Seafood Risk Assessment

New Zealand Jack Mackerel Fishery

Prepared for the OpenSeas Programme

Assessment Summary

New Zealand Jack Mackerel Fishery	Unit/s of Assessment:	
	Product Name/s:	***Jack mackerel***
	Species:	*Trachurus declivis, T. novaezelandiae, T. murphyi*
	Stock:	JMA1, JMA7
	Gear type:	Purse seine (JMA1), Mid-water trawl (JMA7)
	Year of Assessment:	2017

Fishery Overview

This summary is adapted from MPI (2017):

Commercial fisheries occur for three species of jack mackerel: Greenback horse mackerel *(Trachurus declivis),* Yellowtail horse mackerel *(T. novaezelandia),* and Chilean jack mackerel *(T. murphyi).*

Commercial catches and management of jack mackerel are not reported separately by species. All species of mackerel can be caught by bottom trawl, mid-water trawl or by purse seine. Jack mackerels are relatively low value fish, however, the high harvest volume makes them a valuable part of New Zealand's deepwater fisheries.

Jack mackerels have been included in the QMS since 1996, with four QMAs (Figure 1). Before 1996, jack mackerels were considered part of the QMS, although ITQs were issued only in JMA 7. Figure 2 shows historical landings and TACC values after entry into the QMS in 1996 and 2015-16.

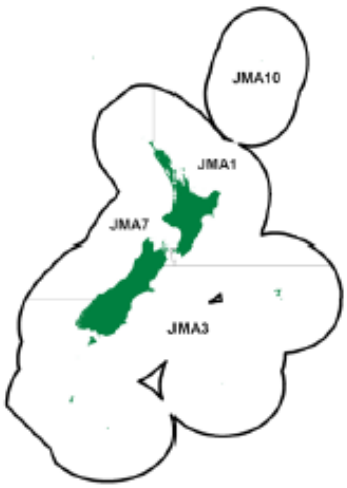

Figure 1: Management areas for the New Zealand Jack Mackerel fishery.

The jack mackerel in JMA 1 is mostly caught by purse seine in the Bay of Plenty and on the east Northland coast. Jack mackerel is often combined with kahawai in the purse seine fishery. In an effort to conserve the kahawai quota, fishing companies will avoid these mixed schools, particularly at the start of the fishing season. Blue mackerel and skipjack tuna are fished in preference to jack mackerel in the purse seine fishery, causing the length of the jack mackerel season to be influenced by the availability of these species. Some trawl bycatch of jack mackerel has been reported in JMA 1.

Landings in JMA 7 represent the greatest proportion of total landings and are mainly taken by chartered trawlers. Several bycatch issues have been reported for the JMA 7 fishery. Blue mackerel is a large bycatch fishery that operates for several months of the year, and includes other bycatch species taken in this fishery such as barracouta, gurnard, John dory, kingfish, and snapper. Although non-availability of ACE is unlikely to be constraining in the first three of these additional species, the same is not true of kingfish, blue mackerel, and snapper.

A number of factors influence landing volumes in the jack mackerel fisheries including availability of annual catch entitlement for bycatch and changes in market price. In recreational fisheries, jack mackerel do not rate highly as a target species although they are popular as bait.

Jack mackerel in JMA7 is managed as part of New Zealand's Deepwater fisheries. JMA1 is managed by the Inshore Fisheries Management Team as almost all catch of those species in those QMAs is taken by the domestic purse seine fleet.

