

## Threatened fishes of the world: *Anoxypristis cuspidata* (Latham, 1794) (Pristidae)

Ali Reza Radkhah<sup>1,2</sup> • Soheil Eagderi<sup>1</sup>

<sup>1</sup> Department of Fisheries, Faculty of Natural Resources, University of Tehran, Karaj, Iran.

<sup>2</sup> Young Researchers and Elites Club, Birjand branch, Islamic Azad University, Birjand, Iran.

### Correspondence

Mr Ali Reza Radkhah; Department of Fisheries, Faculty of Natural Resources, University of Tehran, Karaj, Iran.

 radkhahalireza@yahoo.com

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### Abstract

The knifetooth sawfish *Anoxypristis cuspidata* (Latham, 1794) is a species of sawfish belonging to the family Pristidae. It is an Indo-West Pacific species occurring from the northern Persian Gulf to Australia and north to Japan. The species is assessed as Endangered in the IUCN Red List of Threatened Species. Main threats to the species are fishing, coastal development and habitat degradation. This sawfish species has considerable ecological importance for the regions, but there are little data of its populations. Hence, a detailed study of population status, ecological and biological characteristics of *A. cuspidata* is required. This study will provide basic information on distribution, biological characteristics and conservation of this species.

**Keywords:** Knifetooth sawfish; *Anoxypristis cuspidata*; threatened fish; conservation.

### 1 | TAXONOMIC NOTES

Kingdom: Animalia

Phylum: Chordata

Class: Chondrichthyes

Subclass: Elasmobranchii (Sharks and rays)

Superorder: Euselachii

Order: Pristiformes (Sawfishes)

Family: Pristidae (Sawfishes)

Genus: *Anoxypristis*

Species: *Anoxypristis cuspidata*

This species, *Pristis cuspidatus*, was first described by John Latham in 1794. In 1913, a person named Hoffman was renamed *Pristys* to *Oxypristis* with study of morphological characteristics in this species. In the end, White and Moy-Thomas in 1941 added a prefix to this species and called it *Anoxypristis*. To this day, the name has just

changed slightly, now known as *Anoxypristis cuspidata* (Latham, 1794) (FLMNH 2018). *Anoxypristis* in Greek language means “sharp saw”. Oxy means “sharp” and pristis means “saw” (FLMNH 2018).

### 2 | COMMON NAMES

Knifetooth sawfish, narrow sawfish and pointed sawfish (Froese and Pauly 2017; GBIF 2017)

### 3 | SYNONYMS

*Pristis cuspidatus* (Latham, 1794), *Anoxypristis cuspidate* (Latham, 1794), *Squalus semisagittatus* (Shaw, 1804)

### 4 | CONSERVATION STATUS

According to IUCN reports, the global population of all five species of sawfishes has been dramatically reduced over the past years. Three species of sawfishes are on the

IUCN list and two other species are Endangered (Harrison and Dulvy 2014).

Knifetooth sawfish (*A. cuspidata*) is classified as Endangered (EN) by the International Union on the Conservation of Nature (IUCN) (D'Anastasi *et al.* 2013). Knifetooth sawfish populations have been declining worldwide (Stevens *et al.* 2000; Dulvy *et al.* 2016). According to the reports obtained by IUCN, this species has probably gone extinct from Vietnam. Therefore, it is necessary to take protective measures for this unique species (D'Anastasi *et al.* 2013; Harrison and Dulvy 2014).

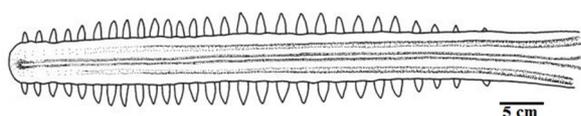
## 5 | IDENTIFICATION

Knifetooth sawfish (Figure 1) can be distinguished by the lack of barbels, ventrally located gills (versus laterally located), dorso-ventrally compressed body, narrow and depressed head, smooth skin, deep fork in caudal fin, long and flattened rostrum (Hamlett and Koob 1999; Myers *et al.* 2006). The sawfish have rostral saw with 16 to 29 pairs of teeth of which 18–22 pairs of teeth not extending onto base of saw. Also, teeth absent from basal quarter. Total rostrum length and standard rostrum length range from 12–41% and 9–39% of total length respectively (Whitty *et al.* 2013). A schematic drawings of rostra of *A. cuspidata* is presented in Figure 2.

Body colour grey above, white or greyish below. Total length ranges from 240 – 470 cm; however, maximum size can reach up to 610 cm (Compagno and Last 1999).



