

The background of the entire page is a teal color. It features three fish silhouettes: a large one at the bottom, a medium one on the left, and a long, thin one at the top. The text is overlaid on the right side of the image.

Hoki, Hake & Ling Trawl Situation Report

Prepared for 2017 MSC Reassessment



deepwater
group

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1. Purpose of this report

This report is one of three prepared for the New Zealand 2017 combined MSC reassessments for hake, hoki, ling and southern blue whiting. It provides an update on 10 Units of Certification (UoC) for hake (HAK 1, 4 & 7), hoki (HOK 1 East & West) and ling (LIN 3, 4, 5, 6 & 7) trawl fisheries, and builds on the information previously provided for the 2016 surveillance audit. This combined UoC is described as the hoki mixed-species trawl fishery.

It is Deepwater Group Limited's (DWG) submission that these 10 fisheries continue to conform with the MSC Fisheries Standard (FCR V1.3) as evidenced in the following updated information and references.

All cited references are available here: www.deepwatergroup.org/species/hoki/new-zealand-hoki-hake-and-ling-trawl-fishery-re-assessment-2017/

2. Overview of fishery status and information

Hake trawl certification details

Certification date	2014
Stock areas	UoC 9: HAK 1 (Sub-Antarctic) UoC 10: HAK 4 (Chatham Rise) UoC 11: HAK 7 (West Coast South Island)
Species	<i>Merluccius australis</i>
Method/gear	Trawl

Hoki trawl certification details

Certification date	Initial Certification: March 2001 First Recertification: October 2007 Second Recertification: September 2012
Stock areas	UoC 12: HOK 1 (East) UoC 13: HOK 1 (West)
Species	<i>Macruronus novaezealandiae</i>
Method/gear	Trawl

Ling trawl certification details

Certification date	2014
Stock areas	UoC 14: LIN 3 UoC 15: LIN 4 UoC 16: LIN 5 UoC 17: LIN 6 UoC 18: LIN 7
Species	<i>Genypterus blacodes</i>
Method/gear	Trawl

Stock status, TACC & catches

UoC 9 – HAK 1 (MPI, 2017)

Update on stock status (2014)	B ₂₀₁₄ was estimated at 60% B ₀ ; Very Likely (>90%) to be at or above the target
TACC 2016-17	3,701 t
TACC 2015-16	3,701 t
TACC 2014-15	3,701 t
UoC share of TACC	100%
HAK 1 catch 2015-16	1,584 t
HAK 1 catch 2014-15	1,725 t

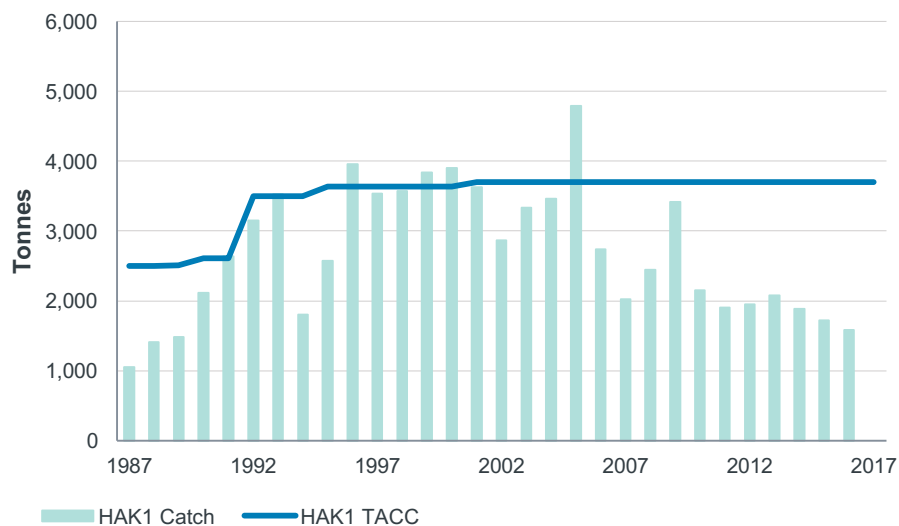


Figure 1 Total Allowable Commercial Catches and reported catches for HAK 1¹

UoC 10 – HAK 4 (MPI, 2017)

Update on stock status (2017)	For the Chatham Rise stock (HAK 4 plus HAK 1 north of the Otago Peninsula), B_{2016} was estimated to be about 48% B_0 ; Likely (> 60%) to be at or above the management target of 40% B_0 .
TACC 2016-17	1,800 t
TACC 2015-16	1,800 t
TACC 2014-15	1,800 t
UoC share of TACC	100%
HAK 4 catch 2015-16	274 t
HAK 4 catch 2014-15	304 t

¹ This hake trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for hake in this fishery. The reasons for the hake catch being lower than the TACC reflect these socio-economic factors for catching hake in this fishery.

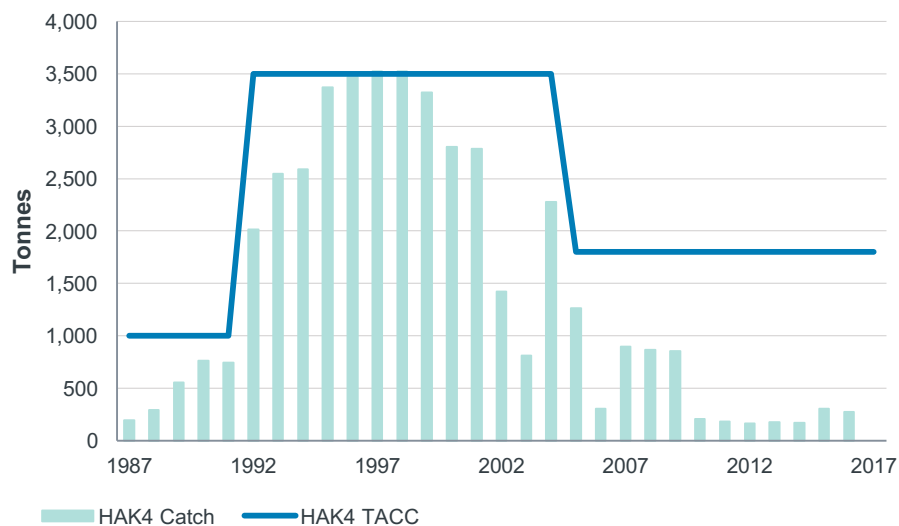


Figure 2 Total Allowable Commercial Catches and reported catches for HAK 4²

UoC 11 – HAK 7 (MPI, 2017)

Update on stock status (2017)	For the West Coast South Island stock (HAK 7), B_{2016} was estimated to be either 26% (survey model) or 50% (CPUE model) B_0 ; Either Very Unlikely (< 10%) (survey model) or Very Likely (> 90%) (CPUE model) to be at or above the management target of 40% B_0 .
TACC 2016-17	7,700 t
TACC 2015-16	7,700 t
TACC 2014-15	7,700 t
UoC share of TACC	100%
HAK 7 catch 2015-16	2,864 t
HAK 7 catch 2014-15	6,219 t

² This hake trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for hake in this fishery. The reasons for the hake catch being lower than the TACC reflect these socio-economic factors for catching hake in this fishery.

