

Yokohama, Japan  
June 03-07, 2024

# Socio-Ecological Resilience of the Baja California Red Sea Urchin Fishery

---

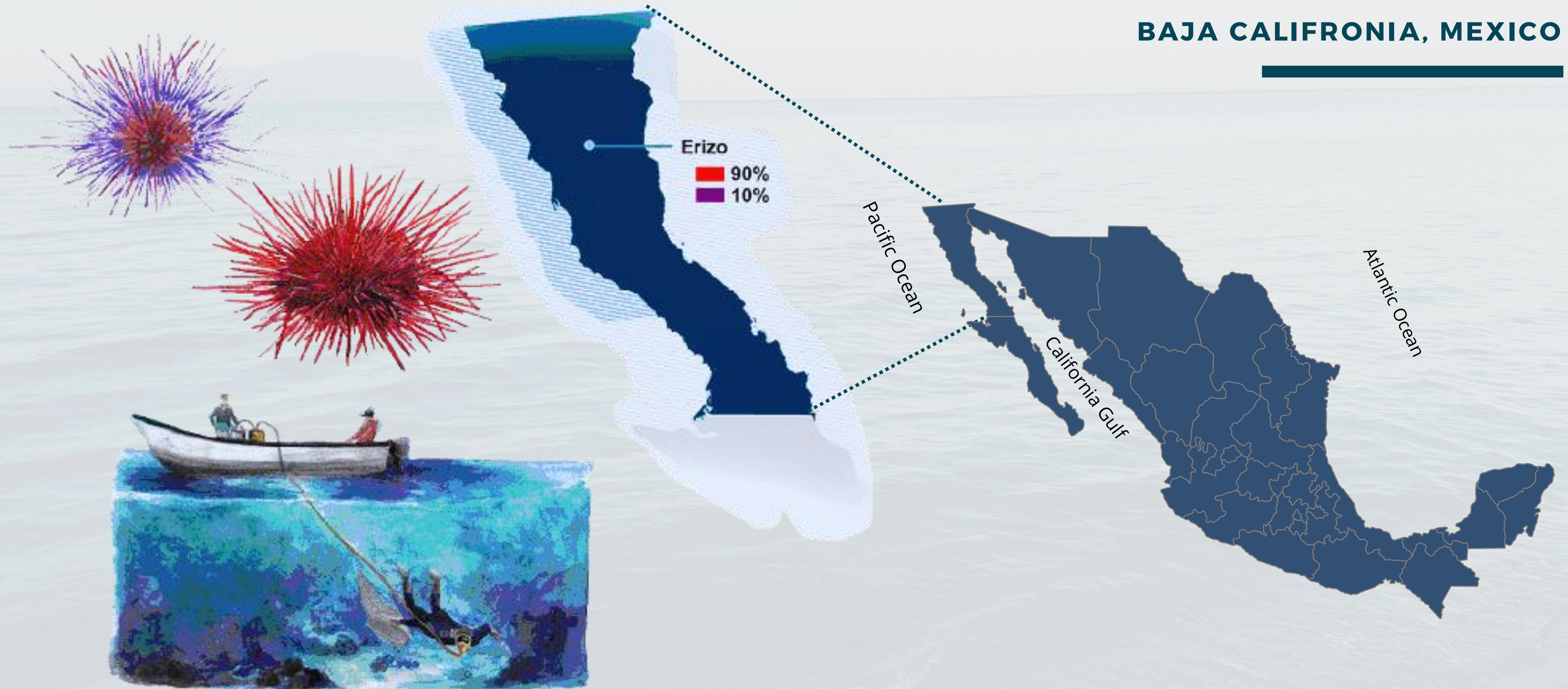
## co-authors

Tavera-Ortiz, Teresa; Malpica-Cruz, Luis;  
Zepeda-Domínguez, José Alberto; Montaño-  
Moctezuma, Gabriela; Beas-Luna, Rodrigo,  
Sandoval-Gil, Jose; Nenadovic, Mateja.



