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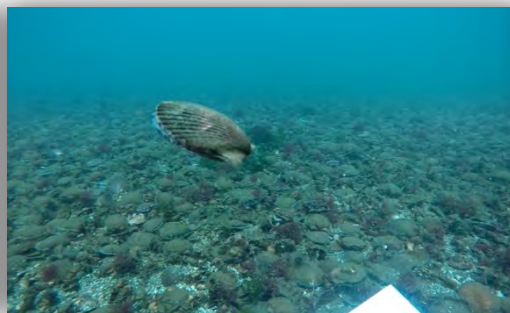
2018 International Symposium: Understanding Changes in Transitional Regions of the Pacific

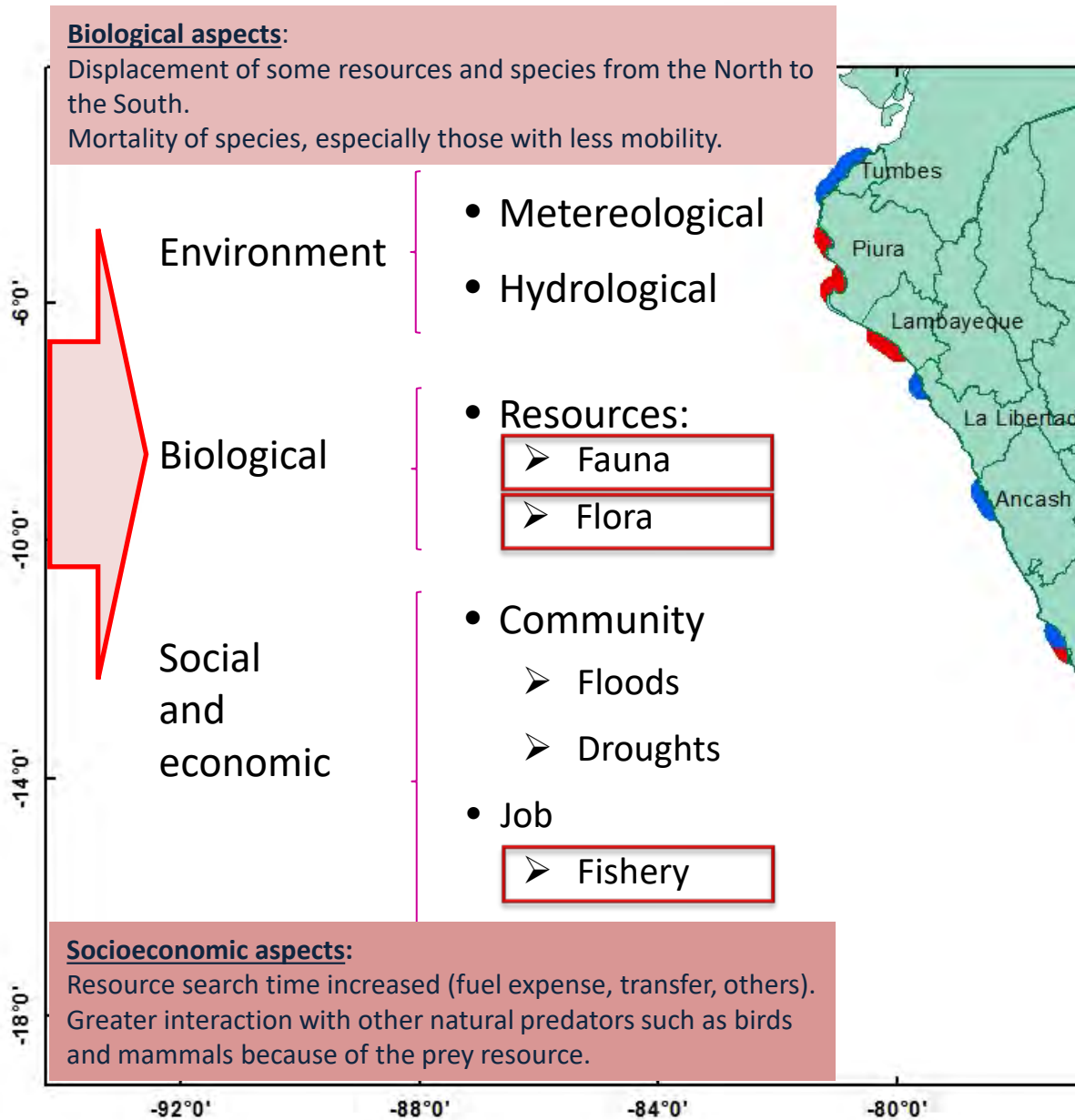
THE COASTAL EL NIÑO 2017 AND ITS EFFECT ON THE SPACE-TIME DISTRIBUTION OF SOME FISHES AND INVERTEBRATES OFF THE COAST OF PERU

