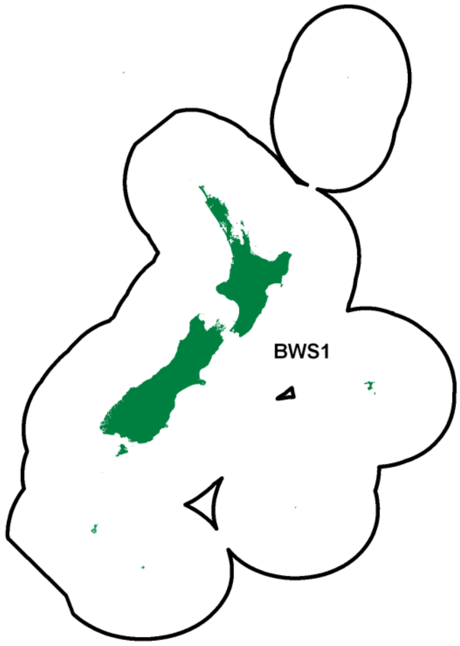
BLUE SHARK (BWS)

(*Prionace glauca*)



1. FISHERY SUMMARY

Blue shark was introduced into the QMS on 1 October 2004 under a single QMA, BWS 1, with allowances, TACC, and TAC in Table 1.

Table 1: Recreational and Customary non-commercial allowances, other mortalities, TACC and TAC (all in tonnes) for blue shark.

Fishstock	Recreational Allowance	Customary non-commercial Allowance	Other mortality	TACC	TAC
BWS 1	20	10	190	1 860	2 080

Blue shark was added to the Third Schedule of the 1996 Fisheries Act with a TAC set under s14 because blue shark is a highly migratory species and it is not possible to estimate MSY for the part of the stock that is found within New Zealand fisheries waters.

Blue shark was also added to the Sixth Schedule of the 1996 Fisheries Act with the provision that:

> "A commercial fisher may return any blue shark to the waters from which it was taken from if –
> (a) that blue shark is likely to survive on return; and
> (b) the return takes place as soon as practicable after the blue shark is taken."

The conditions of Schedule 6 releases have been amended for mako, porbeagle, and blue shark. From 1 October 2014, fishers have been allowed to return these three species to the sea both alive and dead, although the status must be reported accurately. Those returned to the sea dead are counted against a fisher's ACE and the total allowable catch limit for that species.

Management of blue sharks throughout the western and central Pacific Ocean (WCPO) is the responsibility of the Western and Central Pacific Fisheries Commission (WCPFC). Under this regional convention New Zealand is responsible for ensuring that the management measures applied within New Zealand fisheries waters are compatible with those of the Commission.

1.1 Commercial fisheries

Most of the blue shark catch in the New Zealand EEZ is caught in the tuna surface longline fishery. Relatively little blue shark is caught by other methods. Data collected by the Ministry for Primary Industries (MPI) Fishery Observer Services from the tuna longline fishery suggest that most of the blue shark catch has been processed (72% of the observed catch), although prior to 1 October 2014 usually only the fins were retained and the rest of the carcass was dumped (over 99% of the processed, observed catch). Greenweight (total weight) was obtained by applying species specific conversion factors to the weight of the fins landed. On 1 October 2014 a ban on shark finning was introduced; after this time any blue sharks for which the fins are retained are required to be landed with the fins attached (artificial attachment such as tying or securing the fins to the trunk is permitted). Figure 1 shows historical landings and fishing effort for BWS 1 and BWS ET.

Landings of blue sharks reported by fishers on CELRs, Catch CLRs, or TLCERs and by processors on LFRRs and MHRs are given in Table 2. Total weights reported by fishers were 551–1167 t per annum during 1997–98 to 2007–08. Processors (LFRRs) reported 525–1415 t per annum during 1997–98 to 2012–13. In addition to catches within New Zealand fisheries waters, small catches are taken by New Zealand vessels operating on the high seas (Figure 1).

