

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

FRENCH FRIGATE SHOALS-LALO ISRA

New Zealand & Pacific Islands Region

SUMMARY

French Frigate Shoals-Lalo is located in the southern part of the Northwestern Hawaiian Islands of the United States of America. It is the largest atoll of this Hawaiian region and consists of a crescent-shaped reef surrounding a shallow lagoon exposed to open ocean in the west side. The area includes multiple islets, some of which are submerged constantly. The area overlaps with the Northwestern Hawaiian Islands Key Biodiversity Area and the Papahānaumokuākea Marine National Monument. Within this area there are: **threatened species** (e.g., Grey Reef Shark *Carcharhinus amblyrhynchos*); **feeding areas** (e.g., Tiger Shark *Galeocerdo cuvier*); and **undefined aggregations** (e.g., Galapagos Shark *Carcharhinus galapagensis*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C2 - Feeding Areas;
Sub-criterion C5 - Undefined Aggregations

HAWAII

0-60 metres

818.1 km²



DESCRIPTION OF HABITAT

French Frigate Shoals-Lalo is located in the southern part of the Northwestern Hawaiian Islands of the United States of America. It is the largest atoll of this Hawaiian region and sits ~900 km from O'ahu. The atoll consists of a crescent-shaped reef (~30 km) with multiple sandy islets and one pinnacle (Dale et al. 2011). Tern, East, and Trig are the largest islands in the area and the latter two have mostly washed away. La Perouse Pinnacle is a volcanic rock that stands ~35 m tall and is surrounded by coral reefs. Other important sandy islands, islets, and shoals in the area are Whale, Skate (previously one island with Whale but separated after a part of it was submerged), Disappearing, Gin, Little Gin, Near, Mullet, Bare, Shark, and Round). The barrier reef surrounds a 12 km wide, shallow (<25 m deep) lagoon open and exposed to the open ocean on the western side. Forereefs are characterised by spur and groove formations extending from the barrier to depths of 20–30 m where the habitat changes to sandy and reef patches substrates (Blandino 2021). The shelf around the atoll is narrow and gradually descends to 100 m depth. Inside the lagoon, sandy and coral rubble substrates are the most common with ribbon and patch reefs. Sandy islets are important nesting and haul-out sites for seabirds, sea turtles, and marine mammals (e.g., seals) during boreal summer. Sea surface temperatures range from ~23°C in the winter to 27°C in the summer (Desch et al. 2009).

The area overlaps with the Northwestern Hawaiian Islands Key Biodiversity Area (KBA 2024) and the Papahānaumokuākea 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 60 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

Three Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. These are the Endangered Grey Reef Shark (Simpfendorfer et al. 2020) and Sandbar Shark (Rigby et al. 2021b); and the Vulnerable Blacktip Shark (Rigby et al. 2021a).

SUB-CRITERION C2 – FEEDING AREAS

French Frigate Shoals-Lalo is an important feeding area for two shark species.

Galapagos Sharks commonly feed on Hawaiian Monk Seal *Monachus schauinslandi* pups mostly during the seven weeks between birth and weaning that commonly occurs in March and April according to direct observations (Johanos et al. 1994; Lowe et al. 2006; Gobush 2010; Baker et al. 2020; Johanos 2020). Beach surveys have been conducted since the early 1980s to monitor seal populations in the North Hawaiian Islands and these data revealed that predation from Galapagos Sharks started to become common in the mid-1990s at Whaleskate Island that held the largest abundance of seal pups (Baker et al. 2020). By 2000, Whaleskate Island was totally submerged and predation increased in Trig Island and started to expand to all other small islands in French Frigate Shoals-Lalo, mostly to East and Gin Islands. Monitoring of 68 Galapagos Sharks tagged with acoustic transmitters between 2008–2010 showed that individuals heavily use shallow lagoon habitats during April around these islands (Blandino 2021). In 2018, Trig and East islands were also submerged but Galapagos Shark predation on seal pups was still observed at the other islands. Between 2018–2019,

from 25 dead pups sampled, 16 were due to Galapagos Shark predation (Baker et al. 2020). Galapagos Shark feeding on Monk Seal pups has not been reported for any other of the North Hawaiian Islands and can represent between 15–30% of total mortality for seal pup populations in the French Frigate Shoals-Lalo (Gobush 2010; Baker et al. 2020; Johanos 2020).

