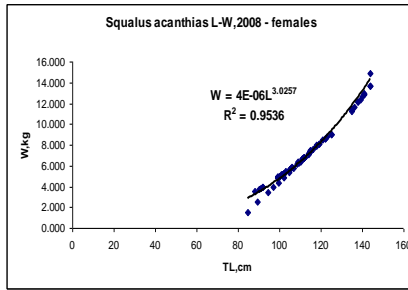
	Length characteristics				Weight characteristics			Parameters of relationship		
	N	MTL	±SE	TL _{min} - TL _{max}	MW	±SE	W _{min} - W _{max}	a	b	r ²
Squalidae										
<i>Squalus acanthias</i>	22	125	0.02	112-144	10.35	0.68	6.2-14.2	2E-06	3.153	0.81
Rajidae										
<i>Raja clavata</i>	24	68.81	1.38	56-79	2.89	0.24	1.2-5.5	0.0002	2.301	0.86

Previous research

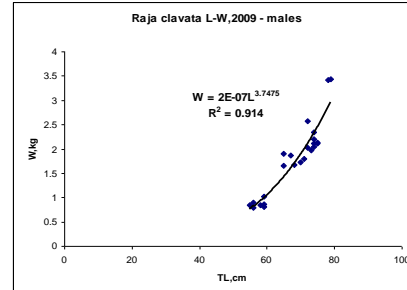
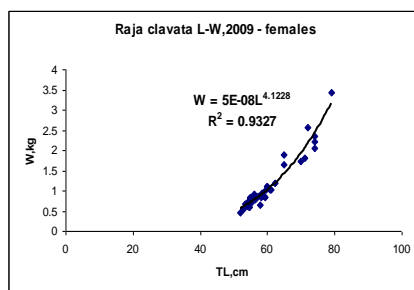
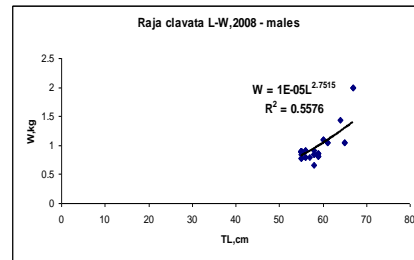
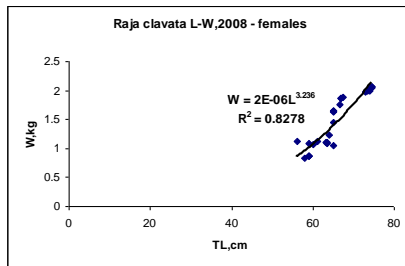
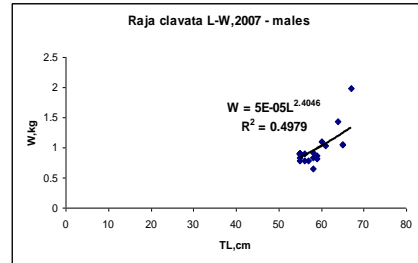
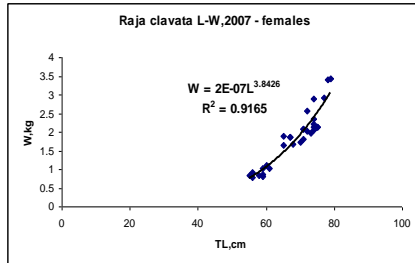
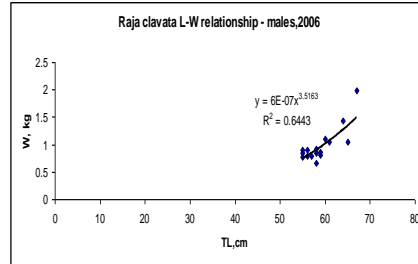
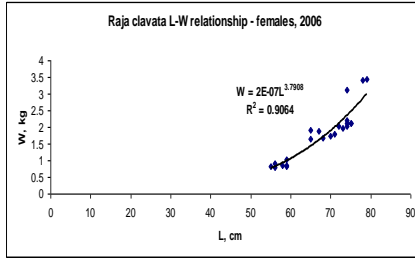
- *Sq.acanthias* - $W=0.01530 \cdot L^{2.757}$, $r^2 = 0.98$ (Orlov, VNIRO; Anonymous, 1988);
- $W=0.0040 \cdot L^{2.95}$, $r^2 = 0.99$ (Avsar, 2001, South-eastern Black Sea)
- *Raja clavata* - **a** : 0.00500 95% **b** : 3.002 **r2** =0.960 South-eastern Black Sea, Demyrhan et al., 2005)

