

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

## BROKEN WATER BAY & SEPIK RIVER ISRA

### New Zealand & Pacific Islands Region

#### SUMMARY

Broken Water Bay & Sepik River is located on the north coast of Papua New Guinea. The area encompasses the Broken Water Bay in the Bismarck Sea, part of the sediment plume of the Sepik and Ramu Rivers, and the Sepik River main channel up to the middle floodplain, including Chambri Lake. The area is characterised by the main channel of the Sepik River which flows relatively fast and is highly turbid; and the Broken Water Bay with a steep slope, coral reefs, seagrass meadows, and mangrove forests. Within this area there are: **threatened species** (e.g., Narrow Sawfish *Anoxypristis cuspidata*); **reproductive areas** (Largetooth Sawfish *Pristis pristis*); and **undefined aggregations** (Narrow Sawfish).

#### CRITERIA

**Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C5 - Undefined Aggregations**

PAPUA NEW  
 GUINEA

0-128 metres

866.5 km<sup>2</sup>





## DESCRIPTION OF HABITAT

Broken Water Bay & Sepik River is located on the north coast of Papua New Guinea. The area encompasses Broken Water Bay in the Bismarck Sea, part of the sediment plume of the Sepik and Ramu River and the Sepik River main channel up to the middle floodplain, including Chambri Lake. Broken Water Bay has a steep slope with a very limited continental shelf habitat and a prevailing current running to the north. The marine section of the area is characterised by coral reefs, seagrass meadows, and mangrove forests. The Sepik River is >1,100 km long and is the largest river in Papua New Guinea (Grant et al. 2021). The area includes inland waters of the Sepik River up to 170 km from the sea, including the lower and middle Sepik River.

The area is influenced by freshwater flow from the upper Sepik River and various tributaries flowing northward from the central highlands that connect with the middle Sepik. The area is characterised by the main channel of the Sepik River (~50–100 m wide) which flows relatively fast and is highly turbid (Coates 1987). In the wet season (October–April), the main channel breaks to form a large floodplain system, which has several deeper oxbow lakes scattered within a broader low-lying grassland. Lake Chambri forms the western boundary of this floodplain, and while shallow (2–3 m), is the only part of the floodplain that is stably connected to the main channel throughout the year through a network of small tributaries and creeks (M Grant pers. obs. 2024). The area is lined with various riparian vegetation including wild sugar cane and other long grasses, and sediment throughout the area is characterised by mud and silt (M Grant pers. obs. 2024).

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 128 m based on the bathymetry of the area and the global depth range of the Qualifying Species.

## ISRA CRITERIA

### CRITERION A – VULNERABILITY

Two Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. These are the Critically Endangered Narrow Sawfish (Haque et al. 2023) and Largetooth Sawfish (Espinoza et al. 2022).

### SUB-CRITERION C1 – REPRODUCTIVE AREAS

Broken Water Bay & Sepik River is an important reproductive area for one ray species.

During April, September, and November 2017, fishery observations and local ecological knowledge from fishers that use primarily gillnets within the area were collected by formal interviews (Leeney et al. 2018; Grant et al. 2021). Data collected indicate that the area is regionally important for young-of-the-year (YOY) Largetooth Sawfish (Leeney et al. 2018; Grant et al. 2021). Dry rostra of animals caught in the area between 2015–2017 were used to estimate total length (TL) (Grant et al. 2021) based on published length relationships (Whitty et al. 2014). Due to the remoteness of the area, no further fishery observation data are available, however, regular catches of Largetooth Sawfish across the whole lifetime of fishers in the area were reported (Leeney et al. 2018).

Largetooth Sawfish (n = 13) caught between 2015–2017 were documented from the mouth of the Sepik River, upstream to Korogu Village and Chambri Lake during the interviews (Grant et al. 2021). Individuals caught at the mouth of the river were adults and measured 270–487 cm TL, while all

individuals caught upstream measured <90 cm TL (at least five individuals), and were considered neonates or YOY based their sizes (Leeney et al. 2018; Grant et al. 2021). Size-at-birth for the species is 72–90 cm TL (Peverell 2008).

In Timbunke Village (within the area), local ecological knowledge surveys indicated that ~50 Largetooth Sawfish are caught annually by fishers in this village (M Grant unpubl. data 2017). The relatively small sample size of neonate/YOY Largetooth Sawfish in contemporary studies persists despite the regular capture of sawfishes in the area, as rostra are rarely retained. The rostra that are retained are likely biased to larger individuals (M Grant pers. obs. 2024). Although information on the presence of pregnant females in the area could not be obtained due to the examination of only rostra and smoked specimens, this species has been shown to exhibit philopatry to natal river systems (Feutry et al. 2015; Phillips et al. 2017) and to be present and give birth in freshwater environments (Lear et al. 2019). Therefore, the use of Broken Water Bay and the lower Sepik River by pregnant females is inferred from the presence of YOY Largetooth Sawfish in the upper region of the river (Grant et al. 2021). Local interviews indicate that large individuals of Largetooth Sawfish, along with Narrow Sawfish, are frequently encountered west of the Sepik River mouth and along the coast, particularly during the months of December and January (Leeney et al. 2018).

