



THE SPAWNING ENVIRONMENT OF THE BAY OF BISCAY ANCHOVY (*Engraulis encrasicolus* L.)

Lorenzo MOTOS, Andrés URIARTE and Victor VALENCIA.

*AZTI, Instituto Tecnológico Pesquero y Alimentario,
Av. Sarristegui 8, 20008 Donostia-San Sebastián, Basque Country, SPAIN.
Tel.: +3443212503, Fax: +3443212162, e-mail: lorenzo@rp.azti.es*

SUMMARY

The spawning season of the Bay of Biscay anchovy population extends from March to August, although most of the reproductive effort is made during May-June. Spawning is triggered by the warming up of surface waters and coincides with the maximum rate of temperature rising and the onset of stratification. Preferential sea surface temperatures are in the range of 14°-18°C. This population shows a relatively short peak spawning period that seems to be an adaptation to stable and predictable environmental conditions in the SE bay of Biscay. At the beginning of the spawning season, usually in April, anchovy concentrates in the SE corner of the bay of Biscay. Later, in May, anchovy spawning is prevalent along the SE bay of Biscay. As the spawning season progresses, in June, distinct coastal and oceanic spawning areas appear. Simultaneously, the geographical range of spawning extends North and Westwards. The bay of Biscay anchovy selects stable habitats related to river plumes, shelf edge fronts and oceanic eddies, where increased biological production potentially occurs: i) low salinity plumes related to main river estuaries (Gironde, Adour and Bidasoa). ii) structures related to shelf break fronts: French shelf to the North of 45 N and Southern bay of Biscay, iii) oceanic eddies of slope waters (SWODDIES), in oceanic sites outside the continental shelf. This population shows a density-dependent selection of the spawning habitat. The spawning areas associated to the Estuaries of Gironde, Adour and Bidasoa, in the SE region of the bay of Biscay, seem to form a refuge basin favourable for the maintenance of this population of anchovy even though in adverse environmental conditions.

RESUMEN

La puesta de la anchoa del Golfo de Vizcaya se extiende de Marzo a Agosto, aunque la mayor parte del esfuerzo reproductivo tiene lugar en Mayo y Junio. El calentamiento estacional de las aguas superficiales actúa como un impulsor de las actividades reproductivas de la anchoa, que coinciden con las tasas máximas de calentamiento y el comienzo de la estratificación vertical, en un rango preferencial de 14 a 18°C. Esta población muestra un periodo de puesta relativamente corto, adaptado a las condiciones ambientales estables y predecibles prevalentes año tras año en el Sudeste del Golfo de Vizcaya. Al comienzo de la estación de puesta, generalmente en abril, la anchoa se concentra en un área restringida de la región SE del Golfo. Posteriormente, en mayo, la puesta se extiende por toda esta región. A medida que la temporada avanza, en junio, se pueden distinguir áreas de puesta diferenciadas costeras y oceánicas, respectivamente, a la vez que se extiende el rango geográfico de puesta hacia el N y hacia el W. La anchoa del Golfo de Vizcaya parece seleccionar un habitat relacionado a condiciones de estabilidad vertical y de producción biológica como son i) plumas de agua de baja salinidad provenientes de los estuarios más importantes del sur del Golfo; ii) estructuras relacionadas con frentes de talud y plataforma; iii) remolinos oceánicos de aguas de talud. Esta población de anchoa muestra una selección del habitat dependiente de la abundancia. El área de puesta asociado a los grandes estuarios del sur del Golfo de Vizcaya parecen conformar una cuenca favorable para su mantenimiento aun en condiciones ambientales adversas.