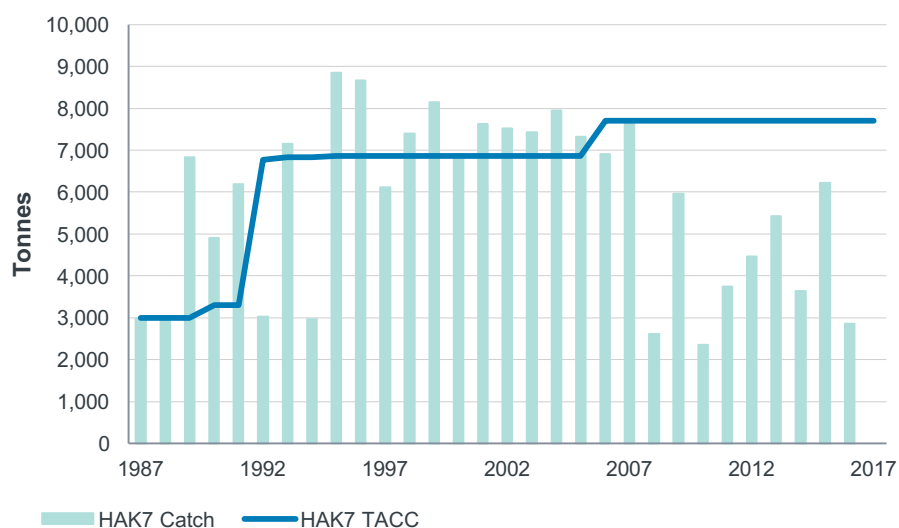


Figure 3 Total Allowable Commercial Catches and reported catches for HAK 7³

UoC 12 – HOK 1 East (MPI, 2017a)

Update on stock status (2017)	For the Eastern stock (HOK 1), B_{2017} was estimated to be between 60% B_0 ; Virtually Certain (> 99%) to be at or above the lower end of the management target range (35% B_0).
TACC 2016-17	150,000 t (agreed catch limit split East 60,000 t; West 90,000 t)
TACC 2015-16	150,000 t (agreed catch limit split East 60,000 t; West 90,000 t)
TACC 2014-15	160,000 t (agreed catch limit split East 60,000 t; West 100,000 t)
UoC share of TACC	100%
HOK 1 catch 2015-16	136,719 t (HOK 1 East 56,533 t, HOK 1 West 75,365 t) ⁴
HOK 1 catch 2014-15	161,500 t (HOK 1 East 59,875 t, HOK 1 West 78,963) ⁵

³ This hake trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for hake in this fishery. The reasons for the hake catch being lower than the TACC reflect these socio-economic factors for catching hake in this fishery.

⁴ The sum of the HOK 1 East & West sub-area catches from FishServe amounts to less than the total hoki catch because operators with less than 200 t are not required to report by sub-area.

⁵ The total HOK 1 ACE available for 2014-15 was 167,574 tonnes (due to under-caught ACE carried forward from the previous year). See FishServe (2015) for an explanation on how under-catch is managed and carried forward. In 2015-16, there was 161,206 tonnes of ACE available.

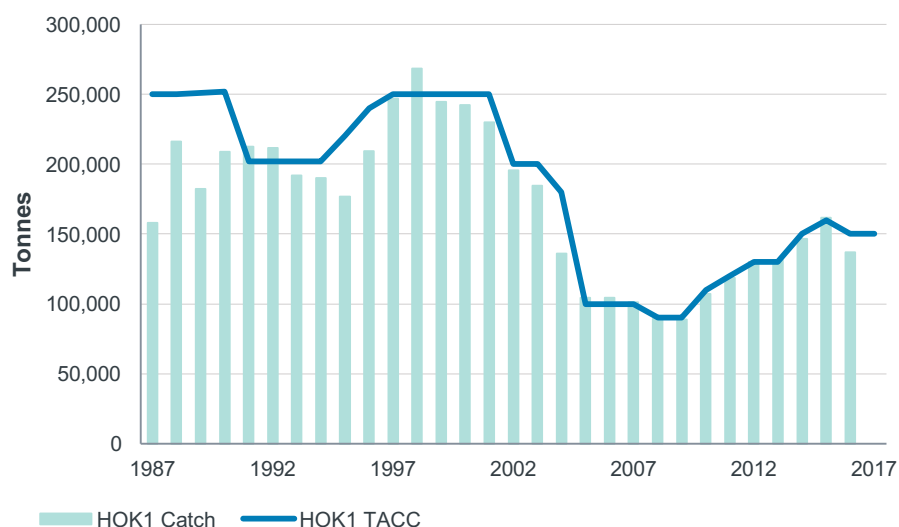


Figure 4 Total Allowable Commercial Catches and reported catches for HOK 1 (East & West combined)

UoC 13 – HOK 1 West (MPI, 2017a)

Update on stock status (2017)	For the Western stock (HOK 1), B_{2017} was estimated to be between 59% B_0 ; Very Likely (> 90%) to be at or above the lower end of the target range and Likely (> 60%) to be at or above the upper end of the target range.
TACC 2016-17	150,000 t (agreed catch limit split East 60,000 t; West 90,000 t)
TACC 2015-16	150,000 t (agreed catch limit split East 60,000 t; West 90,000 t)
TACC 2014-15	160,000 t (agreed catch limit split East 60,000 t; West 100,000 t)
UoC share of TACC	100%
HOK 1 catch 2015-16	136,719 t (HOK 1 East 56,533 t, HOK 1 West 75,365 t) ⁶
HOK 1 catch 2014-15	161,500 t (HOK 1 East 59,875 t, HOK 1 West 78,963) ⁷

⁶ The sum of the HOK 1 East & West sub-area catches from FishServe amounts to less than the total hoki catch because operators with less than 200 tonnes are not required to report by sub-area.

