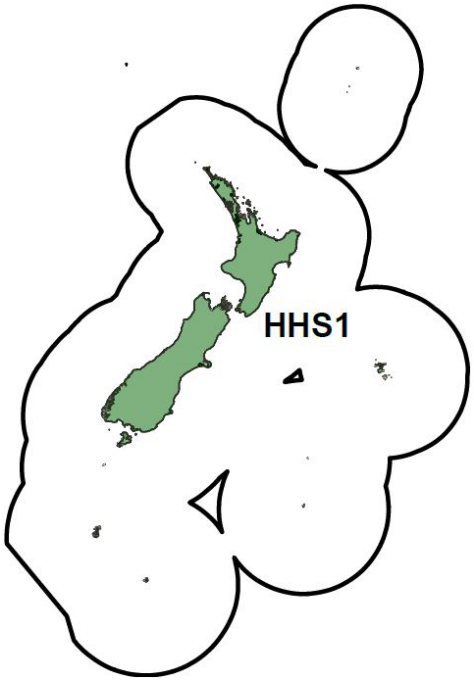
SMOOTH HAMMERHEAD SHARK (HHS)

(*Sphyrna zygaena*)



1. FISHERY SUMMARY

Smooth hammerhead sharks (*Sphyrna zygaena*) are not currently managed under the QMS. No assigned fishing allowances exist. However, as hammerhead shark has been listed as an Appendix II species under CITES it is appropriate to include it in this document.

The Western and Central Pacific Fisheries Commission (WCPFC) has listed hammerhead sharks (as a group) as a key shark species, and the management of smooth hammerhead sharks throughout the western and central Pacific Ocean (WCPO) is the responsibility of the WCPFC. As such, New Zealand (which is a signatory to the WCPFC) is responsible for ensuring that the management measures applied within New Zealand fisheries waters are compatible with or better than those of the Commission, and that our data collection requirements will allow New Zealand to report catches of hammerhead sharks as required.

1.1 Commercial fisheries

There are no target fisheries for hammerhead sharks in New Zealand. However, they are caught as bycatch in several commercial fisheries within New Zealand fishery waters.

The majority of small hammerhead sharks are caught in inshore set net and bottom longline fisheries. The distribution of hammerhead shark catches around New Zealand from 1 Dec 1989–30 June 2013 is shown in Figure 1 and 2. A small number of large hammerheads are caught as bycatch in the surface longline fisheries targeting highly migratory species. Surface longline fishing effort is mainly distributed along the east coast of the North Island and the south-west coast South Island. The west coast South Island fishery predominantly targets southern bluefin tuna (*Thunnus maccoyii*) and rarely catches hammerhead sharks, whereas the fishery off the east coast of the North Island targets a range of species including bigeye tuna (*Thunnus obesus*), swordfish (*Xiphias gladius*), and southern bluefin tuna. It is unknown what proportion of hammerhead sharks are released alive from the surface longline fishery.

