

FISH COMMUNITY ASSOCIATED WITH AN ARTIFICIAL REEF NORTH OF FORMENTERERA ISLAND (WESTERN MEDITERRANEAN)

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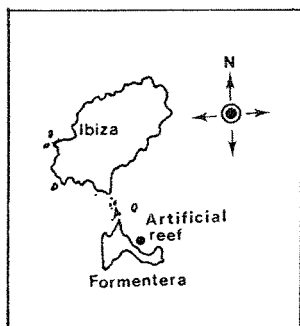


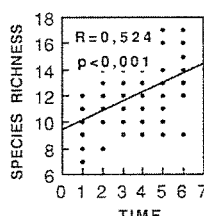
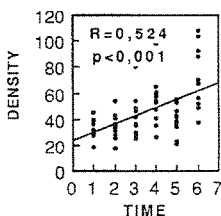
Fig. 1. Situation of the artificial reef, north of Formentera island

An artificial reef moored in Playa de Tramontana, between Punta Prima and Recó des Caló, N of Formentera Island (Fig. 1.), situated in 38°41'75"N 01°30'00' E has been studied. The reef composed of 50 boulders of 8 m³ is 30 m deep and occupies an approximate area of 39.000 m². The fish community established in the reef after one year and its temporal evolution over the course of two years is given. The monitoring has been carried by visual census, using scuba dives, in February, May and September of 1992 and 1993. Nine to twelve previously marked boulders, located on *Posidonia oceanica* meadows, were sampled every time. The mean density for each species and the average values of the specific richness, diversity (Shannon-Weaver), total density and the density of categories 3, 4, 5 and 6 of HARMELIN (1987) have been calculated. In order to

establish the temporal succession, the analyses of hierarchic classification and correspondence have been taken into account. The community descriptive indexes have been calculated by means of correlation analysis and ANOVA (SOKAL & ROLF, 1979). Thirty nine species have been counted (Table I), the most representative of which during the whole study have been: *C. chromis*, *C. julis*, *S. tinca*, *D. vulgaris*, *A. imberbis*, *S. mediterraneus*, *S. cabrilla*, *S. scriba*, *S. melanocercus*, *S. rostratus*, *L. viridis*, *L. merula*, *S. dodderleini*, *S. scrofa*, *B. rouxi* and *M. helena*. The specific composition of the samples was very similar during the study period. However, the average number of species per boulder and the density of those belonging to categories 3, 4, 5, and 6 increased significantly from February 92 to the end of the study in September 93 (Figs. 2 and 3). Therefore, colonization by most of the characteristics rocky bottom and *Posidonia* meadow species at 30 m had already taken place during the first year, but the frequency around the boulders increased with time.

