

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

KINGMAN REEF ISRA

New Zealand & Pacific Islands Region

SUMMARY

Kingman Reef is located in the northernmost of the Line Islands in the northern-central Pacific Ocean. This area is remote and uninhabited, situated at 67 km northwest of the next closest island (Palmyra Atoll). Kingman Reef is a largely submerged triangular atoll with a benthos dominated by reef-building corals and crustose coralline algae. This area is part of the Pacific Remote Islands Marine National Monument of the United States of America. It overlaps one Ecologically or Biologically Significant Marine Area and two Key Biodiversity Areas. Within this area there are: **threatened species** and **undefined aggregations** (Grey Reef Shark *Carcharhinus amblyrhynchos*).

CRITERIA

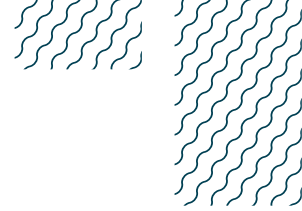
Criterion A - Vulnerability; Sub-criterion C5 - Undefined Aggregations

KINGMAN REEF

0-30 metres

43.04 km²





DESCRIPTION OF HABITAT

Kingman Reef is located in the northernmost of the Line Islands in the northern Pacific Ocean. This area is halfway between the Hawaiian Islands and American Samoa and lies 67 km northwest of the next closest island (Palmyra Atoll). The area is a largely submerged triangular atoll, with shallow (<2 m) reefs along the southern and northern sides that are connected by a deeper (>20 m) reef along the western terrace (Friedlander et al. 2010). The atoll lacks permanent emergent land, although two small rubble islands lie near the eastern ends of the shallow reefs. The forereef habitat is fairly consistent along the northern and southern coasts, beginning with a gradually sloping terrace extending 30-60 m from the reef crest with a drop-off beginning at ~20 m depth. The benthos of each habitat is dominated by reef-building corals and crustose coralline algae (Friedlander et al. 2010).

Kingman Reef is located in the Central Pacific high productivity zone, a large-scale oceanographic feature, comprising the western extent of flow from the Pacific South Equatorial Current. This westerly flowing cool upwelling tongue of water brings high nutrients to the surface waters of the central Pacific Ocean supporting high primary production (CBD 2024). Mean sea surface temperature is 27.9 °C and coral cover is 43.8% (Sandin et al. 2008). The oceanic primary productivity ranges between 147-445 mg C-m⁻²-day⁻¹ which represents one of the highest compared to other areas in the central-western Pacific (Nadon et al. 2012).

This area partly overlaps with the Equatorial High-Productivity Zone Ecologically or Biologically Significant Marine Area (EBSA; CBD 2024). It also overlaps with two Key Biodiversity Areas (KBA): Palmyra Atoll Marine (KBA 2024a) and Proposed Central Pacific World Heritage Site (KBA 2024b). This area overlaps with the Pacific Remote Islands Marine National Monument of the United States of America.

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 30 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A - VULNERABILITY

One Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occurs in the area. This is the Endangered Grey Reef Shark (Simpfendorfer et al. 2020).

SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Kingman Reef is an important area for undefined aggregations of one shark species.

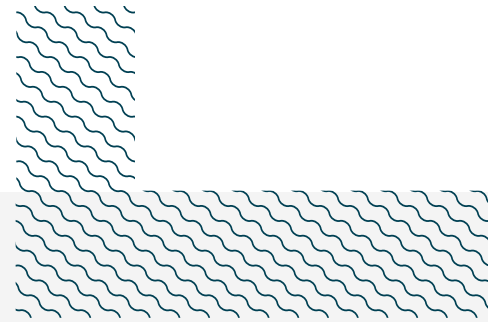
Between August-September 2005, two studies compared reef shark abundance in the Line Islands (i.e., Palmyra, Kingman, Tabuaeran, and Kiritimati atolls) using belt-transect dive surveys at shallow depths (2-12 m) (DeMartini et al. 2008; Sandin et al. 2008). These studies demonstrated that Kingman Reef had a higher abundance of reef sharks compared with Palmyra, Tabuaeran, and Kiritimati. Top predators dominated this area, where reef sharks contributed 74% to top predator biomass (329 g/m²) (Sandin et al. 2008). Sharks contributed 62% to total reef fish biomass in this area (DeMartini et al. 2008).

Between 2004–2010 in the central-western Pacific Ocean, reef sharks were recorded biennially around 46 US individual islands, atolls, and banks (i.e., Mariana, Hawaii, American Samoa, Wake, Phoenix, Jarvis, Johnston, and Line islands) on surveys (divers towed behind a boat) that each covered >0.01 km² on forereefs at 15–20 m of depth (Nadon et al. 2012). Sites were grouped in 15 locations according to their geographic proximity. Line Islands, where Kingman Reef is located, had the third highest abundance for all reef sharks (Line Islands = 4.5 individuals/0.01 km²; this area = 6.8 individuals/0.01 km²) in which the most observed species was the Grey Reef Shark (71% of all reef sharks).

Between August–September 2007, surveys (n = 135) were conducted on SCUBA around the entire area except for the western terrace which was too deep (>30 m) to survey (Friedlander et al. 2010). The Grey Reef Shark was the largest contributor to overall biomass among all habitats pooled at 10 m. This species accounted for 38% of the biomass on the forereef, 13% on the patch reefs, and 13% on the backreef (Friedlander et al. 2010). The Grey Reef Shark was the first-ranked species by weight, among all three depth strata on the forereef with the highest density at 20 m (1.68 t/ha). In this area, the Grey Reef Shark has an average of 38.5 (±73 SD) individuals per 0.01 km². In nine surveys, between 200–450 sharks per 0.01 km² were recorded. In 28, 11, and six surveys, 50, 100, and 150 individuals per 0.01 km² were recorded, respectively (Pristine Seas unpubl. data 2015). The contribution of the Grey Reef Shark ranged from 38% at 5 and 10 m to 56% at 20 m (Friedlander et al. 2010). Grey Reef Sharks (n = 105) measured in average 133 (±23 SD) cm TL with a range between 83–183 cm TL (Friedlander et al. 2010). Considering the size-at-maturity (120–142 cm TL for females, 130–145 cm TL for males; Ebert et al. 2021), most individuals were adults.