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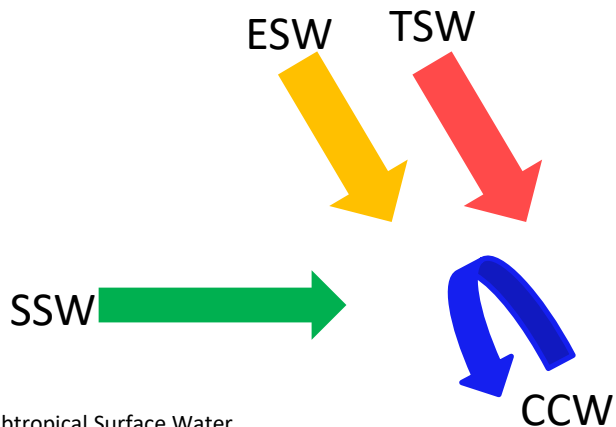


Normal distribution of water masses:

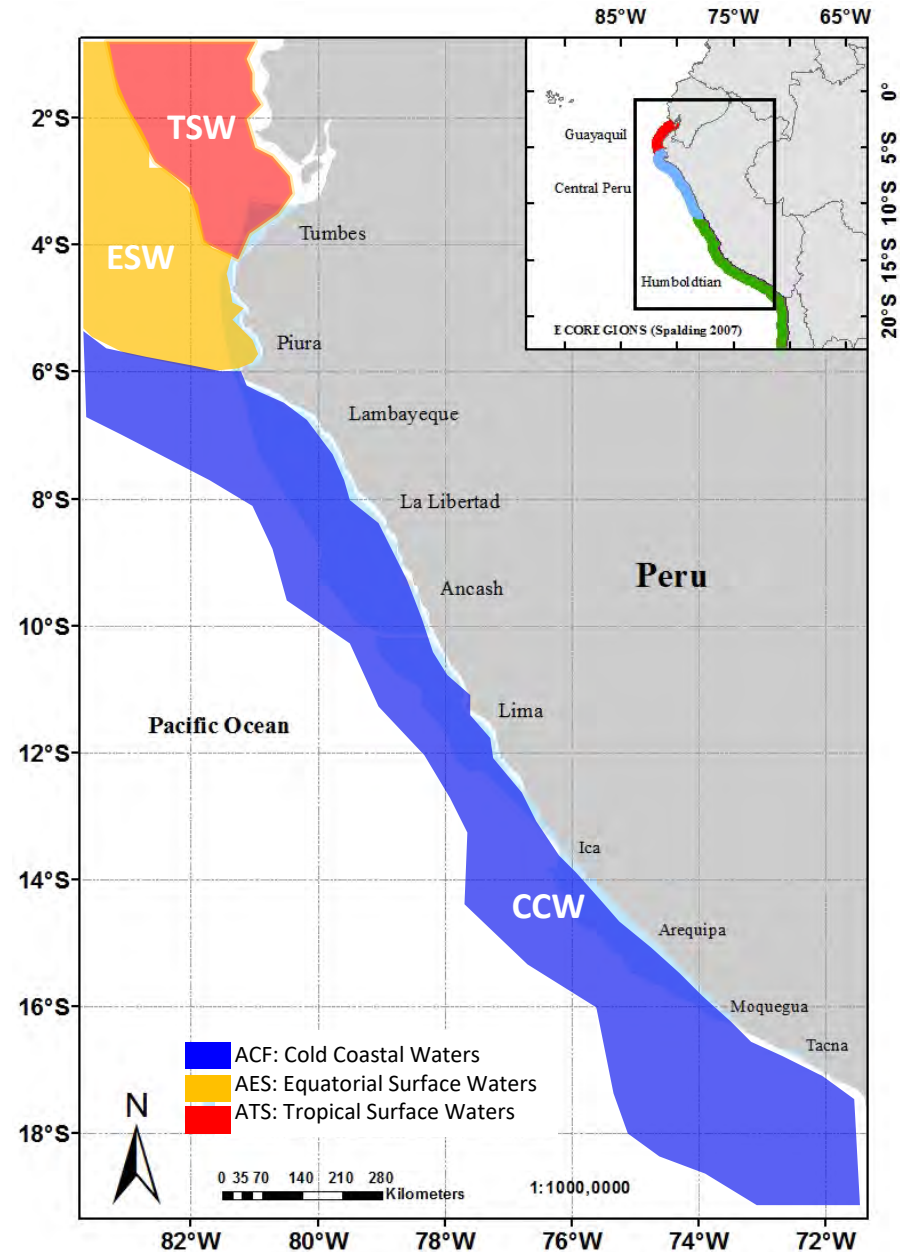
Equatorial Surface Waters (ESW),
Tropical Surface Waters (TSW)
Cold Coastal Waters (CCW)

During Coastal El Niño 2017:

The water masses TSW and ESW moved towards the South. In addition to this, the SSW approached to the coast.