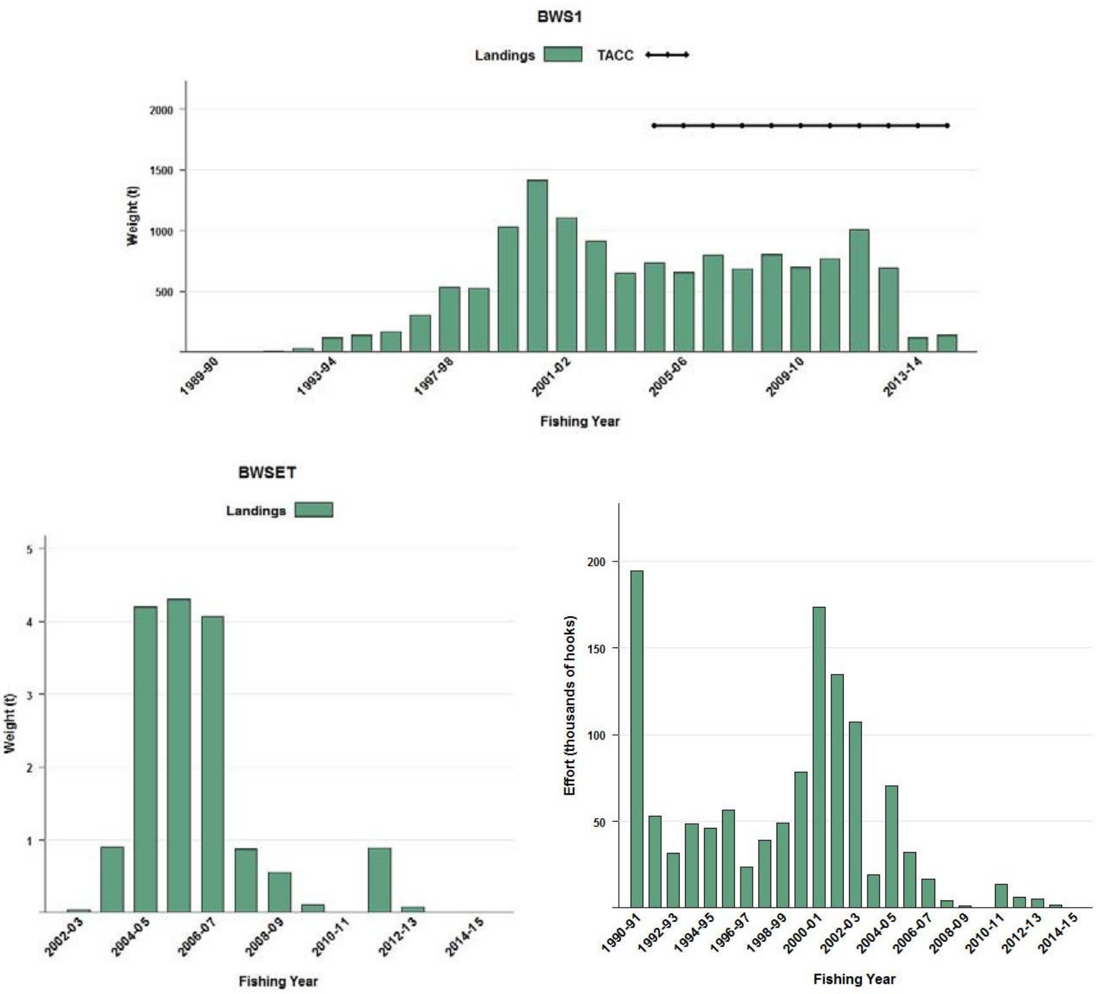


Figure 1: [Top] Blue Shark catch from 1989–90 to 2014–15 within New Zealand waters (BWS 1), and 2002–03 to 2014–15 on the high seas (BWS ET). [Bottom] Fishing effort (number of hooks set) for high seas New Zealand flagged surface longline vessels, from 1990–91 to 2014–15. [Figure continued on next page].

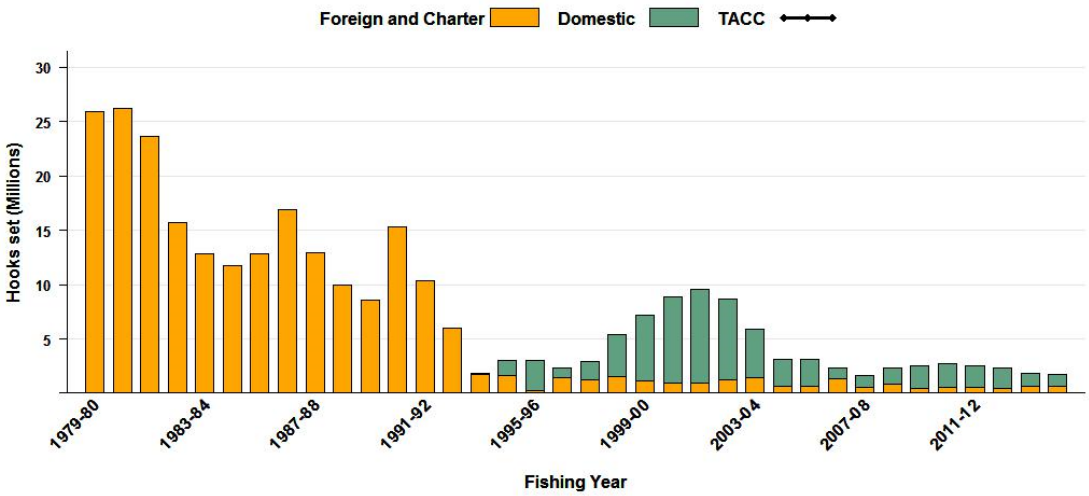


Figure 1 [Continued]: Fishing effort (number of hooks set) for all domestic and foreign vessels (including effort by foreign vessels chartered by New Zealand fishing companies), from 1979–80 to 2014–15.

The majority of blue sharks (55%) are caught in the bigeye tuna fishery (Figure 2); although there are no directed blue shark fisheries, blue sharks form one of the three top catches by weight across all longline fisheries (17%) (Figure 3). Longline fishing effort is distributed along the east coast of the North Island and the south west coast of the South Island.

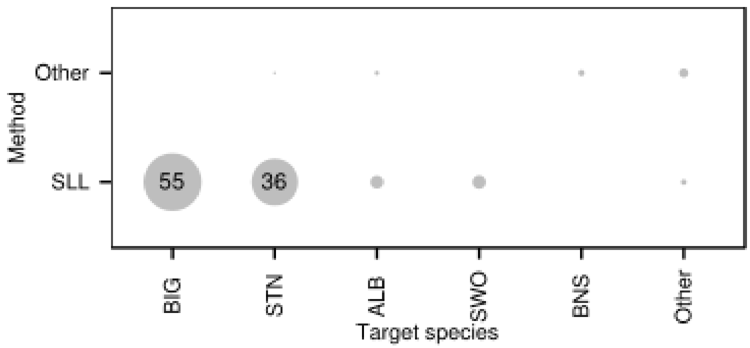


Figure 2: A summary of the proportion of landings of blue shark taken by each target fishery and fishing method for 2012–13. The area of each circle is proportional to the percentage of landings taken using each combination of fishing method and target species. The number in the circle is the percentage. SLL = surface longline (Bentley et al 2013).

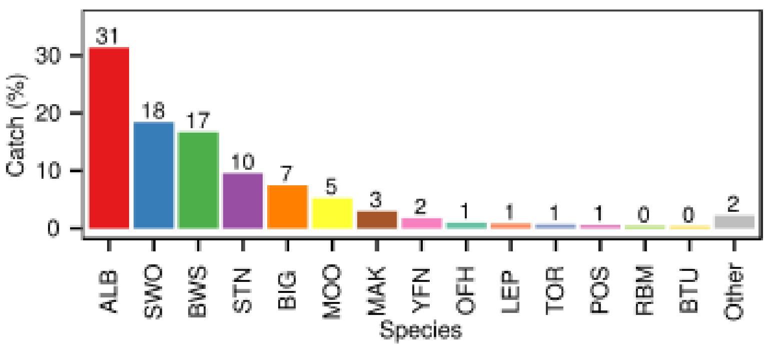


Figure 3: A summary of species composition of the reported surface longline catch for 2012–13. The percentage by weight of each species is calculated for all surface longline trips (Bentley et al 2013).

