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Cover: Pseudo-flying animals and wind-dependent seed & spore dispersers – made with digital painting in Krita. © Melito Prinson Pinto



First record of the Great Seahorse *Hippocampus kelloggi* Jordan & Snyder, 1901 (Actinopterygii: Syngnathiformes: Syngnathidae) from the northwestern coast of Bay of Bengal

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Abstract: This study reports the first occurrence of the Great Seahorse *Hippocampus kelloggi* from the state of Odisha in the eastern coast (Bay of Bengal) of India. The seahorse was captured in a ring net during daily fishing activities. The sample was collected from the Ariyapalli fish landing center and identification was carried out based on the morphometric features of the specimen and the seahorse identification guide. The total length of the juvenile seahorse was 12.5 cm (with a tail length of 6.6 cm (52.8%), trunk length of 3.4 cm (27.2%) and head length of 2.5 cm (20%). The length of the snout was 1 cm. There were 38 tail rings followed by 11 rings on the trunk of the animal. Both eye and cheek spines were present. Northward migration (~1,300 km) of this species can be a response of extensive fishing activities around the southern coast of India. This calls for increased monitoring of the coast coastal ecosystems of India on the east coast for better conservation and management of the remaining seahorse populations.

Keywords: Conservation, Kellogg's Seahorse, migration, monitoring, Vulnerable.

Seahorses belong to the single genus *Hippocampus* are a unique and remarkable group of fishes that have unusual body shapes (e.g., horse-like head structure) and biology (e.g., where males incubate fertilized eggs) inhabiting shallow coastal ecosystems worldwide (Foster & Vincent 2004; Lourie et al. 2004; Zhang & Vincent 2018). The Indo-Pacific region is one of the hotspots of seahorse populations that are distributed across diverse

ecosystems such as seagrass, mangroves, macroalgal beds, and coral reefs, while inhabiting the shallow estuaries, lagoons, and subtidal regions up to 15 m depth (Foster & Vincent 2004; Salin et al. 2005; Balasubramanian & Murugan 2017; Li et al. 2021). Around 46 species of seahorse species are reported worldwide with 12 species found in the Indo-Pacific region; eight species as 'Vulnerable' (VU) (*Hippocampus arbourin*, *H. kelloggi*, *H. kuda*, *H. mohnikei*, *H. spinosissimus*, *H. trimaculatus*, *H. fuscus*, and *H. histrix*), four 'Data Deficient' (DD), and one 'Least Concern' (IUCN 2022). Most of the seahorse population in the Indo-Pacific are under decline due to their overexploitation for traditional Chinese medicines (e.g., *Hippocampus capensis*, *H. kelloggi*, *H. kuda*, *H. trimaculatus*, and *H. histrix*) and as ornamental fishes, combined with general destructive fishing and fisheries bycatch (Sreepada et al. 2002; Foster & Vincent 2004; Kavungal & Saravanan 2015; Jeyabaskaran et al. 2018; Zhang & Vincent 2018).

The coastal ecosystems of India inhabit nine out of 12 species of seahorses found in the Indo-Pacific—*Hippocampus trimaculatus* (VU), *H. kuda* (VU), *H. fuscus* (VU), *H. spinosissimus* (VU), *H. kelloggi* (VU), *H. histrix* (VU), *H. mohnikei* (VU), and *H. camelopardalis* (DD)

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Figure 1. The common occurrence locations of seahorse populations across various states and union territories of India (*). *Hippocampus kelloggi* is recorded from the coast of Odisha (OR*). Andhra Pradesh (AP), Tamil Nadu (TN), Kerala (KL), Karnataka (KA), Goa (GA), Maharashtra (MH), Gujarat (GJ), Daman & Diu (DM), Lakshadweep (LK), and Andaman & Nicobar Islands (AN).

