

STOCK AND CATCH ASSESSMENT OF SEA URCHIN *PARACENTROTUS LIVIDUS* IN THE "PENISOLA DEL SINIS-ISOLA DI MAL DI VENTRE" MPA (WESTERN SARDINIA, ITALY) FINALIZED TO FISHERY MANAGEMENT

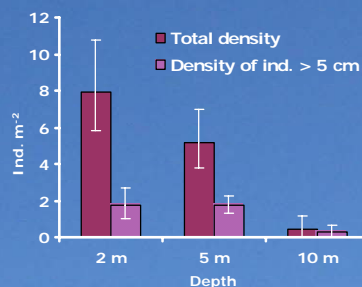
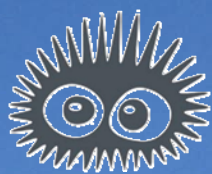
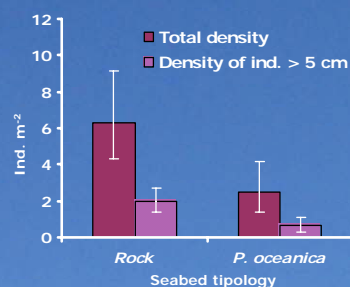
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The sea urchin *Paracentrotus lividus* (Lamarck, 1816) is an ecologically relevant species able to affect assemblages composition in subtidal habitats and also represents an economical resource. The aim of MPAs is to combine fishery management and conservation of marine ecosystems. Knowledge about stock and population dynamics is necessary for a correct management of this target species.



Density of individuals > 5 cm showed significant difference between substrata. *P. lividus* was differently distributed among depths: density is higher at 2 and 5 m than 10 m.

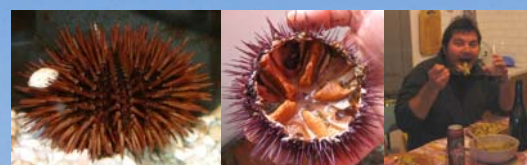


Penisola del Sinis - Isola di Mal di Ventre MPA (Western Mediterranean Sea, Italy) with habitat types and limits of different protection levels.

	Km ²	Total population				Population > 5 cm			
		Density (Ind. m ⁻²)	Abundance (Ind. x 10 ⁶)			Density (Ind. m ⁻²)	Abundance (Ind. x 10 ⁶)		
		Mean ± SD	Mean	CL -95%	CL +95%	Mean ± SD	Mean	CL -95%	CL +95%
Habitat type and depth									
Rock (2 m, 5 m)	3.94	8.12 ± 0.67	31.97	24.69	41.10	2.36 ± 0.51	9.31	7.10	11.96
Posidonia (2 m, 5 m)	3.87	4.43 ± 0.59	17.15	11.78	24.35	0.89 ± 0.57	3.43	1.62	5.84
10 m	5.48	0.47 ± 0.65	2.57	0.00	6.34	0.27 ± 0.41	1.46	0.16	3.56
Tot	13.3		51.69	36.47	71.80		14.19	8.88	21.36

Mean density, total population and stock evaluated in 2004 considering different habitat type and depths.

The legislation in force in 2004 allowed 21.7 x 10⁶ of annual catches that is higher than the estimated stock (14.2 x 10⁶). The effective potential catches (15 x 10⁶) estimated by the number of licenses, the useful fishing days and the individual quotas represent more than the entire stock. The estimated catches from harvest logbook data, were valued in ca. 10⁶ individuals, 7% of the individuals > 5 cm. Moreover the analysis of the following years highlighted an increase of number licences and a subsequent increase of catches.



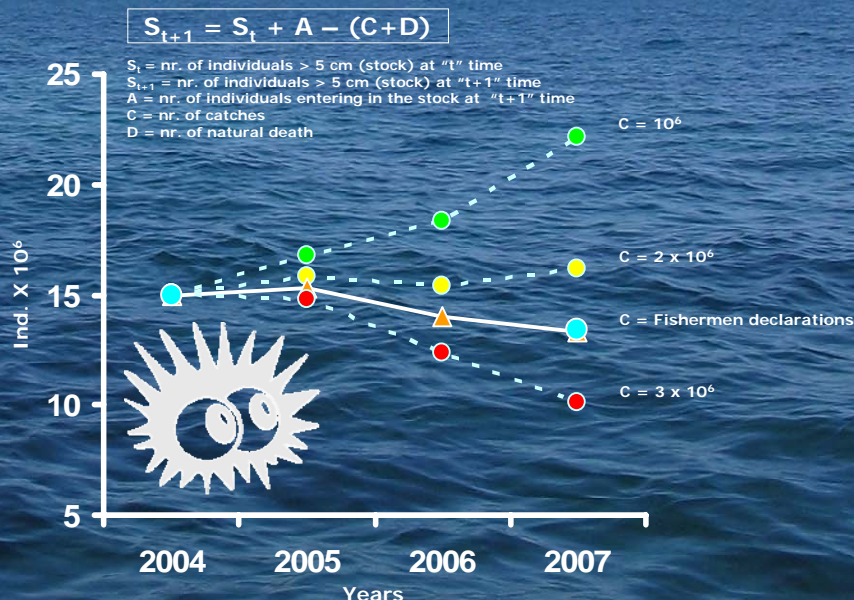
Fishery season	2003-2004	2004-2005	2005-2006	2006-2007
1 Nov - 15 Apr	1 Nov - 15 Apr	1 Nov - 20 Apr	1 Nov - 20 Apr	1 Nov - 20 Apr
Authorized fishermen	130	282	267	307
Potential fishery days	167	171	171	171
Effective fishery days	116	163	164	151
Allowed catches (nr.) per fisherman/day	1000	1000	1000	1000
Maximum catches	21.7 x 10 ⁶	48.2 x 10 ⁶	45.7 x 10 ⁶	52.5 x 10 ⁶
Effective potential catches	15.1 x 10 ⁶	46 x 10 ⁶	43.8 x 10 ⁶	46.4 x 10 ⁶
Estimated catches (fishermen declarations)	0.9 x 10 ⁶	2.4 x 10 ⁶	2.6 x 10 ⁶	2.4 x 10 ⁶

Catches data from 2003 to 2007.



Growth curve obtained from the relation between main diameter and age based on the analysis of growth bands.

These results suggest that catches had a limited impact on the population, at least for 2003 - 2004. In order to maintain the stock size constant, a threshold of 2 millions of catches have been suggested in 2004. As the number of fishing authorization increased in 2005 - 2006 and 2006 - 2007, the stock slightly decreased during this period. These data will be used by the MPA managers to adopt measures aimed to the reduction of catches.



Stock variations, estimated by means of analysis of population dynamics with different catches values, using data calculated in 2004. The continue line represents the stock variation calculated from fishermen declaration. The light - blue points are the stock values calculated in 2004 and in 2007.