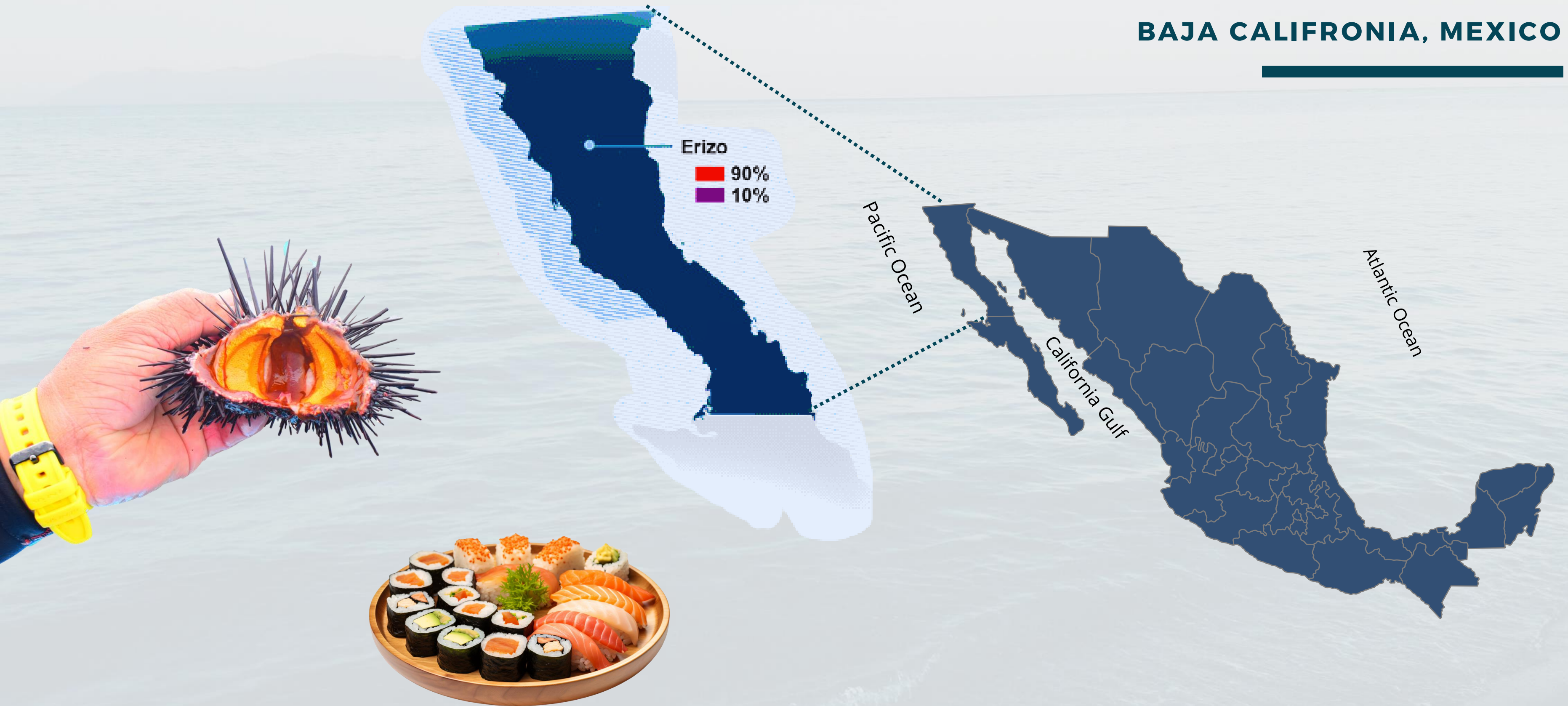
# Small Scale Fishery Red Sea Urchin

BAJA CALIFRONIA, MEXICO



# Small Scale Fishery Red Sea Urchin

BAJA CALIFRONIA, MEXICO



# kelp forest

BAJA CALIFORNIA, MEXICO

---

Foto: Luis  
Malpica



# Some “kelp forest” NOW

BAJA CALIFORNIA, MEXICO

---

Foto: Luis  
Malpica



**To deal with these  
climate-driven changes,  
the fishers have looked  
for ways to persist and  
adapt**

**Red sea urchin  
fisher diver**



# Strategies to improve yield fishery

---

## TRANSLOCATION OF WILD ORGANISMS

**From sites with little algae to  
persistent kelp forests.**

**To improve the quantity and  
quality of sea urchins gonads**



# TRANSLOCATION OF WILD ORGANISMS

---

- 1. Understand the drivers that lead the fishers to translocate red sea urchins.**
- 2. Identify the ecological impacts of red urchin translocation on the target kelp forest.**
- 3. Gain insights into adaptative capacity to climate change at the organizational and fisher levels.**