⁷ The total HOK 1 ACE available for 2014-15 was 167,574 tonnes (due to under-caught ACE carried forward from the previous year). See FishServe (2015) for an explanation on how under-catch is managed and carried forward.

UoC 14 – LIN 3 (MPI, 2017b)

Update on stock status (Updated in 2015; McGregor, 2015)	For Chatham Rise (LIN 3 & 4), B_{2014} was estimated to be about 57% B_0 ; Very Likely (> 90%) to be above the management target of 40% B_0 .
TACC 2016-17	2,060 t
TACC 2015-16	2,060 t
TACC 2014-15	2,060 t
UoC share of TACC and catch	22% of TACC, based on average of last two years and using estimated trawl catch 43% of total estimated catch, based on average of last two years and using estimated trawl catch
LIN 3 catch 2015-16	1,440 t (Total reported catch) 454 t (Estimated catch for all target trawl) ⁸ 507 t (Estimated catch for bottom longline) ⁸ 185 t (Estimated catch for other methods) ⁸
LIN 3 catch 2014-15	1,325 t (Total reported catch) 449 t (Estimated catch for all target trawl) ⁸ 428 t (Estimated catch for bottom longline) ⁸ 89 t (Estimated catch for other methods) ⁸

⁸ There are typically differences between estimated and reported catches. "Estimated catch" is an at-sea estimate of the top 5-8 species per fishing event, whereas "reported catch" is the landings as reported against the TACC and balanced with ACE.

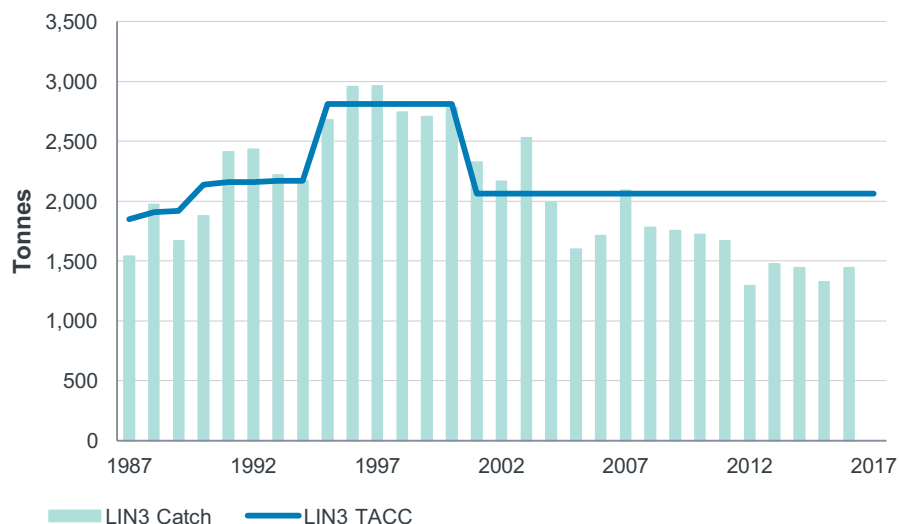


Figure 5 Total Allowable Commercial Catches and reported catches for LIN 3 (all gear types)⁹

UoC 15 – LIN 4 (MPI, 2017b)

Update on stock status (Updated in 2015; McGregor, 2015)	For the Chatham Rise stock (LIN 3 & 4), B_{2014} was estimated to be about 57% B_0 ; Very Likely (> 90%) to be above the management target
TACC 2016-17	4,200 t
TACC 2015-16	4,200 t
TACC 2014-15	4,200 t
UoC share of TACC and catch	16% of TACC, based on average of last two years and using estimated trawl catch 32% of total estimated catch, based on average of last two years and using estimated trawl catch
LIN 4 catch 2015-16	2,659 t (Total reported catch) 582 t (Estimated catch for all target trawl) ¹⁰

⁹ This ling trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for ling in this fishery. The reasons for the ling catch being lower than the TACC reflect these socio-economic factors for catching ling in this fishery.

¹⁰ There are typically differences between estimated and reported catches. "Estimated catch" is an at-sea estimate of the top 5-8 species per fishing event, whereas "reported catch" is the landings as reported against the TACC and balanced with ACE.

LIN 4 catch 2014-15	1,659 t (Estimated catch for bottom longline) ¹¹
	Negligible estimated catch for other methods.
	2,246 t (Total reported catch)
	721 t (Estimated catch for all target trawl) ¹¹
	1,120 t (Estimated catch for bottom longline) ¹¹
	Negligible estimated catch for other methods.

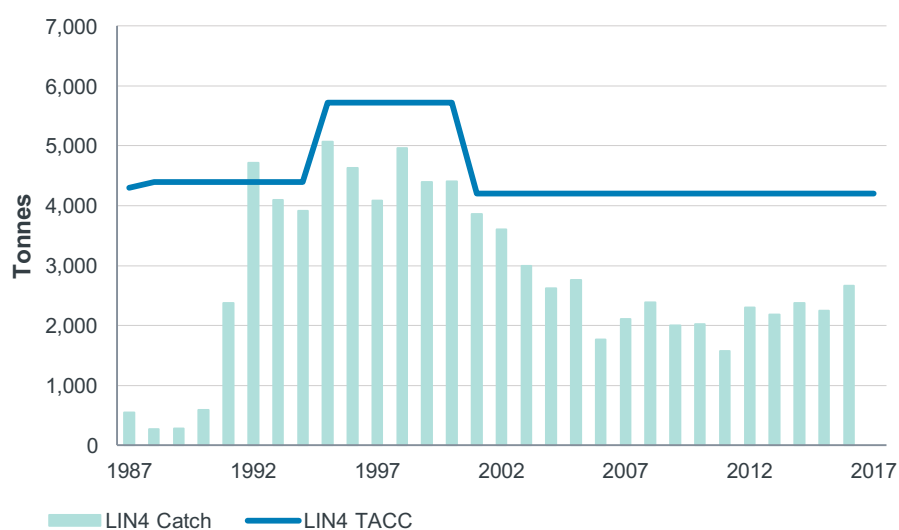


Figure 6 Total Allowable Commercial Catches and reported catches for LIN 4 (all gear types)¹²

UoC 16 – LIN 5 (MPI, 2017b)

Update on stock status (updated in 2015; Roberts, 2016)	For the Sub-Antarctic stock (LIN 5 & 6, excluding the Bounty Plateau), B_{2014} was estimated to be between 70% and 101% B_0 ; Virtually Certain (> 99%) to be above the management target.
TACC 2016-17	3,955 t
TACC 2015-16	3,955 t
TACC 2014-15	3,955 t

¹¹ There are typically differences between estimated and reported catches. “Estimated catch” is an at-sea estimate of the top 5-8 species per fishing event, whereas “reported catch” is the landings as reported against the TACC and balanced with ACE.

