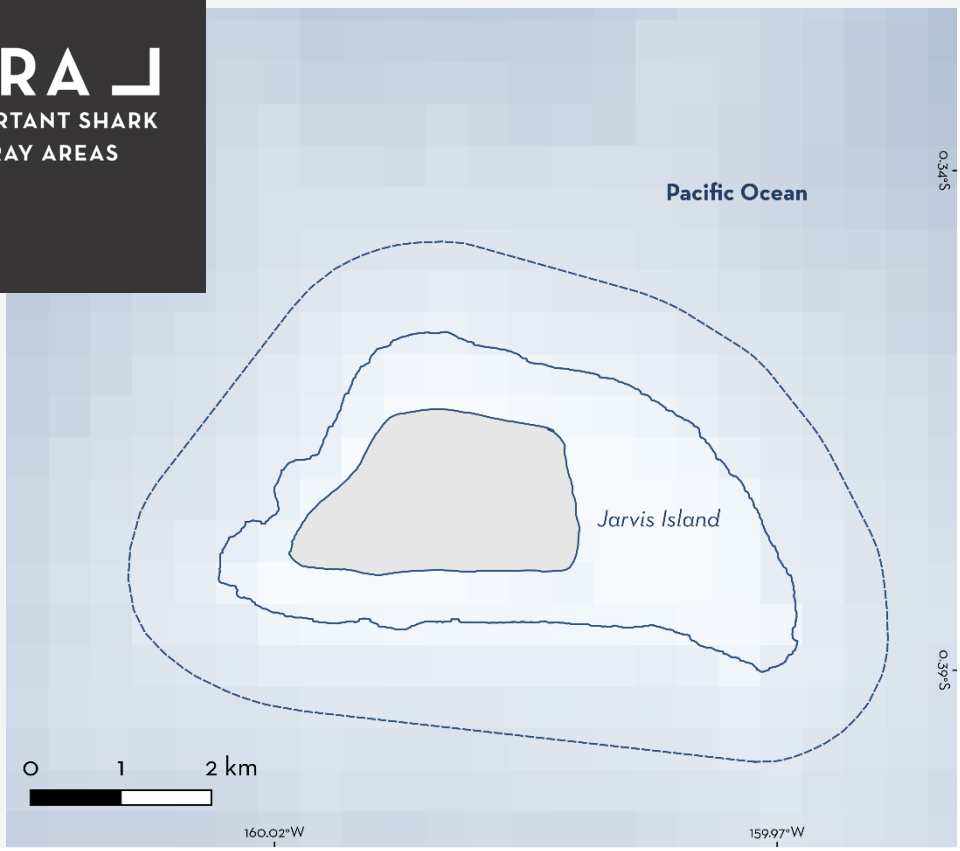
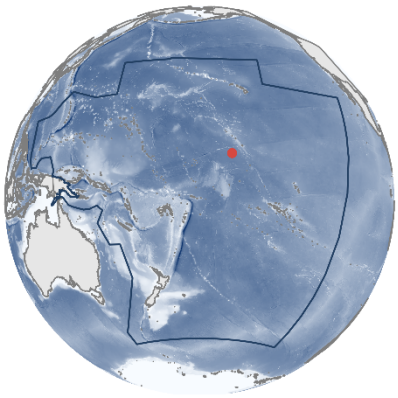
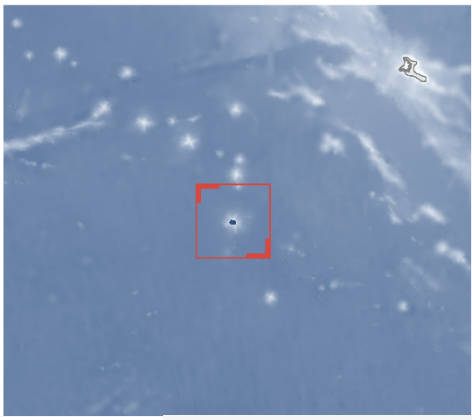
ISRA
IMPORTANT SHARK AND RAY AREAS







