Mexico Baja California Sur blue and brown shrimp – bottom trawl/cast net

Fishery Improvement Project (FIP)

Action 2. Evaluate the fishery bycatch mortality.

Six-Month Progress Report

April 2026

During this reporting period, substantial progress was made toward completing the biological and ecological assessment of bycatch associated with the shrimp trawl fishery. Preliminary analyses have now been completed for the three planned tasks: bycatch characterization, estimation of bycatch abundance, and estimation of survival and mortality rates of organisms captured by the fishing gear.

The available results provide a first integrated description of bycatch composition, abundance by tow, biomass by tow, and post-capture condition of organisms recorded as alive or dead. These outputs are currently being consolidated into a scientific manuscript, which is planned for submission in June 2026. Once submitted, the manuscript will serve as formal technical evidence supporting the progress made under these tasks.

Task 1. Gather the essential data for evaluating the impact on both the habitat and ecosystem.

The preliminary results provide a clear biological characterization of the most abundant bycatch species recorded during the sampling period. The analysis identifies the dominant taxa contributing to the bycatch assemblage and compares their survival patterns between fishing and closed-season sampling periods.

The species-level results show marked differences among taxa. Some species, such as Paralabrax maculatofasciatus, showed consistently high apparent survival, particularly during the closed-season period. Other species, including Eucinostomus gracilis, Eucinostomus dowii, Etropus peruvianus, and Etropus crossotus, showed consistently low survival values across periods. This suggests that bycatch response to capture is highly species-specific and should not be interpreted only from aggregate survival rates.

These results contribute directly to the ecological characterization of bycatch because they distinguish between species that appear more resilient to capture and handling and those that may be more vulnerable to mortality after interaction with the fishing gear. This information is relevant for identifying priority species for further monitoring, risk assessment, and potential mitigation measures.

Task 2. Estimate the abundance of bycatch caught by fishing gear.

Bycatch abundance was estimated at the tow level using organism counts and biomass records. The preliminary data show clear variability among tows, both in total number of organisms and total biomass captured. This variation is expected in trawl fisheries because bycatch composition and abundance can vary according to fishing area, depth, habitat, season, and local species availability.

The tow-level abundance plots show that individual tows contained from relatively low to high numbers of organisms, with some tows exceeding 200 individuals. Biomass also varied among tows, with total bycatch biomass generally ranging from approximately 5 to more than 15 kg per tow in the preliminary dataset. These results provide the basis for estimating bycatch

abundance associated with shrimp fishing operations and allow comparison between fishing-season and closed-season sampling periods.

The analysis also separates live and dead fractions by tow, which is important because abundance alone does not fully describe the ecological impact of bycatch. A tow with high abundance but high survival may have different implications than a tow with lower abundance but high mortality. Therefore, the combination of counts, biomass, and condition at capture provides a more complete estimate of bycatch interaction with the gear.

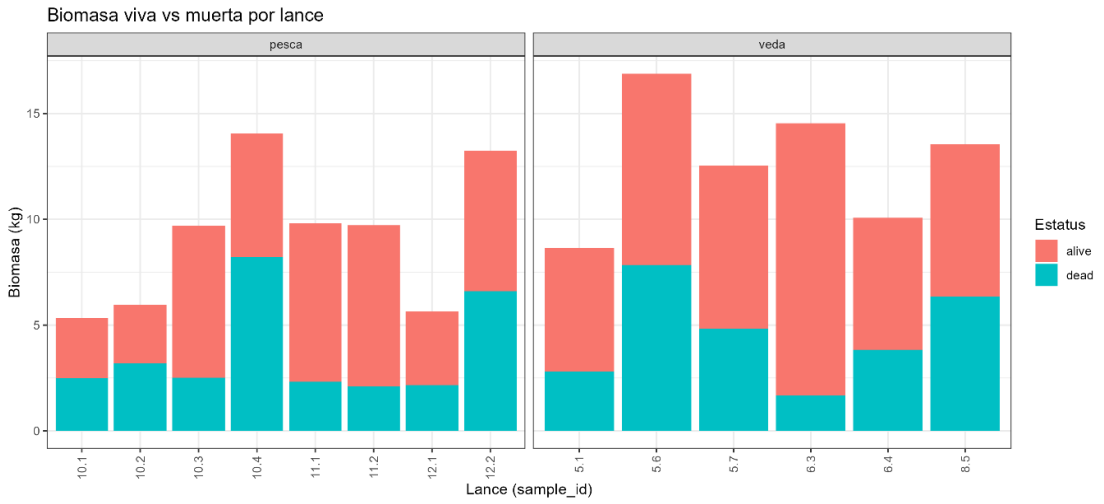

Figure 1. Live and dead bycatch biomass by tow.