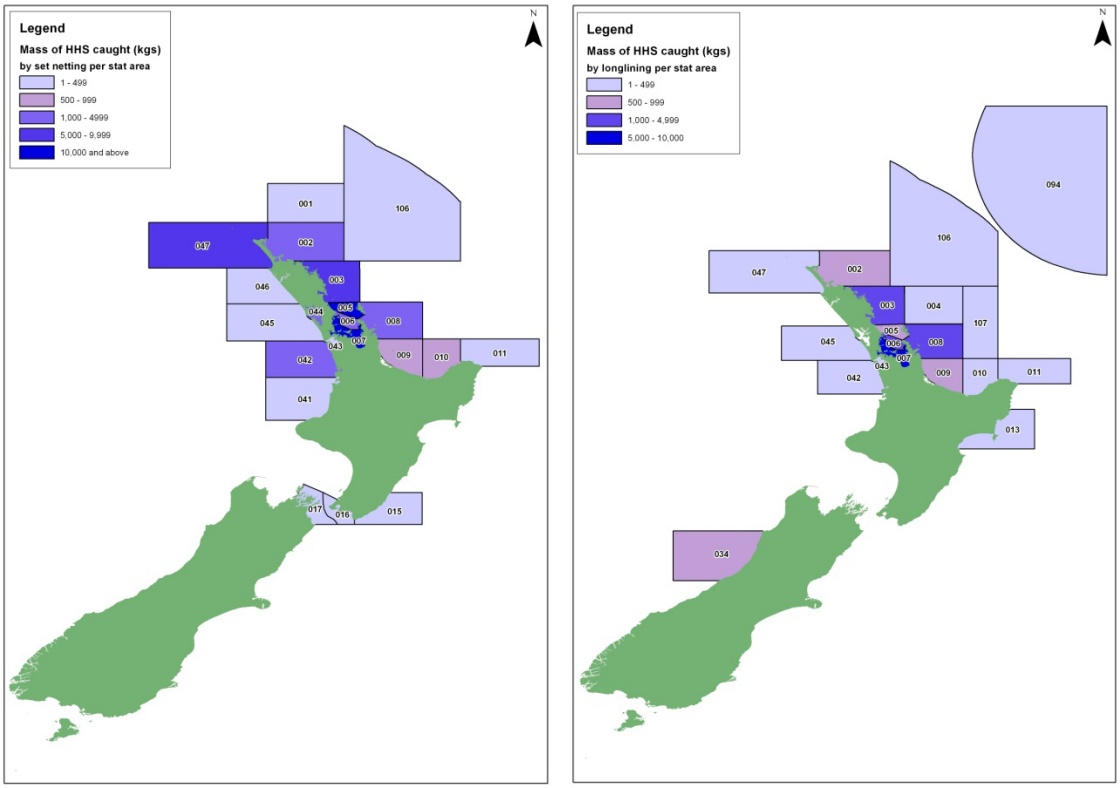


Figure 1: Mass of hammerhead sharks per statistical area caught by set net [left] and longline [right] fisheries. These maps have been produced using data extracted from the catch and effort database. HHS data from 1 Dec 1989–30 June 2013 have been mapped. Only captures where the primary method was set net or longline are included. Data were plotted using the fishing event start position. If no statistical area was supplied, then it was derived using the latitude and longitude. Only records that reported the weight of HHS have been mapped (if no weight was reported, then this is not included on the map).

