“Analysis of fish bycatch from the commercial shrimp fleet in the South East Gulf of California”

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Although shrimp fisheries are of great economic importance worldwide, they produce serious ecological disturbances and affect other resource harvesting activities such as small-scale fisheries.
Although shrimp trawl fisheries provide social and economic benefits, several other aspects need to be considered in their evaluation.

Some 9.5 million tons of bycatch are taken annually in shrimp trawl fisheries worldwide, representing 35% of the incidental catch by all commercial fisheries.
A characteristic is its high variability in space and time. Changes in the abundance and the composition of the diversity happen frequently in the fish communities of co-occurrent areas.
Objectives

To describe the composition, distribution and abundance of the bycatch ichthy fauna in the Sinaloa area from the commercial shrimp fleet in the South East Gulf of California.

To determine the spacial abundance and biomass of the ichthyic species.

To describe the temporal variations within areas of the species that conform the community of fishes at this area using the ecological models as richness, diversity and equitability.

To determine the dominate species of the ichthyic fauna in Sinaloa, in terms of numeric abundance.
Materials and Methods

Cruises of boats were carried out aboard shrimp fishers who are facilitated in agreement with the Regional Center of Fishing Investigation (CRIP); they were operating in part of the Annual Shrimp distributions of shrimp throughout the coast of Sinaloa, in the platform of the Mexican Pacific from 25º 40´ N, 109º 30´ W to 21º 54´ N, 106º 03´ W (Figure 1).
The cruises were carried out in commercial boats with shrimp trawling nets of 80 and 120 feet of length, and line of 30 mm in the cod end.

At the laboratory, the organisms were identified, measured (total length), and weighed in a digital balance.

These data, together with locality, depth, salinity and temperature were used to calculate the different indices.
Abundance and relative weight:

\[ %N = \left( \frac{N}{TN} \right) \times 100 \]

\[ %W = \left( \frac{W}{TW} \right) \times 100 \]

Pielou Equitability Index:

\[ H? = H\text{\textsuperscript{\textregistered}} \text{ax} = H? \ln S = J \]
Diversity and Richness

Margalef Richness:

\[ DMg = \frac{(S-1)}{\ln N} \]

Shannon index:

\[ H' = -\sum (pi)(\log pi) \]

Simpson index:

\[ D = 1 - \sum (pi)^2 \]
RESULTS

219 species from 52 families were identified.
<table>
<thead>
<tr>
<th>Specie</th>
<th>Relative weight</th>
<th>Specie</th>
<th>Relative abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synodus scituliceps</td>
<td>6.6335</td>
<td>Orthopristis chalceus</td>
<td>6.293353</td>
</tr>
<tr>
<td>Pomadasys panamensis</td>
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<tr>
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<tr>
<td>Chloroscombrus orqueta</td>
<td>1.8105</td>
<td>Diplectrum pacificum</td>
<td>1.849711</td>
</tr>
</tbody>
</table>

Abundance and relative weight of the most common species during the 3 years of samplings
Centropomus robalito 8%
Diapterus peruvianus 6%
Orthopristis chalceus 10%
Larimus effulgens 4%
Pseudopenaeus grandiquamis 6%
Stellifer furthii 5%
Otras 49%

Selene peruviana 8%
Prionotus xenisma 6%
Centropomus robalito 5%
Pseudopenaeus grandiquamis 6%
Orthopristis chalceus 6%
Synodus scituliceps 5%
Eucinostomus currani 3%
Otras 63%

Zone 60

Zone 40

Zone 30
<table>
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<th>Zone</th>
<th>Mean</th>
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<tr>
<td>30</td>
<td>174.5</td>
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<tr>
<td>40</td>
<td>256.5</td>
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<td>60</td>
<td>172.9</td>
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</table>

<table>
<thead>
<tr>
<th>Zone</th>
<th>Mean</th>
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<tbody>
<tr>
<td>30</td>
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<td>40</td>
<td>24.9</td>
</tr>
<tr>
<td>60</td>
<td>20.1</td>
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</table>
Margaleff index for each sampling site
Shannon diversity Index for each sampling site
Number of species and organisms in the three sampling zones
Shannon index of diversity in the different zones

![Graph showing the Shannon index of diversity in different zones. The x-axis represents zones, and the y-axis represents the diversity index. The graph shows a decrease in the diversity index from zone 20 to zone 70.]
Simpson index of diversity in the different zones
Annual bycatch fauna from 1992 to 2004 in the different zones
Annual bycatch fauna per hectare in the three different zones (1992-2004)
Changes of the Shannon index of diversity throughout the year

- Winter
- Spring
- Summer
- Autumn

Graph showing changes in Shannon index from Winter to Autumn.
Shannon index of diversity against the different depths
Conclusions

The specific composition of the ichthyc community along the Sinaloa coast was composed by 219 species in 57 families.

The families that were more representative were: Scianidae (31 species), Haemulidae (18 species), Carangidae (16 species) and Serranidae (16 species).

The more abundant species were: Orthopristis chalceus, Selene peruviana, Pomadasys panamensis and Synodus scituliceps.
The diversity increases during the hot months, and decreases during the cold months.

The Northern part of the coast of Sinaloa presents the highest diversity and richness values.

The diversity also changes according to depth, being higher at shallow depths and decreasing towards deeper waters.
Thank you!!!