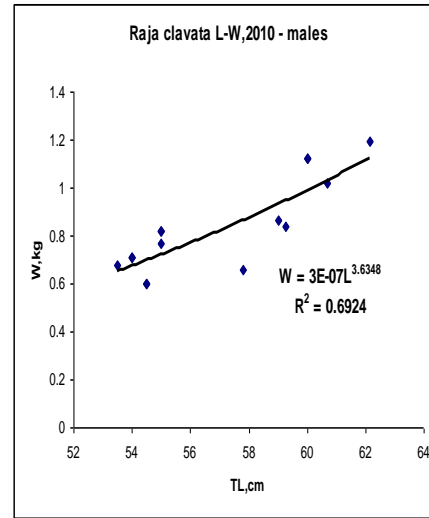
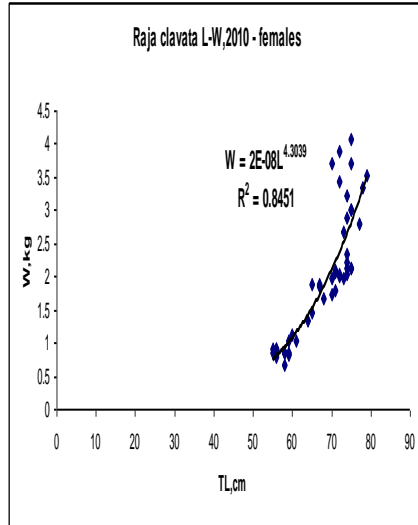
Squalus acanthias – present research





Raja clavata





- **Spiny dogfish** (*Squalus acanthias* L.): The distribution of spawning fish concentrations.
- April-May approaches the coast for mating. The males are grouping and form agglomerations, attracted by female individuals (sometimes 1-2 female could attract 240 males for mating at depth of 45m). The highest agglomerations were observed during April on 45 meters depth in front the Cape Emine – 240 individuals (only male); On 47 meters depths at the same area 90 specimens has been caught (only male); In October-November again approaches the coast to give a birth.
- It is carnivorous, viviparous, coldwater; demersal species. It is distributed in shelf region from 15 to 120 meters depth.



- **Spiny dogfish** (*Squalus acanthias* L.): The distribution of juvenile fish concentrations.
- Mapping of the juvenile specimen were done on the basis of literature data and some personal communications with the fishermen. Juvenile has been detected from the upper layers to 120 meters depth. Main concentrations were observed close to the Capes Kaliakra, Emine, Maslen; In bigger depths in front of Varna Bay and Bourgas Bay; In southern part: In front of Sozopol;



- Spiny dogfish (*Squalus acanthias*): total distribution of adult fish in the period of wintering and fattening fish concentrations
- Mapping of this species is made on the base of scientific cruise during winter (December and February) and in spring (April); during trawl survey for sprat (in June);
- It is carnivorous, viviparous, coldwater; demersal species. It is distributed in shelf region from 15 to 120 meters depth.
- In summer (June to September) and in winter dwells the layers between 30 and 90m depths, under thermocline. Feeds on fish (sprat, whiting and mollusks).
- In September-October usually can be found in 20 – 90 m depths. December-March at 30-90m and deeper, usually not below 120m.



Conclusions

- L-W relationship give us good scientific information about the condition of the selected species;
- The present research is the result of synthesis for 2006-2010 and has been done for the first time for this period and for the selected species in Black Sea