Table 2: New Zealand estimated commercial landings of blue shark (t) reported by fishers on CELRs, CLRs, or TLCERs and processors (LFRRs or MHRs) by fishing year.

Year	Total reported	LFRR/MHR
1989–90	12	5
1990–91	2	3
1991–92	18	13
1992–93	39	33
1993–94	371	118
1994–95	254	140
1995–96	152	166
1996–97	161	303
1997–98	551	537
1998–99	576	525
1999–00	641	1 031
2000–01	1 167	1 415
2001–02	1 076	1 105
2002–03*	968	914
2003–04*	649	649
2004–05*	734	734
2005–06*	656	656
2006–07*	790	794
2007–08*	681	687
2008–09*		804
2009–10*		696
2010–11*		770
2011–12*		1 011
2012–13*		691
2013–14*		117
2014–15*		142

[1] Note that there may be some misreporting of blue shark catches (MPI species code "BWS") as bluenose (*Hyperoglyphe antarctica*; MPI species code "BNS") and vice versa. *MHR rather than LFRR data.

Table 3: Percentage of blue shark (including discards) that were alive or dead when arriving at the longline vessel and observed during 2006–07 to 2012–13, by fishing year, fleet and region. Small sample sizes (number observed < 20) were omitted Griggs & Baird (2013). [Continued on next page]

Year	Fleet	Area	% alive	% dead	Number
2006–07	Australia	North	95.4	4.6	131
	Charter	North	89.8	10.2	2 155
		South	93.4	6.6	5 025
	Domestic	North	87.9	12.1	3 991
	Total		**90.8**	**9.2**	**11 302**
2007–08	Charter	South	89.2	10.8	2 560
	Domestic	North	88.6	11.4	5 599
	Total		**88.8**	**11.2**	**8 159**
2008–09	Charter	North	94.5	5.5	1 317
		South	95.1	4.9	4 313
	Domestic	North	92.0	8.0	3 935
		South	94.9	5.1	98
	Total		**93.7**	**6.3**	**9 663**
2009–10	Charter	South	95.6	4.4	2 004
	Domestic	North	85.7	14.3	2 853
		South	94.0	6.0	882
	Total		**90.5**	**9.5**	**5 739**

Table 3 [Continued]:

2010–11	Charter	North	100.0	0.0	25
		South	95.9	4.1	2 650
	Domestic	North	92.8	7.2	3 553
		South			0
	Total		**94.1**	**5.9**	**6 228**
2011–12	Charter	North	100.0	0.0	10
		South	93.0	7.0	5 394
	Domestic	North	93.5	6.5	5 672
		South	93.2	6.8	1 592
	Total		**93.2**	**6.8**	**12 668**
2012–13	Charter	North	96.1	3.9	256
		South	89.3	10.7	5 087
	Domestic	North	95.5	4.5	5 150
		South	95.6	4.4	180
	Total		**92.5**	**7.5**	**10 673**
Total all strata			**91.9**	**8.1**	**64 432**

Across all fleets in the longline fishery most of the blue sharks were alive (93%) when brought to the side of the vessel during 2010–11 to 2012–13 (Table 3). The foreign charter fleet retained most of the blue sharks (77–89%) mostly for fins, while practices within the domestic fleet were more variable, ranging from 12−53% of their blue shark catch retained, mostly for the fins. The domestic fleet retained some blue shark flesh in 2010–11 and 2011–12, and the percentage of blue sharks discarded by domestic vessels increased over the three year period (Table 4).

Table 4: Percentage of blue shark that were retained, or discarded or lost, when observed on a longline vessel during 2006–07 to 2012–13, by fishing year and fleet. Small sample sizes (number observed < 20) omitted Griggs & Baird (2013). [Continued on next page]

Year	Fleet	Area	% retained or finned	% discarded or lost	Number
2006–07	Australia		3.0	97.0	132
	Charter		85.1	14.9	8 272
	Domestic		33.2	66.8	3 994
	Total		**67.5**	**32.5**	**12 398**
2007–08	Charter		91.8	8.2	2 638
	Domestic		59.5	40.5	5 650
	Total		**69.8**	**30.2**	**8 288**
2008–09	Charter		87.5	12.5	5 723
	Domestic		54.0	46.0	4 049
	Total		**73.6**	**26.4**	**9 772**
2009–10	Charter		91.7	8.3	2 023
	Domestic		37.6	62.4	5 531
	Total		**52.1**	**47.9**	**7 554**

Table 4 [Continued]:

2010–11	Charter	North	100.0	0.0	25
		South	88.9	11.1	2 650
	Domestic	North	43.0	57.0	3 736
		South			0
	Total		**62.2**	**37.8**	**6 411**
2011–12	Charter	North	60.0	40.0	10
		South	86.2	13.8	5 394
	Domestic	North	44.2	55.8	6 346
		South	88.0	12.0	1 601
	Total		**66.4**	**33.6**	**13 351**
2012–13	Charter	North	72.7	27.3	256
		South	77.0	23.0	5 088
	Domestic	North	12.3	87.7	5 372
		South	0.0	100.0	180
	Total		**43.8**	**56.2**	**10 896**
Total all strata			**62.2**	**37.8**	**68 670**

Catches of blue sharks aboard tuna longline vessels are concentrated off the west and south-west coasts of the South Island, and the north-east coast of the North Island (Figure 4). Most of the blue shark landings reported by fishers (TLCERs) are concentrated in FMAs 1, 2 and 7.