# We used ethnography tool

## 1. UNDERSTAND THE DRIVERS THAT LEAD THE FISHERS TO TRANSLOCATE RED SEA URCHINS.

Participant observation  
How do they plan translocation activities



Participant observation  
How translocations take place



## Participant observation

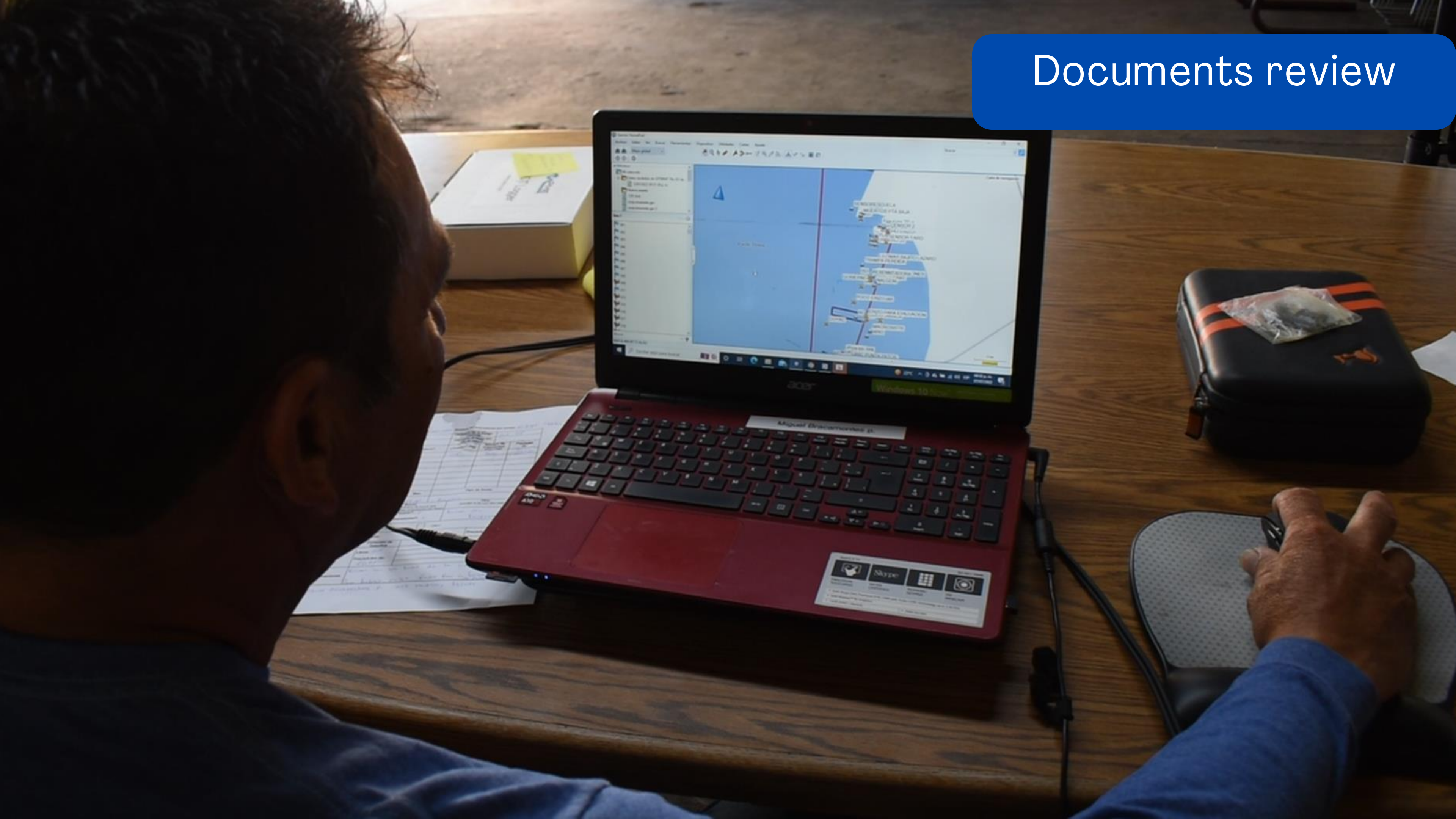
Where and how sea urchins are harvested  
and translocated