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

JARVIS ISLAND ISRA

New Zealand & Pacific Islands Region

JARVIS ISLAND

0–330 metres

10.58 km²

SUMMARY

Jarvis Island is located in the central equatorial Pacific Ocean. It forms part of the Line Islands linear volcanic chain and is a territory of the United States of America. The shallow marine benthic habitats around Jarvis Island consist of a fringing reef with shallow backreefs, a steep forereef, and a moderately-sized reef terrace. The area overlaps with the Jarvis Island National Wildlife Refuge and is part of the Pacific Remote Islands Marine National Monument. Within this area there are: **threatened species** (e.g., Scalloped Hammerhead *Sphyrna lewini*) and **undefined aggregations** (e.g., Grey Reef Shark *Carcharhinus amblyrhynchos*).

CRITERIA

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

DESCRIPTION OF HABITAT

Jarvis Island is located in the central equatorial Pacific Ocean and is a territory of the United States of America. It is part of the Pacific Remote Island Areas (PRIA) and forms part of the Line Islands linear volcanic chain (Brainard et al. 2019). It is an uninhabited crest of an ancient coral reef cap and a large underlying extinct volcano, situated 733 km from Palmyra Atoll (Brainard et al. 2019). The centre of Jarvis Island is a dried former lagoon where deep guano deposits have accumulated. The shallow benthic habitats around Jarvis Island consist of a fringing reef with shallow backreefs, a steep forereef, and a moderately-sized reef terrace on the eastern windward side of the island (Brainard et al. 2019). The marine ecosystem surrounding the island is exceptionally productive due to the combined effects of wind-driven equatorial upwelling and topographic upwelling of the eastward-flowing Equatorial Undercurrent as it encounters the western submerged flanks of the island. Both forms of upwelling introduce cool, nutrient-rich waters to the relatively shallow euphotic zone where photosynthesis drives high levels of biological productivity for the coral reef ecosystem (Brainard et al. 2019). Such productivity has been indicated as a key driver of higher shark density (Nadon et al. 2012).

The area overlaps with the Jarvis Island National Wildlife Refuge and the Pacific Remote Islands Marine National Monument (UNEP-WCMC & IUCN. 2024).

This Important Shark and Ray Area is benthic and pelagic and is delineated from inshore and surface waters (0 m) to 330 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

Five Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. Threatened sharks comprise one Critically Endangered species, two Endangered species, and one Vulnerable species; threatened rays comprise one Endangered species (IUCN 2024).

SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

Jarvis Island is an important area for undefined aggregations of four shark and one ray species.

Aggregations of Grey Reef Sharks, Blacktip Reef Sharks, Scalloped Hammerheads, Whitetip Reef Sharks, and Oceanic Manta Rays were recorded on historical and contemporary towed-diver surveys (TDS) and stationary point count (SPC) surveys conducted around the island. The TDS method involved two divers being towed behind a boat (~2.2 km track). The diver at ~15 m depth recorded the number, size (TL), and species of all fishes measuring >50 cm total length (TL) within a 20,000 km^2 area (Brainard et al. 2019). The SPC method involved two divers counting fish in 15-meter-diameter plots each, covering smaller areas (~350–600 m^2). The SPC survey is a comprehensive small-scale survey approach, thus, aggregations, and rare and patchily distributed species are not well surveyed (Brainard et al. 2019). Between 2008–2017, Jarvis Island reef fishes were surveyed on six occasions (2008, 2010, 2012, 2015, 2016 [only SPC], and 2017) (Brainard et al. 2019).

Baited Remote Underwater Video Station (BRUVS) surveys were deployed in 18 nations including 58 sites as part of the Global FinPrint project between 2010–2018 (Simpfendorfer et al. 2023). Deployments covered 117 individual reefs. The MaxN (maximum number of individuals of a species

observed in a single frame) of all Pacific sites combined was 1.8 shark and ray per hour, which ranged by site from 0 (Molokai Island, Hawaii) to 10.1 (Jarvis Island) (Cramp 2021).

