

Stable Isotopes Track the Ontogenetic Movement of Three Commercially Important Fish in Coastal Tanzania

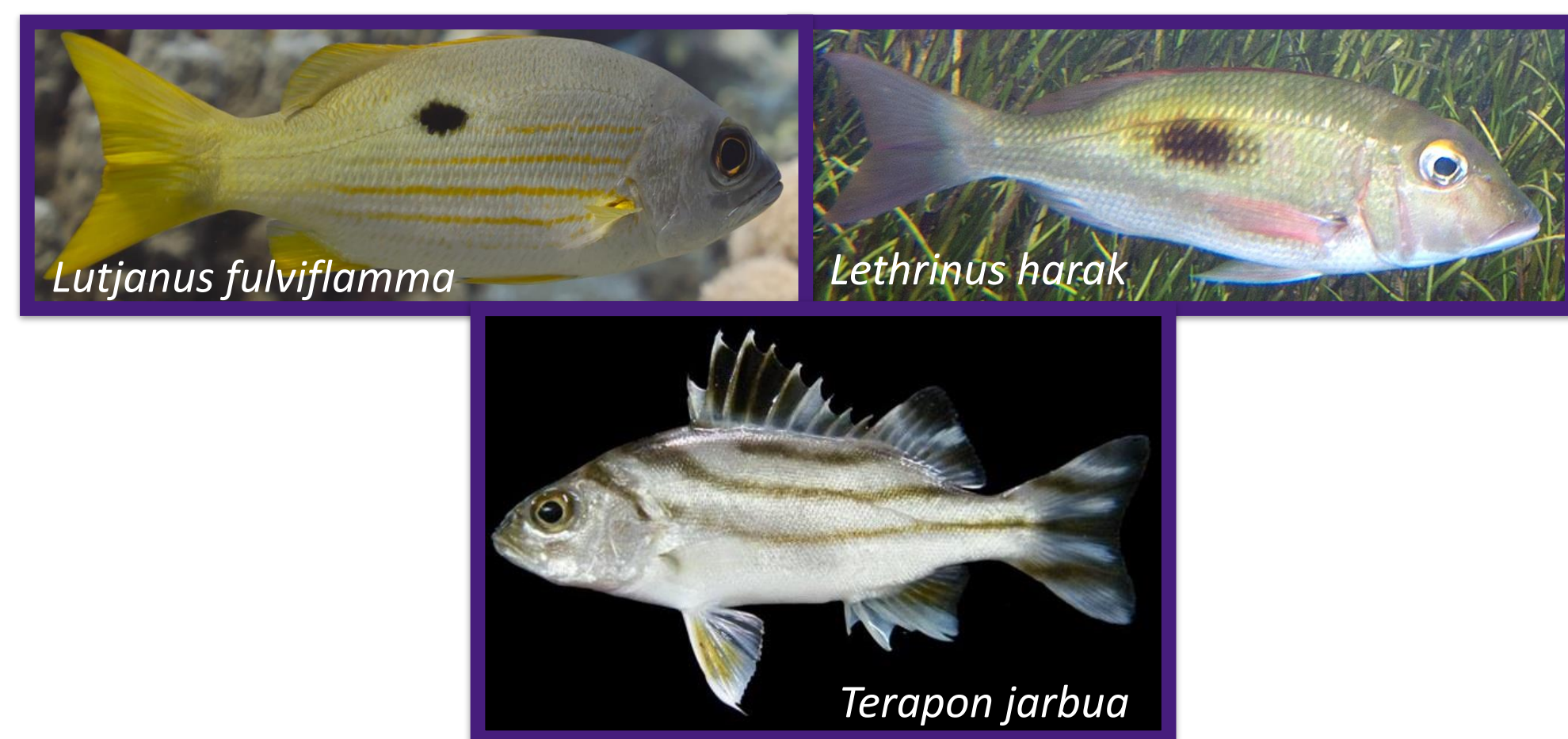
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Introduction

Coastal fisheries are an important source of revenue and sustenance for many people in Tanzania. However, continued deforestation of mangroves has raised concerns about the potential destruction of nursery habitat for many commercially important species. As such, more information about the ontogenetic movements of these fish from mangroves to seagrass habitats is needed to assess potential reductions in fisheries productivity due to habitat loss.