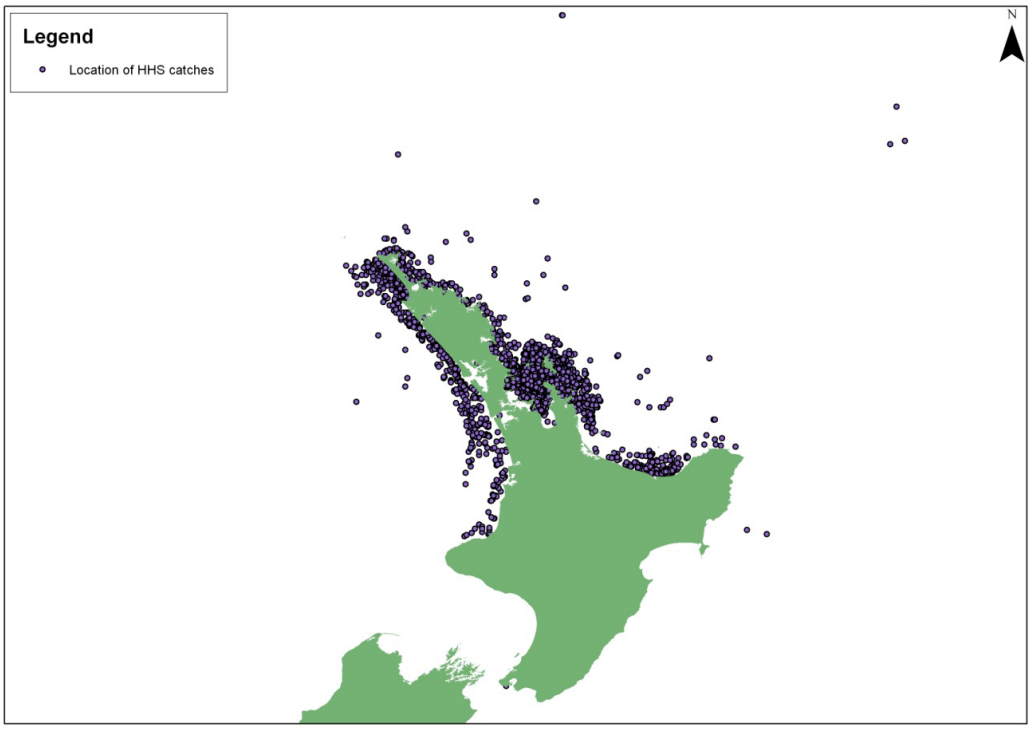


Figure 2: Location of hammerhead shark catches throughout the New Zealand Exclusive Economic Zone. This map has been produced using data extracted from the catch and effort database. HHS data from 1 Dec 1989–30 June 2013 have been mapped. Data were mapped using the fishing event start position. Only records that reported by latitude and longitude have been included.

1.2 Recreational fisheries

Hammerhead sharks are rarely targeted by recreational fishers. There may be considerable cryptic bycatch of juveniles in recreational set nets.

Recreational catch estimates are available from three national panel surveys. They are caught around the upper North Island, with harvest by area in 2017–18 being: Fishery Management Area (FMA) 1 (83.5%) and FMA 9 (16.5%). In 2022-23 all harvest was reported from FMA 1.

1.2.2 Estimates of recreational harvest

Recreational catch estimates are available from national panel surveys conducted in the 2011–12 fishing year (Wynne-Jones et al. 2014) and the 2017–18 fishing year (Wynne-Jones et al. 2019). The panel surveys used face-to-face interviews of a random sample of New Zealand households to recruit a panel of fishers and non-fishers for a full year. The panel members were contacted regularly about their fishing activities and catch information collected in standardised phone interviews. Note that the national panel survey estimates include harvest taken on recreational charter vessels, but for hammerhead sharks the survey is unlikely to estimate this proportion of the catch well. The national panel survey was repeated during the 2017–18 and 2022–23 fishing years using very similar methods to produce directly comparable results (Wynne-Jones et al. 2019; Heinemann & Gray 2024). Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals.

The national panel survey harvest estimate was 1429 fish (CV 0.34), 1158 fish (CV 0.46) and 533 fish (CV 0.55) for the 2011–12, 2017–18 and 2022–23 fishing years, respectively.

1.3 Customary non-commercial fisheries

There is no customary non-commercial fishery for hammerhead shark.

1.4 Unreported catch

There is no known unreported catch of hammerhead shark.

1.5 Other sources of mortality

The proportion of sharks discarded dead is unknown. Mortality rates of hammerhead sharks tagged and released by the New Zealand Gamefish Tagging Programme are also unknown.

2. BIOLOGY

Only one species of hammerhead shark (*Sphyrna zygaena*) has been recorded in New Zealand waters. Several tropical and subtropical species occur in Australia and the South Pacific Ocean and these may occasionally visit New Zealand.

Juvenile *S. zygaena* are common in shallow coastal waters of the northern North Island but are rare further south. Coastal waters appear to serve as a nursery for this species, with highest concentrations occurring in the Firth of Thames, Hauraki Gulf, eastern Bay of Plenty, and Ninety Mile Beach. Other areas are probably also important (e.g., Kaipara Harbour and Manukau Harbour) but data to confirm this are sparse.

Length frequency data from research trawl surveys showed that newborn young first occur in coastal waters during summer at a total length (TL) of around 60 cm. These young grow to about 70 cm by the following spring. Larger sharks up to 150 cm probably represent the 1+ and 2+ age classes (Francis 2016). Aerial survey observations indicate that juveniles of 150–200 cm total length are abundant off the west coast of the North Island.

The habitat of adult hammerheads is unknown. However, a shark tagged in the outer Hauraki Gulf in 2011 was recaptured in Tonga, about 2225 km away. At recapture, it measured 229 cm fork length

(about 285 cm TL) and weighed 85 kg and was probably mature (Francis 2016). Elsewhere in the world, large *S. zygaena* have been recorded travelling 1000 km or more, so they are probably much more mobile than juveniles.