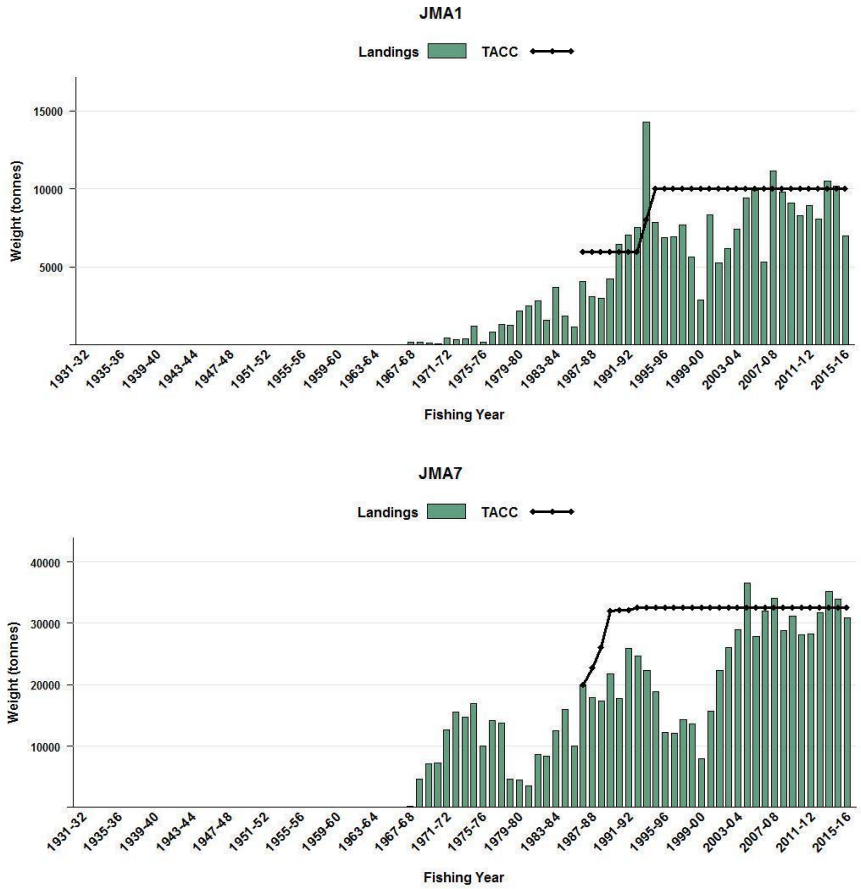

Figure 2: Catch history and TAC for New Zealand jack mackerel from areas JMA1 (Auckland East, Central East) and JMA 7 (Challenger, Central Egmont, and Auckland West).

Scoring

Performance Indicator	JMA1 – purse seine	JMA7 – Mid-water trawl
COMPONENT 1		
1A: Stock Status	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
1B: Harvest Strategy	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
1C: Information and Assessment	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
OVERALL	HIGH RISK	HIGH RISK
COMPONENT 2		
2A: Non-target Species	LOW RISK	LOW RISK
2B: ETP Species	LOW RISK	PRECAUTIONARY HIGH RISK
2C: Habitats	LOW RISK	LOW RISK
2D: Ecosystems	LOW RISK	LOW RISK
OVERALL	LOW RISK	MEDIUM RISK
COMPONENT 3		
3A: Governance and Policy	LOW RISK	LOW RISK
3B: Fishery-specific Management System	LOW RISK	LOW RISK
OVERALL	LOW RISK	LOW RISK

Summary of main issues

- Stock assessments for jack mackerel are complicated by the reporting and management of three species under a single code. The stock structure of the three jack mackerel species is uncertain and further complicated with the effect of the relatively recent (1987) invasion of *T. murphyi* on stocks of the New Zealand jack mackerel.
- The most recent assessment for JMA 1 was undertaken in 1993. It is not known whether catches at the level of the current TACC or recent catch levels are sustainable in the long-term
- The most recent assessment of JMA7 indicated that overfishing was unlikely to be occurring, although the position of the stock against reference points is unknown. A stock assessment is planned for 2017-18.
- The JMA7 fishery has a bycatch of common dolphins. Preliminary risk assessment results examining cumulative risk to common dolphins across all New Zealand fisheries are highly uncertain with an estimated risk score that may be less than half the Population Sustainability Threshold (PST) or may exceed the PST by a factor of two. Final risk assessment results are expected in 2017.

Outlook

JMA1 – Purse seine

Component	Outlook	Comments
Target species	Uncertain	Uncertain stock status; no recent stock assessment
Environmental impact of fishing	Stable	No major changes to existing P2 arrangements are expected.
Management system	Stable	No major changes to existing P3 arrangements are expected.

JMA7 – Mid-water trawl

Component	Outlook	Comments
Target species	Uncertain	Stock assessment planned for the 2017/18 financial year.
Environmental impact of fishing	Uncertain	Final outcomes of the Marine Mammal Risk Assessment are expected in 2017.
Management system	Stable	No major changes to existing P3 arrangements are expected.

Contents

Disclaimer

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Background

This report sets out the results of an assessment against a seafood risk assessment procedure, originally developed for Coles Supermarkets Australia by MRAG Asia Pacific. The aim of the procedure is to allow for the rapid screening of uncertified source fisheries to identify major sustainability problems, and to assist seafood buyers in procuring seafood from fisheries that are relatively well-managed and have lower relative risk to the aquatic environment. While it uses elements from the GSSI benchmarked MSC Fishery Standard version 2.0, the framework is not a duplicate of it nor a substitute for it. The methodology used to apply the framework differs substantially from an MSC Certification. Consequently, any claim made about the rating of the fishery based on this assessment should not make any reference to the MSC or any other third party scheme.

This report is a "live" document that will be reviewed and updated on an annual basis.

Methods

Risk Assessment

Detailed methodology for the risk assessment procedure is found in MRAG AP (2015). The following provides a brief summary of the method as it relates to the information provided in this report.

Assessments are undertaken according to a 'unit of assessment' (UoA). The UoA is a combination of three main components: (i) the target species and stock; (ii) the gear type used by the fishery; and (iii) the management system under which the UoA operates.