ASS: Subtropical Surface Water



Monitoring Area:


Maritime Peruvian domain: from Tumbes (3°S) to Tacna (18°S).

Reports from 9 Coastal Laboratories of IMARPE.

Information on biological variables:

Absence or presence of species:

Species of Tropical Surface Waters 

Species of Equatorial Surface Waters 

Species of Cold Coastal Waters 

Area that involves the Ecoregions (Spalding, 2007):

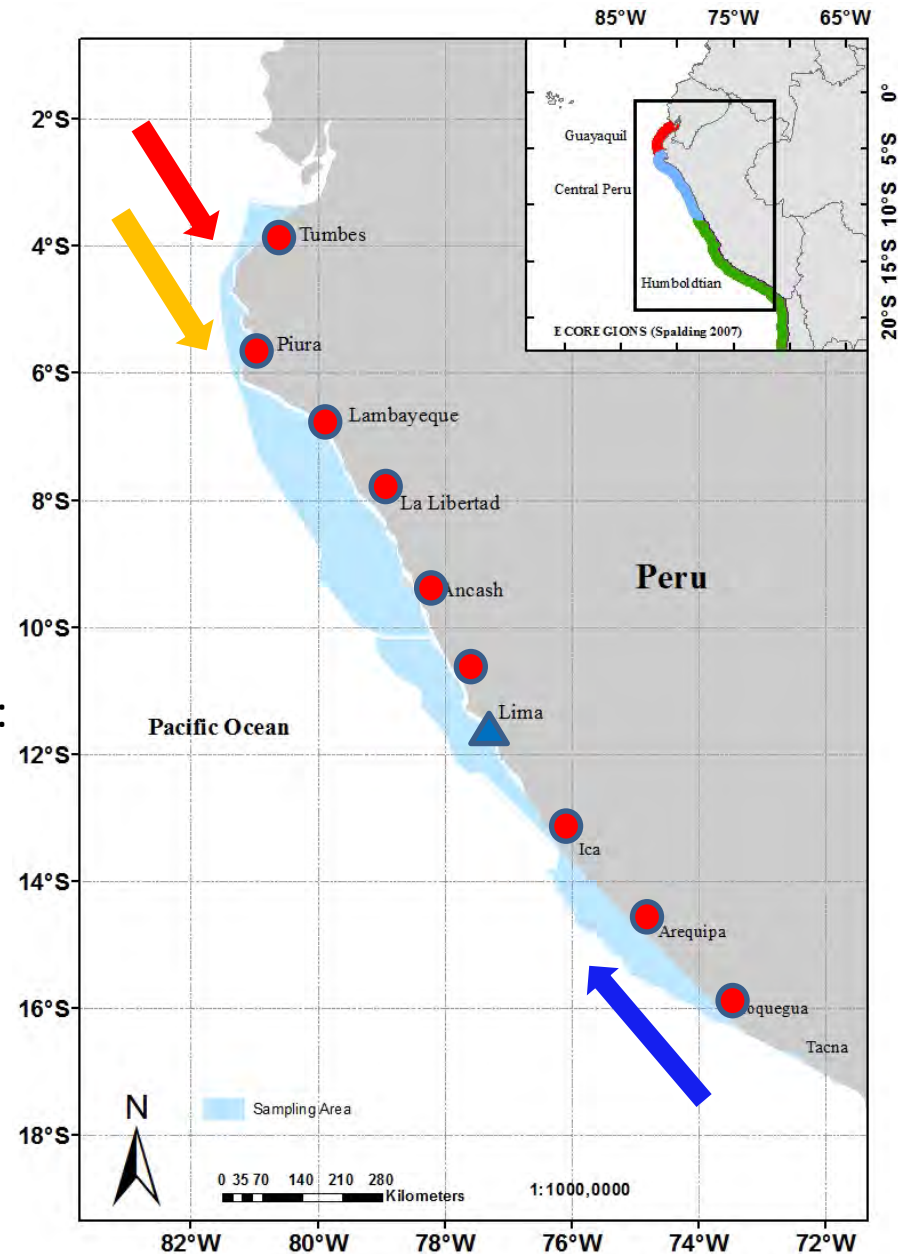
- Guayaquil
- Central Peru
- Humboldtian