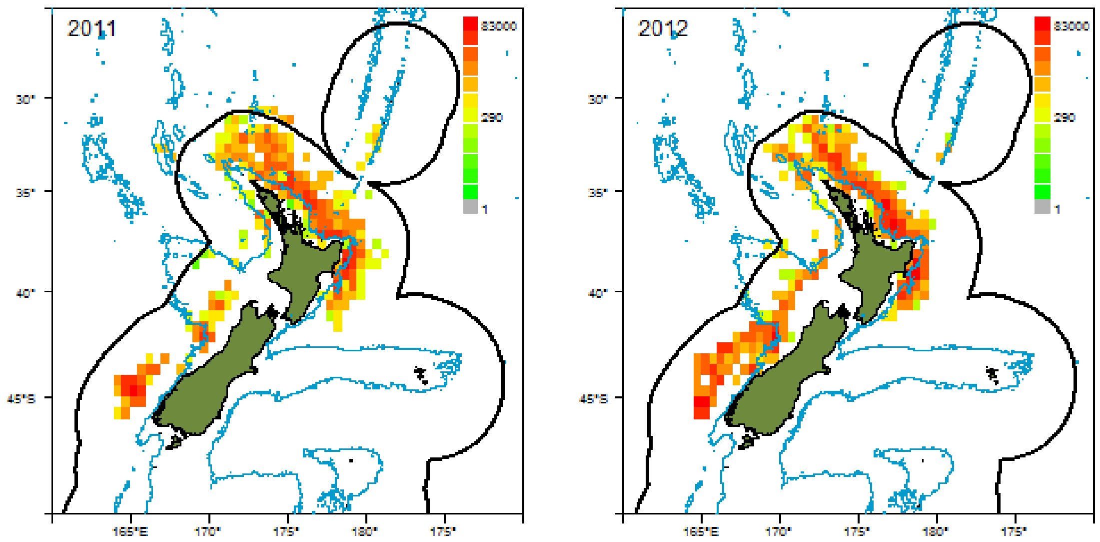


Figure 4: Blue shark catches (kg) by the surface longline fishery in 0.5 degree rectangles by fishing year. Note the log scale used for the colour palette. Depth contour = 1000 m. Source: TLCER data (Francis et al 2014) [Continued on next page].

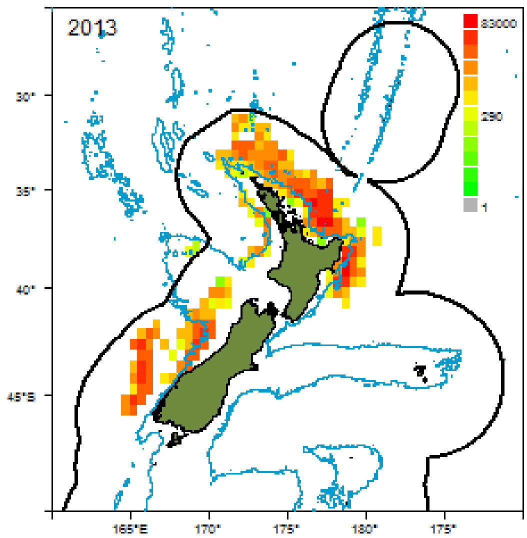


Figure 4 [Continued]: Blue shark catches (kg) by the surface longline fishery in 0.5 degree rectangles by fishing year. Note the log scale used for the colour palette. Depth contour = 1000 m. Source: TLCER data (Francis et al 2014).

1.2 Recreational fisheries

Blue sharks are caught in relatively large numbers by recreational fishers in the New Zealand EEZ. Although not as highly regarded as other large, pelagic sharks such as mako in northern New Zealand, blue sharks are the primary target gamefish in southern New Zealand. Several hundred blue sharks were tagged and released each year by recreational fishers off Otago Heads in the late 1990s as part of the New Zealand Gamefish Tagging Programme. About 125 blue sharks have been tagged per year for the last ten years. The total recreational catch is unknown but most are released. There were 12 blue sharks weighed by New Zealand Sport Fishing Council clubs in 2014–15.

1.3 Customary non-commercial fisheries

Prior to European settlement, Maori caught large numbers of cartilaginous fishes, including blue sharks. However, there are no estimates of current Maori customary catch.

1.4 Illegal catch

There is no known illegal catch of blue sharks.

1.5 Other sources of mortality

About 91% of all observed blue sharks caught in the tuna longline fishery are retrieved alive. About 33% of all observed blue sharks are discarded. The proportion of sharks discarded dead is unknown. Mortality rates of blue sharks tagged and released by the New Zealand Gamefish Tagging Programme are also unknown.

2. BIOLOGY

Blue sharks (*Prionace glauca*) are large, highly migratory, pelagic carcharhinids found throughout the world's oceans in all tropical and temperate waters from about 50° N to 50° S. They are slender in build, rarely exceeding 3 m in total length and 200 kg in weight. They feed opportunistically on a range of living and dead prey, including bony fishes, smaller sharks, squid and carrion.

In New Zealand waters, male blue sharks are sexually mature at about 190–195 cm fork length (FL) and females at about 170–190 cm FL. Gestation in female blue sharks lasts between 9–12 months and between 4–135 pups (averaging 26–56) are born alive, probably during the spring. Pups are probably born at about 50 cm FL. The few embryos from New Zealand fisheries waters examined to date consisted of mid-term pups 21–37 cm FL collected in July and a full-term pup 54 cm FL collected in February. Blue sharks 50–70 cm FL are caught year-round in New Zealand fisheries waters but only in small numbers.

Age and growth estimates are available for blue sharks in New Zealand waters. These estimates were derived from counts of opaque growth zones in X-radiographs of sectioned vertebrae with the assumption that one opaque zone is formed per year. This assumption is untested. Female blue sharks appear to approach a lower mean asymptotic maximum length and grow at a faster rate than males. This differs from the age and growth analyses of blue shark from other oceans, where females typically approach a larger mean asymptotic maximum length than males. This is thought to result from the presence of relatively few large (over 250 cm FL), old female blue sharks in the length-at-age dataset analysed.

Table 5: Estimates of biological parameters.

Fishstock	Estimate					Source
1. Natural mortality (M)						
BWS 1	0.19–0.21					Manning & Francis (2005)
2. Weight = a (length)^{b} (Weight in kg, length in cm fork length)						
	a	b				
BWS 1 males	1.578×10^{-6}	3.282				Ayers et al (2004)
BWS 1 females	6.368×10^{-7}	3.485				
3. Von Bertalanffy model parameter estimates						
	k	t_0	L_∞			
BWS 1 males	0.0668	-1.7185	390.92			Manning & Francis (2005)
BWS 1 females	0.1106	-1.2427	282.76			
4. Schnute model (case 1) parameter estimates (are provided for comparison with the von Bertalanffy estimates above)						
	L_1	L_2	κ	γ	L_∞	
BWS 1 males	65.21	217.48	0.1650	0.1632	297.18	Manning & Francis (2005)
BWS 1 females	63.50	200.60	0.2297	0.0775	235.05	

The MPI observer data suggest that large (over 250 cm FL) female blue sharks are missing from the catch, despite reliable personal observations to the contrary from commercial and recreational fishers. There is evidence of size and sex segregation in the distributions of blue sharks in the North Pacific, with large, pregnant females tending to be found nearer the equator than males or smaller females. It is possible that large female blue sharks occur in New Zealand but have not been adequately sampled by observers.