Semistructured interviews with key actors  
and surveys with the divers

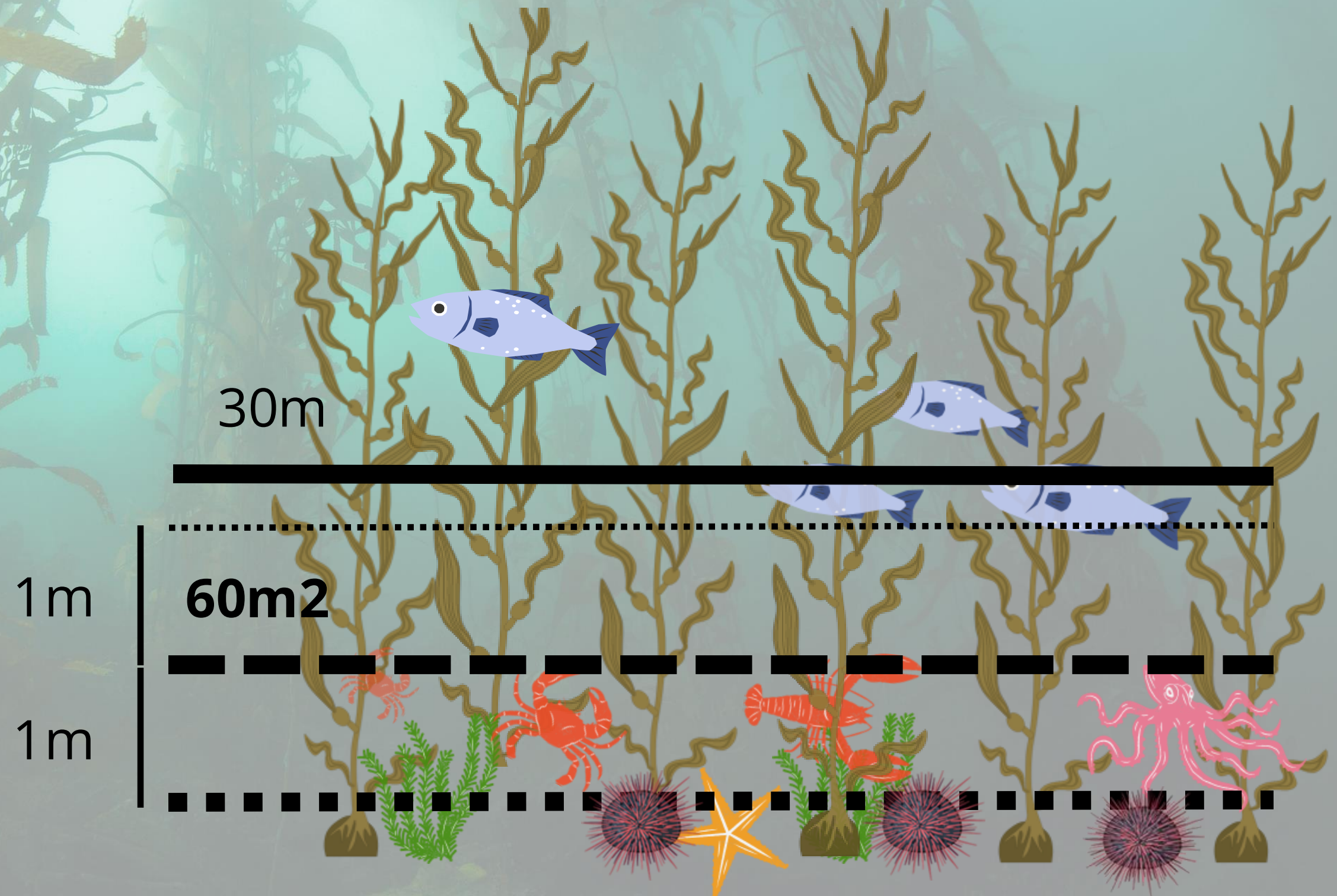


# Documents review

