Bridging the gap: leveraging open-access seafloor imagery and hydrodynamic models to inform coral larval connectivity among Hawaiian seamounts



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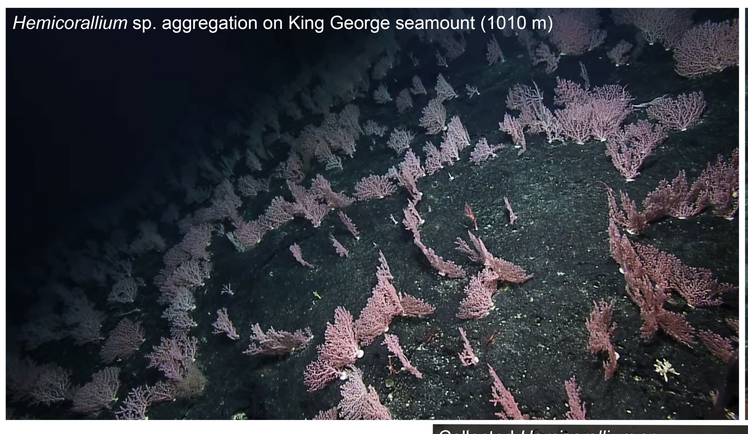
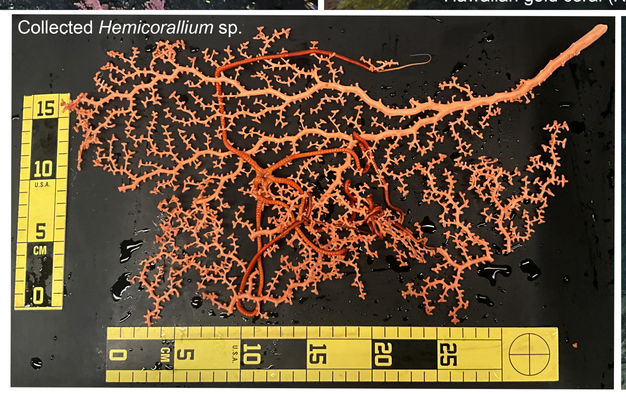
Introduction

- Papahānaumokuākea National Marine Sanctuary (PNMS) is one of the largest marine protected area on Earth.
- Protects wildlife (including large expanse of deep-sea habitats) and cultural heritage sites of great cultural importance for Kānaka ʻŌiwi (Native Hawaiians).
- Demographic connectivity of commercially and ecologically important species and locations of source or sink habitats remain poorly understood.
- Such information is needed to inform area-based management.

Goal: Evaluate inter-habitat larval connectivity among three managed deep-sea precious corals (within and outside the boundaries of PNMS, including sensitivity of connectivity estimates to uncertain early life history parameters for these taxa.



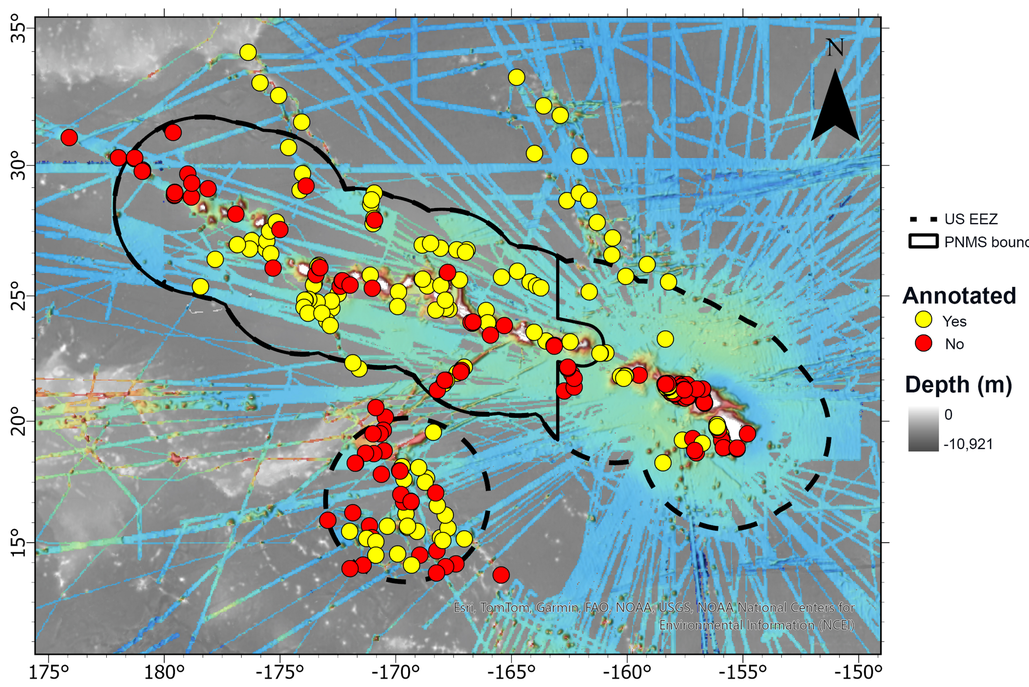






Data Compilation and larval dispersal model

Over 200 remotely operated vehicle (ROV) dives: Hawaii Undersea Research Laboratory, NOAA Ocean Exploration,Ocean Exploration Trust.

