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BRIEF COMMUNICATION

Possible range extension in the endangered and understudied winghead shark (*Eusphyra blochii*)

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Abstract

Here the authors report on a possible range extension in the rare and understudied winghead shark (*Eusphyra blochii*). A specimen was captured by recreational fishermen in Moreton Bay, Queensland, Australia, *c.* 800 km south of its current distribution. As winghead sharks show a clumped distribution in Australia associated with river outflow, Moreton Bay, with its large catchment area, may represent a suitable habitat for the species and previous occurrence may have gone undetected. Alternatively, climate change may have caused a recent southward shift in winghead sharks, as observed in other elasmobranch species along Australia's East Coast.

KEYWORDS

Australia, climate change, Moreton Bay, range expansion, winghead shark

The winghead shark, *Eusphyra blochii*, is an endangered hammerhead species in the family Sphyrnidae ranging across the tropical Indo-West Pacific (Last & Stevens, 2009). It generally occupies shallow, turbid waters over continental and insular shelves, often associated with estuarine habitats and high river outflow (Heupel *et al*., 2015).

The species is long-lived, with a possible annual reproductive cycle in Australian waters and a litter size between 6 and 25 pups (Stevens & Lyle, 1989). Within its global range it is likely heavily fished, and population declines are expected from India and Southeast Asia (Smart & Simpfendorfer, 2016; Stobutzki *et al*., 2006). In Australia, it is listed as "Least Concern" as the winghead shark only constitutes a small portion of commercial catches (Leigh, 2015; Smart & Simpfendorfer, 2016). Here, the species co-occurs with two other hammerhead species, the scalloped hammerhead (*Sphyrna lewini*) and the great hammerhead (*Sphyrna mokarran*); nonetheless, the winghead is the least studied and likely the least common species of Sphyrnidae across its range (Heupel *et al*., 2015; Leigh, 2015). Available information suggests the species shows a highly clumped distribution in Australia, with higher catch rates reported from the Northern Territory, compared to Queensland and Western Australia (Heupel *et al*., 2015; Smart & Simpfendorfer, 2016). Previous studies have stated the need for improved understanding of winghead distribution, space-use and fisheries impacts (Heupel *et al*., 2015; Heupel *et al*., 2020).

Here, the authors report on a possible range extension of the winghead shark in Queensland, Australia. On 14 January 2018, a 157 cm adult male winghead was caught and released by recreational fishers in Moreton Bay off Brisbane (27°20.066S 153° 11.635E) (Figures 1 and 2). In the last two decades the distribution limits of the winghead shark have continuously been moved south with Ingham in Northern Queensland stated as a possible southern limit (Smart & Simpfendorfer, 2016), while a likely hotspot for wingheads has recently been identified off Mackay (Heupel *et al*., 2015). In general, the species is considered rare in Queensland waters (Heupel *et al*., 2015; Leigh, 2015; Smart & Simpfendorfer, 2016). This record from Morten Bay constitutes a possible range extension, *c.* 800 km further south than previously recorded.

This single record raises the question if the captured male represents a single, stray record or if continuous occurrence of the winghead shark in Moreton Bay has remained unnoticed, or represents a recent phenomenon.

Moreton Bay likely constitutes a suitable habitat for the species as winghead catches are highest in turbid, coastal and estuarine

FIGURE 1 Photos of the captured winghead (*Eusphyra blochii*) specimen (157 cm male). Photos were taken by Kurt Ockenfels in Moreton Bay, Queensland