Based on direct observations and stomach content analysis ($n = 5$), it has been reported that Tiger Sharks feed on birds in the area, mostly on Laysan Albatross *Phoebastria immutabilis* during the fledging season, and this has regularly occurred since the 1970s (Papastamatiou et al. 2006; Lowe et al. 2006; Meyer et al. 2010; Dale et al. 2011; Blandino 2021). Based on acoustic telemetry of 61 Tiger Sharks monitored between 2000–2003 ($n = 13$) and 2008–2010 ($n = 48$), individuals were detected at East, Trig, Gin, Round, Shark, and Tern Islands (Lowe et al. 2006; Meyer et al. 2010; Blandino 2021). Tiger Sharks were detected throughout the year, but aggregation clusters and a higher site fidelity was found in shallow lagoon habitats around islands (mainly around East Island) during June and July which overlaps the fledging season for albatrosses (Lowe et al. 2006; Meyer et al. 2010; Blandino 2021). Laysan Albatross use French Frigate Shoals-Lalo as a breeding area from October–July and this is one of the main breeding sites for these species in the Northwestern Hawaiian Islands (Arata et al. 2009). Breeding adults and sub-adults arrive around October to the area and leave it around July along with hatch-year birds. Eggs start hatching around December–January and after one month, adults start to make foraging trips and come back to the area to feed the chicks (Arata et al. 2009). Chick-rearing season runs from February–June when chicks start to fledge (Arata et al. 2009). Predictable shark foraging migrations to the area are consistent with the feeding behaviour reported for the species around the globe and in other areas in the Northern Hawaiian Islands (e.g., Kure Atoll; Heithaus et al. 2007; Werry et al. 2014). Satellite-tagged individuals have shown that some Tiger Sharks leave French Frigate Shoals-Lalo in mid-July when the fledging season is over to areas around the Main Hawaiian Islands, including late-stage pregnant females that go there to pup (Meyer et al. 2010; Papastamatiou et al. 2013).

SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

French Frigate Shoals-Lalo is an important area for undefined aggregations for five shark species.

Fishing surveys (2008–2010 with bottom longlines) and monitoring with acoustic telemetry of 24 Grey Reef Sharks (29 tagged) and 68 Galapagos Sharks (82 tagged) between 2008–2010 showed that both species form assemblages in different habitats along French Frigate Shoals-Lalo (Dale et al. 2011, Blandino 2021). Grey Reef Sharks had a higher fidelity to forereef habitats while Galapagos Sharks to deep lagoon habitats. However, both species had a high seasonal overlap in habitat use in forereef (winter months), deep lagoon and shallow lagoon habitats, where they also exhibited the same diurnal activity patterns (Dale et al. 2011; Blandino 2021). Further, both species also form assemblages with Blacktip Sharks, Sandbar Sharks, and Tiger Sharks in deep lagoon habitats (Dale et al. 2011). Of 221 sharks caught with bottom longlines between May–August 2009, Galapagos Sharks had the highest relative abundance ($n = 80$; 36.2%), followed by Grey Reef Sharks ($n = 57$; 25.8%), Tiger Sharks ($n = 45$; 20.4%), Sandbar Sharks ($n = 23$; 10.4%), and Blacktip Sharks ($n = 9$; 4.1%; Dale et al. 2011). Blacktip Sharks were not captured in forereefs while Sandbar Sharks were not caught in shallow lagoon habitats.

These species were also observed in French Frigate Shoals-Lalo during baited remote underwater video station (BRUVS) surveys conducted between 2012–2014 (Asher et al. 2017), in stationary point count surveys, and towed dive surveys conducted in the area between 2000–2016 (CREP-PIFSC 2017a, 2017b; ESD-PIFSC 2018, 2019). The five species have been reported to commonly co-occur in mesophotic zones (30–100 m) in the Northwestern Hawaiian Islands, including French Frigate Shoals-Lalo, with Galapagos Sharks and Grey Reef Sharks having the highest relative abundances among all

shark species (Asher et al. 2017, 2019). The continuous presence of the five species confirms their regular and contemporary occurrence of the assemblage in the area. Additional information is needed to confirm the nature of these aggregations.

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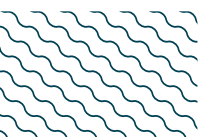
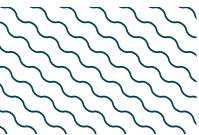
QUALIFYING SPECIES

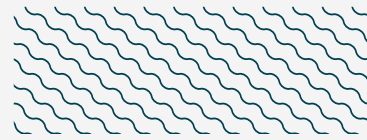
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN	0-280	X						X		
<i>Carcharhinus galapagensis</i>	Galapagos Shark	LC	0-528				X			X		
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X						X		
<i>Carcharhinus plumbeus</i>	Sandbar Shark	EN	0-280	X						X		
<i>Galeocerdo cuvier</i>	Tiger Shark	NT	0-1,275				X			X		

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Triaenodon obesus</i>	Whitetip Reef Shark	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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