¹² This ling trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for ling in this fishery. The reasons for the ling catch being lower than the TACC reflect these socio-economic factors for catching ling in this fishery.

UoC share of TACC and catch	<p>97% of TACC, based on average of last two years and using estimated trawl catch</p> <p>89% of total estimated catch, based on average of last two years and using estimated trawl catch</p>
LIN 5 catch 2015-16	<p>3,868 t (Total reported catch)</p> <p>3,660 t (Estimated catch for all target trawl)¹³</p> <p>453 t (Estimated catch for bottom longline)¹³</p> <p>3.4 t (Estimated catch for other methods)¹³</p>
LIN 5 catch 2014-15	<p>3,924 t (Total reported catch)</p> <p>3,989 t (Estimated catch for all target trawl)¹³</p> <p>472 t (Estimated catch for bottom longline)¹³</p> <p>8 t (Estimated catch for other methods)¹³</p>

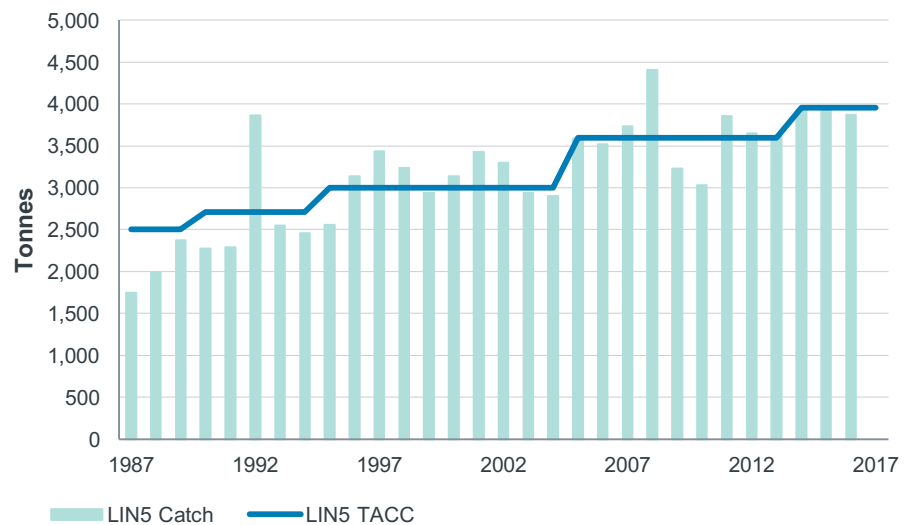


Figure 7 Total Allowable Commercial Catches and reported catches for LIN 5 (all gear types)

¹³ There are typically differences between estimated and reported catches. "Estimated catch" is an at-sea estimate of the top 5-8 species per fishing event, whereas "reported catch" is the landings as reported against the TACC and balanced with ACE.

UoC 17 – LIN 6 (MPI, 2017b)

<p>Update on stock status</p> <p>LIN 5 & 6 (Updated in 2015; Roberts, 2016)</p> <p>LIN 6B (Updated in 2006; Horn, 2007)</p>	<p>For the Sub-Antarctic stock (LIN 5 & 6, excluding the Bounty Plateau, LIN 6B), B_{2014} was estimated to be between 70% and 101% B_0; Virtually Certain (> 99%) to be above the management target.</p> <p>For the Bounty Plateau stock (LIN 6B part of LIN 6), B_{2006} was estimated to be 61% B_0; Very Likely (> 90%) to be at or above the management target.</p>
<p>TACC 2016-17</p> <p>TACC 2015-16</p> <p>TACC 2014-15</p>	<p>8,505 t</p> <p>8,505 t</p> <p>8,505 t</p>
<p>UoC share of TACC</p>	<p>18% of TACC, based on average of last two years and using estimated trawl catch</p> <p>72% of total estimated catch, based on average of last two years and using estimated trawl catch</p>
<p>LIN 6 catch 2015-16</p> <p>LIN 6 catch 2014-15</p>	<p>2,222 t (Total reported catch)</p> <p>1,238 t (Estimated catch for all target trawl)¹⁴</p> <p>598 t (Estimated catch for bottom longline)¹⁴</p> <p>Negligible estimated catch for other methods.</p> <p>220 t (Estimated catch for LIN 6B bottom longline)¹⁵</p> <p>3,115 t (Total reported catch)</p> <p>1,871 t (Estimated catch for all target trawl)¹⁴</p> <p>588 t (Estimated catch for bottom longline)¹⁴</p> <p>0.3 t (Estimated catch for other methods)¹⁴</p> <p>23 t (Estimated catch for LIN 6B bottom longline)¹⁵</p>

¹⁴ There are typically differences between estimated and reported catches. "Estimated catch" is an at-sea estimate of the top 5-8 species per fishing event, whereas "reported catch" is the landings as reported against the TACC and balanced with ACE.

¹⁵ LIN 6B catches are included in the above reported and estimated totals for LIN 6, but have also been separated out here for ease of assessing the LIN 6B fishery.

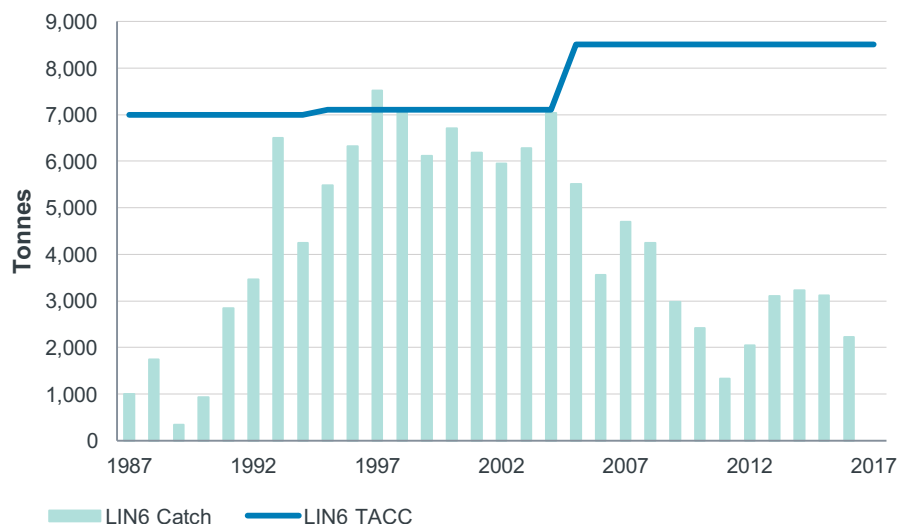


Figure 8 Total Allowable Commercial Catches and reported catches for LIN 6 (all gear types)¹⁶

