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**Humboldt**  
250 2do Congreso  
Latinoamericano de Biogeografía

# Biogeographic distribution of octocorals of the *Muricea* and *Leptogorgia* genera on the equatorial front of the Tropical Eastern Pacific

## Distribución biogeográfica de octocorales de los géneros *Muricea* y *Leptogorgia* en el frente ecuatorial del Pacífico Tropical Oriental

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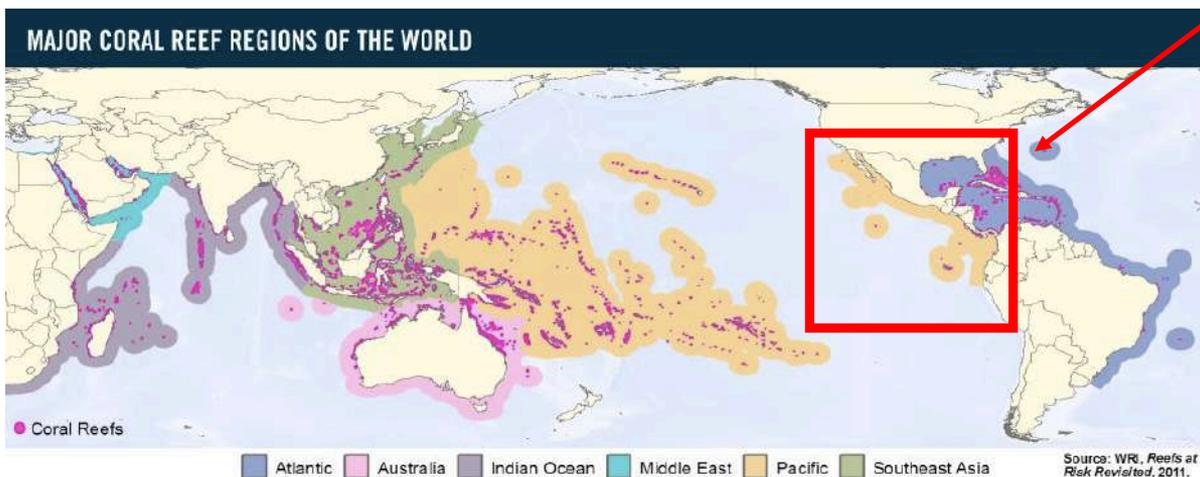
August 8<sup>th</sup>, 2019

# INTRODUCTION

## GLOBAL CONTEXT

Reduction of coral populations globally

Distribution



Tropical Eastern Pacific (TEP)

Causes of disappearance?

Climate change  
Anthropogenic impacts

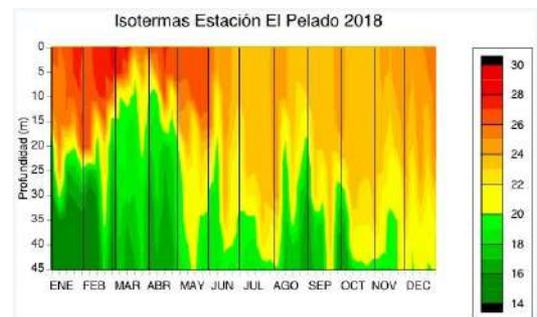
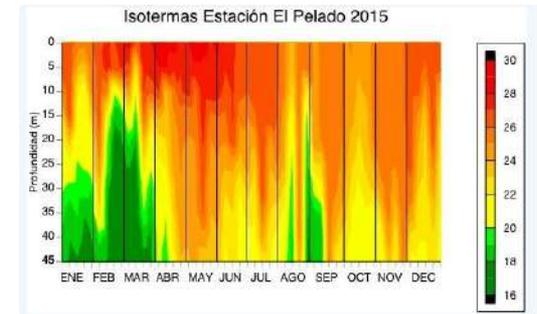
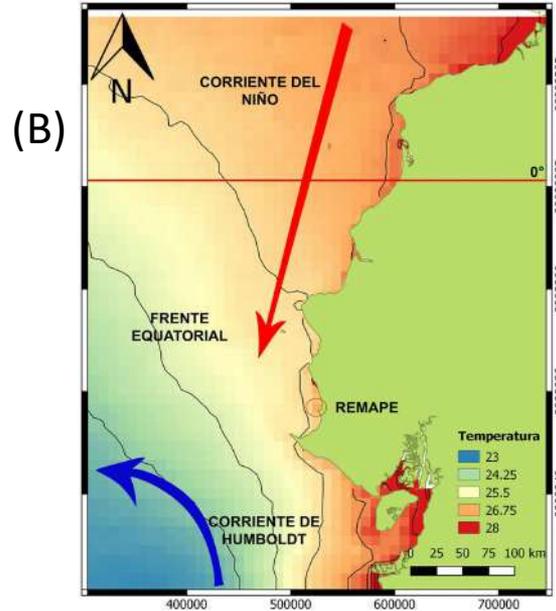
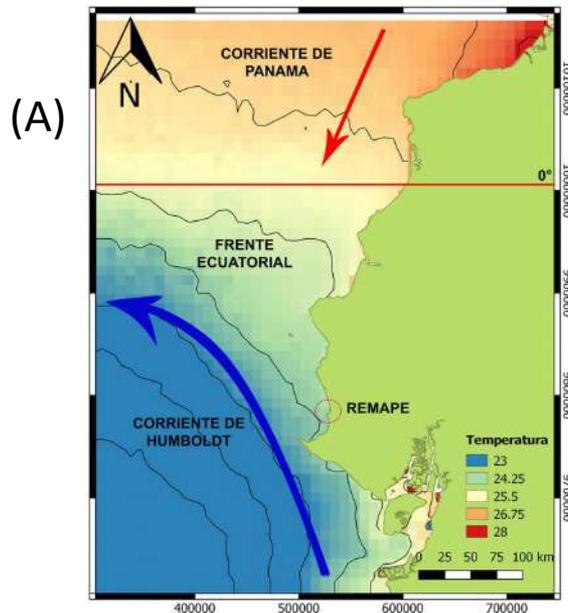


