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Multivariate characterization of spawning and larval environment of small pelagic fishes in the Gulf of California

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Spawning and nursery areas of *Sardinops sagax* (Pacific sardine) and *Engraulis mordax* (northern anchovy) were characterized during early winter in the Gulf of California, using near-surface horizontal and oblique Bongo tows. The main spawning area for anchovy was located near the islands of Tiburón and Angel de la Guarda and for sardine near both coasts on either side of the central region of the gulf. A hydroacoustic survey showed a close spatial overlap between the distribution of small pelagic fish schools, their spawning areas and areas with the highest zooplankton biomass. Distribution and abundance of eggs and distinct larval stages showed that the nursery area is considerably larger than the spawning area. Sardines and anchovies had distinct interspecific larval drift patterns, mostly caused by differences in the spawning locations that were influenced by regionally distinct advection caused by coastal upwelling, filaments and eddies. Abundance of eggs and early larvae of both species were closely associated with higher abundance of fucoxanthin and chlorophyll a, zooplankton biomass and the small copepod *Acartia clausi*. Older larvae were mostly associated with abiotic environmental variables and large-sized copepods, such as *Centropages furcatus* and *Calanus pacificus*. These results suggest the importance of sequential spatial overlap of larvae with food availability as they drift in the Gulf of California.

Palabras clave: Specialist, spawning area, *Engraulis mordax*, von-Bertalanffy, larval drift, acoustic survey

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