UoC 18 – LIN 7 (MPI, 2017b)

Update on stock status (updated in 2016; Dunn & Ballara, in prep)	Three alternative model runs were presented, with B_{2017} estimated to be 79%, 66% and 54% B_0 . Very Likely (>90%) to be at or above the management target for all model runs.
TACC 2016-17	3,080 t
TACC 2015-16	3,080 t
TACC 2014-15	3,080 t
UoC share of TACC	51% of TACC, based on average of last two years and using estimated trawl catch 68% of total estimated catch, based on average of last two years and using estimated trawl catch
LIN 7 catch 2015-16	3,337 t (Total reported catch) 1,682 t (Estimated catch for all target trawl) ¹⁷

¹⁶ This ling trawl fishery is largely a bycatch fishery in the much larger hoki trawl fishery. As the hoki TACC and fleet have reduced subsequently so have the catches for ling in this fishery. The reasons for the ling catch being lower than the TACC reflect these socio-economic factors for catching ling in this fishery.

¹⁷ There are typically differences between estimated and reported catches. "Estimated catch" is an at-sea estimate of the top 5-8 species per fishing event, whereas "reported catch" is the landings as reported against the TACC and balanced with ACE.

LIN 7 catch 2014-15	909 t (Estimated catch for bottom longline) ¹⁷
	54 t (Estimated catch for other methods) ¹⁷
	3,344 t (Total reported catch)
	1,489 t (Estimated catch for all target trawl) ¹⁷
	552 t (Estimated catch for bottom longline) ¹⁷
	0.2 t (Estimated catch for other methods) ¹⁷

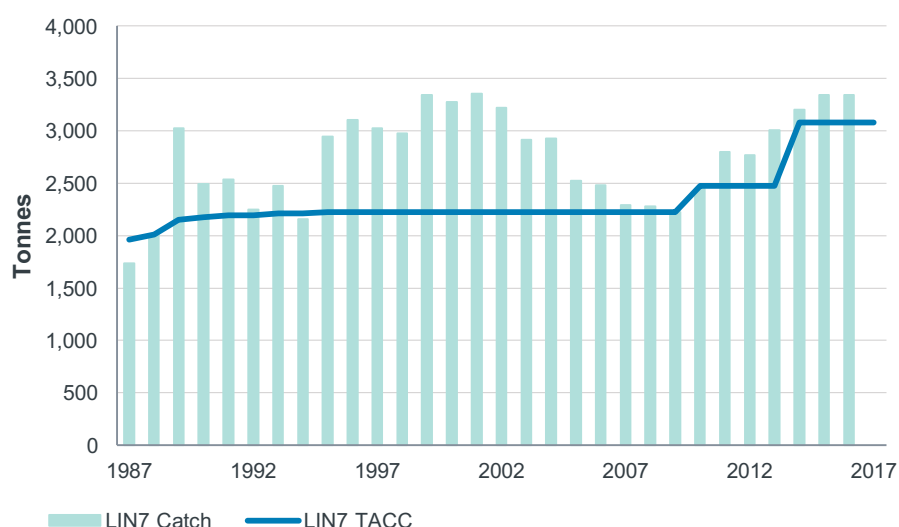


Figure 9 Total Allowable Commercial Catches and reported catches for LIN 7 (all gear types)

Key P1 references

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- Horn, P L (in prep.) Stock assessment of hake (*Merluccius australis*) on the Chatham Rise (HAK 4) and off the west coast of South Island (HAK 7) for the 2016–17 fishing year. *Draft New Zealand Fisheries Assessment Report*.
- MPI (2017). Fisheries Assessment Plenary May 2017: Stock Assessments and Stock Status. Hake.
- MPI (2017a). Fisheries Assessment Plenary May 2017: Stock Assessments and Stock

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MPI (2017c). Annual Review Report for Deepwater Fisheries for 2015/16. MPI Technical Paper No: 2017/29. MPI: Wellington

Stevens, D.W., O'Driscoll, R.L., Ladroit, Y., Ballara, S.L., MacGibbon, D.J. & Horn, P.L. (2015). Trawl survey of hoki and middle-depth species on the Chatham Rise, January 2014 (TAN1401). *New Zealand Fisheries Assessment Report 2015/19*. 123 p.

McGregor, V. (2015). Stock assessment of ling (*Genypterus blacodes*) on the Chatham Rise (LIN 3&4) for the 2014-15 fishing year. *New Zealand Fisheries Assessment Report 2015/82*. 54 p.

McKenzie, A. (2017) Assessment of hoki (*Macruronus novaezelandiae*) in 2016. *New Zealand Fisheries Assessment Report 2017/11*. 84 p.

Roberts, J. (2016). Stock assessment of ling (*Genypterus blacodes*) in the Sub-Antarctic (LIN 5&6) for the 2014–15 fishing year. *New Zealand Fisheries Assessment Report 2016/05*. 35 p.

3. Overview of environmental information

Observer Coverage

The MPI observer programme collects data from fisheries including ETP incidental capture information. This ETP component, under New Zealand law, is administered and funded by the Department of Conservation (DOC) through levies recovered from relevant fisheries sectors. Personnel and observer deployment are managed by MPI. Table 1 outlines observer coverage in these fisheries for the last five years.

Table 1 Observer coverage in the hoki mixed-species trawl fisheries. Coverage given as the percentage of tows observed.

	2011-12	2012-13	2013-14	2014-15	2015-16
All HOK, HAK, LIN	24%	39%	31%	29%	28%
All HOK, HAK, LIN, SWA & WWA	19%	30%	28%	30%	26%

MPI's Annual Operational Plan (MPI, 2016) provides the Deepwater Observer Coverage Plan for 2016-17. This includes:

- Briefing (where required) and debriefing (all trips) observers allocated to deep water trips
- Planning the annual observer coverage requirements for the deep water fisheries
- Updating biological sampling targets and observer tasking
- Monitoring progress towards sampling targets during the year.

Data collected by the observer programme are used:

- As an input to monitor key fisheries against harvest strategies, including through various approaches to stock assessment
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- As an input to monitor biomass trends for target and bycatch species
 - To assess fishery performance against environmental benchmarks as available
 - To enable more timely responses to sustainability and environmental impact issues
 - To evaluate certain compliance issues.