# INTRODUCTION

## CONTINENTAL COAST OF ECUADOR

### Environmental conditions

- Convergence zone (Humboldt and Panama)
- Thermohaline gradient
- “El Niño Southern Oscillation” (ENSO) and “La Niña” climate phenomenon
- Extreme climate conditions



- A. Equatorial front: June to November  
B. Equatorial front: December to May

[http://www.cenaim.espol.edu.ec/biodiversidad\\_REMAPE\\_amb](http://www.cenaim.espol.edu.ec/biodiversidad_REMAPE_amb)

# INTRODUCTION

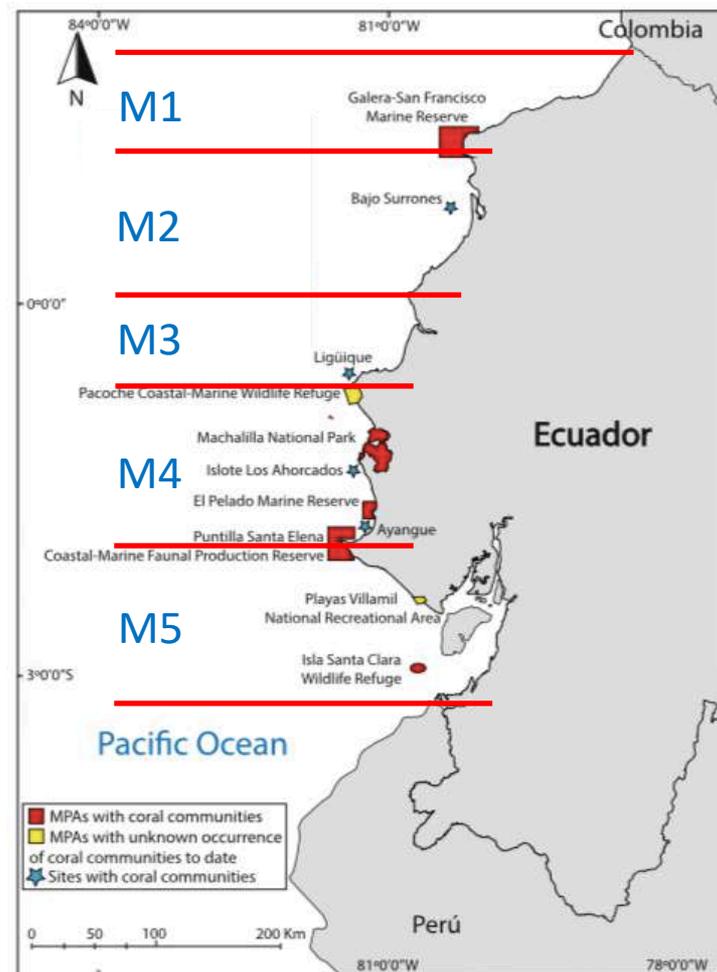
## BIOGEOGRAPHIC REGIONS OF THE ECUADORIAN CONTINENTAL COAST

- Oceanographic and hydrographic criteria
- 5 delimited macrozones on the continental coast of Ecuador
- Scientific-technical studies for the investigation of the adjacent sea

Technical Secretariat of the Sea (“Estudios de caracterización del mar territorial continental del Ecuador, bases para lograr la zonificación marina”).