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Lorenzo Motos, Andrés Uriarte & Victor Valencia
AZTI-San Sebastián
Basque Country - SPAIN

INTRODUCTION

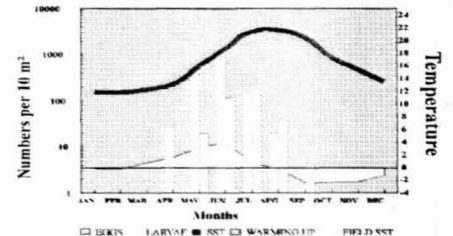
This poster is a summary of the paper by the same authors (Motos et al., in press) analysing the spatio-temporal patterns of spawning of the Bay of Biscay anchovy population. The reproductive activities of adult spawners are tracked through the distribution and abundance of anchovy eggs. The environmental features where the eggs occur and develop are described and there are also explored the potential implications for recruitment of this short period of the anchovy life history.

MATERIAL AND METHODS

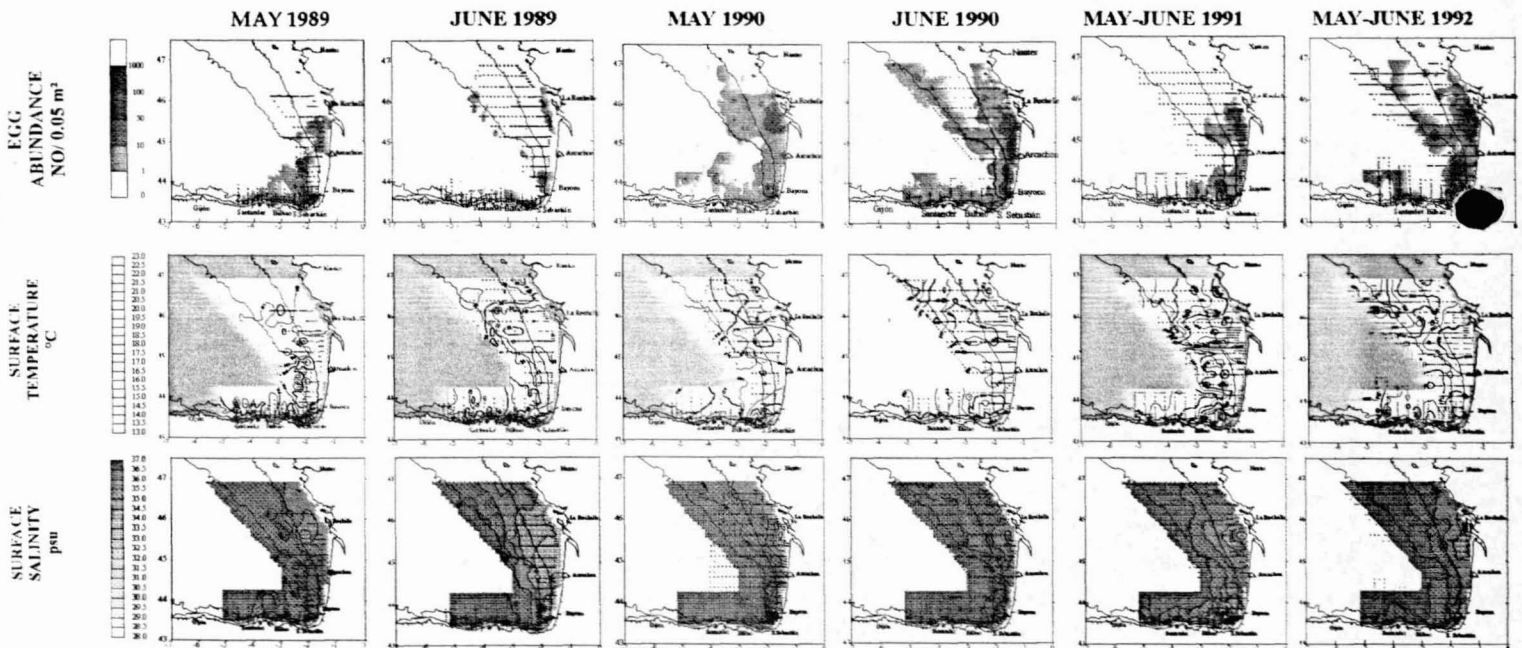
The temporal distribution of anchovy eggs was studied by means of a monthly transect sampled from Jan 1987 to Dec 1989 using a BONGO net (Sola et al. 1990). The spatial distribution was investigated through annual (1989-1992) egg surveys along the potential spawning area of the species. Concurrent environmental features were monitored by means of SEABIRD '19' or '25' CTD casts. Samples were processed following standard procedures (Smith & Richardson, 1977).