Growth rates estimated for New Zealand blue sharks are broadly comparable with overseas studies. Males and females appear to grow at similar rates until about seven years of age, when their growth appears to diverge. Age-at-maturity is estimated at 8 years for males and 7–9 years for females. The maximum recorded ages of male and female blue sharks in New Zealand waters are 22 and 19 years, respectively. Blue sharks appear to be fully recruited to the commercial longline fishery by the end of their second year. The commercial catch sampled by MPI observers consists of both immature and mature fish.

Estimates of biological parameters for blue sharks in New Zealand waters are given in Table 5.

3. STOCKS AND AREAS

The New Zealand Gamefish Tagging Programme has tagged and released 4761 blue sharks between 1979–80 and 2014–15 in the New Zealand EEZ. Most tagged sharks were captured and released off the east coast of the South Island. A total of 88 tagged sharks have been recaptured since the start of the tagging programme. The recapture data show dispersal of tagged sharks away from their release point, although the relationship between time at liberty and dispersal is unclear. While some tagged sharks have been recaptured with little apparent net movement away from their release point, others have been recaptured off Australia, New Caledonia, Vanuatu, Fiji, Tonga, Cook Islands and French Polynesia (Figure 5). The longest displacement distance for any fish recaptured in the New Zealand Gamefish Tagging Programme (4600 nautical miles) was from a blue shark recaptured off Chile.

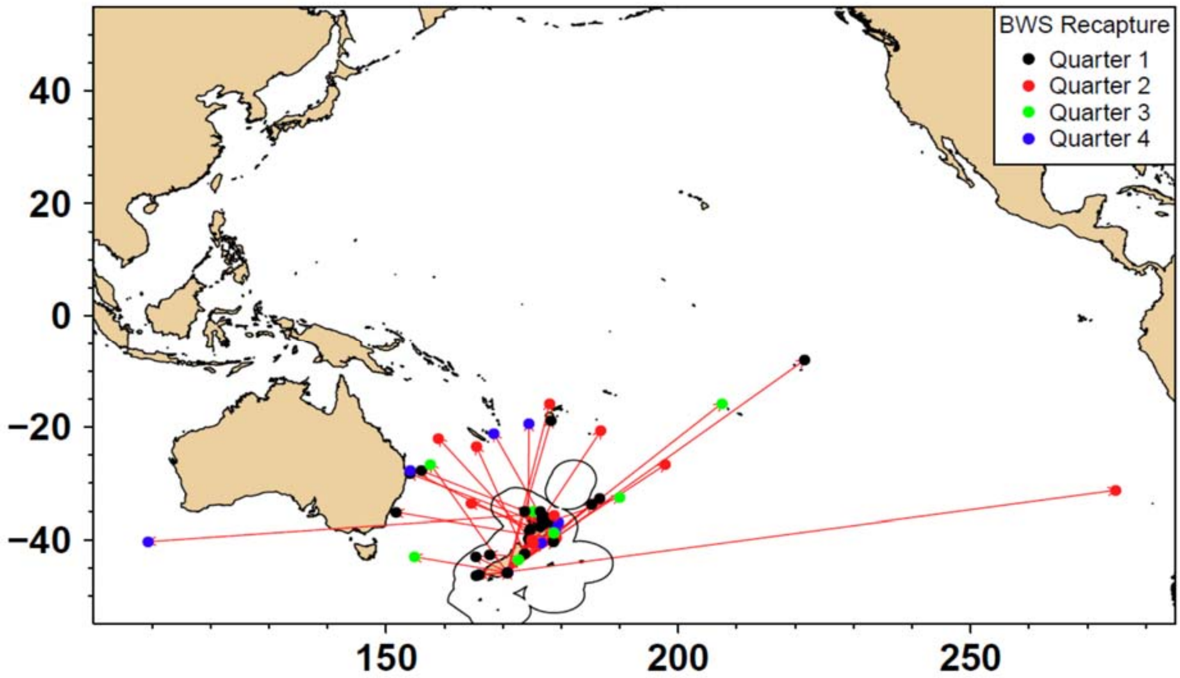


Figure 5: All release and recapture locations of blue sharks in the gamefish tagging programme, 1982–2015.

Although the data are relatively sparse, an overview of tagging data from Australia, New Zealand, the Central Pacific and California suggests that population exchange exists between not only the eastern and western South Pacific, but also between the South Pacific, south Indian, and even South Atlantic oceans. This suggests that blue sharks in the South Pacific constitute a single biological stock, although whether this is part of a single larger Southern Hemisphere stock is unclear.

No other data are available on blue shark stock structure in the South Pacific.

4. STOCK ASSESSMENT

With the establishment of the WCPFC in 2004, future stock assessments of the western and central Pacific Ocean stock of blue shark will be reviewed by the WCPFC.

A new stock assessment for South Pacific blue shark was conducted in 2016. SC12 noted that the 2016 South Pacific blue shark assessment is preliminary and is considered to be a work in progress. As a result, it cannot be used to determine stock status and form the basis of management advice.

SC12 noted that there are a number of data uncertainties within the South Pacific blue shark assessment, especially with regard to historical and contemporary longline catch and CPUE estimates. The data-poor nature of the South Pacific blue shark assessment indicates that an improvement in the amount and quality of available biological and fishery information will be required in order to develop a useful integrated stock assessment model.

Quantitative stock assessments of blue sharks outside the New Zealand EEZ have been mostly limited to standardised CPUE analyses, although quantitative assessment models have been developed using conventional age-structured and MULTIFAN-CL methods. An indicator analysis of blue sharks in New Zealand waters was conducted in 2014.

