



INDONESIA DISSERTATION/THESIS PROJECT

IN44 Some like it hot! Thermal tolerance and dynamics of reef fishes

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The tropical Indo-Pacific warm pool (IPWP) is a major heat reservoir that influences global atmospheric circulation. The IPWP affects the temperatures in the Wakatobi on an annual basis causing large temperature changes. Reconstructions from Foraminifera cores covering a span of 2000 years suggest that the temperatures at times over those 2000 years may have been even higher than at present. This might be one of the reasons why corals in the Wakatobi appear to be more resilient than in the Great Barrier Reef with much less bleaching occurring. This topic makes use of Hasanuddin University facilities to examine temperature tolerances of reef fish species and more thermal dynamics studies have been published from Hoga Island than anywhere else in the Indo-Pacific. This topic could include: determination of critical thermal limits of field acclimated fishes, acclimation dynamics of fish exposed to different temperature treatments, and thermal acclamatory capacity and plasticity. All studies will involve animal husbandry and feeding, field collections, and laboratory-based experiments but will also involve field work and ecological observations of the study organisms.

Recommended Reading

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- Dabruzzi TF, Bennett WA, Fangue NA (2017) Thermal ecology of red lionfish *Pterois volitans* from southeast Sulawesi, Indonesia, with comparisons to other Scorpaenidae. *Aquatic Biology* 26: 1-14
- Day PB, Stuart-Smith RD, Edgar GJ, Bates E (2018) Species' thermal ranges predict changes in reef fish community structure during 8 years of extreme temperature variation. *Diversity and Distributions* 24: 1036–1046
- Donelson JM (2015) Development in a warm future ocean may enhance performance in some species. *Journal of Experimental Marine Biology and Ecology* 472: 119–125
- Habary A, Johansen JL, Nay TJ, Steffenson JF, Rummer JL (2017) Adapt, move or die – how will tropical coral reef fishes cope with ocean warming? *Global Change Biology* 23: 566–577

- Motson K, Donelson JM (2017) Limited capacity for developmental thermal acclimation in three tropical wrasses. *Coral Reefs* 36: 609-621
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- Rangel RE, Johnson DW (2018) Metabolic responses to temperature in a sedentary reef fish, the bluebanded goby (*Lythrypnus dalli*, Gilbert). *Journal of Experimental Marine Biology and Ecology* 501: 83–89
- Rowe CE, Figueira W, Raubenheimer D, Solon-Biet SM, Machovsky-Capuska GE (2018) Effects of temperature on macronutrient selection, metabolic and swimming performance of the Indo-Pacific Damselfish (*Abudefduf vaigiensis*). *Marine Biology* 165: 178
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- Waldock C, Stuart-Smith RD, Edgar GJ, Tomas, Bird J, Bates AE (2019) The shape of abundance distributions across temperature gradients in reef fishes. *Ecology Letters* 22: 685-696
- Warren DT, Donelson JM, McCormick MI (2017) Extended exposure to elevated temperature affects escape response behaviour in coral reef fishes. *PeerJ* 5: e3652