Although few data are available on the smooth hammerhead's life-history characteristics, it is a large hammerhead shark and presumably at least as biologically vulnerable as the scalloped hammerhead shark (*Sphyrna lewini*) (Casper et al. 2005). Preliminary, unvalidated studies of age and growth in the Atlantic Ocean suggest that *S. zygaena* can live for 20–25 years (Coelho et al. 2011, Rosa et al. 2015).

3. STOCKS AND AREAS

Genetic studies show that there is significant population structuring of this species among ocean basins, and in some cases within ocean basins (e.g., between the south-west and south-east Pacific Ocean); however there is no genetic structuring between New Zealand and Australia, suggesting the existence of gene flow across the Tasman Sea (Hernandez 2013).

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

Smooth hammerhead sharks are primarily taken as non-target catch in set net and bottom longline fisheries. Please refer to those fisheries for environmental and ecosystem considerations.

4.1 Role in the ecosystem

The smooth hammerhead shark (*Sphyrna zygaena*) is found worldwide in temperate and tropical seas (Casper et al. 2005). It is coastal-pelagic and semi-oceanic and occurs on the continental shelf, to 200 m depth (Ebert 2003). The smooth hammerhead is an active-swimming predator, predominantly feeding on squid and teleosts (Casper et al. 2005). Based on specimens caught by recreational anglers off New South Wales, Australia, Stevens (1984) reported that 76% of specimens with food in their stomachs contained squid and 54% teleosts.

5. STOCK ASSESSMENT

There is insufficient information with which to conduct a stock assessment of hammerhead sharks.

5.1 Estimates of fishery parameters and abundance

No estimates of fisheries parameters or abundance are available for this species.

5.2 Biomass estimates

No estimates of biomass are available for this species.

5.3 Yield estimates and projections

Yield estimate and projections have not been estimated for *S. zygaena.*

6. RESEARCH NEEDS

The key research needs are to determine the link between the New Zealand stock and the wider Pacific stock, and to assess the trends in the stock status for this species.

7. STATUS OF THE STOCKS

Hammerhead sharks in New Zealand are likely to be part of a wider south-western Pacific Ocean stock. The text below relates only to the New Zealand component of that stock.

Stock Status		
Most Recent Assessment Plenary Publication Year	No assessment	
Intrinsic productivity level	Medium	
Catch in most recent year of assessment	Year:	Catch:
Assessment Runs Presented	-	
Reference Points	Target: Not established Soft Limit: Not established by WCPFC; but HSS default of 20% SB_0 assumed Hard Limit: Not established by WCPFC; but HSS default of 10% SB_0 assumed Overfishing threshold: Not established	
Status in relation to Target	Unknown	
Status in relation to Limits	Unknown	
Status in relation to Overfishing	Unknown	

Historical Stock Status Trajectory and Current Status
-

Fishery and Stock Trends	
Recent trend in Biomass or Proxy	Unknown
Recent trend in Fishing Intensity or Proxy	Unknown
Other Abundance Indices	Unknown
Trends in Other Relevant Indicators or Variables	Unknown

Projections and Prognosis	
Stock Projections or Prognosis	Unknown
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Soft Limit: Unknown Hard Limit: Unknown
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Unknown

Assessment Methodology and Evaluation		
Assessment Type	-	
Assessment Method	-	
Assessment Dates	Latest assessment Plenary publication year: N/A	Next assessment: None planned
Overall assessment quality rank	-	
Main data inputs (rank)	-	-
Data not used (rank)	-	-
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments
This fishery is largely a bycatch fishery.

8. FOR FURTHER INFORMATION

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Ebert, D A (2003) *The sharks, rays and chimaeras of California*. University of California Press.

Francis, M (2010) Review of research data on hammerhead sharks (*Sphyrna zygaena*). Final Research Report for Ministry of Fisheries project IPA2009-01. 8 p. (Unpublished report held by Fisheries New Zealand, Wellington.)

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Wynne-Jones, J; Gray, A; Heinemann, A; Hill, L; Walton, L. (2019) National Panel Survey of Marine Recreational Fishers 2017–18. *New Zealand Fisheries Assessment Report 2019/24*. 104 p.