Objective

- Use bulk stable isotope analysis to track ontogenetic shifts and habitat use in *Lethrinus harak*, *Lutjanus fulviflamma*, and *Terapon jarbua*.



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Methods

- Fish were collected from mangrove habitats or from fishermen in adjacent seagrass habitats.
- White muscle was analyzed via isotope-ratio mass spectrometry for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$.
- Analyzed using regression and isotopic niche analysis



Pangani Region, Tanzania
Stars indicate sampling sites
Diamond indicates market

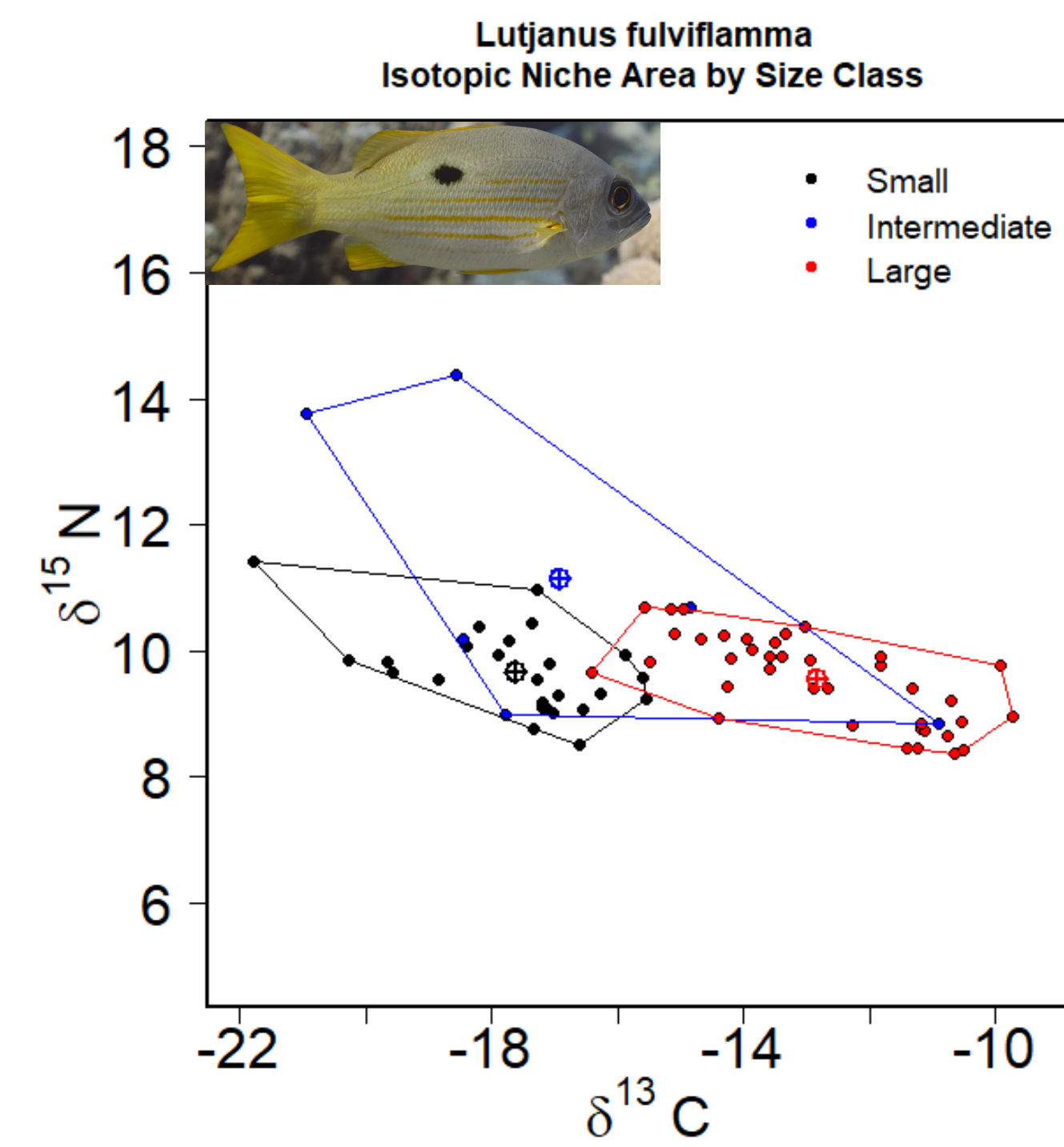
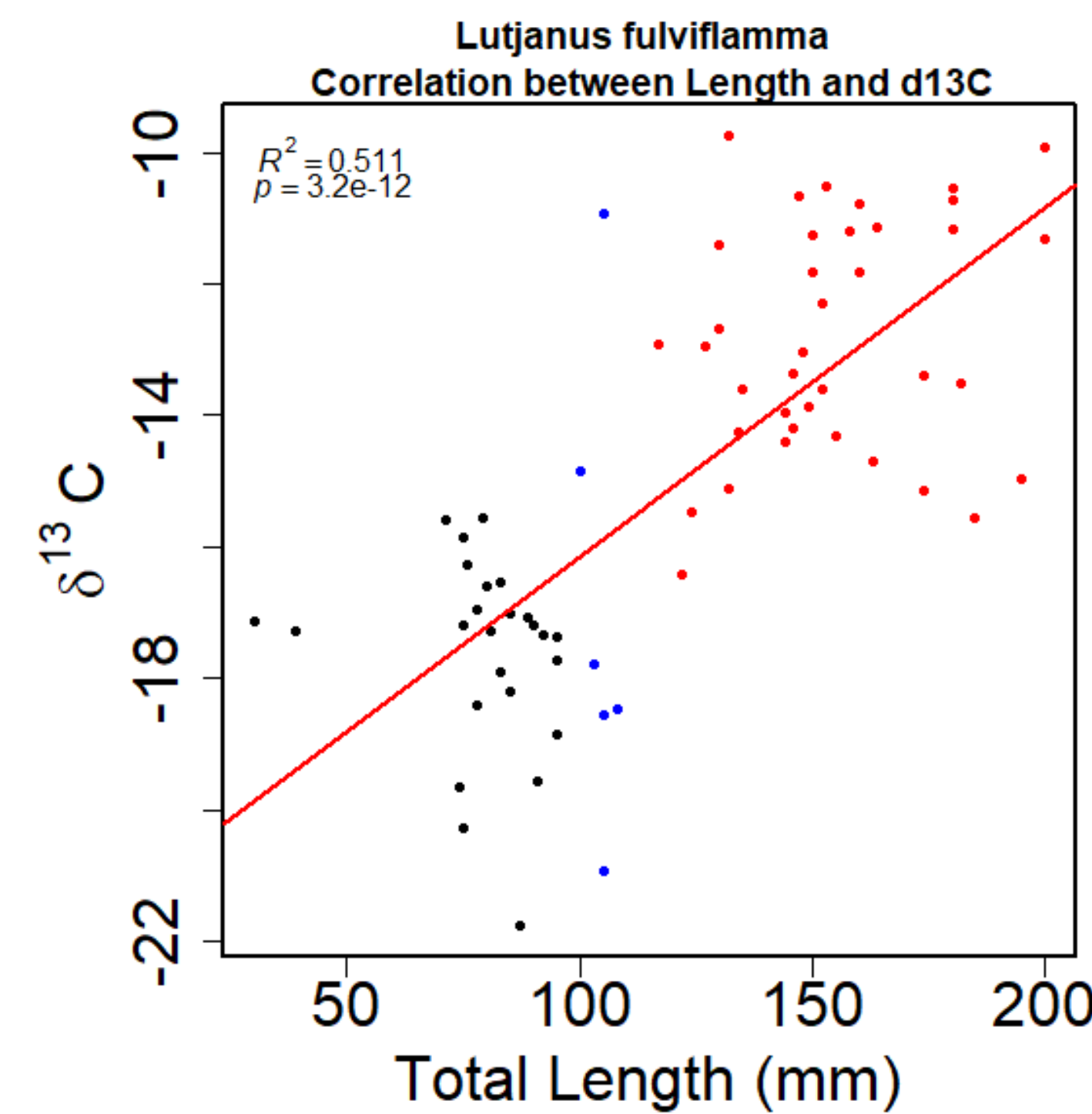
Dissections in our 5-star accommodations