RESULTS - TEMPORAL DISTRIBUTION

Anchovy spawning goes from April to September with a peak in May-June, when the maximum rate of warming up was recorded (May=3.1 °C, June=3.9 °C).

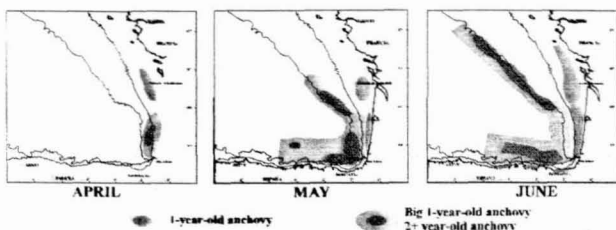


RESULTS - SPATIAL DISTRIBUTION & ENVIRONMENT



RESULTS - SPATIAL DISTRIBUTION

At the beginning of the spawning season, usually in April, anchovy concentrates in the SE corner of the bay of Biscay. Later, in May, anchovy spawning is prevalent along the SE bay of Biscay, from the Spanish and French coast up to 46°30' N and 4° W. As the spawning season progresses, in June, distinct coastal and oceanic spawning areas appear. Simultaneously, the geographical range of spawning extends North and Westwards.



CONCLUSIONS

The spawning season of the Bay of Biscay anchovy population extends from March to September, although most of the reproductive effort is made during May-June. Spawning is triggered by the warming up of surface waters and coincides with the maximum rate of temperature rising and the onset of stratification. Preferential sea surface temperatures are in the range of 14-18 °C. This population shows a relatively short peak spawning period that seems to be an adaptation to stable and predictable environmental conditions in the SE bay of Biscay.

Selection of a specific spawning site is related to good feeding conditions for adults. The bay of Biscay anchovy selects habitats related to river plumes, shelf edge fronts and oceanic eddies, where increased biological production potentially occurs.

The spawning areas associated to the Estuaries of Gironde, Adour and Bidasoa, in the SE

RESULTS - ENVIRONMENTAL FEATURES

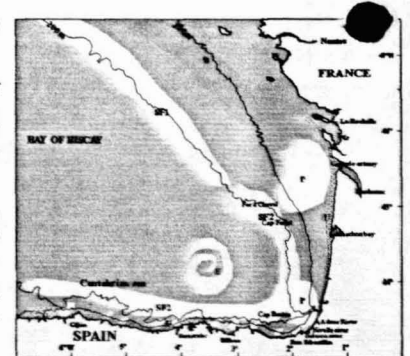
The attached figure shows a summary of the habitats selected by anchovy to spawn:

Low salinity plumes related to river estuaries (P).

Structures related to shelf break fronts of different origin: French shelf to the North of 45°N (SF1) and Southern bay of Biscay (SF2).

Oceanic eddies of slope waters (SWODDIES), in oceanic sites outside the continental shelf (E).

Anchovy avoids particular features as the cold bottom water 'tongue' (B).



ACKNOWLEDGEMENTS

The authors acknowledge the support and ideas received from a number of colleagues working together with us on anchovy research activities. We are specially grateful to Concha Franco, Amor Solá, Ana Lago de Lanzós and Alberto García (IEO) who were in charge of egg cruises carried out on board R/V 'INVESTIGADOR' in 1990 and 'CORNIDE DE SAAVEDRA' in 1991 and 1992.

The processing work was made by AZTI's technical staff.