	Febr. 92	May. 92	Sept. 92	Febr. 93	May. 93	Sept. 93
<i>M. helena</i>	0.33±0.24	0.17±0.11	0.15±0.10	0.15±0.10	0.17±0.17	0.09±0.09
<i>E. caninus</i>	-	-	-	0.08±0.08	0.08±0.08	0.09±0.09
<i>E. alexandrinus</i>	-	-	-	0.15±0.15	-	-
<i>E. guaza</i>	-	-	0.15±0.15	-	0.42±0.23	0.18±0.12
<i>S. cabrilla</i>	1.67±0.17	1.33±0.14	1.08±0.14	1.38±0.35	0.67±0.14	0.18±0.26
<i>S. scriba</i>	1.22±0.76	0.83±0.32	0.46±0.18	1.31±0.55	2.33±0.48	1.45±0.59
<i>A. imberbis</i>	2.00±0.71	2.08±0.47	2.46±0.48	2.54±0.76	1.58±0.45	5.27±1.01
<i>S. dumerili</i>	12.9±8.28	-	-	-	54.2±42.4	10.5±7.40
<i>S. umbra</i>	0.11±0.11	0.25±0.13	0.54±0.31	0.15±0.10	0.33±0.14	1.27±0.79
<i>M. surmuletus</i>	-	-	0.31±0.17	0.31±0.17	-	0.45±0.37
<i>D. annularis</i>	0.11±0.11	0.67±0.22	0.69±0.24	0.31±0.13	0.71±0.11	1.55±0.78
<i>D. puntazzo</i>	-	-	0.31±0.13	0.31±0.24	0.25±0.13	0.45±0.37
<i>D. sargus</i>	-	-	0.31±0.31	0.38±0.24	0.75±0.43	3.00±1.47
<i>D. vulgaris</i>	1.78±0.72	2.17±0.58	3.46±1.54	8.31±3.39	2.50±1.64	2.45±1.60
<i>S. cantharus</i>	-	0.08±0.08	-	-	-	0.36±0.36
<i>S. maena</i>	-	-	-	11.6±11.5	6.33±6.24	1.82±1.82
<i>S. smaris</i>	-	-	-	3.15±2.08	-	3.64±3.64
<i>C. chromis</i>	73.4±12.0	64.8±13.4	88.3±15.2	110±11.44	106±28.37	59.0±10.5
<i>C. julis</i>	15.2±2.18	16.4±2.11	21.7±3.09	24.3±2.67	17.1±1.71	38.4±5.06
<i>L. bimaculatus</i>	-	0.08±0.08	-	-	-	-
<i>L. merula</i>	0.78±0.22	0.42±0.19	0.38±0.14	0.08±0.08	0.42±0.15	0.18±0.12
<i>L. viridis</i>	0.33±0.24	-	0.15±0.10	0.23±0.17	0.67±0.19	0.82±0.18
<i>S. dodderleini</i>	0.11±0.11	0.50±0.19	0.77±0.17	0.38±0.14	0.33±0.14	0.55±0.28
<i>S. mediterraneus</i>	0.98±0.26	2.58±0.15	2.00±0.44	2.08±0.50	2.75±0.49	2.82±0.54
<i>S. melanocercus</i>	0.44±0.18	0.58±0.15	1.40±0.33	1.00±0.36	1.50±0.19	1.09±0.28
<i>S. ocellatus</i>	-	0.50±0.19	-	-	-	3.91±1.56
<i>S. rostratus</i>	0.33±0.17	0.58±0.19	0.31±0.13	1.15±0.67	1.08±0.36	0.27±0.19
<i>S. tinca</i>	6.44±2.16	2.92±0.61	1.31±0.35	7.69±1.73	3.25±0.48	2.09±0.59
<i>T. pavo</i>	-	-	-	-	-	0.09±0.09
<i>G. auratus</i>	-	-	0.31±0.21	-	0.08±0.08	-
<i>G. cruentatus</i>	-	0.08±0.08	-	0.08±0.08	-	-
<i>G. geniporus</i>	-	-	0.15±0.10	0.08±0.08	0.08±0.08	-
<i>G. vittatus</i>	-	-	0.31±0.31	-	0.17±0.17	-
<i>Gobius sp.</i>	0.89±0.89	-	-	-	-	0.09±0.09
<i>B. rouxi</i>	-	0.08±0.08	0.54±0.22	0.46±0.27	0.08±0.08	2.18±2.18
<i>T. delaisi</i>	-	0.25±0.18	0.38±0.21	-	0.83±0.27	1.55±0.51
<i>Tripterygion sp.</i>	-	-	0.46±0.24	0.23±0.17	0.67±0.26	-
<i>S. porcus</i>	-	-	-	0.08±0.08	-	-
<i>S. notata</i>	0.33±0.17	0.17±0.11	0.15±0.10	1.08±0.24	0.67±0.28	-

Table 1. Mean density and standar error per boulder for all species censused.



Figures 2 and 3. Correlation analysis between number of species (Fig. 2) and density of categories 3, 4, 5 and 6 (Fig. 3) and time (1: February 92 to 6: September 93).

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