Diver spatial point count surveys (n = 154) were conducted between 2007–2015 in this area (Papastamatiou et al. 2017). The results showed that the greatest abundance of Grey Reef Sharks was located on the forereef (surveys = 86) with an average aggregation of 2.55 (±0.29 SD) and a maximum aggregation of 12 sharks.

The Grey Reef Shark is a highly social species, which aggregates by day in or near reef passes or lagoons, and becomes more active at night, when aggregations disperse (Ebert et al. 2021). However, more information is needed to determine the nature and function of their aggregations at Kingman Reef.



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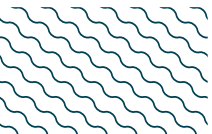
QUALIFYING SPECIES

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	
SHARKS													
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN	0-280	X							X		

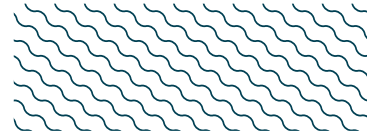
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
RAYS		
<i>Mobula birostris</i>	Oceanic Manta Ray	EN

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



SUPPORTING INFORMATION



There are additional indications that Kingman Reef is an important area for undefined aggregations of one shark and one ray species.

During diving surveys between August-September 2007 ($n = 135$) in the forereef of this area the Whitetip Reef Shark had an average of 6.7 (± 20 SD) individuals per 0.01 km². In 19 and four surveys, 50 and 100 individuals per 0.01 km² were recorded, respectively (Pristine Seas unpubl. data 2015). Whitetip Reef Sharks ($n = 26$) measured on average 128 (± 13 SD) cm TL with a range between 103-153 cm TL (Friedlander et al. 2010).

The Oceanic Manta Ray was the species with the highest total biomass on the backreef (26%) but was encountered infrequently (Friedlander et al. 2010). Oceanic Manta Rays accounted for 91% of the planktivore biomass (0.45 tonnes/hectare) on the backreef while present at only 25% of backreef stations and were not encountered in the other habitats. (Friedlander et al. 2010). During diving surveys between August-September 2007 ($n = 48$) in the backreef of this area, the Oceanic Manta Ray had an average of 4.2 (± 14 SD) individuals per 0.01 km². In four surveys, 50 individuals per 0.01 km² were recorded (Pristine Seas unpubl. data 2015).

Further information is needed to understand the importance of this area for the Whitetip Reef Shark and Oceanic Manta Ray.



REFERENCES

- Convention on Biological Diversity (CBD). 2024.** Equatorial High-Productivity Zone. Ecologically or Biologically Significant Areas (EBSAs). Available at: <https://chm.cbd.int/database/record?documentID=200049> Accessed July 2024.
- Ebert DA, Dando M, Fowler S. 2021.** *Sharks of the world: A complete guide*. Princeton: Princeton University Press.
- DeMartini EE, Friedlander AM, Sandin SA, Sala E. 2008.** Differences in fish-assemblage structure between fished and unfished atolls in the northern Line Islands, central Pacific. *Marine Ecology Progress Series* 365: 199–215. <https://doi.org/10.3354/meps07501>
- Friedlander AM, Sandin SA, DeMartini EE, Sala E. 2010.** Spatial patterns of the structure of reef fish assemblages at a pristine atoll in the central Pacific. *Marine Ecology Progress Series* 410: 219–231. <https://doi.org/10.3354/meps08634>
- Key Biodiversity Area (KBA). 2024a.** Palmyra Atoll Marine. Available at: <https://www.keybiodiversityareas.org/site/factsheet/31018> Accessed August 2024.
- Key Biodiversity Area (KBA). 2024b.** Proposed Central Pacific World Heritage Site. Available at: <https://www.keybiodiversityareas.org/site/factsheet/47242> Accessed August 2024.
- Nadon MO, Baum JK, Williams ID, Mcpherson JM, Zgliczynski BJ, Richards BL, Schroeder RE, Brainard RE. 2012.** Re-creating missing population baselines for Pacific reef sharks. *Conservation Biology* 26(3): 493–503. <https://doi.org/10.1111/j.1523-1739.2012.01835.x>
- Papastamatiou YP, Bodey TW, Friedlander AM, Lowe CG, Bradley D, Weng K, Bradley D, Weng K, Priestley V, Caselle JE. 2017.** Spatial separation without territoriality in shark communities. *Oikos* 127(6): 767–779. <https://doi.org/10.1111/oik.04289>
- Sandin SA, Smith JE, DeMartini EE, Dinsdale EA, Donner SD, Friedlander AM, Konotchick T, Malay M, Maragos JE, Obura D, et al. 2008.** Baselines and degradation of coral reefs in the Northern Line Islands. *PLoS ONE* 3: e1548. <https://doi.org/10.1371/journal.pone.0001548>
- Simpfendorfer C, Fahmi, Bin Ali A, Dharmadi, Utzurrum JAT, Seyha L, Maung A, Bineesh KK, Yuneni RR, Sianipar A, et al. 2020.** *Carcharhinus amblyrhynchos*. *The IUCN Red List of Threatened Species* 2020: e.T39365A173433550. <https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T39365A173433550.en>