### How they were established:

- Analysis of primary (phytoplankton) and secondary (zooplankton) productivity at 2 depths
- 61 sampling stations in the 5 macrozones of the territorial sea and the inland waters of the continental shelf of Ecuador



Alvarado *et al.*, 2017



# METHODOLOGY

## DATA AND ESTABLISHMENT OF GEOGRAPHICAL POINTS

2 genera of octocorals more abundant and conspicuous in tropical waters: *Leptogorgia* and *Muricea* (Alcyonaceae).

Structure	Recognition
Axis: Support and flexibility (gorgonin)	Sclerites
Cenenchyme: Structure of calcium carbonate (sclerites)	Ramifications
	Molecular and chemical analysis

*Muricea fruticosa*



*Leptogorgia alba*

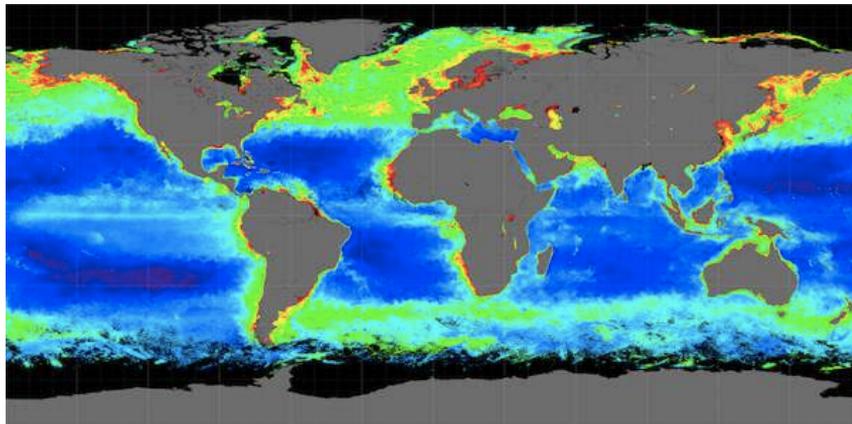
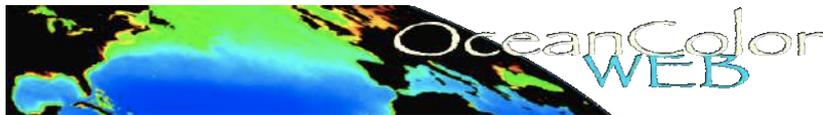




# METHODOLOGY

## DATA AND ESTABLISHMENT OF GEOGRAPHICAL POINTS

- Repository samples of PUCE QCAZ and CENAIM museums. Records from the 80's until today
- 247 records
- Database generation
- Geographic Information Systems (QGIS 3.2)
- Satellite determination of environmental and oceanographic patterns with NASA Ocean Color WEB



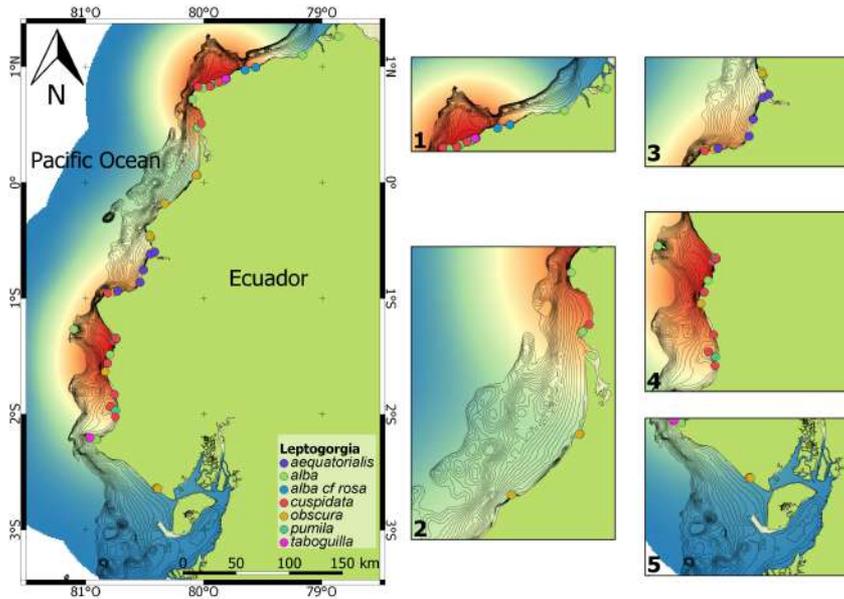
- ❖ Bathymetry
- ❖ Surface temperature
- ❖ Chlorophyll a