Historically, Largetooth Sawfish were observed in the Sepik River throughout expeditions as far back as the 1800–1900s (M Grant unpubl. data 2024). In these historical accounts, the villages of Korogu and Pagwi, situated on the main channel to the north of Lake Chambri are often mentioned as sites where Largetooth Sawfish were common and where rostra could be regularly observed (M Grant pers. obs. 2024). This area has national historical importance as it is one of two on the north coast of mainland Papua New Guinea where sawfish have historically been documented (White et al. 2017).

## SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

Broken Water Bay and Sepik River is an important area for undefined aggregations of one ray species.

Fishery observations and local ecological knowledge surveys conducted during three separate surveys (April 2017, September–November 2017, March 2018) indicate that the area is regionally important for various size classes of Narrow Sawfish (Leeney et al. 2018; Grant et al. 2021). Due to the remoteness of the area, no further fishery observation data are available, however, regular catches of Narrow Sawfish across the whole lifetime of fishers in the area were reported (Leeney et al. 2018).

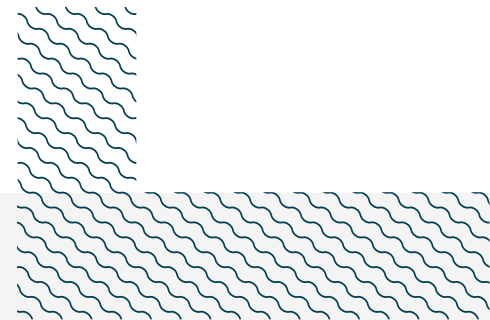
During September–November 2017, catch landing observations of fishers using primarily gillnets of varied mesh sizes to target croakers (Sciaenidae), Barramundi (*Lates calcarifer*), sharks, and rays were conducted in the area (Grant et al. 2021). Narrow Sawfish (n = 13) were observed from the mouth of both the Sepik and Ramu Rivers measuring 100–300 cm TL (Grant et al. 2021). During this survey, across three days in September, nine Narrow Sawfish measuring 100–223 cm TL were captured, including four individuals caught in a single net (Grant et al. 2021). Size-at-birth for the species is 43–70 cm TL, while maturity is reached at 200–225 cm TL (Last et al. 2016).

Additionally, in April 2017, 46 interviews were conducted from 12 villages along the Sepik, Keram, and Ramu Rivers (flowing into the area) and two additional sites along the coastline within the area where gillnets, longlines, and occasionally spear guns are used during fishing activities (Leeney et al. 2018). Fishers at Kopar Village report that Narrow Sawfish are regularly caught year-round at fishing sites adjacent to the Sepik River mouth, with higher catch rates reported in the drier months (~January–June) (Leeney et al. 2018). During local ecological knowledge interviews, one fisher suggested that 50–60 sawfish could be caught each week if their fishing group set all 15 of their 100–200 m gillnets

each day (Leeney et al. 2018). In corroboration of this, in April 2017, five gillnets set in one day resulted in the capture of two Narrow Sawfish measuring 104 and 107 cm TL, indicating that these may be juvenile individuals.

The relatively low contemporary sample size of Narrow Sawfish in scientific studies in the area persists despite being regularly caught in the area, as rostra are infrequently retained (e.g., only five dried rostra from Narrow Sawfish were observed between Kopar and Marangis Village despite high observed catch rates [Leeney et al. 2018; Grant et al. 2021]). Further, the rostra that are retained are likely biased to larger individuals (M Grant pers. obs. 2024).

In a regional context, the Sepik and Ramu Rivers, and the coastal area around and inclusive of Broken Water Bay is the only region on the north coast of mainland Papua New Guinea where sawfish have historically been documented (White et al. 2017). Historic and contemporary data indicate that estuarine/marine waters of both the Sepik and Ramu Rivers support populations of Narrow Sawfish (White et al. 2017; Leeney et al. 2019; Grant et al. 2021). The northern coast of mainland Papua New Guinea has very limited continental shelf habitat and lacks the abundance of large floodplain river systems found in the country's southern coastline. For this reason, it appears that the Broken Water Bay area, which receives outflow from both the Sepik and Ramu Rivers, supports what are potentially localised populations of this species. It is therefore inferred that the area supports a range of important ecological activities for this species, though further information is required to understand the nature and function of this aggregation.



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## Suggested citation

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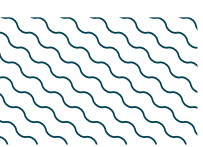
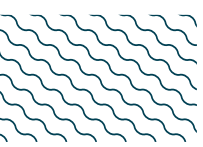
## QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
<b>RAYS</b>												
<i>Anoxypristis cuspidata</i>	Narrow Sawfish	CR	0-128	X						X		
<i>Pristis pristis</i>	Largetooth Sawfish	CR	0-60	X		X						

## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus amblyrhynchoides</i>	Graceful Shark	VU
<i>Carcharhinus leucas</i>	Bull Shark	VU
<i>Eusphyra blochii</i>	Winghead Shark	CR

*IUCN Red List of Threatened Species Categories are available by searching species names at [www.iucnredlist.org](http://www.iucnredlist.org) Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.*





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