Results of these indicator analyses (Figures 6 and 7) suggest that blue shark populations in the New Zealand EEZ have not been declining under recent fishing pressure, and may have been increasing since 2005 (Table 6, Francis et al 2014). These changes are presumably in response to a decline in SLL fishing effort since 2003 (Griggs & Baird 2013), and a decline in annual landings since a peak in 2001 for blue sharks. Observer data from 1995 suggest that blue sharks may have undergone a down-then-up trajectory. The quality of observer data and model fits means these interpretations are uncertain. The stock status of blue sharks may be recovering. Conclusive determination of stock status will require a regional (i.e. South Pacific) stock assessment.

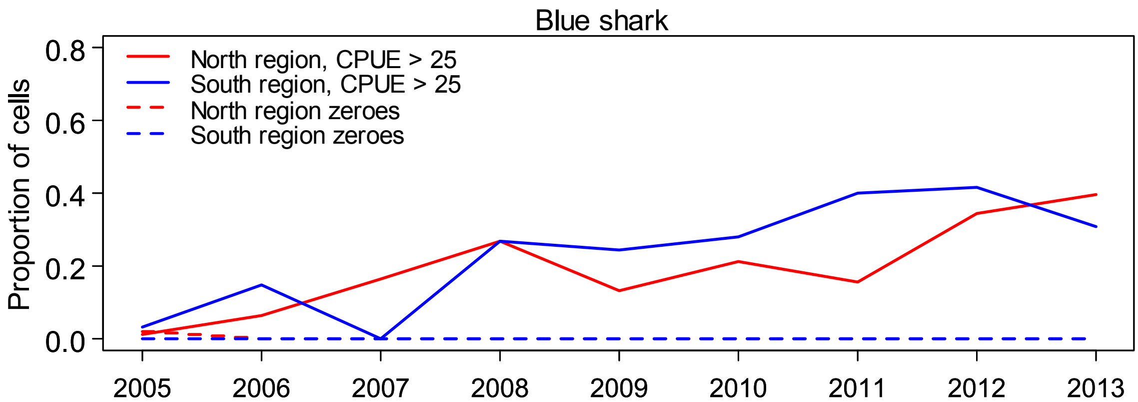


Figure 6. Blue shark distribution indicators. Proportions of 0.5 degree rectangles having CPUE greater than 25 per 1000 hooks, and proportions of rectangles having zero catches, for North and South regions by fishing year, based on estimated catches (processed and discarded combined) reported on TLCERs. North region comprises Fisheries Management Areas (FMAs) 1, 2, 8, and 9, and South region comprises FMAs 5 and 7.

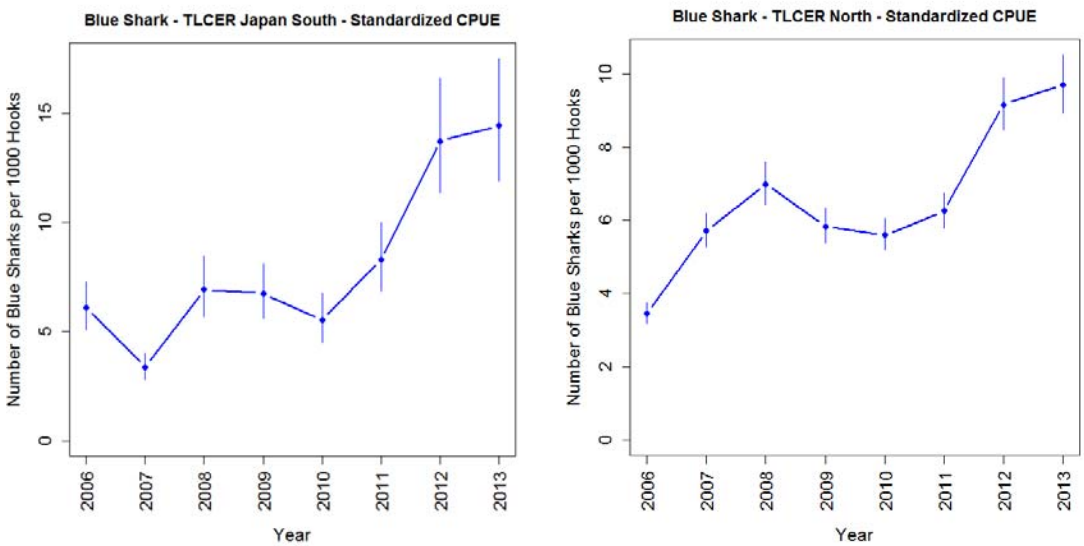


Figure 7: Standardised CPUE indices for commercial TLCER (Japan South and North) and observer datasets (all New Zealand) [Continued on next page].

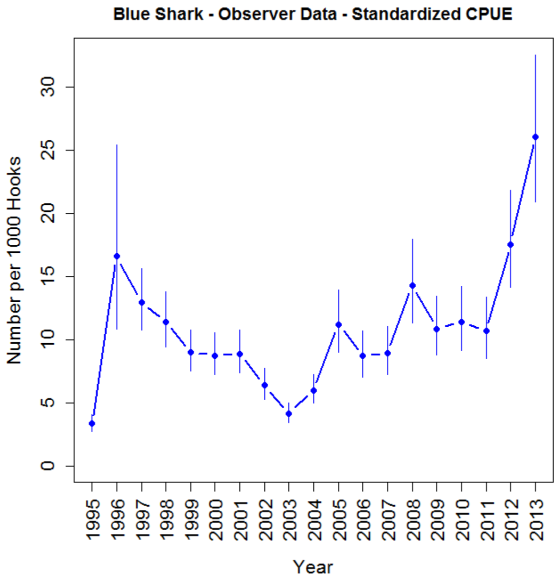


Figure 7 [Continued]: Standardised CPUE indices for commercial TLCER (Japan South and North) and observer datasets (all New Zealand).

Table 6: Summary of trends identified in abundance indicators since the 2005 fishing year based on both TLCER and observer data sets. The CPUE-Obs indicator was calculated for both North and South regions combined. North region comprises Fisheries Management Areas (FMAs) 1, 2, 8, and 9, and South region comprises FMAs 5 and 7. For the CPUE-TLCER indicator in South region, only the Japan dataset indicator is shown (the TLCER Domestic South dataset was small and probably unrepresentative). Green cells show indicators that suggest positive trends in stock size. Note that a downward trend in 'proportion-zeroes' is considered a positive stock trend. NA = indicator not applicable because of small sample size. Source: Francis et al (2014).