Information on incidental captures of ETP species reported by the MPI Observer Programme is summarised in a series of annual reports (e.g. Dragonfly website (www.dragonfly.co.nz/data/) and MPI, 2016), which enable the incidental captures of seabirds, marine mammals and turtles by the commercial fisheries to be monitored on an ongoing basis.

In addition to MPI's Observer Programme, a range of management measures, including some industry-led, non-regulatory initiatives, are employed to monitor environmental interactions in deep water fisheries and to reduce the risk of any adverse effects on protected species populations. Measures relating to the monitoring of ETP species are described in the DWG Operational Procedures (2016).

Retained & bycatch species

Fish bycatch and discard estimates are available for the hoki, hake and ling trawl fisheries from 1990-91 to 2012-13 (Ballara & O'Driscoll, 2015).

Since 1990–91 the annual combined total landed catch of hoki, hake, and ling has been between 109,600 and 301,600 t. Hoki, hake and ling have accounted for, on average, 91% of the total estimated catch weight recorded by observers in these target fisheries. The remainder of the observed catch has principally comprised two other QMS species, silver warehou (1.4% of the total catch) and spiny dogfish (0.9%), and two non-QMS species/groups javelinfish (1.4% of the total catch) and rattails (1.1%). Invertebrate species made up only a very small fraction of the overall catch, with arrow squid (0.1% of the total catch) the main species group caught. All but a few edible invertebrates (crustaceans and molluscs) were discarded.

Eight of the top ten bycatch species are managed within the QMS and therefore catches are well monitored and direct controls exist to limit their overall catch.

As fourteen of the top sixteen observed bycatch species are managed within the QMS (the two non-QMS groups being javelinfish and rattails), discard rates have been “low” (Ballara & O'Driscoll, 2015, Table A1). Total annual discard estimates ranged from about 3,699 to 16,633 t per year. Discards increased in the 1990s, peaked in 2000, and have since decreased. The main species discarded have been spiny dogfish, rattails, javelinfish, hoki, and shovelnose dogfish. The individual species most discarded has been spiny dogfish, which was introduced into the QMS in October 2004 but at the same time added to the 6th schedule of the Fisheries Act 1996, allowing it to be legally discarded at sea provided the catch is reported.

Total annual bycatch has decreased since 2004 (Ballara & O'Driscoll, 2015, Figure 17).

ETP species

Seabirds

On average for the last five years, there have been 550 estimated seabird captures each year in the hoki multi-species trawl fishery¹⁸ with some released alive (44% of observed incidental captures were recorded as released alive) (Table 2) (Abraham & Thompson, 2015).

The two species represented most often (sooty shearwater representing 25% of incidental captures over the last five years and white-chinned petrel 19%) are classified as having 'very low' fisheries risk according to the most recent update of the Spatially Explicit Fisheries Risk Assessment for seabirds (MPI, 2016, Table 8.32, and Richard and Abraham, in prep).

The species most frequently represented in incidental capture data are all regularly monitored at the population level.

The majority of inshore ling coastal trawlers (< 28 m) are now also operating in accordance with Seabird Risk Management Plans (96% of all effort in this category in 2015-16). DWG, Fisheries Inshore NZ Ltd (<http://www.inshore.co.nz/>) and Southern Inshore Fisheries Management Company (SIFMC) Ltd (<http://www.southerninshore.co.nz/cms/>) have active and ongoing programmes to install seabird risk management plans (RMPs) on these small inshore trawl vessels. Seabird captures from these vessels has previously been around 20 per year, but with increased risk mitigation this is expected to reduce.

Table 2 Observed (both dead, D, and released alive, A) and estimated (Draonfly's statistical model) seabird incidental captures in the hoki mixed-species trawl fishery¹⁹ for fishing years 2010-11 to 2014-15 (Abraham & Thompson, 2015)

Species	2010-11		2011-12		2012-13		2013-14		2014-15		Totals	Avg/Yr
Albatrosses:	D	A	D	A	D	A	D	A	D	A		
Salvin's	7	7	8	9	17	17	26	11	17	15	134	26.8
Southern Buller's	3	4	17	3	21	6	22	2	11	3	93	18.6
NZ white-capped	2	5	16	4	29	14	19	10	9	7	116	23.2
Shearwaters & petrels:												
Sooty shearwater	25	21	19	5	24	4	52	31	21	22	224	44.8
White-chinned petrel	11	4	8	2	21	8	25	37	29	20	165	33.0
Westland petrel	-	1	1	2	2	10	3	7	3	2	31	6.2

¹⁸ This includes silver warehou and white warehou target tows.

¹⁹ This includes silver warehou and white warehou target tows.

Fairy prion	-	2	-	4	-	6	1	14	-	2	29	5.8
Common diving petrel	-	14	-	1	-	1	-	-	-	3	19	3.8
Other seabirds (with >10 total captures):	2	9	8	4	3	15	5	11	1	3	63	12.6
Totals	90		86		143		231		93		886	177.2
Observer coverage	24%		39%		31%		29%		28%		-	
Estimated incidental captures (all species)	588		447		501		580		635		2,751	550

New Zealand fur seal

On average for the last five years, there have been 290 estimated incidental captures of New Zealand fur seals per year in the hoki mixed-species trawl fishery²⁰ with some of these released alive (22% of observed incidental captures were recorded as released alive) (Table 3).

Table 3 Observed (dead, D, and released alive, A) and estimated (Dragonfly's statistical model) incidental captures of New Zealand fur seals in the hoki mixed-species trawl fishery²⁰ for fishing years 2010-11 to 2014-15 (Abraham & Thompson, 2015)

Species	2010-11		2011-12		2012-13		2013-14		2014-15		Totals	Avg/Yr
	D	A	D	A	D	A	D	A	D	A		
Observed	24	4	33	4	58	21	36	2	40	11	233	46.6
Estimated	267		266		317		224		377		1,451	290.2

New Zealand sea lion

There have been two reported incidental captures of New Zealand sea lions in the hoki mixed-species trawl fishery²⁰ in the last five years (2010-11 to 2014-15), both of which were released alive (Abraham & Thompson, 2015).

It has been estimated by Dragonfly's statistical model that there has been one incidental capture of a sea lion per year for the last five years.

Basking shark

In 2014-15 one basking shark (*Cetorhinus maximus*) was reported captured in the hoki mixed-species trawl fishery²⁰.

The Department of Conservation (DOC) has recently undertaken a review of basking shark interactions (Francis, 2017).

²⁰ This includes silver warehou and white warehou target tows.

