SCIENTIFIC COMMITTEE
TWENTY-SECOND REGULAR SESSION
11-19 August 2026
Apia, Samoa (Hybrid)

Bycatch risk analysis for three sea turtle species in the WCPO under data-limited conditions

WCPFC-SC22-2026-EB-IP10
10 July 2026

K. Okamoto, M. Nishimoto, and D. Ochi

Bycatch risk analysis for three sea turtle species in the WCPO under data-limited conditions

Kei Okamoto, Makoto Nishimoto, and Daisuke Ochi
Japan Fisheries Research and Education Agency

Key Points of Analysis

- **Purpose:**
  Estimation and visualization of bycatch risk of leatherback turtle (including loggerhead turtle and olive ridley)

- **Analysis data:**
  Bycatch records for leatherbacks, loggerheads, and olive ridleys
  The Japanese longline scientific observer program during 2011-2019
  Environmental data (sst, O_2, chlorophyll a)

- **Challenges:** Data poor (sparse and coarse) due to small number of bycatch of leatherback turtle

Key Points of Analysis

- **Problems:**

  Zero inflation

  Almost no leatherback bycatch records

  Different bycatch rates for the three species in shallow and deep sets

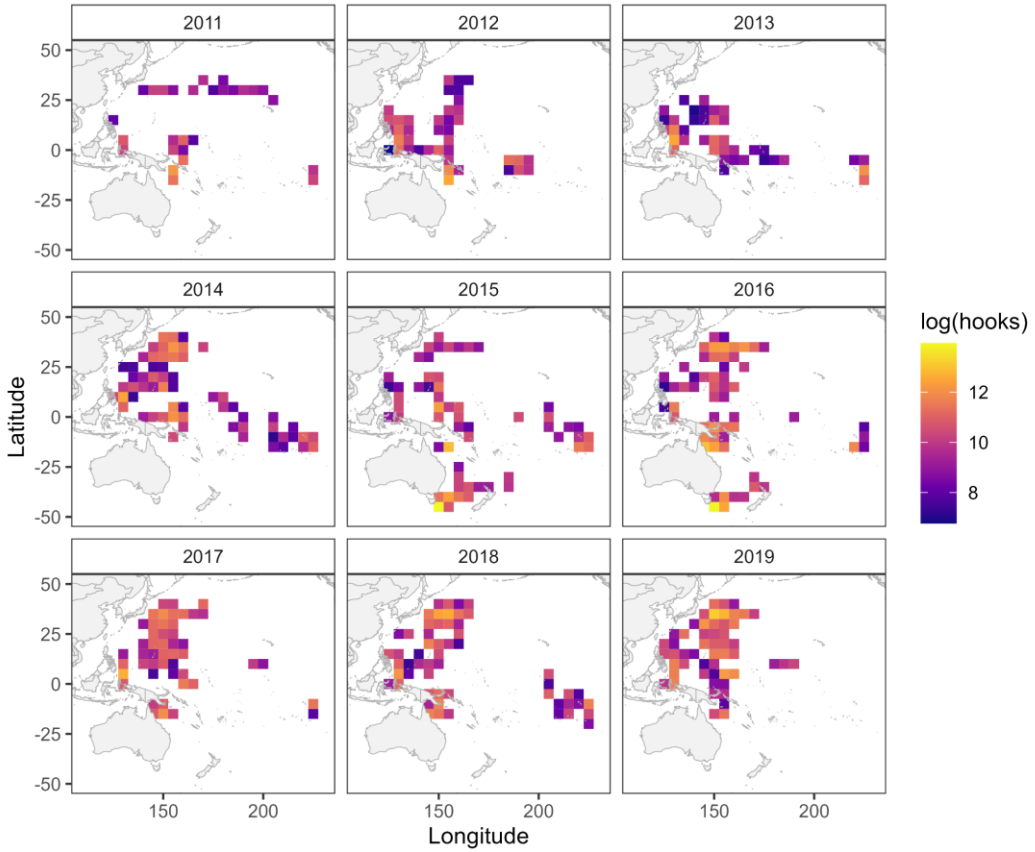
- **Solutions:**

  Aggregate data to a 5°x5° grid for minimum usability

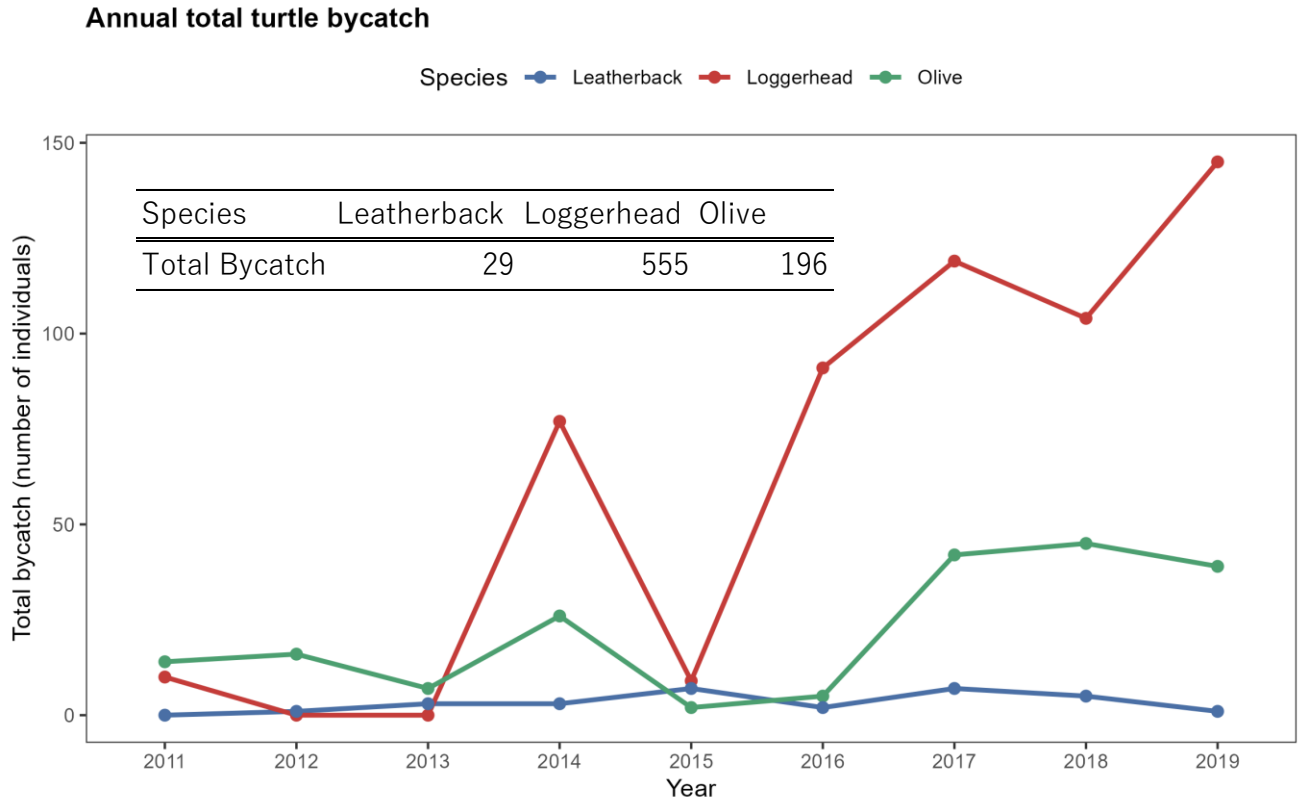
  Address zero inflation using a zero-inflated negative binomial model

  Attempt spatiotemporal smoothing estimation through information borrowing by assigning species-common variance as a basis function