		North region			South region		
Indicator class	Indicator	Blue	Porbeagle	Mako	Blue	Porbeagle	Mako
Distribution	High-CPUE	Up	Up	Up	Up	Up	NA
Distribution	Proportion-zeroes	Nil	Down	Down	Nil	Nil	Down
Catch composition	GM index total catch - TLCER	Up (all species)			Up (all species)		
Catch composition	GM index total catch - Obs	Up (all species)			Nil (all species)		
Catch composition	GM index HMS shark catch - TLCER	Up (all species)			Up (all species)		
Catch composition	GM index HMS shark catch - Obs	Up (all species)			Nil (all species)		
Standardised CPUE	CPUE - TLCER	Up	Nil	Up	Up	Nil	Nil
Standardised CPUE	CPUE - Obs	Up	Nil	Nil	Up	Nil	Nil
Sex ratio	Proportion males	Nil	Nil	Nil	Nil	Nil	NA
Size composition	Median length - Males	Nil	Nil	Nil	Nil	Nil	NA
Size composition	Median length - Females	Nil	Nil	Nil	Nil	Nil	NA

Blue sharks are the most heavily fished of the three large pelagic shark species (blue, mako, and porbeagle sharks) commonly caught in the tuna longline fishery. Compared to mako and porbeagle sharks, however, blue sharks are relatively fecund, fast growing, and widely distributed.

Observed length frequency distributions of blue sharks by area and sex are shown in Figure 8 for fish measured in 1993–2012. Length frequency distributions of blue sharks showed differences in size composition between North and South areas (Figure 8). There were more female blue sharks caught than males, with a higher proportion of females in the South than the North. Based on the length-frequency distributions and approximate mean lengths at maturity of 192.5 cm fork length for males and 180 cm for females (Francis & Duffy 2005), most blue sharks were immature (91.1% of males and 92.9% of females, overall). Greater proportions of mature male blue sharks were found in the North (12.1% mature in the North and 1.1% in the south), while more similar proportions of mature females were found in the North and South (4.5% and 8.4% respectively).

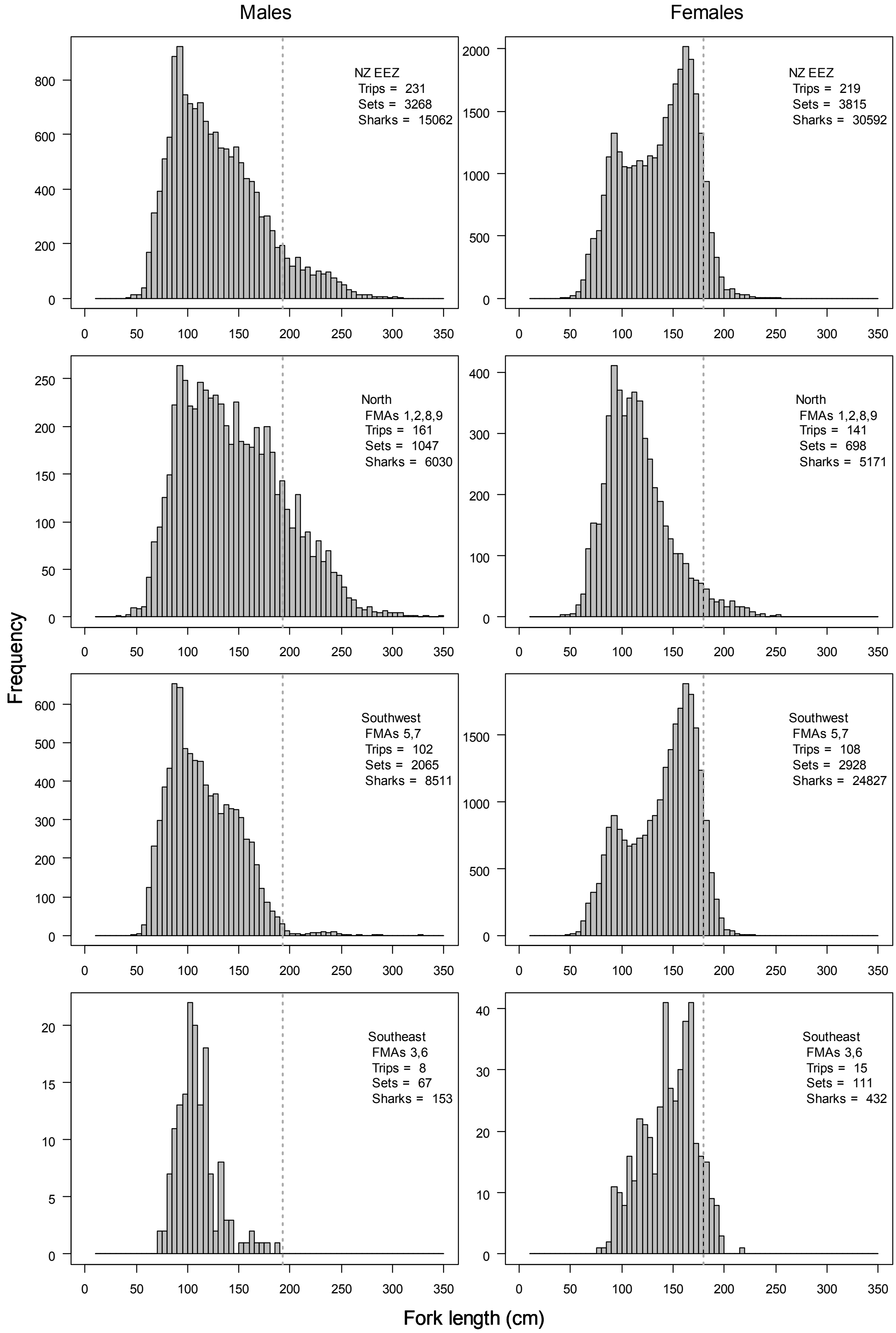


Figure 8: Length-frequency distributions of male and female blue sharks measured by observers aboard surface longline vessels between 1993 and 2012 for the New Zealand EEZ, and North, Southwest and Southeast regions. The dashed vertical lines indicate the median length at maturity. Source: Francis (2013).