Information on environmental variables:

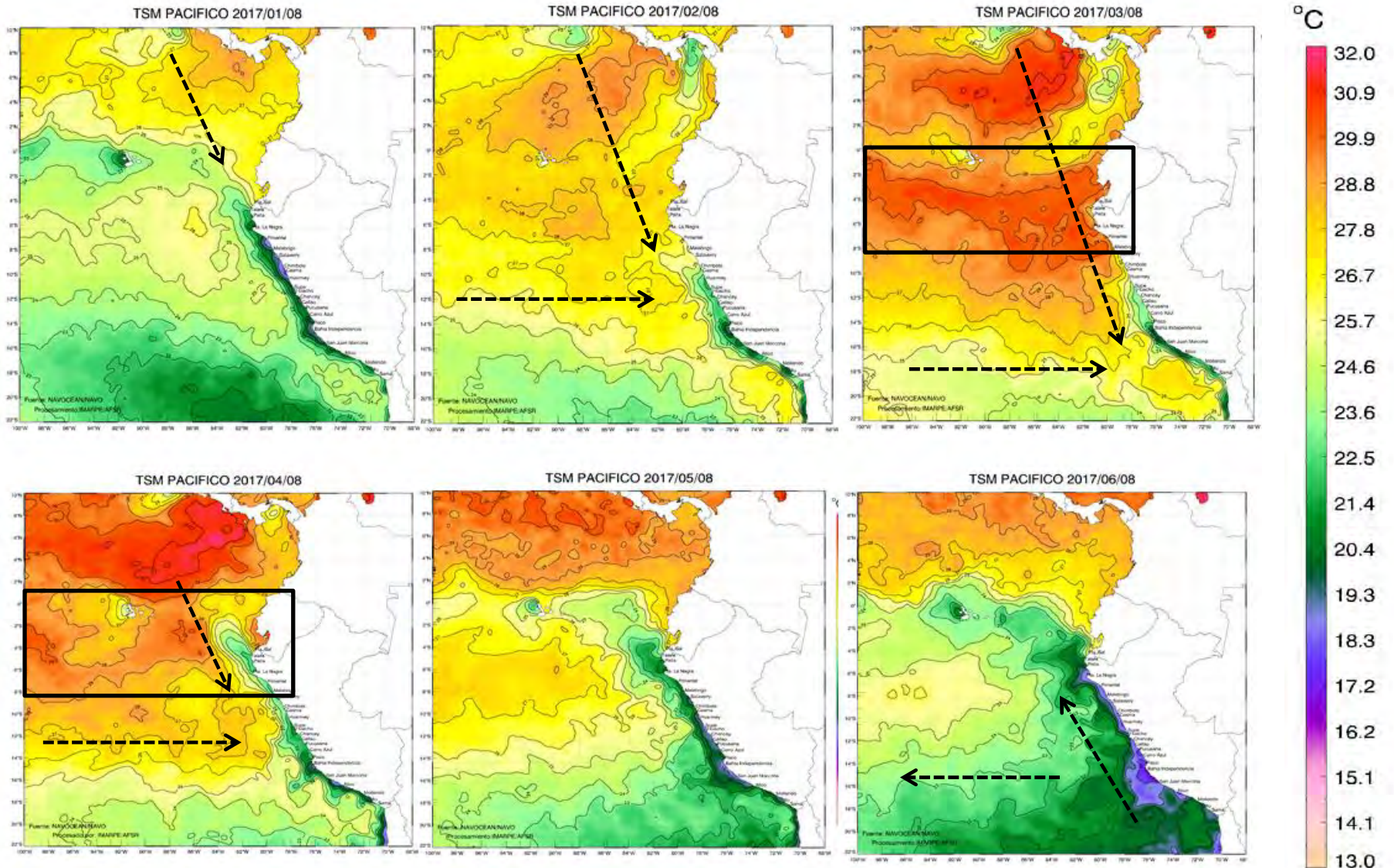
Oceanographic parameters:

Sea Surface Temperature (SST)

Sea Surface Oxygen (SSO)



Sea Surface Temperature in the Pacific Ocean (January - June 2017)



EFFECTS ON ECOSYSTEMS (CENTRAL AREA)



Loss of brown seaweed (kelps) during The Coastal El Niño 2017 event (Islas Ballestas-Ica)

Kelps of: *Lessonia trabeculata*, *L. nigrescens* and *M. ...*
Kelps after the Coastal El Niño 2017





The population of *Aulacomyxa atra* "choros" were decreased considerably, from big mantles to small patches. Therefore, the catches opportunity was decreased too.