Longline Bycatch Data



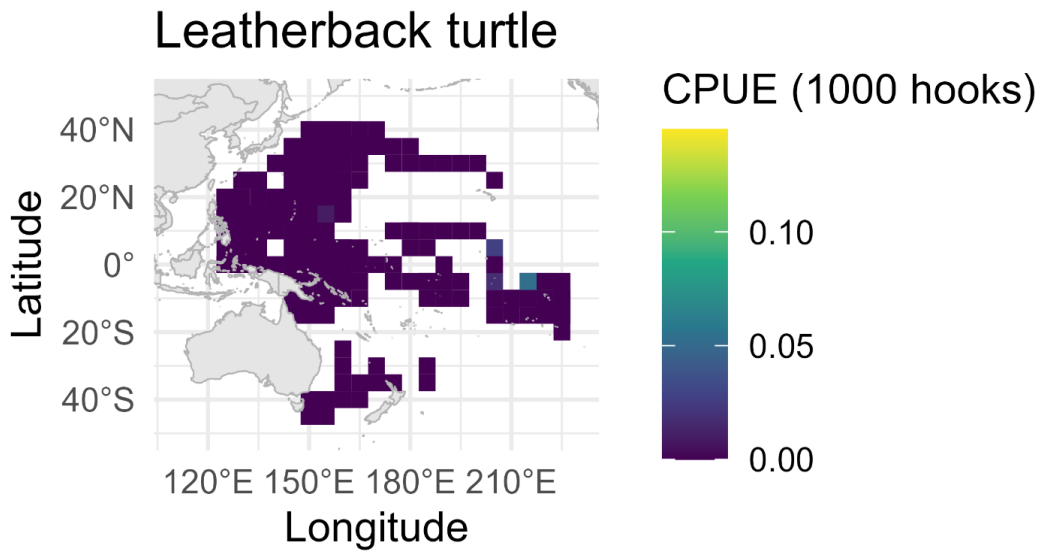
Distributional maps of No. of hooks observed by year