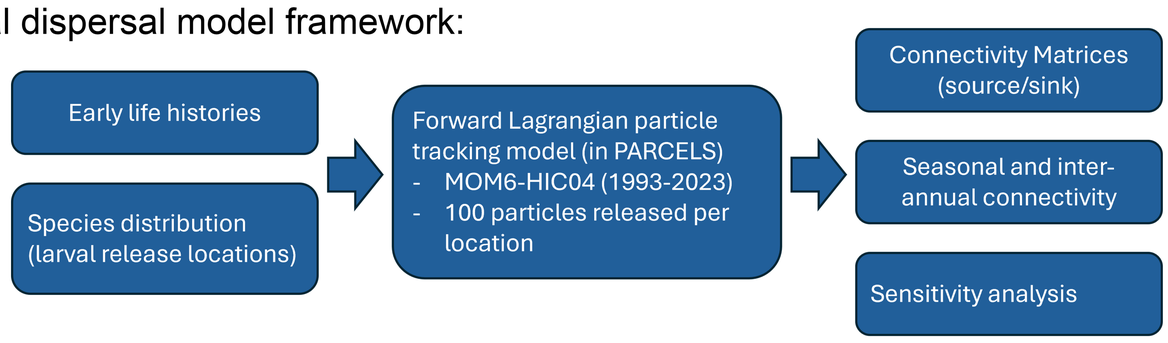


Available data on precious coral distribution and their reproductive biology will be used to parameterize larval dispersal models and quantify potential connectivity:

Reproductive biology: Uncertain early life history (Waller & Baco, 2007). Spawning may occur periodically or quasi-continuously for *H. laauense* and *P. secundum* and in late Summer/Fall for *K. haumeaae*. Spawning frequency, larval dispersal depth, migrations (diel or ontogenic) and pelagic larval duration are unknown.

ʻIke Hawaiʻi: Traditional ecological knowledge is often found within the language of indigenous people. Hawaiian language textual resources will be reviewed to gain a deeper understanding of the life history of these organisms.

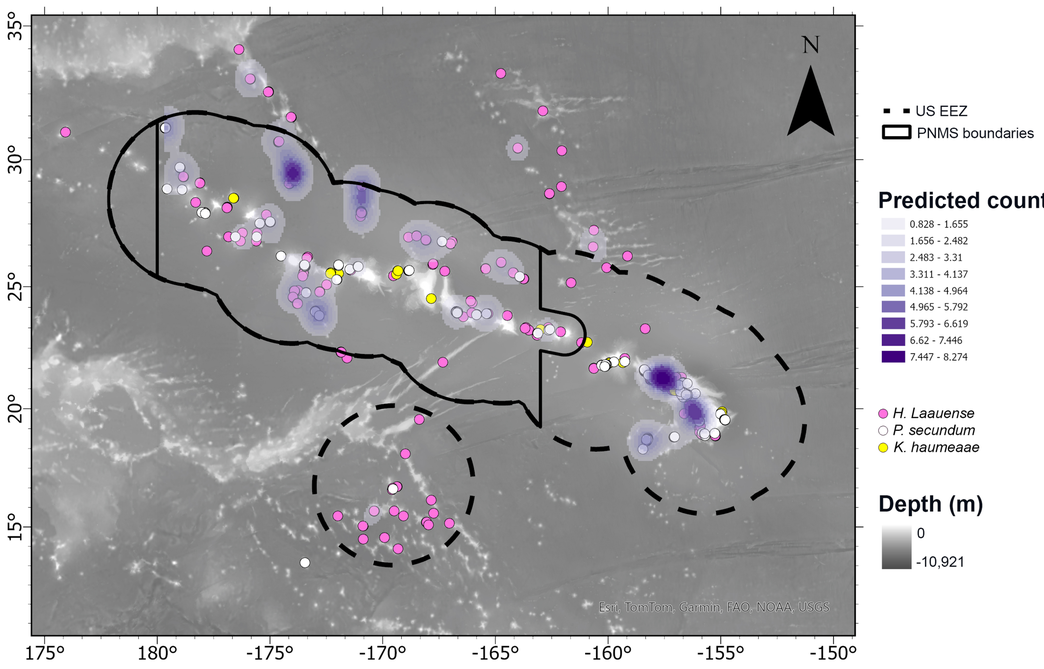
Larval dispersal model framework:



Existing video annotations and specimen collections will be leveraged to characterize spatio-temporal connectivity patterns and identify life history parameters models are most sensitive to.

Expected outcomes and broader impacts

Observed and predicted precious coral distribution:



Project outcomes will be shared with a broad Management Transition Advisory Group consisting of managers from relevant agencies. Outreach and Art will be used for public communication (c.f. deep-sea poster, Jenna Lee).

Management Implications:
- Refine Essential Fish Habitats, identify source/sink habitats and evaluate connectivity between PNMS and the rest of the Hawaiian Archipelago.
- Contribute to stock assessments for precious corals.



Biological community on Hawaiian seamount (© Jenna Lee)

Acknowledgments

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Cited litterature: Waller, R. G., & Baco, A. R. (2007). Reproductive morphology of three species of deep-water precious corals from the Hawaiian Archipelago: *Gerardia* sp., *Corallium secundum,* and *Corallium lauuense*. Bulletin of Marine Science, 81(3), 533-542.