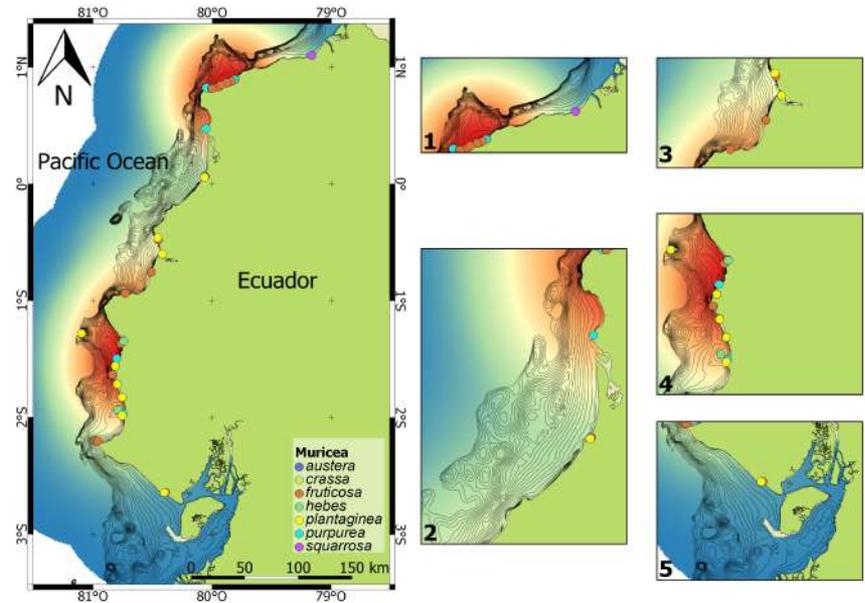
# RESULTS

## BATHYMETRY

### *Leptogorgia*



### *Muricea*



- 14 species ( *Leptogorgia* 7, *Muricea* 7)
- Heat distribution map
- 2 defined areas of abundance