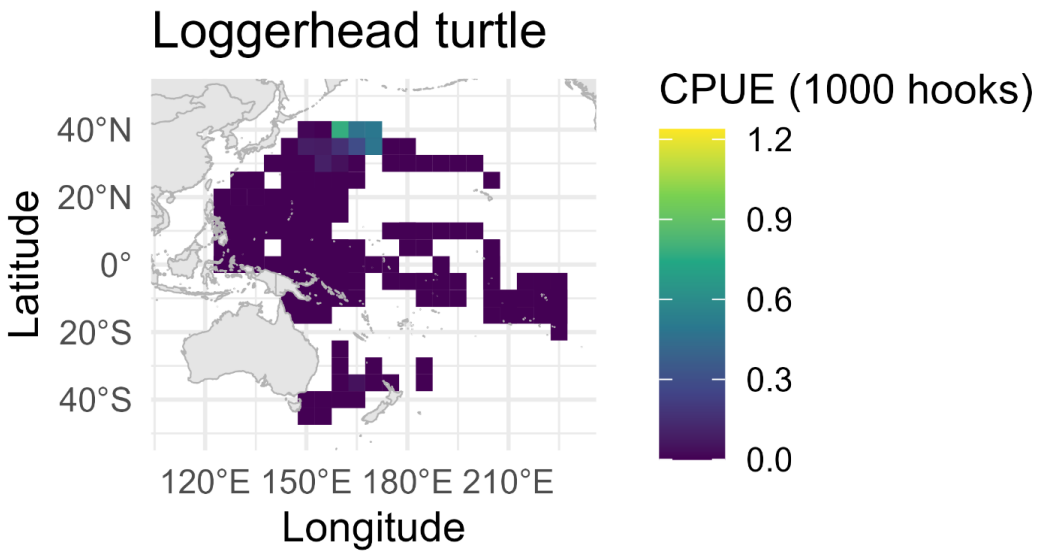


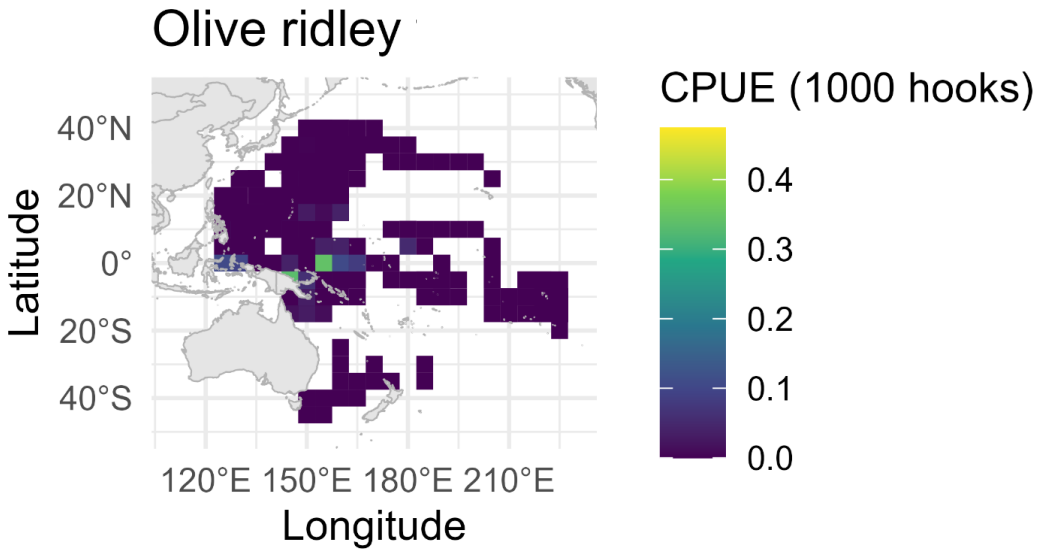
Species	Leatherback	Loggerhead	Olive
Total Bycatch	29	555	196

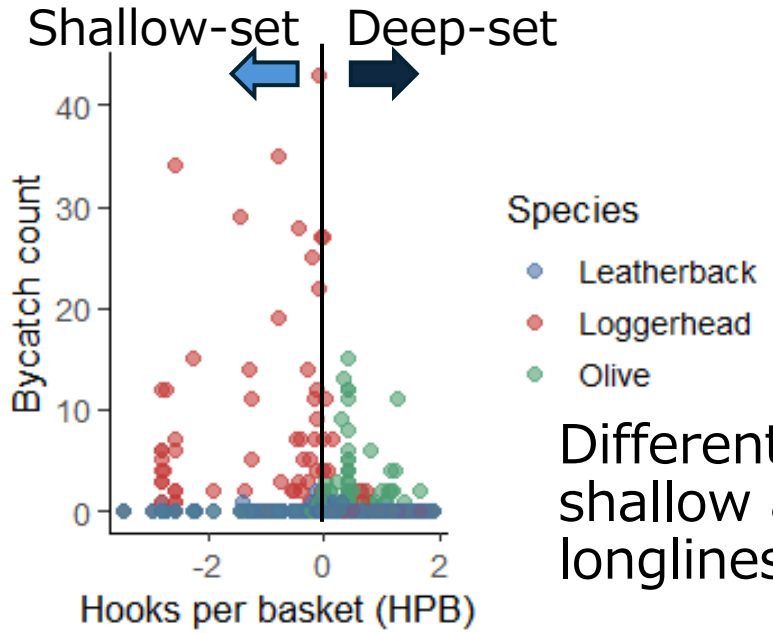
Yearly trends of No. of bycatch by species

Bycatch rate (CPUE)