An active mitigation programme administered by DWG and monitored by MPI has been in place since 2013 to reduce the incidental capture of basking sharks in the deep water fisheries (DWG, 2016).

Whales & dolphins

There have been three reported incidental captures of dolphins in the hoki mixed species trawl fishery²⁰ in the last five years (2010-11 to 2014-15), two common dolphins (one released alive) and one dusky dolphin (Abraham & Thompson, 2015).

It has been estimated by Dragonfly's statistical model that there has been five incidental captures of dolphins per year for the last five years.

There have been no whale captures.

Coral

Coral bycatch has been low (typically less than 100 kg with an average of about 140 kg/year) (Table 4, Figures 10-11). There were two fishing trips in 2012-13 that account for the larger than average catch in this year (although these volumes were still low). From Table 4, it can be seen that the average catch of coral per tow over the last five years in this mixed fishery is very small at only 29 g.

Table 4 Total catch of all types of coral combined (kg) per year from observed tows, the number of observed tows and the average catch of coral per tow (kg/tow) for the hoki mixed-species trawl fishery²¹ (MPI data, T. Bock *pers.comm.*)

Species	2011-12	2012-13	2013-14	2014-15	2015-16	Average
Coral (kg)	39	493	56	68	62	144
Observed Tows	3,473	5,932	5,403	5,345	4,538	4,938
Catch rate (kg/tow)	0.01	0.08	0.01	0.01	0.01	0.03

²¹ This includes silver warehou and white warehou target tows.

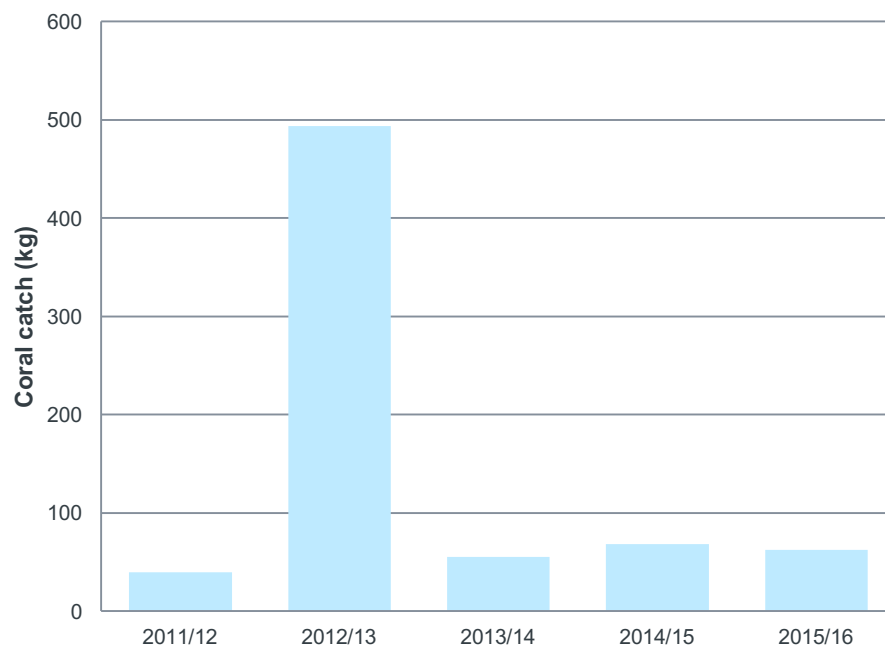


Figure 10 Total catch of all types of coral combined (kg) per year for the hoki mixed-species fishery²¹ (MPI data, T. Bock pers comm.)

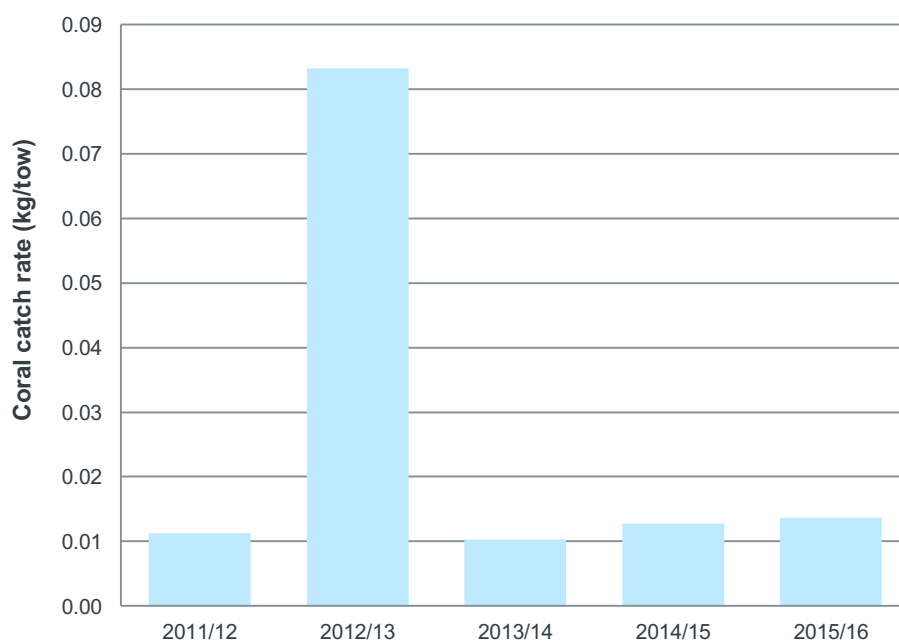


Figure 11 Catch rate (kg/tow) of all types of coral combined for the hoki mixed-species fishery²² (MPI data, T. Bock pers comm.)

²² This includes silver warehou and white warehou target tows.

Benthic interactions

The trawl footprint of these fisheries is monitored to assess their interactions with the benthic habitat (Black & Tilney, 2017, and Black, 2016). Each year, the total trawl footprint has been calculated since 1989 for eleven main deep water species including hoki, hake and ling, as well as the cumulative footprint for all deep water fisheries.

Table 5 Swept area of trawls as a percentage of the EEZ by depth for all hake, hoki and ling fisheries, and for the cumulative deep water fisheries (Black & Tilney, 2017)

Fishery	EEZ Area	Swept Area 1989-90 to 2013-14 (% of EEZ Area)	Swept Area 2013-14 (% of EEZ Area)
All hake target trawls	400-800 m depths	3.1%	0.2%
	All depths	0.4%	0.0%
All hoki target trawls	400-800 m depths	24.0%	4.0%
	All depths	3.9%	0.5%
All ling target trawls	400-800 m depths	1.7%	0.1%
	All depths	0.3%	0.0%
All deepwater trawls	400-800 m depths	30.1%	4.7%
	All depths	8.1%	0.9%

Tingley (2017) summarises New Zealand's strategy for managing benthic effects from fishing and Ford (2017) provides an update on benthic research.