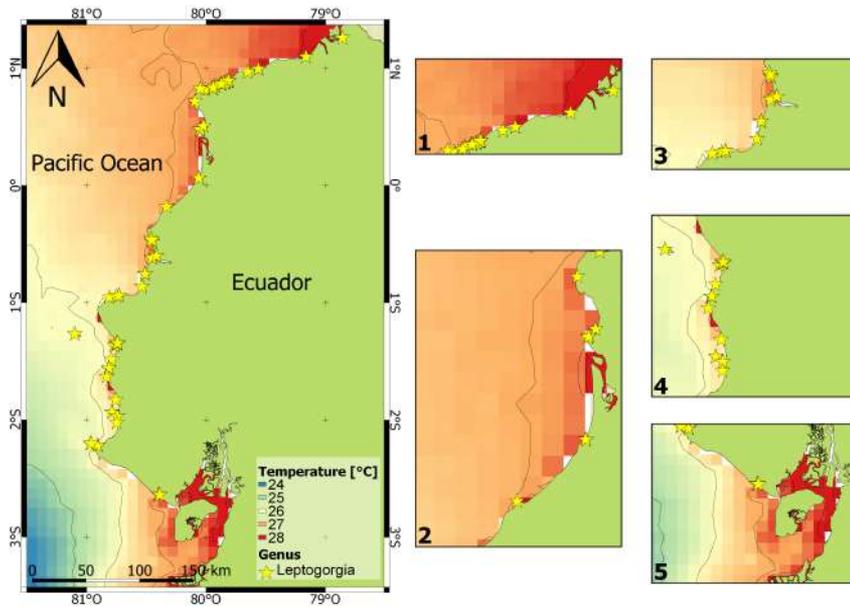
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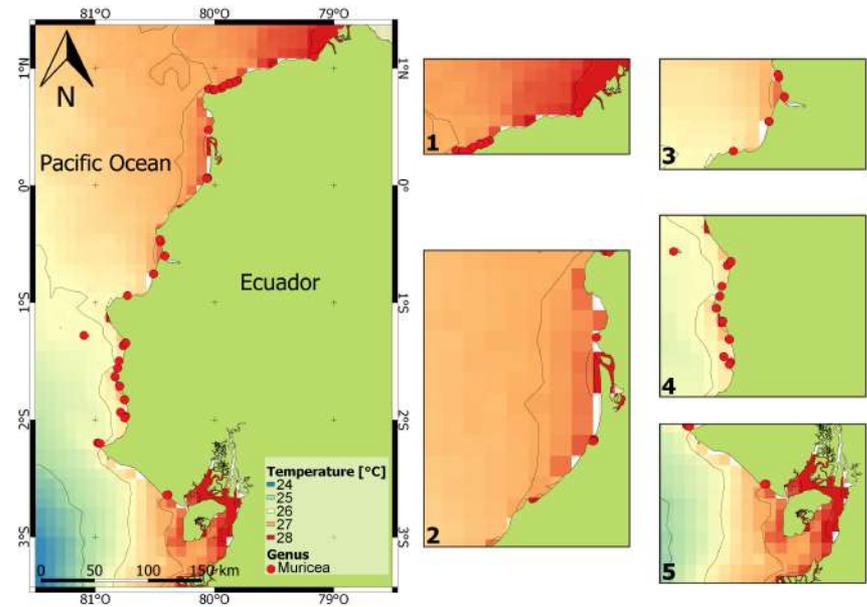
# RESULTS

## SURFACE TEMPERATURE (°C)

### *Leptogorgia*



### *Muricea*



Rainy season

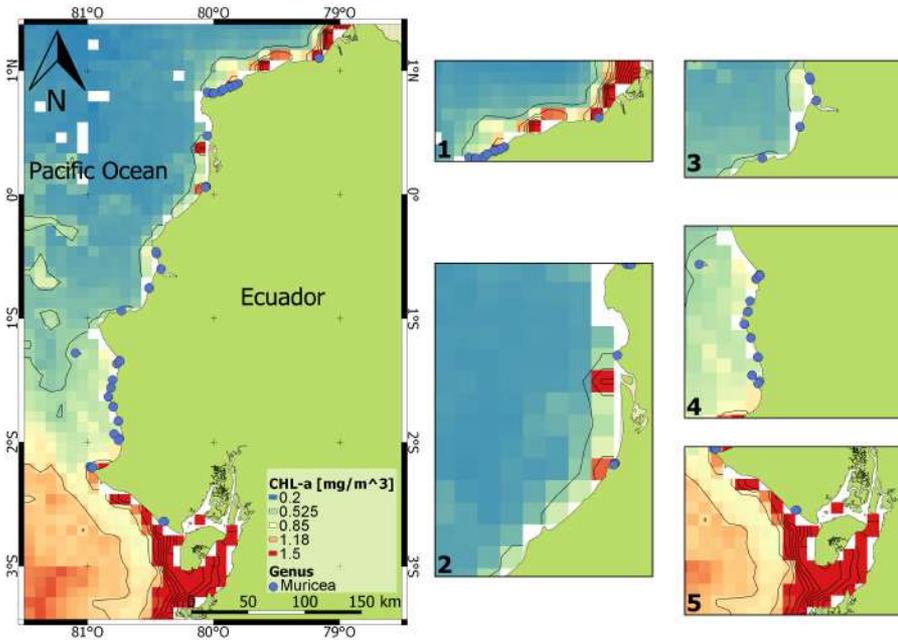
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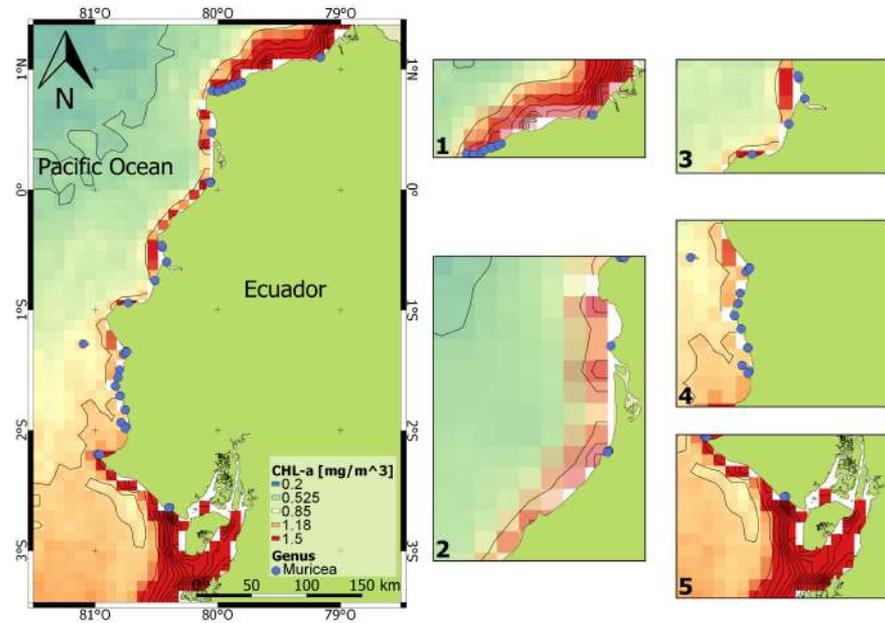
# RESULTS