**FIGURE 1** Knifetooth sawfish, *Anoxypristis cuspidata* [source: Australian National Fish Collection, CSIRO; extracted from Bray 2019]



**FIGURE 2** Schematic drawings of rostra of knifetooth sawfish, *Anoxypristis cuspidata* [extracted from Lange *et al.* 2015]

## 6 | HABITAT AND ECOLOGY

This species is a benthopelagic and amphidromous fish (Froese and Pauly 2017). It is globally distributed in tropical and sub-tropical coastal marine and estuarine waters (depth range 0–40 m). This species is found mainly in in-shore coastal waters, estuarine environment, river deltas

and upstream rivers (Faria 2007; Faria *et al.* 2013). It feeds on invertebrates, small fish, cuttlefish, prawns and squids (Peverell 2007; Froese and Pauly 2017).

## 7 | DISTRIBUTION

This species occurs in the waters of Indo-West Pacific Region (Red Sea, Persian Gulf, Pakistan, India, Sri Lanka, Andaman Islands, Malaysia; Myanmar, Thailand, Singapore, Indonesia, Papua New Guinea) and Australia (central Queensland coast, Northern Territory, Western Australia) (Figure 3). However, sawfish is most widely distributed and abundant in Queensland waters (Compagno and Last 1999; CMS 2014).



**FIGURE 3** World map showing the distribution of knifetooth sawfish, *Anoxypristis cuspidata*

## 8 | GROWTH, REPRODUCTION AND MATING BEHAVIOR

The knifetooth sawfish is an ovoviparous species (Compagno and Last 1999). This species is the most productive sawfish species, reaching maturity early (D'Anastasi *et al.* 2013; CMS 2014) which gains maturity at two to three years of age, at around 200 cm and 230 cm total lengths for males and females respectively (Peverell 2005; IUCN 2017). The young sawfish are quite large at birth, measuring around 40 to 80 cm in length (Carpenter and Niem 1999). Peverell (2008) examined the age and body size of knifetooth sawfish found that the total length of body was 83 – 115 cm at the age of 0 whereas, it ranged from 316 – 338 cm at the age of more than five (Whitty *et al.* 2019).

## 9 | THREATS

All sawfish species are classified as Endangered or Critically Endangered on the IUCN Red List. Therefore, these species are arguably the most threatened marine fishes in the world (IUCN 2007; Dulvy *et al.* 2014, 2016). The principal threats to *A. cuspidata* are from commercial fishing, coastal development, habitat degradation, climate changes etc. (IUCN 2017).

The reports show that *A. cuspidata* make up the largest portion of sawfish caught by commercial fishing (Whitty *et al.* 2019). Thus, this species has been affected by com-

mercial fishing over the past years. Harrison and Dulvy (2014) stated that fishing mortality presents the greatest risk to remaining knifetooth sawfish populations. This species is most commonly caught sawfish in Australian waters such as Gulf of Carpentaria and Queensland east coast (Peeverell 2005, Harry *et al.* 2011)

This sawfish species requires special habitats such as rivers, lakes and estuaries in different life cycles. The introduction of humans into sawfish habitats has created a new problem (FLMNH 2018). Human impacts such as pollution, prey depletion, overfishing and coastal development have a great contribution to the destruction of habitats. For example, coastal and riverine developments prevent the migration of sawfish to critical habitats (CMS 2019).

## 10 | CONSERVATION RECOMMENDATION

Specific actions have been taken in different parts of the world (e.g. Australia and India) to conserve knifetooth sawfish (D'Anastasi *et al.* 2013). This species is protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Moreover, trade of products made from this species declared banned on several online stores. Special laws and regulations have been implemented to prevent catching and killing of this species in Australia. The Australian government launched a spatial closure in response to killing of considerable number of knifetooth sawfish in 2008 (D'Anastasi *et al.* 2013). In addition to these actions, fishing methods have been modified over the years to reduce the bycatch of *A. cuspidata*. However, the use of Turtle Exclusion Devices (TEDs) in the trawl fishery reduced the bycatch of this species (Brewer *et al.* 2006; D'Anastasi *et al.* 2013).

The conservation of sawfish species has generally been of low priority for marine bodies (Barker and Schluessel 2005; Dulvy *et al.* 2016). Conservation efforts should pay particular attention to restoring its populations. However, conservation of habitats, through protection and improvement, is the best way to sustain the population.

So far, several studies have been done on *A. cuspidata* in different parts the world. Population structure and levels of genetic diversity were studied by Phillips *et al.* (2011) which can be very useful for the conservation of threatened *A. cuspidata*. However, more research is needed on biological characteristics of this species, especially on the age, growth rate, and reproduction. Examining these characters would be very important in the development of effective conservation plans of this species.

However, based on our findings, we suggest the following management strategies for the conservation of sawfishes including *A. cuspidata*: (a) habitat conservation; (b) avoid

commercial fishing and limitation of trade; (c) improvement of the stringent laws and regulations to prevent commercial fishing; (d) identification of effective management plans; (e) explaining the importance of Endangered fish species such as sawfishes among the people involved in sawfish fishing; (f) the activities of non-governmental organizations (NGOs) and indigenous peoples should be strengthen; and (g) global participation of national and international organizations for the conservation of sawfishes.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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#### CONTRIBUTION OF THE AUTHORS

ARR & SE data collection and manuscript preparation