A data informed qualitative risk assessment was completed on all chondrichthyans (sharks, skates, rays and chimaeras) at the New Zealand scale in 2014 (Ford et al 2015). Blue sharks had a risk score of 12 and were ranked lowest risk of the eleven QMS chondrichthyan species. Data were described as 'exist and sound' for the purposes of the assessment and consensus over this risk score was achieved by the expert panel.

5. STATUS OF THE STOCK

Stock structure assumptions

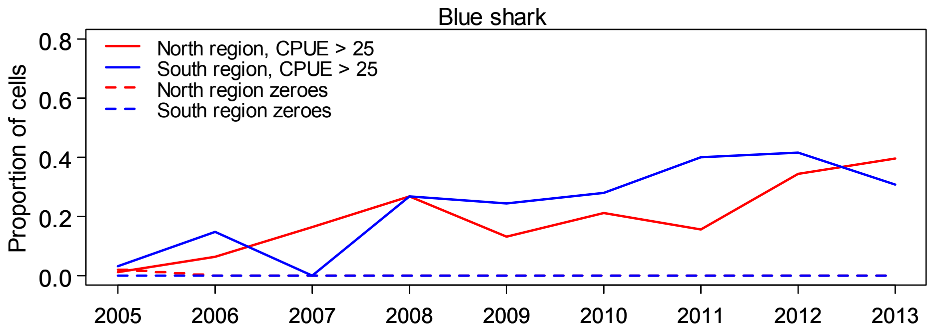
BWS 1 is assumed to be part of the wider South Western Pacific Ocean stock. However, there is no stock assessment for this wider stock. The results below are from indicator analyses of the New Zealand component of that stock only.

Stock Status	
Year of Most Recent Assessment	2014
Assessment Runs Presented	Indicator analyses only for NZ EEZ
Reference Points	Target: Not established Soft Limit: Not established but HSS default of 20% SB_0 assumed Hard Limit: Not established but HSS default of 10% SB_0 assumed Overfishing threshold: F_{MSY}
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

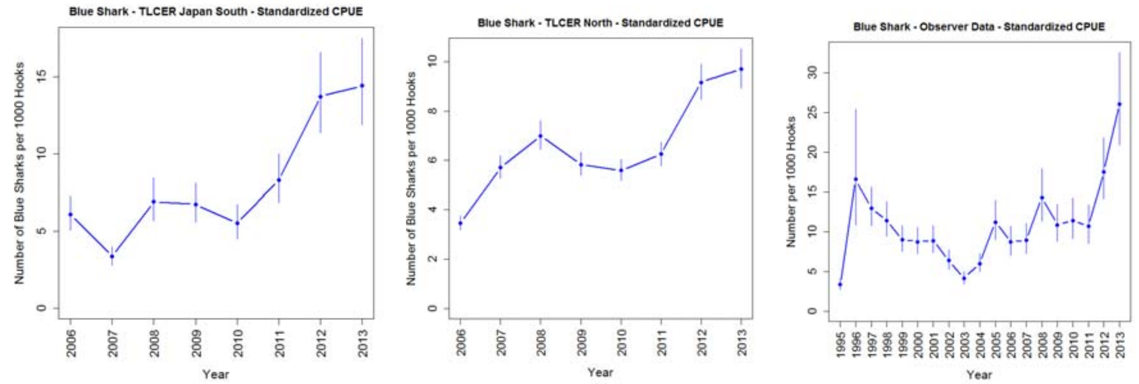
Summary of trends identified in abundance indicators since the 2005 fishing year based on both TLCER and observer data sets. North region comprises Fisheries Management Areas (FMAs) 1, 2, 8, and 9, and South region comprises FMAs 5 and 7.

		North region			South region		
Indicator class	Indicator	Blue	Porbeagle	Mako	Blue	Porbeagle	Mako
Distribution	High-CPUE	Up	Up	Up	Up	Up	NA
Distribution	Proportion-zeroes	Nil	Down	Down	Nil	Nil	Down
Catch composition	GM index total catch - TLCER	Up (all species)			Up (all species)		
Catch composition	GM index total catch - Obs	Up (all species)			Nil (all species)		
Catch composition	GM index HMS shark catch - TLCER	Up (all species)			Up (all species)		
Catch composition	GM index HMS shark catch - Obs	Up (all species)			Nil (all species)		
Standardised CPUE	CPUE - TLCER	Up	Nil	Up	Up	Nil	Nil
Standardised CPUE	CPUE - Obs	Up	Nil	Nil	Up	Nil	Nil
Sex ratio	Proportion males	Nil	Nil	Nil	Nil	Nil	NA
Size composition	Median length - Males	Nil	Nil	Nil	Nil	Nil	NA
Size composition	Median length - Females	Nil	Nil	Nil	Nil	Nil	NA



Blue shark distribution indicators. Proportions of 0.5 degree rectangles having CPUE greater than 25 per 1000 hooks, and proportions of rectangles having zero catches, for North and South regions by fishing year, based on estimated

catches (processed and discarded combined) reported on TLCERs. North region comprises Fisheries Management Areas (FMAs) 1, 2, 8, and 9, and South region comprises FMAs 5 and 7.



Standardised CPUE indices for commercial TLCER (Japan South and North) and observer datasets (all New Zealand).

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Appears to be increasing
Recent Trend in Fishing Intensity or Proxy	Appears to be decreasing
Other Abundance Indices	-
Trends in Other Relevant Indicator or Variables	Catches in New Zealand increased from the early 1990s to a peak in the early 2000s but declined slightly in the mid 2000s and have remained relatively stable since that time.

Projections and Prognosis		
Stock Projections or Prognosis	The stock is likely to increase if effort remains at current levels	
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	Level 2 – Partial Quantitative Stock Assessment: Standardised CPUE indices and other fishery indicators	
Assessment Method	Indicator analyses	
Assessment Dates	Latest assessment: 2014	Next assessment: Unknown
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	-Distribution -Species composition -Size and sex ratio -Catch per unit effort	1 – High quality
Data not used (rank)	N/A	
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	Historical catch recording may not be accurate.	

Qualifying Comments
Fishery Interactions

7. FOR FURTHER INFORMATION

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