Aulacomyxa atra (Molina, 1782)



After the Coastal El Niño 2017

Before the Coastal El Niño 2017

AVAILABILITY OF SOME RESOURCES



The availability of commercial species such as octopus and green algae increased.

Positive effect on incomes of artisanal fisherman.



Octopus mimus



Ulva sp.

EFFECTS ON THE DISTRIBUTION OF SPECIES

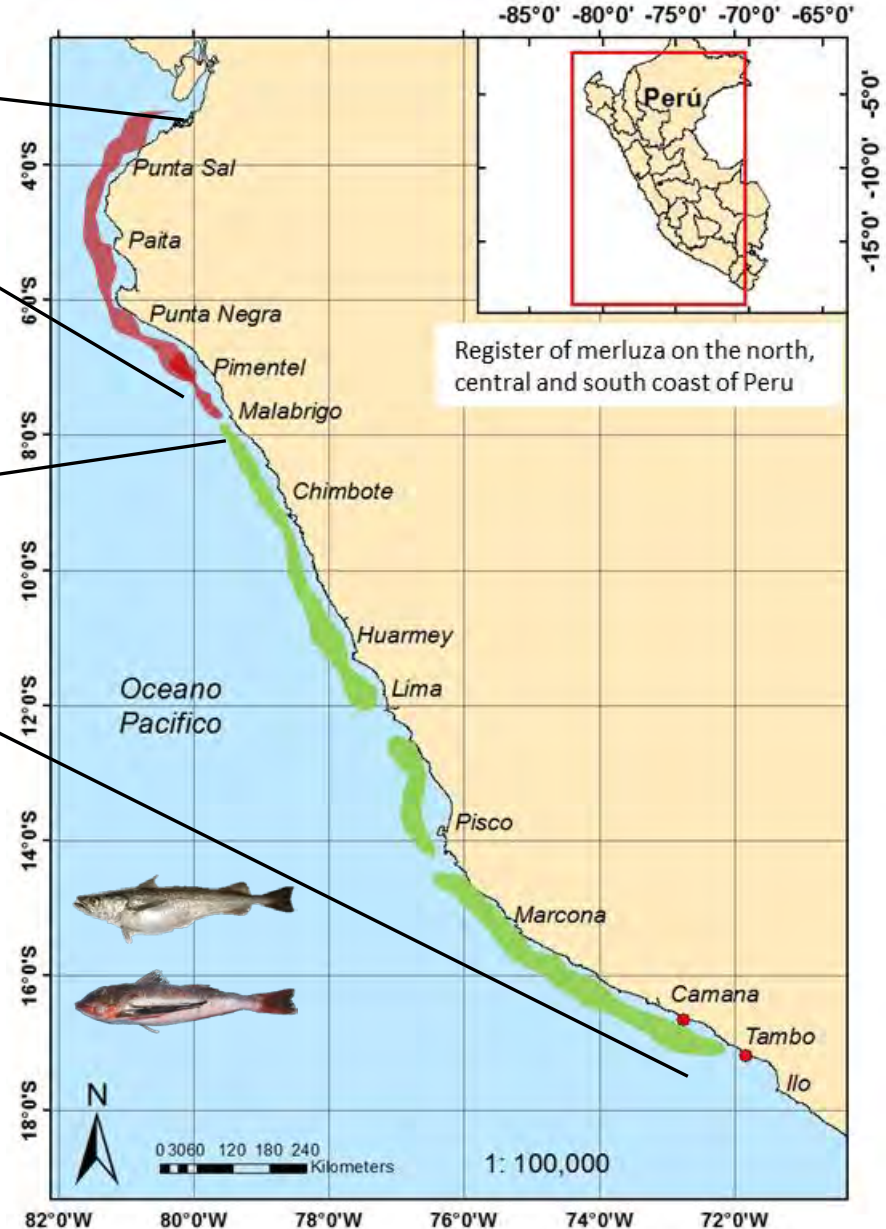