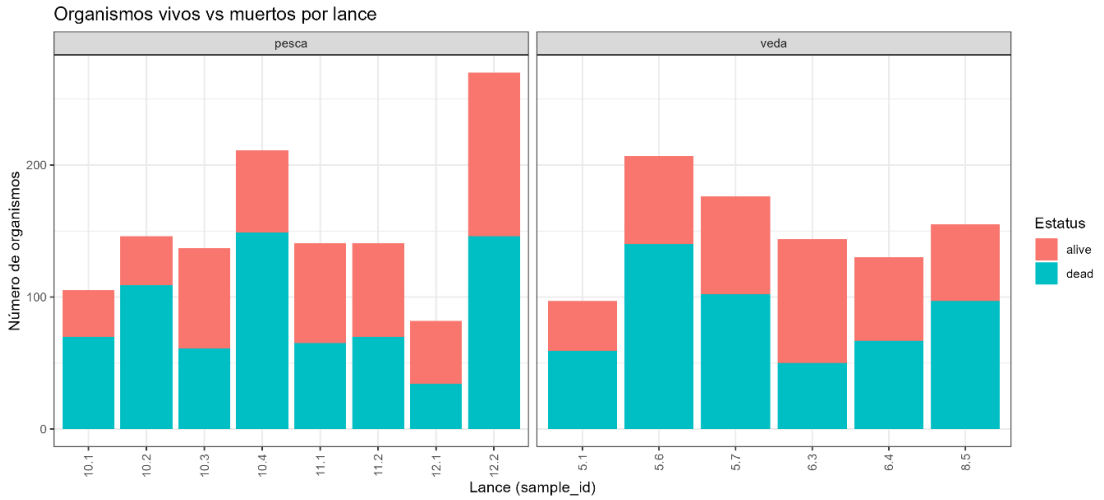

Figure 2. Number of live and dead bycatch organisms by tow.

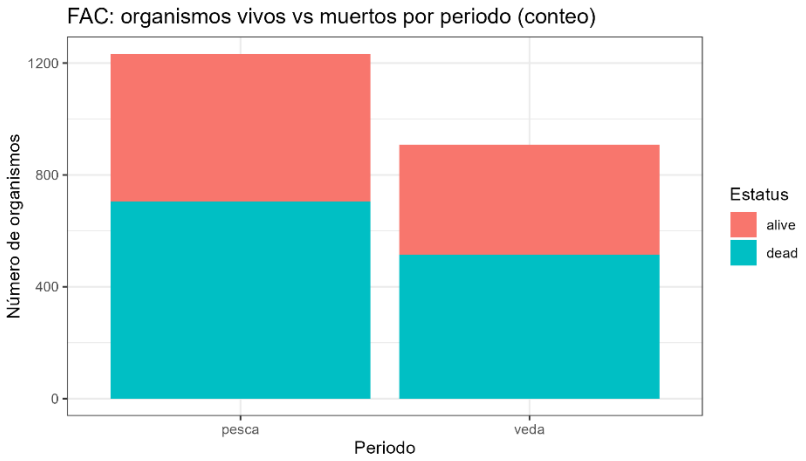

Figure 3. Total number of live and dead bycatch organisms by period.

Task 3. Determine the survival and mortality rates of bycatch captured during shrimp fishing.

Preliminary survival estimates were calculated using organism counts by tow and by species. The results indicate that survival varies substantially among tows and species. At the tow level, median survival during the fishing period appears to be higher than during the closed-season period, although the fishing period also shows greater variability among tows. This suggests that survival is not constant and may be influenced by operational, environmental, or biological factors.

At the aggregate period level, both fishing and closed-season samples included a substantial fraction of dead organisms, indicating that capture and handling mortality is an important component of the bycatch impact. However, the species-level analysis provides a more informative picture: some species show survival values close to 100%, while others show very low survival. This confirms that overall mortality rates should be interpreted cautiously and complemented with species-specific estimates.

The current results are sufficient to demonstrate that survival and mortality rates have been estimated for the main bycatch components. The next analytical step is to refine these estimates in the scientific manuscript, including confidence intervals, sample sizes, and, where appropriate, statistical comparisons between periods and species.