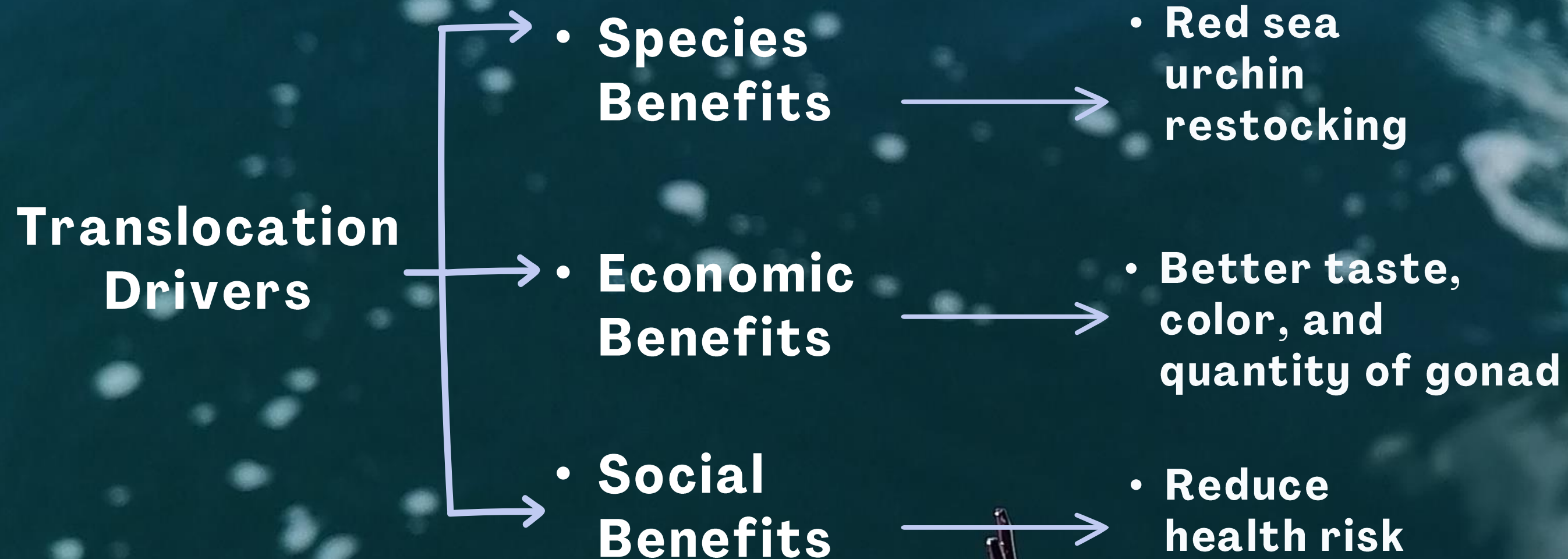


## 2. IDENTIFY THE ECOLOGICAL IMPACTS OF RED URCHIN TRANSLOCATION ON THE TARGET KELP FOREST BEFORE-AFTER CONTROL-IMPACT (BACI)