Normal conditions



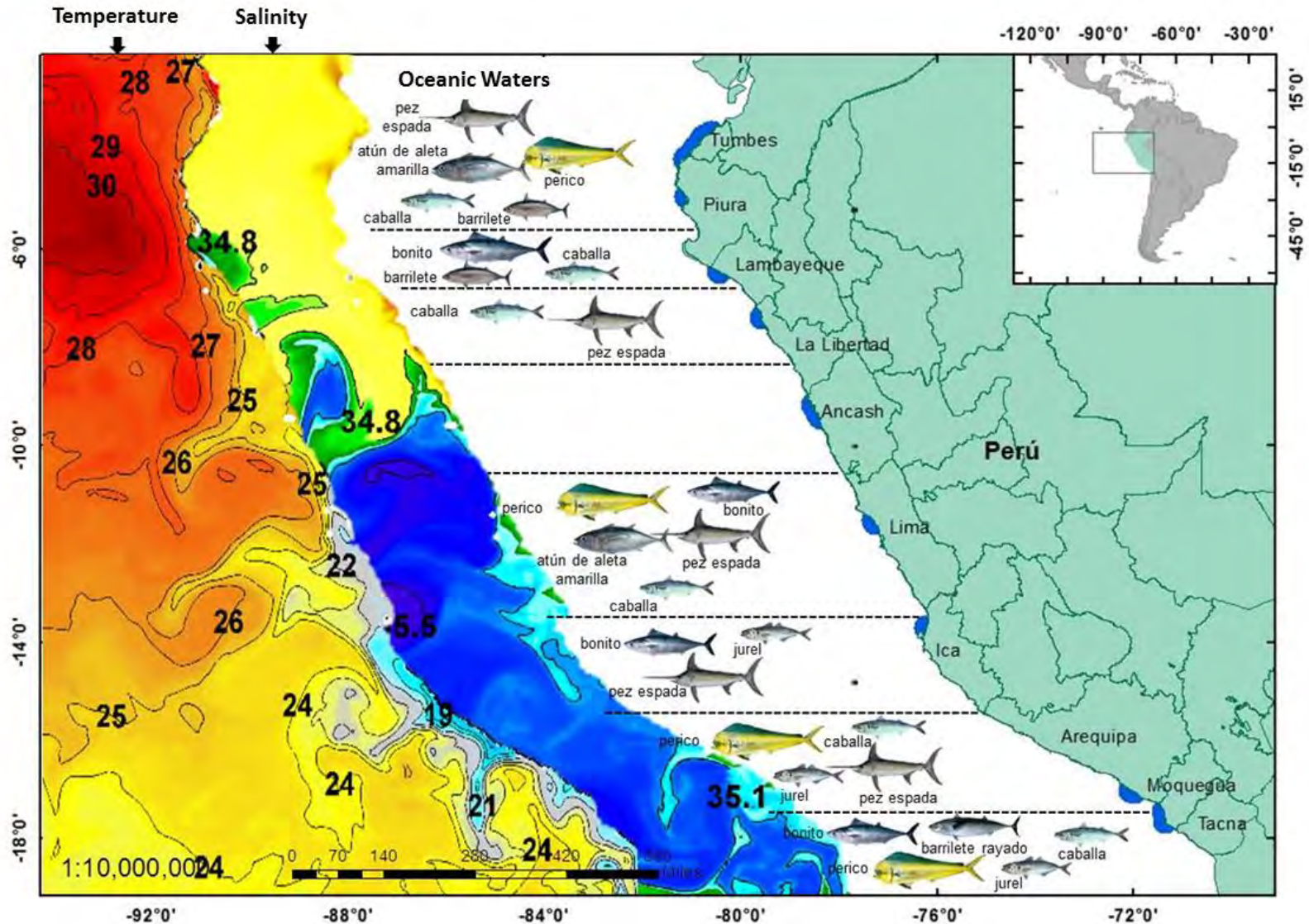
Warm conditions



During The Coastal El Niño 2017, some demersal species such as **Peruvian Hake (*Merluccius gayi peruanus*)** and **Lumptail Searobin (*Prionotus stephanoprysts*)**, deepened and moved to the South of their normal distribution area, due to the reinforcement of the Cromwell Current.