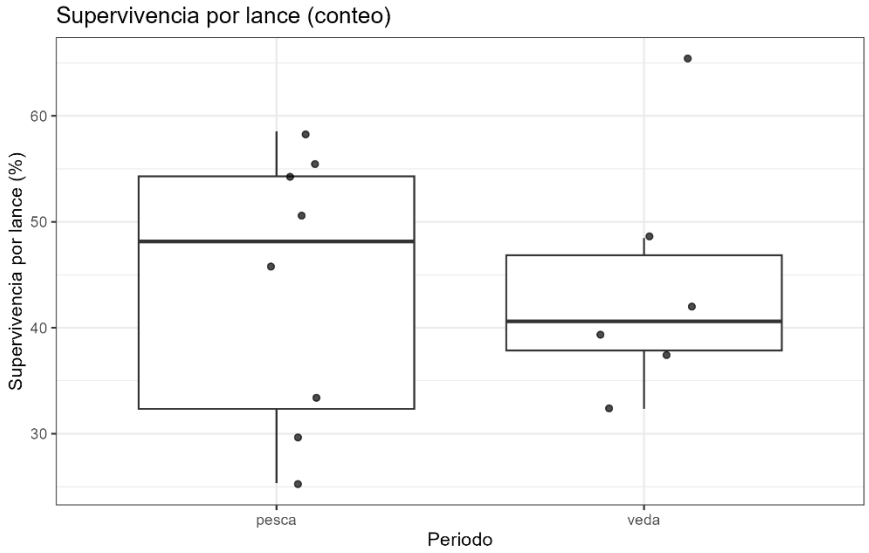

Figure 4. Survival rate by tow during fishing and closed-season periods.

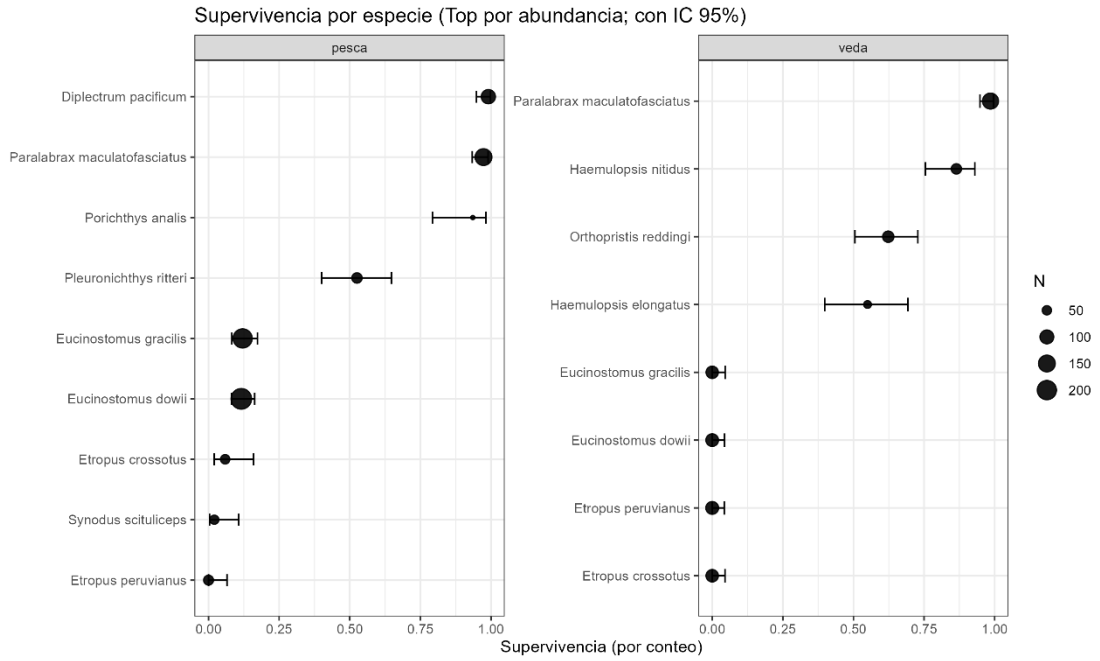

Figure 5. Species-specific survival estimates for the most abundant bycatch species.

Note:

The current results should still be reported as preliminary until the final manuscript is completed. The main conclusions are already useful, but the strongest evidence will come once the dataset is fully checked, confidence intervals are finalized, and the interpretation is consolidated in the article.