Grey Reef Sharks were the most observed shark species around Jarvis Island, seen in all TDS, except in 2012 when the species was present in 89% of surveys (Brainard et al. 2019). In 2008, 17 TDS were conducted, and five aggregations of 4–10 Grey Reef Sharks (average = 5.4 individuals, ranging 100–120 cm total length [TL]) were reported within the transect area. In 2010, 10 TDS were conducted, and 11 aggregations of 4–10 Grey Reef Sharks (average = 5.8 individuals, ranging 105–170 cm TL) were reported. In 2012, nine TDS were conducted, and seven aggregations of 4–5 Grey Reef Sharks (average = 4.1 individuals, ranging 110–140 cm TL) were reported (CREP & PIFSC 2017a). In 2015, six TDS were conducted, 13 aggregations of 3–35 Grey Reef Sharks (average = 7 individuals, ranging 90–130 cm TL) were reported (CREP & PIFSC 2017b). In 2017, five TDS were conducted, and 15 aggregations of 3–11 Grey Reef Sharks (average = 4.2 individuals, ranging 60–140 cm TL) were reported (CREP & PIFSC 2017c). In SPC surveys, Grey Reef Sharks were present all years and aggregations were reported in 2010 (n = 12, 3–12 individuals, 80–170 cm TL), 2012 (n = 11, 3–10 individuals, 100–160 cm TL), 2015 (n = 7, 3–6 individuals, 110–135 cm TL), 2016 (n = 3, 4–7 individuals, 120–165 cm TL), 2017 (n = 2, 3 individuals, 95–140 cm TL). In May 2016, a total of 49 BRUVS deployments were conducted at Jarvis Island. Grey Reef Sharks were present in 45 deployments with aggregations of up to 19 individuals observed in a single frame (average MaxN = 7.8) (Simpfendorfer et al. 2023). Grey Reef Sharks within aggregations in the area ranged in size from 60–165 cm TL. Considering their size-at-maturity (120–145 cm TL; Ebert et al. 2021), the depth range of the Grey Reef Shark, the coral reef association, and the estimated 6.2 km^2 (1.4–10.8 km^2) home range (Bonnin et al. 2021), aggregations of YOY and juveniles in the area support the critical importance of the area for the reproductive success of Grey Reef Sharks. However, further information is required to understand the timing of pupping in the area as all surveys were conducted between March and May (CREP & PIFSC 2017a, 2017b, 2017c, 2017d, 2017e, 2017f).

Blacktip Reef Sharks were present in 53% of 17 TDS conducted in 2008, including two aggregations of three sharks (100 cm TL) and one of seven sharks (100 cm TL) (CREP & PIFSC 2017a). In 2010, Blacktip Reef Sharks were present in 80% of 10 TDS, including two aggregations of three sharks (140—160 cm TL) and one of five sharks (140—150 cm TL) (CREP & PIFSC 2017a). In 2015, Blacktip Reef Sharks were present in 100% of six TDS, and one aggregation of three sharks (110 cm TL) was recorded (CREP & PIFSC 2017b). Although present in 44% and 80% of TDS in 2012 (n = 9 TDS) and 2017 (n = 5 TDS), respectively, no aggregation was recorded (CREP & PIFSC 2017a, 2017c). In May 2016, a total of 49 BRUVS deployments were conducted at Jarvis Island. Blacktip Reef Sharks were present in 31 deployments with up to three individuals observed in a single frame (average MaxN = 1.3) (Simpfendorfer et al. 2023). Blacktip Reef Sharks maturity is reached between 90–112 cm TL (Ebert et al. 2021) indicating that animals sighted are adults.