## CHLOROPHYLL

### *Muricea*



Dry season



Rainy season

Unpublished data

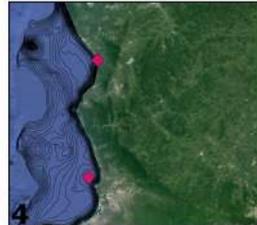
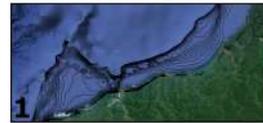
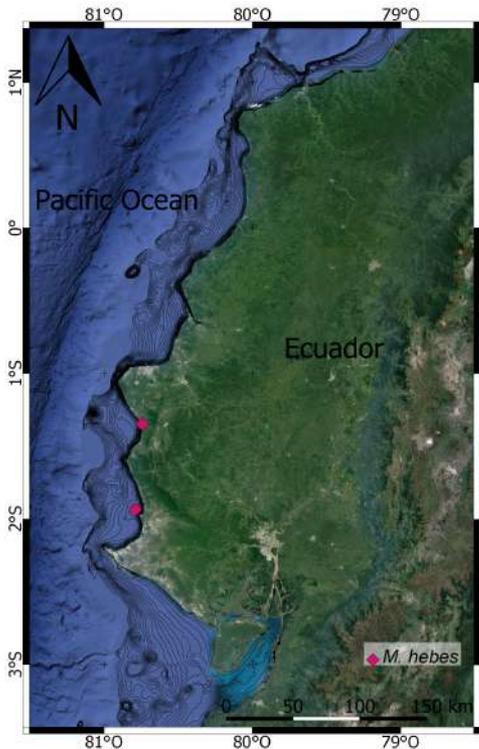
Areas of large amount of nutrient discharge decreases abundance



# RESULTS

## NEW RECORD

### *Muricea hebes*



- Location: El Pelado and Puerto Cayo
- No records for Ecuador
- It is not abundant, although it is not discarded that there could be found in more locations

Unpublished data

### Macrozone 4



## DISCUSSION

- The use of GIS tools and remote sensors allow a deep understanding of the distribution of corals based on environmental conditions.
- The establishment of macrozones helps us to understand the distribution of octocorals and this methodology could be replicable in other sessile organisms.
- The most productive areas are found in macrozones 1, 3 and 4 and the least productive are 2 and 5.
- The temperature and chlorophyll ranges clearly show primary production throughout the year.
- The geography of the coasts determines that macrozones 3 and 4 have a great amount of slopes, which is associated with the biology of octocorals and light exposure.



## CONCLUSIONS

- There are many gaps in research due to the lack of reef monitoring of Ecuador.
- This study serves as a baseline to determinate sessile marine species distribution patterns and to facilitate samplings in monitoring studies.
- There are 2 clearly marked areas of concentration of species where the abundance of octocorals is higher.
- Biological collections are crucial to keep records and incorporate new discoveries.
- The stablishment of macrozones helps to understand on smaller scales the distribution and oceanographic patterns.
- The influence of the currents has a key role in the distribution and stablishment of species.

THANK YOU FOR YOUR ATTENTION!  
QUESTIONS WELCOMED!



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