The New Zealand EEZ contains 17 Benthic Protection Areas (BPAs) representatively distributed around the EEZ that close 30% of the EEZ to bottom fishing and include about 52% of all seamounts over 1,500 m elevation and 88% of identified hydrothermal vents (Helson *et al.*, 2010).

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4. Overview of management information

Legal & customary framework

New Zealand's fisheries management is centred on the Quota Management System (QMS), a system introduced in 1986 based on Individual Transferrable Quota (quota), Total Allowable Catch (TAC) limits and Total Allowable Commercial Catch (TACC) limits.

Quota provides a property right to access commercial fisheries and has been allocated to Maori as part of the Treaty of Waitangi Settlements that acknowledge the Treaty guaranteed Maori "*full exclusive and undisturbed possession of their...fisheries.*"

Quota is a tradable property right that entitles the owner to a share of the TACC. At the commencement of each fishing year, quota gives rise to Annual Catch Entitlements (ACE) which are tradable, expressed in weight, and entitle the holder to land catch against them. The QMS enables sustainable utilisation of fisheries resources through the direct control of harvest levels based on the best available science. The QMS is administered by MPI through the Fisheries Act 1996.

New Zealand has implemented one of the most extensive quota-based fisheries management systems in the world, with over a 100 species or species-complexes of fish, shellfish and seaweed now being managed within this framework. Almost all commercially targeted fish species within New Zealand's waters are now managed within the QMS.

At an operational level, these fisheries are managed in accordance with the National Fisheries Plan for Deepwater and Middle-depth Fisheries (Ministry of Fisheries, 2010, and MPI, 2016a). There are a species-specific chapters for hake, hoki and ling within this plan (MPI, 2011, 2011a, 2011b).

The National Deepwater Plan was developed to align with Fisheries 2030 (Ministry of Fisheries, 2009) and collectively consists of three parts:

- Five-year plan – divided into two sections, Part1A (of which an updated draft is currently being publicly consulted on²³) and Part1B. Part 1A sets the strategic direction for deep water fisheries. Part 1B comprises fishery specific-chapters and how the Management Objectives will be applied at a species level
- Annual Operational Plan (AOP) – this details the management actions for delivery during the financial year
- Annual Review Report – which reports progress towards meeting the five-year plan and annual performance of the deep water fisheries against the AOP.

Collaboration

In 2006, DWG and MPI entered into a formal partnership to enable collaboration in the management of New Zealand's deep water fisheries. This partnership was updated in 2008 and 2010 and has directly facilitated improved management of these deep water fisheries through:

- A close working relationship under a shared and agreed vision, objectives and collaborative work plans
- Real-time, open communication between DWG and MPI on information relevant to management measures, particularly from the MPI Observer Programme and commercial catching operations.

MPI and DOC actively consult with interested parties to inform management decisions through their open scientific working groups and public consultation processes.

Compliance & enforcement

MPI maintains a comprehensive compliance programme, which includes both encouraging compliance through support and creating effective deterrents. This strategy is underpinned by the VADE model, which focuses on all elements of the compliance spectrum as follows:

1. Voluntary compliance – outcomes are achieved through education, engagement and communicating expectations and obligations
2. Assisted compliance – reinforces obligations and provides confidence that these are being achieved through monitoring, inspection, responsive actions and feedback loops
3. Directed compliance – directs behavioral change and may include official sanctions and warnings
4. Enforced compliance – uses the full extent of the law and recognises that some individuals may deliberately choose to break the law and require formal

²³ Refer <https://www.mpi.govt.nz/news-and-resources/consultations/national-fisheries-plans-for-highly-migratory-species-and-deepwater-fisheries/>

investigation and prosecution.

Since 1994, all vessels over 28 m have been required by law to be part of the Vessel Monitoring System (VMS) which, through satellite telemetry, enables MPI to monitor all deep water vessel locations at all times. In combination with at-sea and aerial surveillance, supported by the New Zealand joint military forces, the activities of deep water vessels are fully monitored and verified to ensure compliance with both regulations and with industry-agreed operating procedures.

All commercial catches from QMS stocks must be reported and balanced against ACE at the end of the month. It is illegal to discard or not to report catches of QMS species. Catches may only be landed at designated ports and sold to Licensed Fish Receivers (LFRs). Reporting requirements for deep water trawl vessels include logging the location, depth, main species caught for each tow, and total landed catch for each trip.

MPI audits commercial vessel catch-effort and landing reports, reconciles these against multiple sources including VMS records, data collected by onboard MPI observers, and catch landing records from LFRs to ensure that all catches are reported correctly.

Commercial fishermen face prosecution and risk severe penalties, which include automatic forfeiture of vessel and quota upon conviction of breaches of the fisheries regulations (unless the court rules otherwise). Financial penalties are also imposed in the form of deemed values to discourage fishermen from over-catching their ACE holdings.

The extensive regulations governing these fisheries are complemented by additional industry-agreed non-regulatory measures, known as the New Zealand Deepwater Fisheries Operational Procedures. The Minister for Fisheries relies on the effectiveness of both regulatory and non-regulatory measures to ensure the sustainable management of these fisheries.

As part of DWG's Operational Procedures, DWG has an Environmental Liaison Officer whose role is to liaise with vessel operators, skippers and MPI to assist with the effective implementation of these Operational Procedures.

Fisheries plans

The National Fisheries Plan for Deepwater and Middle-depth fisheries is a statutory document approved by the Minister of Fisheries. This Plan provides an enabling framework outlining agreed management objectives, timelines, performance criteria and review processes. There is a fisheries-specific chapter for the hake, hoki and ling fisheries within this Plan.

The actual management measures and delivery outcomes in the Plan are specified in MPI's Annual Operational Plan (AOP), which is reviewed and updated annually. In addition, an Annual Review Report assesses performance against the AOP and is publicly available.

Research plans

Research needs for deep water fisheries are driven by the Objectives of the National Deepwater Plan and delivered through the research programme for deep water fisheries.

All research projects are reviewed by MPI's Science Working Groups and assessed

against MPI's Research and Science Information Standard for New Zealand Fisheries.

Tables 8-10 of MPI (2016a) specify planned research for 2016-17.

MPI's medium-term research plan for deep water fisheries provides a five-year outlook on planned research to support sustainable management of deep water fisheries.

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