From 2000–2009, TDS and Belt-Transect Surveys were conducted at 40 Pacific Islands under US jurisdiction within four geographic regions: American Samoa, the Hawaiian Archipelago, the Mariana Archipelago, and the Pacific Remote Island Areas (PRIA). Scalloped Hammerheads were rare throughout all islands but observed in the greatest density in the PRIA at 0.16 individuals km^{-2} (95 % CI 0, 0.46; Zgliczynski et al. 2013). The only aggregations (>3 individuals) within the transects were recorded at Jarvis Island (n = 3 [2004, 2006, 2008]) ranging from 3–16 individuals (average = 11), and Baker Island (n = 2 [2006, 2008]) ranging from 7–15 individuals (CREP & PIFSC 2017a). Although present in 11% of TDS in 2012 (n = 9) and 17% in 2015 (n = 6), the maximum number of Scalloped Hammerheads, within the transect area, was one. In SPC surveys, Scalloped Hammerheads were only absent in 2008 and 2010 and the maximum number per survey was two. In 2016, one aggregation of over 100 Scalloped Hammerheads was recorded off-transect after an SPC survey in the area (K McCoy pers. obs. 2024).

A total of 49 BRUVS deployments were conducted in May 2016 at Jarvis Island. Scalloped Hammerheads were present in three deployments with up to 10 individuals observed in a single frame (average MaxN = 4; Simpfendorfer et al. 2023). The same surveys were conducted at an additional 57 areas in the New Zealand & Pacific Islands Region and Scalloped Hammerheads were only recorded in six of those 57 areas (average MaxN = 2.6). Between 2008–2017 the only year the species was not recorded in the transect areas by Coral Reef Ecosystem Program (CREP) and Pacific Reef Assessment and Monitoring Program (PRAMP) was 2010. Adult Scalloped Hammerheads form daytime aggregations that are generally associated with islands and seamounts (Ketchum et al. 2014). All surveys were conducted between March–May. Further information is required to understand the timing and purpose of aggregations in the area.

Whitetip Reef Sharks were present in 82% of 17 TDS conducted in 2008, and six aggregations (3–9 individuals, 75–150 cm TL) were reported (CREP & PIFSC 2017a). In 2010, Whitetip Reef Sharks were present in all 10 TDS conducted and five aggregations of 3–7 individuals (95–140 cm TL) were reported (CREP & PIFSC 2017a). Although reported in TDS from 2012, 2015, and 2017, no aggregations were reported within the survey area (CREP & PIFSC 2017a, 2017b, 2017c). In SPC surveys, Whitetip Reef Sharks were present all years and one aggregation of seven individuals (130–145 cm TL) was reported in 2016. In May 2016, a total of 49 BRUVS deployments were conducted at Jarvis Island. Whitetip Reef Sharks were present in 33 deployments with up to 18 individuals observed in a single frame (average MaxN = 1.8) (Simpfendorfer et al. 2023).

Oceanic Manta Rays were present in 80% of 10 TDS conducted in 2010, and two aggregations of three individuals (270–280 cm TL) were reported (CREP & PIFSC 2017a). In 2015, Oceanic Manta Rays were present in 67% of six TDS conducted, and two aggregations of four individuals (180–220 cm TL) were reported (CREP & PIFSC 2017b). In 2017, five TDS were conducted and one aggregation of three individuals was recorded (190–210 cm TL). Although recorded in TDS in 2008 (n = 17 TDS) and 2012 (n = 9 TDS), there were no aggregations in the survey area (CREP & PIFSC 2017a, 2017b). In SPC surveys, two aggregations were reported, one of 10 individuals (250 cm TL) in 2015, and another of three individuals in 2017 (190–210 cm TL). In 2016, an aggregation of more than eight animals was observed surface feeding (K McCoy pers. obs. 2024). More information is needed to understand the function and seasonality of these aggregations.

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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												
Carcharhinus amblyrhynchos	Grey Reef Shark	EN	0–280	X						X		
Carcharhinus melanopterus	Blacktip Reef Shark	VU	0–100	X						X		
Sphyrna lewini	Scalloped Hammerhead	CR	0–1,043	X						X		
Triaenodon obesus	Whitetip Reef Shark	EN	0–330	X						X		
RAYS												
Mobula birostris	Oceanic Manta Ray	EN	0–1,246	X						X		

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
RAYS		
Taeniurops meyeni	Blotched Fantail Ray	VU

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.

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