spread across eight states and five union territories (Vaidyanathan & Vincent 2021). However, detailed studies on distribution and diversity of seahorses in India is limited mostly to the Gulf of Mannar and Palk Bay region in the southeastern coast of India (Salin et al. 2005; Balasubramanian & Murugan 2017). Despite the ban on fishing and trading activities on seahorses from 2001 (MoEFCC 2001), clandestine fishing and trading still takes place in India (Sreepada et al. 2002; Kavungal & Saravanan 2015). This creates immense pressure on the seahorse populations that have high dependency on local habitats to maintain their extensive and long-life history traits (Foster & Vincent 2004). For successful maintenance of their population seahorses depend on range extension and migration to new habitats despite being poor swimmers and their dependence on rafting for long-distance dispersal (Teske et al. 2005; Luzzatto et al. 2013). Range extension in seahorses of India has been previously documented for *H. fuscus* from southeastern coast, northwards towards the Chilika lagoon (Mahapatro et al. 2017), and for *H. mohnikei* from the southeastern coast into Mandovi estuary in Goa (Sanaye et al. 2020). *Hippocampus kelloggi* is one of the common seahorse species found along the Coromandel coast with distribution limited only to the

southeastern coast of India (Kavungal & Saravanan 2015; Vaidyanathan & Vincent 2021).

METHODS

The specimen was collected from Ariyapalli fish landing center (19.30°N & 84.96°E), Ganjam, in the state of Odisha, east coast of India (Figure 1). The seahorse was caught in a ring net (fishing net) on 21 May 2022 during the sample collection for trash fishes along the Ariyapalli fish landing center. All morphometric measurements were recorded using a vernier caliper. The specimen was identified using seahorse identification guide (Lourie et al. 2004), and pictures were taken for photographic evidence.

RESULTS AND DISCUSSION

The total length of the *H. kelloggi* specimen in this study was 12.5 cm, that consisted of 52.8% as tail length (6.6 cm), 27.2% as trunk length (3.6 cm), and 20% as head length (2.5 cm) (Table 1). The total number of rings on the seahorse was 49, with the tail consisting of 38 rings and the trunk with 11 rings (Table 1). There was a single spine on the eye and cheek bones (Image 1). The snout length was 1 cm and smaller compared to the head length (Table 1). The total body length (12.5



Image 1. Female *Hippocampus kelloggi* specimen collected from the coast of Odisha, Bay of Bengal. Presence of single eye and cheek spines are identification marks for this species. © Anil Kumar Behera.

cm) of the individual in this study was lower than the average length of the *H. kelloggi* (28 cm), suggesting the captured specimen was a juvenile and not a mature adult that grows up to 28 cm (Lourie et al. 2004).

This incidental catch of *H. kelloggi* from the coast of Odisha could be due to northward migration of the species from the Coromandel coast (i.e., coasts of Andhra Pradesh and Tamil Nadu), where this species is abundant and is under extensive fishing pressure (13 million individuals caught per year), despite the ban of fishing and trading on all species of seahorses in India from 2001 (Vaidyanathan & Vincent 2021). Despite the fact that long-distance migrations in seahorses are not well-understood (Luzzatto et al. 2013), our record of *H. kelloggi* from the coast of Odisha provides evidence that

seahorses are able to migrate long-distance (from Palk Bay and Gulf of Mannar region to Ariyapalli in Odisha coast, approx. 1,300 km), adding new information for this vulnerable species of seahorse. However, this migration of seahorses is supported by a unique method known as rafting, where small seahorse species attach themselves to floating substrata (macroalgae, or plastic debris) and are dispersed by ocean currents, such as the east Indian coastal current and north-east and south-west monsoon currents (Teske et al. 2005; Luzzatto et al. 2013). Mostly, this migration in *Hippocampus species* is preferred by juvenile species, which coincides with our specimen of *H. kelloggi* being shorter than a normal adult seahorse. This phenomenon has also been observed for *H. patagonicus* in the southern Atlantic region and, *H. kuda*, *H. fuscus*,

Table 1. Morphometric measurements of the female *Hippocampus kelloggi* recorded from the Ariyapalli coast of Odisha, Bay of Bengal.

Variables	No. / cm
Tail ring (no.)	38
Trunk ring (no.)	11
Head length (cm)	2
Standard length (cm)	12.5
Height (cm)	10.2
Snout length (cm)	1
Tail length (cm)	6.6
Trunk length (cm)	3.4

and *H. capensis* in the Indo-Pacific region (Teske et al. 2005; Luzzatto et al. 2013; Zhang & Vincent 2018).

The occurrence of the threatened Great Seahorse along with previously recorded *H. fuscus* from the Chilika lagoon calls for increase in monitoring of fisheries bycatch from the coast of Odisha. This also calls for trash fish monitoring from fishing activities along the eastern coast of India. Identifying the coastal ecosystems that are potential hotspots and inhabited by these threatened species will create a roadmap for better conservation and management of seahorses and their associated habitats in India (Mishra & Apte 2021; Mishra & Farooq 2022).

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