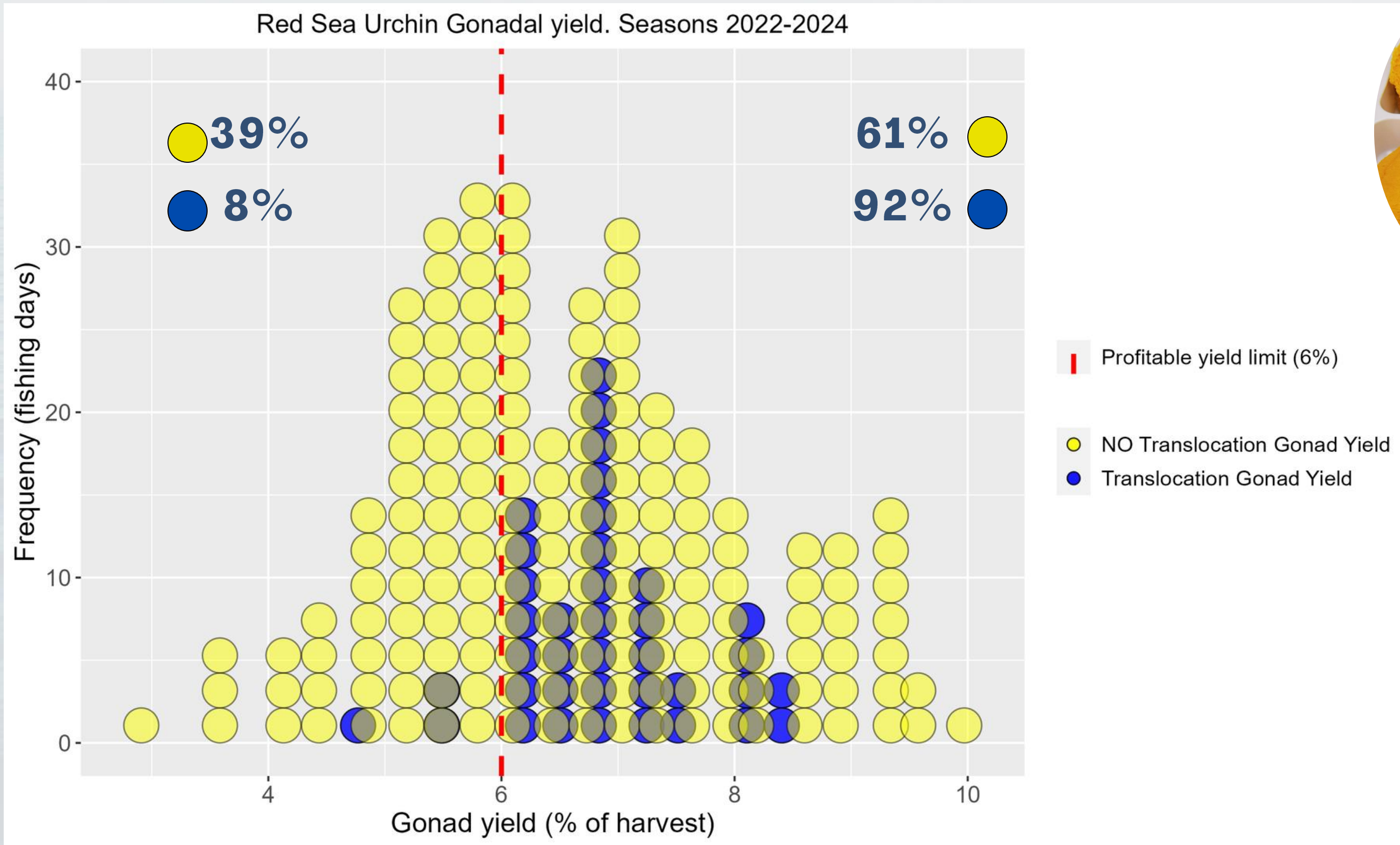
Underwater visual sampling technique to characterize the algal, invertebrate, and fish assemblage using BACI approach.



# Red sea urchin translocation as a fisheries management tool



# Translocation generates profitable gonad for fishing





# Translocation homogenizes the gonad color

Better quality egg yolk yellow color



Red sea urchin gonad from the source area



Red urchin gonad from the target area (translocation zone)