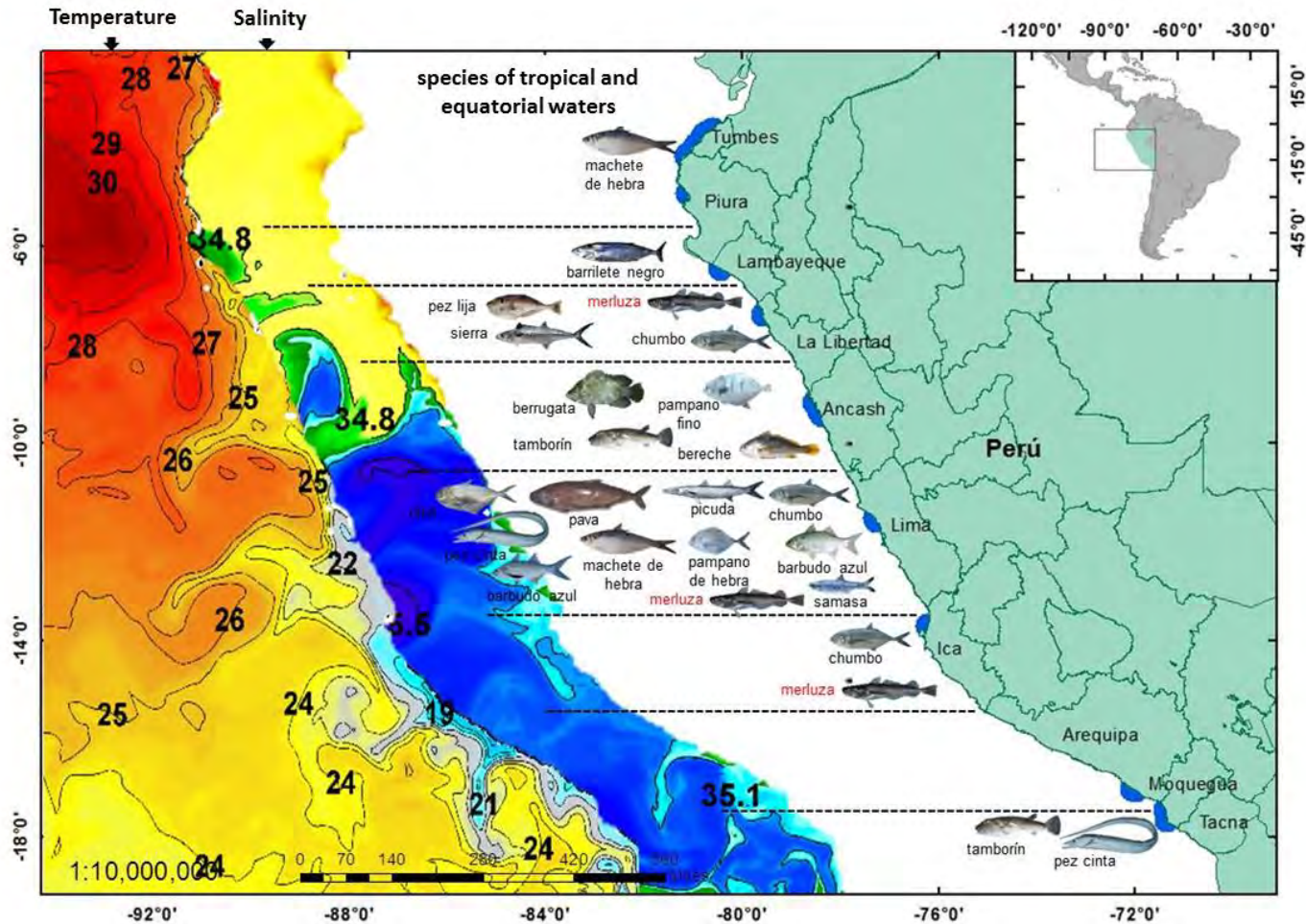


EFFECTS ON THE DISTRIBUTION OF SPECIES



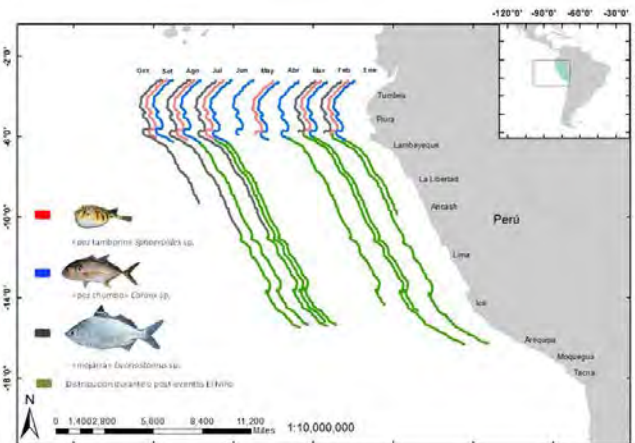
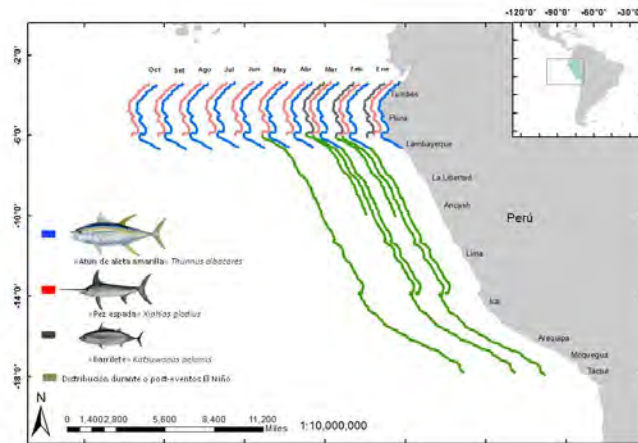
The catchability of oceanic waters species **considerably increased** due to the approach to the coast of these species, such as swordfish (*Xiphias gladius*) and others

