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Influence of Sea Surface Temperature on the Spatiotemporal Dynamics and Fishing Efficiency of Small Pelagic Species in the Western Mediterranean Sea

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Introduction

- Small pelagic fish (*Sardina pilchardus*, *Sardinella aurita*, *Engraulis encrasicolus*) dominate Mediterranean fisheries.
- With the Mediterranean warming, the SST-fish distribution nexus is vital for fisheries management,
- Abundance linked to SST variability.

Objective: Investigate SST influence on spatiotemporal dynamics and fishing efficiency.

Methodology

Study area: Zemmouri Bay, Western Mediterranean (Algerian coast), from Cap Matifou to Cap Djinet, <3nm, <100m depth.

Data: 357 purse-seine landings (2015-2016). Sea Surface Temperature (SST) from magicseaweed.com.

$$CPUE = CT(kg) / N$$

Stats: Kruskal-Wallis (P=0.05).

SST Typologies:

ABS: Indicator Temp interval absent from fishing zone

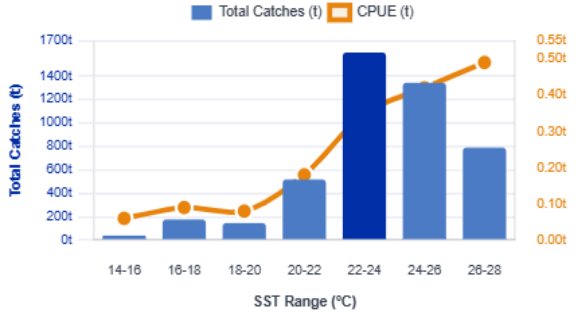
CCC: Indicator Temp interval at coast in fishing zone

CCPDZI: Indicator Temp interval at coast outside the fishing zone

DDDZI: indicator Temp interval diffuse

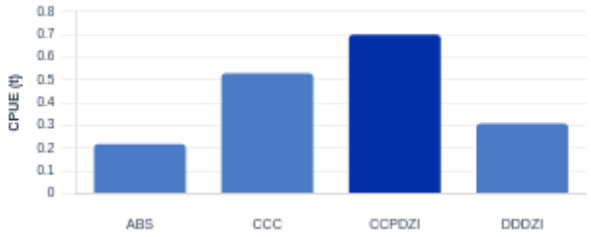
Study Area

Total Catches & CPUE by SST



■ Peak catches: 22-24°C (1599.21t) | ● Peak CPUE: 26-28°C (0.49t)

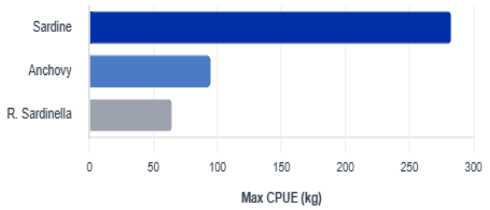
CPUE by SST Typology



ABS	CCC
0.22t	0.53t
265 days	19 days

CCPDZI	DDDZI
0.70t	0.31t
2 days ★	72 days

Species CPUE



Key Finding:

- Optimal efficiency at SST 19-21°C (seasonal aggregation). Beyond: decline in catch rates.
- Evidence of high biological plasticity: small pelagics exhibits a broader thermal tolerance (up to 27 ° C) than established Mediterranean standards.

Conclusions

- Optimal at **19-21°C** for aggregation.
- CPUE highest when temp at coast (CCC, CCPDZI).
- Peak catches: 22-24°C; peak CPUE: 26-28°C.
- significant SST influence confirmed (Kruskal-Wallis, p<0,05),
- Fleet efficiency limited by habitual zones by.
- Integrate SST into monitoring.

Support adaptive management.

Keywords & Refs

Keywords: Small pelagic fish; SST; CPUE; Mediterranean; Sustainability.

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