# Translocation reduces the risk to health

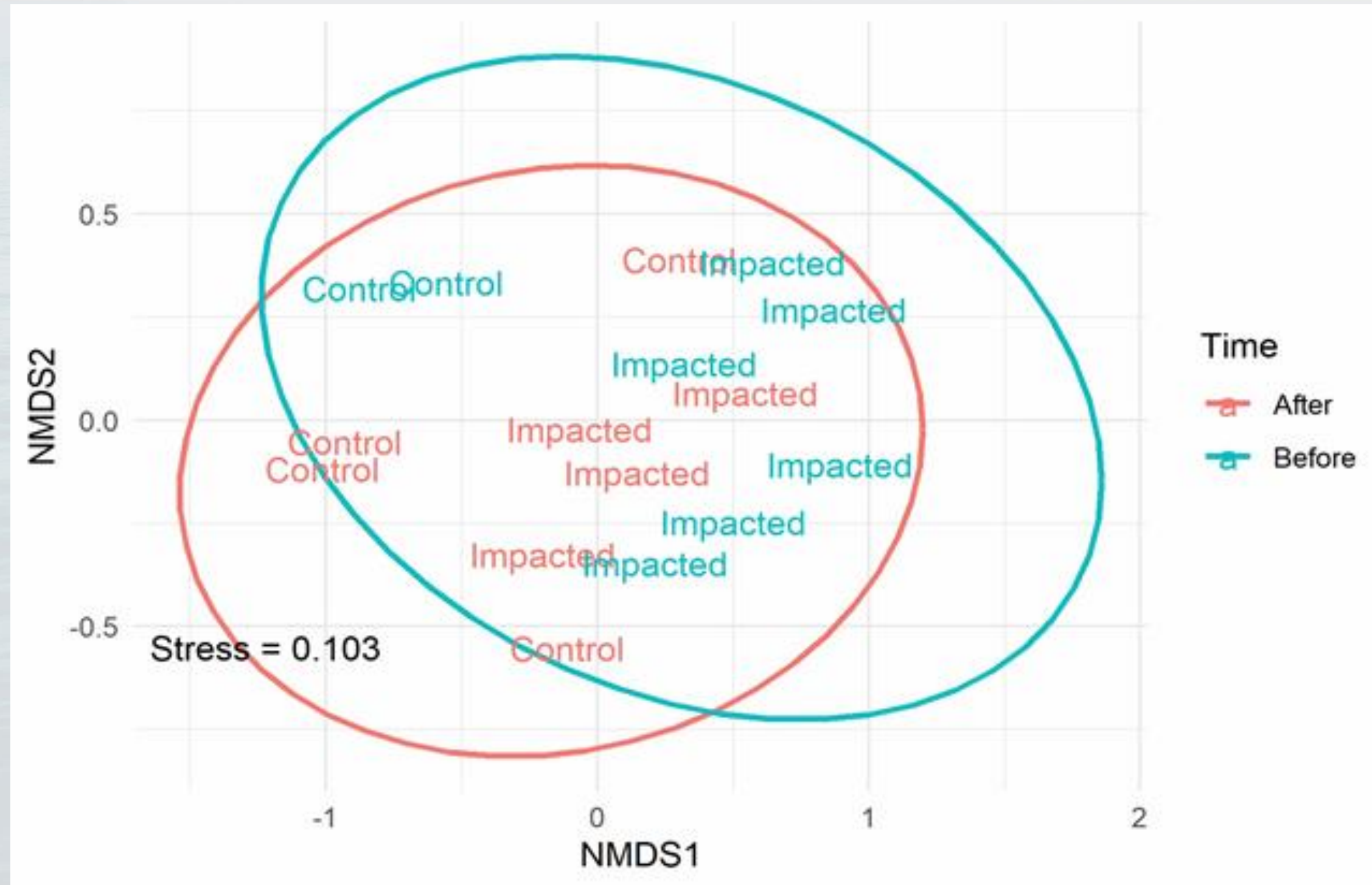
All fisher divers consider  
that sea urchin translocation  
reduces the risk of  
decompression sickness.

Sea urchins translocate in  
shallow areas  
(15-17m)



# Community Structure as a Function of Species Abundance and Diversity.

No detectable impact on the ecological community.  
for a one-year follow-up 2022-2023



Non-metric multidimensional scaling (nMDS) biplot of the Bray-Curtis similarity matrix. For all species (algae, invertebrates, and fish).

**A management system that includes the translocation and the persistence of kelp forest, allows the fishers to continue producing red sea urchins.**



**Socio-Ecological Resilience**

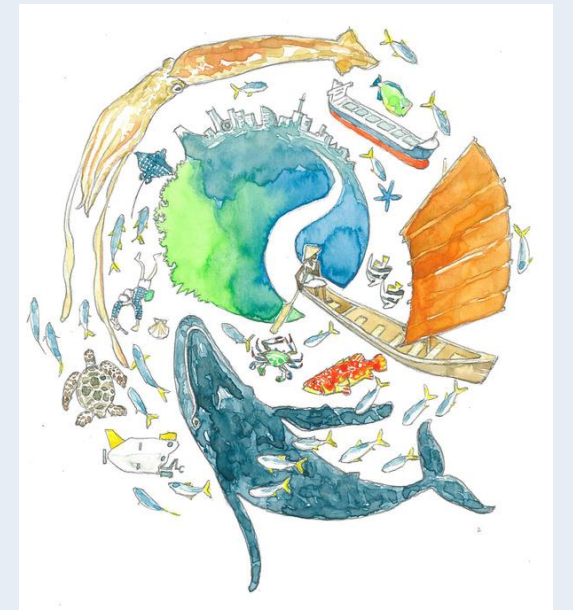
**Climate change**



**Adaptive co-management**

# Acknowledgements





**Gracias**

**CONTACT:**

Teresa Tavera

e-mail: [ttavera@uabc.edu.mx](mailto:ttavera@uabc.edu.mx)