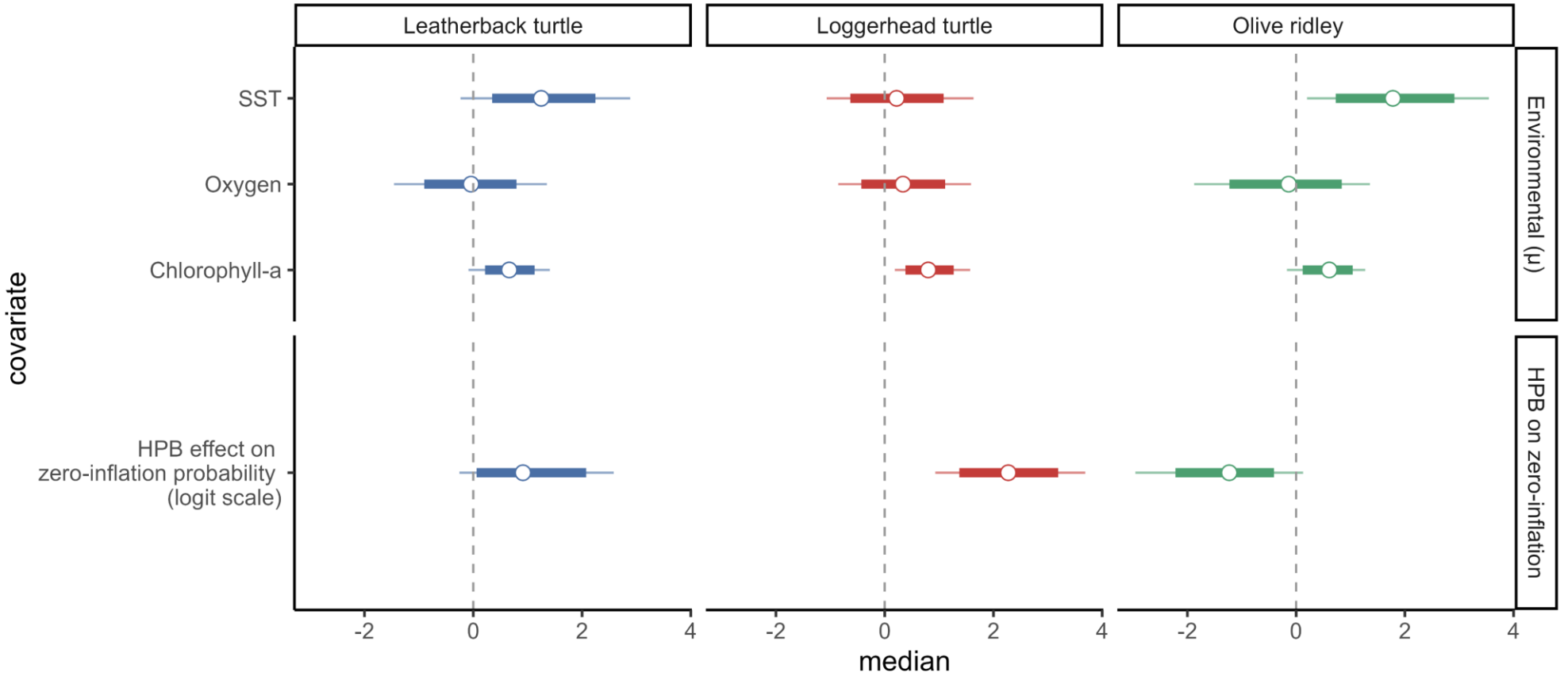


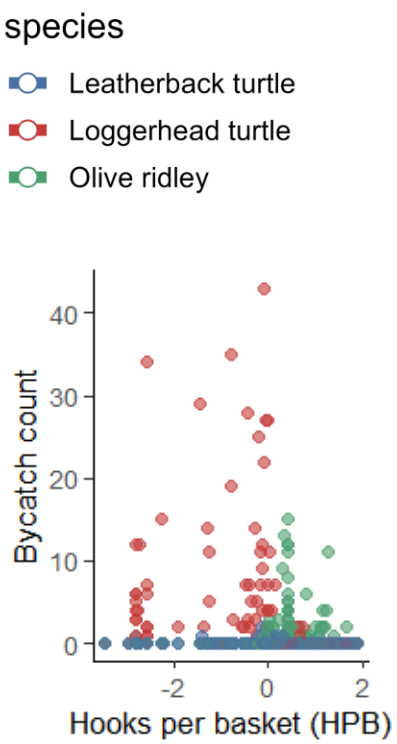




Different bycatch rates in shallow and deep-set longlines by species

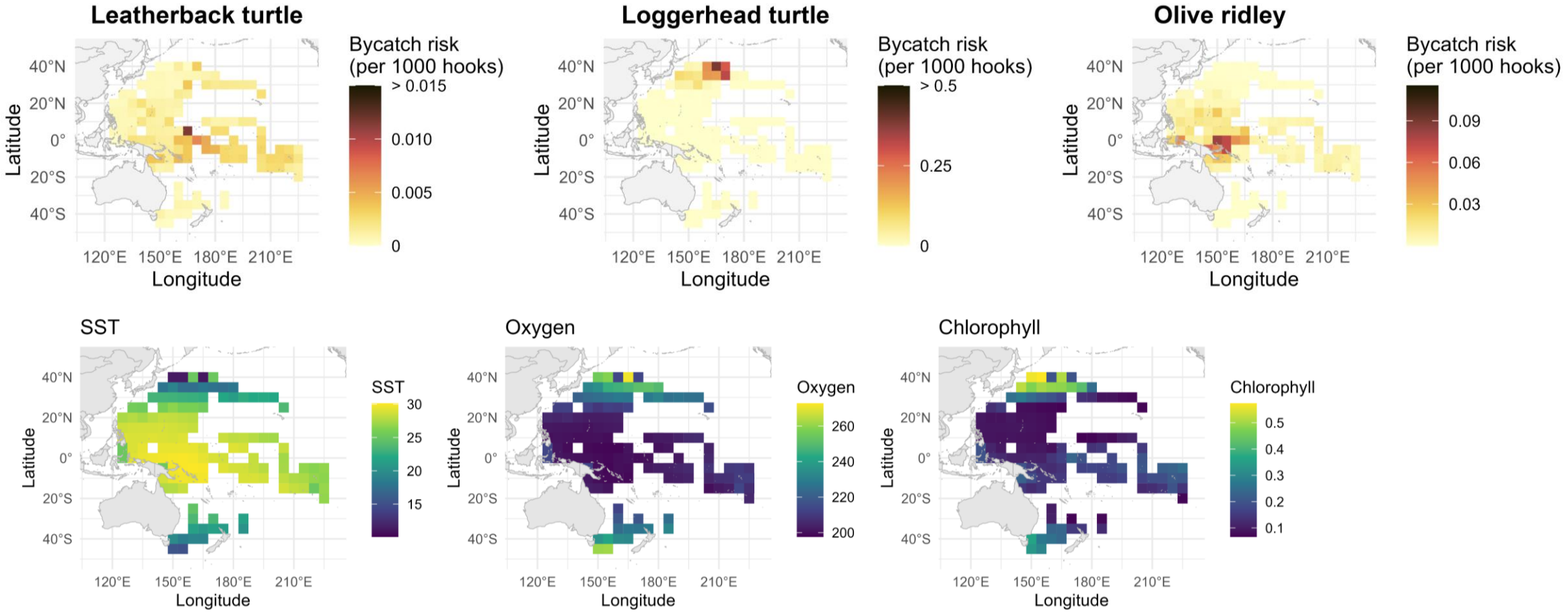
The impact of the environmental parameters on bycatch numbers (median with 95 & 80%CI)





Leatherback & Loggerhead: shallow set
Olive ridley: deep set

Bycatch risk based on estimated relative density



In areas relatively rich in food sources (≒ High Chl.)

Leatherback turtles and olive ridleys are bycaught in warm waters

Conclusions

Gear depth differentiation

Leatherback & Loggerhead → shallow-set longlines

Olive ridley → deep-set longlines

Environmental drivers

High chlorophyll-a (≒ nutrient including jellyfish rich)

→ increased bycatch risks for all species

Warm SST → higher risk for leatherback & Olive ridley

Risk magnitude

Leatherback is the lowest encounter rates and overall risk, and higher risk in tropical than temperate waters

Management implications

- **Overall bycatch risk of leatherback is very low level**
- **Spatially concentrated in tropical waters**

◆Spatially heterogeneous risk and low overall interaction rates

→Expanding mitigation measures to all deep-set longline fisheries may not reduce leatherback bycatch

◆Bycatch risk of leatherback is low and spatially limited in tropical waters

→Implementation of measures focusing on relatively high-risk tropical waters (e.g., certain EEZs) may be more cost-effective

Summary

Methodological contributions

- ◆Developed a **multi-species bycatch model** robust to sparse data
- ◆Considering **false negatives** via HBF in the observation process
- ◆Enables estimation of environmental effects on bycatch risk
- ◆Scalable framework for integrating multinational datasets

Broader Implication

- ◆ Provides a framework for improved **Pacific leatherback risk assessment**
- ◆ Supports future **cross-national data integration**

This report is still preliminary

We would like to discuss continuously in SC22