COSTECH Elemental Analyzer and Thermo-Fisher Isotope-Ratio Mass Spectrometer

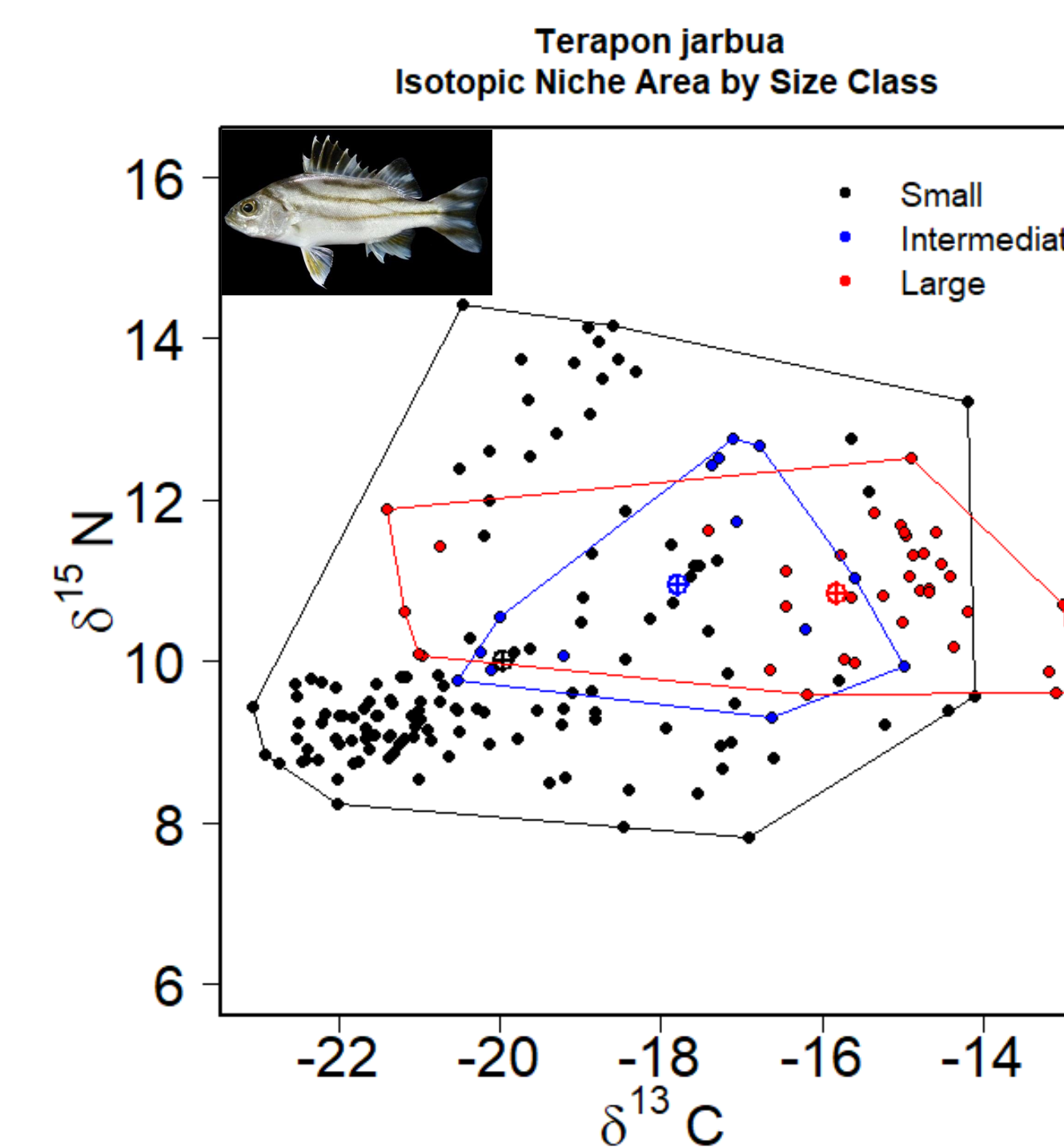
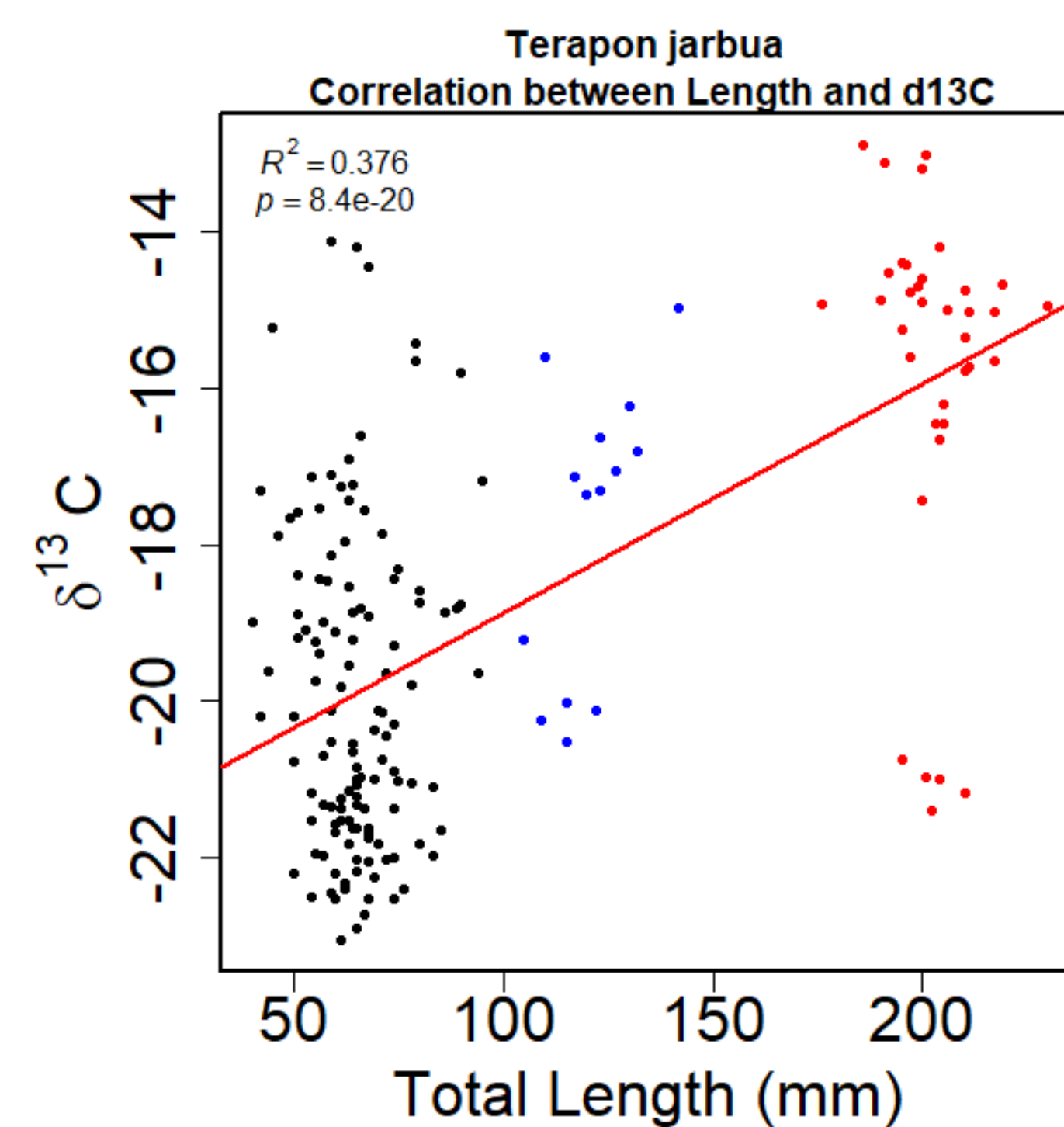
Results