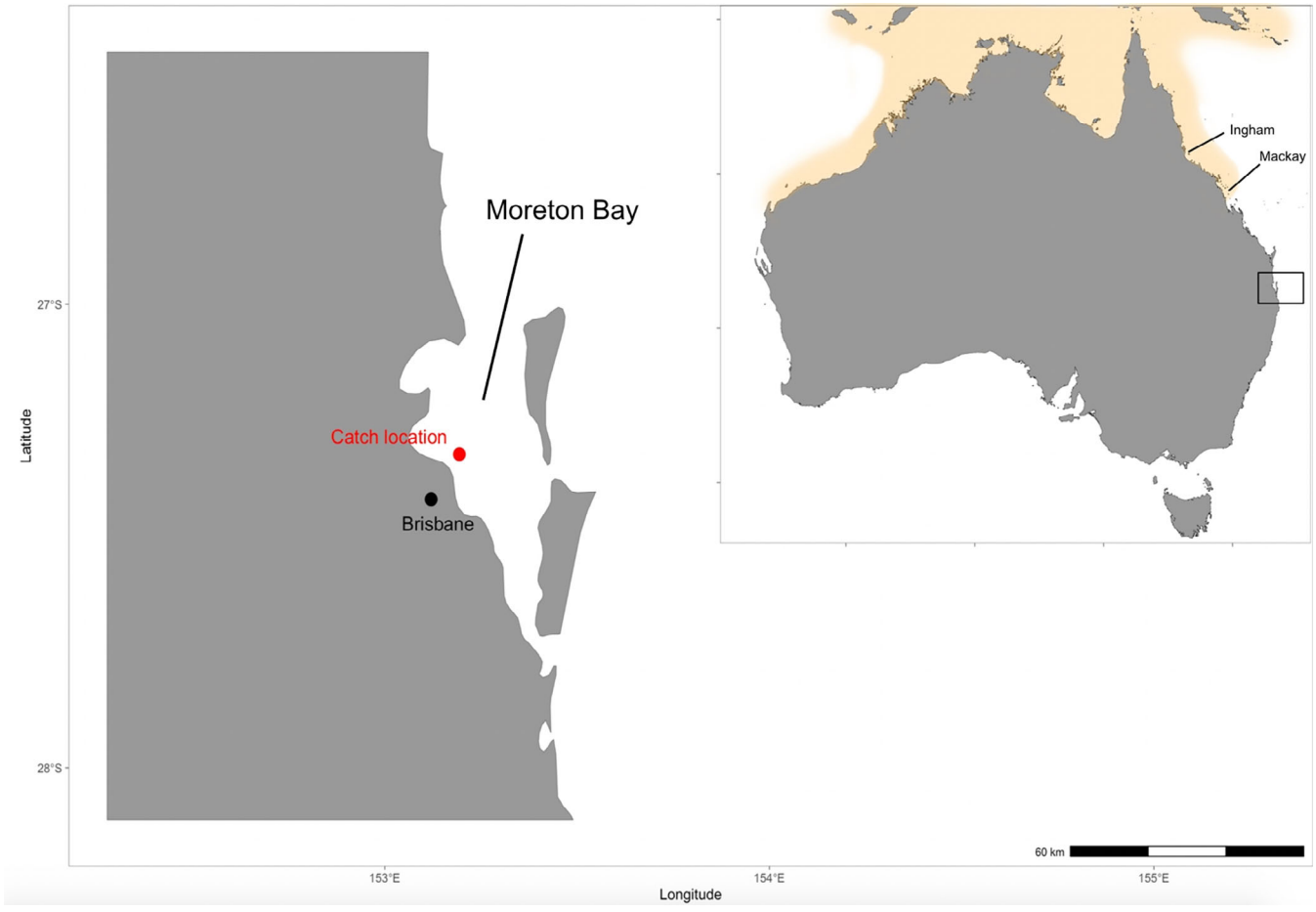

FIGURE 2 Map showing previously reported distribution of the winghead shark (*Eusphyra blochii*) in orange and catch location of the specimen reported here, represented by a red dot

regions (Heupel *et al*., 2015). The large catchment area of multiple river systems flowing into Moreton Bay may provide necessary riverine output, especially during strong rainfall events (Gibbes *et al*., 2014). As the species appears to be naturally rare in Queensland and identification to the species level in commercial fisheries only began in 2018, the occurrence of winghead sharks in Moreton Bay may have gone undetected (Smart & Simpfendorfer, 2016).

If Moreton Bay represents the range limit of wingheads, it may only be occupied during the summer months, due to potential temperature preferences of the species. This is supported by this individual

that was caught in January, during the Austral summer. Many ectothermic elasmobranch species show distinct temperature preferences and exhibit seasonal movements to and from the range limit which can only be inhabited during the summer when temperatures are suitable (*e.g.*, Barnett *et al.*, 2011; Diemer *et al.*, 2011; Lee *et al.*, 2019; Smoothey *et al.*, 2016). Because the spatio-temporal extents of winghead habitat use remain virtually unknown, future tracking studies (*e.g.*, Barnett *et al.*, 2019) would be of value to determine if seasonal patterns exist and if Moreton Bay indeed represents an essential habitat for wingheads.

The occurrence of this individual may also represent a relatively recent southward shift in winghead distribution, which has been recorded in many marine vertebrates and invertebrates, including other elasmobranch species, along Australia's East Coast over recent decades. Globally, such poleward shifts have been attributed to warming waters caused by climate change (*e.g.*, Perry *et al.*, 2005; Hyndes *et al.*, 2017; Niella *et al.*, 2020). In general, future research is needed to support either of these hypotheses, and improve our understanding of winghead movement behaviour, habitat use, distribution and population trends across the species range.

AUTHOR CONTRIBUTIONS

N.L. acquired photos and catch data, and wrote the manuscript text. A.B. reviewed and edited the manuscript.

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