EFFECTS ON THE DISTRIBUTION OF SPECIES

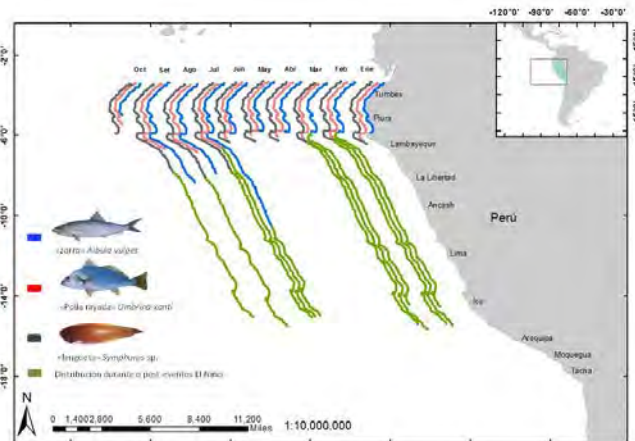
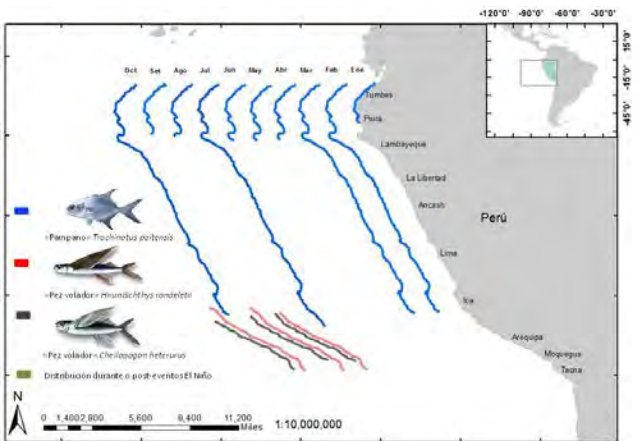


The displacement of the Tropical and Equatorial Waters causes the appearance of typical tropical species such as largehead hairtail "pez cinta" (*Trichiurus lepturus*). In addition to this, the deepening and the extension of the distribution of Peruvian Hake associated to the Cromwell Current.

DISTRIBUTION OF SPECIES



The distribution of several tropical and oceanic species extended to the South, during and after El Niño



- Yellowfin tuna (*Thunnus albacares*)
- Swordfish (*Xiphias gladius*)
- Skipjack tuna (*Katsuwonus pelamis*)
- Pampanito (*Trachinotus paitensis*)
- Flying fish (*Hirundichthys rondeletii*)
- Flying fish (*Cheilopogon heterurus*)
- Bullseye puffer (*Spherooides sp.*)
- Silver mojarra (*Eucinostomus sp.*)
- Bonefish (*Albula vulpes*)
- Polla drum (*Umbrina xanti*)
- Grey wrasse (*Symphurus sp.*)

- The Coastal El Niño 2017, which impacted in Ecuador and the Peruvian coast, was caused by a weakening of the South Pacific Anticyclone that runs from the South to the North across to the ocean basin of the South Pacific, and the projection of ESW during the austral summer 2017, which determined the increased of anomalies of the sea surface temperature with maximum values between + 2°C and + 10°C on the Northern coast, while in the Central coast it varied between + 2°C and + 5.5°C, and on the Southern coast, between - 1°C and + 1°C.
- As a result of these environmental changes, typical species from the Northern zone of Peru moved to the South (*Albula vulpes*, *Caranx* sp., *Eucinostomus* sp., *Sphoeroides* sp., *Symphurus* sp., *Umbrina xanti*).
- Other typical species of oceanic waters approached to the coast (*Coryphaena equiselis*, *Coryphaena hippurus*, *Cheilopogon heterurus*, *Hirundichthys rondeletii*, *Katsuwonus pelamis*, *Sarda chiliensis*, *Thunnus albacares* and *Xiphias gladius*), causing fluctuations in the abundance of fishes and invertebrates landings.



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Thank you very much!

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