- All species had a significant increase in $\delta^{13}\text{C}$ with increasing size.
- Mangrove $\delta^{13}\text{C} \approx -26 \text{‰}$, Seagrass $\delta^{13}\text{C} \text{‰} \approx -14 \text{‰}$ (Kruitwagen et al. 2010)

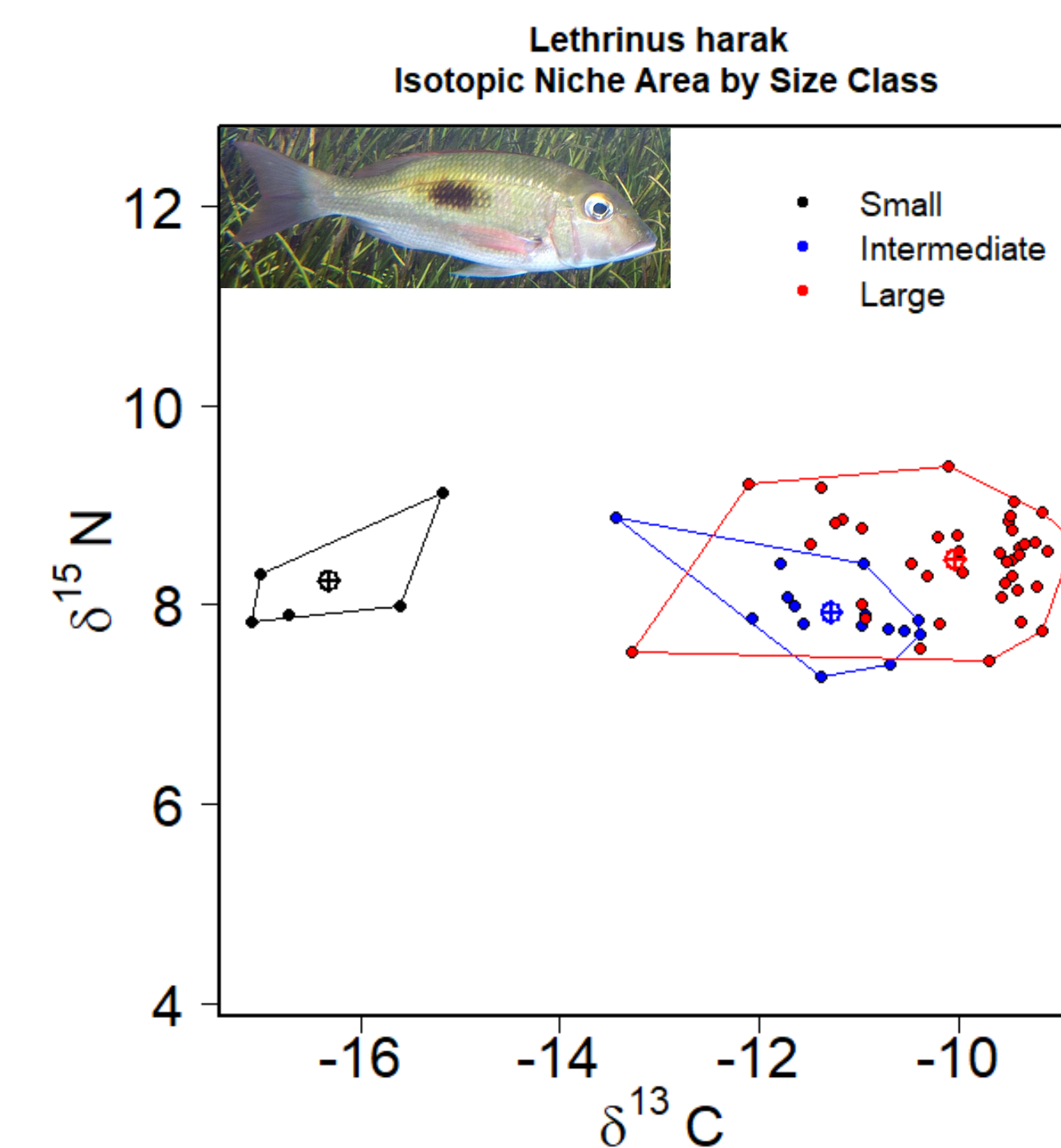
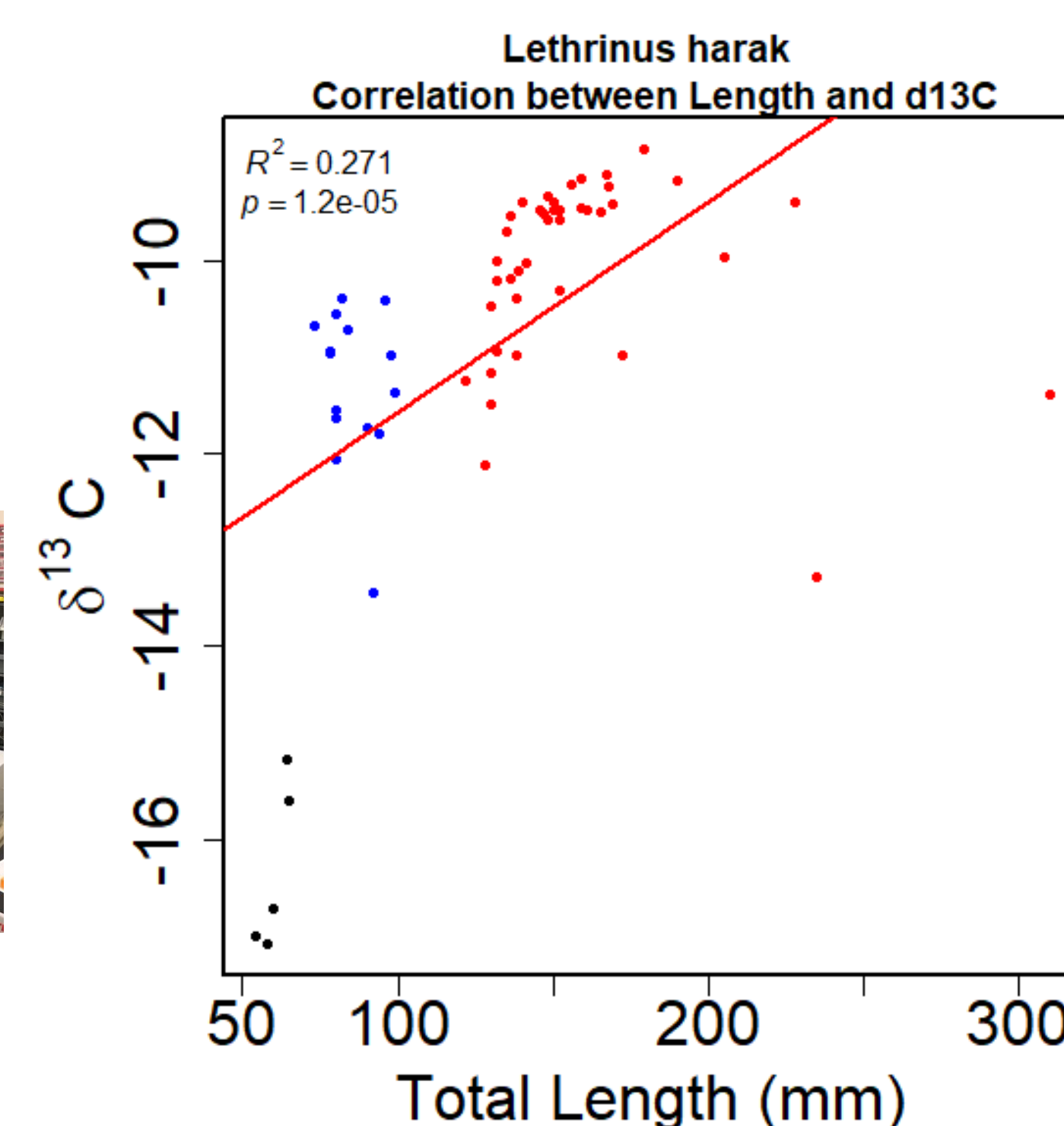
Lutjanus fulviflamma



Terapon jarbua



Lethrinus harak



Conclusion

- All three fish species demonstrated a potential for mangrove habitat use at smaller sizes.
- This supports the idea that mangroves act as nursery habitats for commercially important fish species before reaching the size needed to migrate into seagrass habitats.
- With increased exploitation of mangrove and fisheries resources occurring along the coast of Tanzania, it is critical to elucidate the links between mangroves and fisheries productivity in order to secure the sustenance and revenue they provide.

Future Directions

- Additional carbon sources are being analyzed such as mangroves, particulate organic matter, algae, and seagrasses.
- Compound-specific isotope analysis will provide a more precise estimate of the relative carbon sources used by fish throughout their ontogeny.
- Size selections based on life history information will allow more accurate isotopic niche analyses for these species.

References

- Kruitwagen, G., Nagelkerken, I., Lugendo, B. R., Mgaya, Y. D., & Bonga, S. W. (2010). Importance of different carbon sources for macroinvertebrates and fishes of an interlinked mangrove-mudflat ecosystem (Tanzania). *Estuarine, Coastal and Shelf Science*, 88(4), 464-472.