Each UoA is assessed against three components:

1. Target fish stocks;
2. Environmental impact of fishing; and
3. Management system.

Each component has a number of performance indicators (PIs). In turn, each PI has associated criteria, scoring issues (SIs) and scoring guideposts (SGs). For each UoA, each PI is assigned one of the following scores, according to how well the fishery performs against the SGs:

- Low risk;
- Medium risk;
- Precautionary high risk; or
- High risk

Scores at the PI level are determined by the aggregate of the SI scores. For example, if there are five SIs in a PI and three of them are scored low risk with two medium risk, the overall PI score is low risk. If three are medium risk and two are low risk, the overall PI score is medium risk. If there are an equal number of low risk and medium risk SI scores, the PI is scored medium risk. If any SI scores precautionary high risk, the PI scores precautionary high risk. If any SI scores high risk, the PI scores high risk.

For this assessment, each component has also been given an overall risk score based on the scores of the PIs. Overall risk scores are either low, medium or high. The overall component risk score is low where the majority of PI risk scores are low. The overall risk score is high where any one PI is scored high risk, or two or more PIs score precautionary high risk. The overall risk score is medium for all other combinations (e.g. equal number of medium/low risk PI scores; majority medium PI scores; one PHR score, others low/medium).

Outlook

For each UoA, an assessment of the future 'outlook' is provided against each component. Assessments are essentially a qualitative judgement of the assessor based on the likely future performance of the fishery against the relevant risk assessment criteria over the short to medium term (0-3 years). Assessments are based on the available information for the UoA and take into account any known management changes. Outlook scores are provided for information only and do not influence current or future risk scoring.

Table 1: Outlook scoring categories.

Outlook score	Guidance
Improving	The performance of the UoA is expected to improve against the relevant risk assessment criteria.
Stable	The performance of the UoA is expected to remain generally stable against the relevant risk assessment criteria.
Uncertain	The likely performance of the UoA against the relevant risk assessment criteria is uncertain.
Declining	The performance of the UoA is expected to decline against the relevant risk assessment criteria.

Information sources

Information to support scoring is obtained from publicly available sources, unless otherwise specified. Scores will be assigned on the basis of the objective evidence available to the assessor. A brief justification is provided to accompany the score for each PI.

Assessors will gather publicly available information as necessary to complete or update a PI. Information sources may include information gathered from the internet, fishery management agencies, scientific organisations or other sources.

Assessment Results

COMPONENT 1: Sustainable target fish stocks

1A: Stock Status

CRITERIA: (i)The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.

(a) Stock Status

Stock assessments for jack mackerel are complicated by the reporting and management of three species under a single code (MPI, 2017). The stock structure of the three jack mackerel species is uncertain and further complicated with the effect of the relatively recent (1987) invasion of *T. murphyi* on stocks of the New Zealand jack mackerel. It is possible that *T. murphyi* in New Zealand waters is part of a single, extensive trans-Pacific stock linking the coasts of Chile and New Zealand between latitudes 35–50° S.

MPI (2017) report that "the three species have different levels of mobility and different spatial distributions within New Zealand. *T. murphyi* has been extremely mobile, with a widespread distribution throughout New Zealand during the 1990s, but is now rarely seen in areas where once it was common. The degree to which its biomass has actually declined is difficult to determine and there are no recent reliable estimates of its current spatial distribution *T. declivis* is also believed to be highly mobile within New Zealand. Because of this, a single biological stock is assumed, but this has not yet been reliably determined. The mobility of *T. novaezelandiae* is assumed to be lower, given that it is a smaller animal with a more northerly and inshore distribution than *T. declivis*. Consequently, there is a higher probability of multiple independent breeding populations for *T. novaezelandiae."*

JMA1 **PRECAUTIONARY HIGH RISK**

In JMA1, most of the jack mackerel catch is taken in the Bay of Plenty, with relatively small catches taken from off the east Northland coast. From 1999-2000 to 2015-16, annual catches in JMA 1 have been largely dominated by Yellowtail horse mackerel (*T. novaezelandiae*), with low cumulative catches of *T. declivis* and *T. murphyi* (at 7% and 2%, respectively). Landings in JMA 1 in 1997/98 – 2004/05 approached the level of the TACC (10,000t), and have since then fluctuated around 8,000 – 10,000 t, with the exception of a considerably lower catch in 2006/07 and a peak catch of 11, 200 t in 2007/08. JMA1 landings in 2015-16 were considerably less than the TACC of 10,000t at 6,989 t.

The most recent assessment for JMA 1 was undertaken in 1993 as a qualitative evaluation involving an assessment of fishery trends (e.g., catch, effort and nominal CPUE, length-frequency information). There is no agreed index of abundance.

MPI (2017) concluded that 'it is not known whether catches at the level of the current TACCs or recent catch levels are sustainable in the long-term". They also noted that recent work and discussions concerning the use of aerial sightings data for annual relative abundance indices concluded that the inter-annual variation was too great for these data to provide a reliable index.

JMA7 **PRECAUTIONARY HIGH RISK**

Preliminary stock assessments for *T. declivis* and *T. novaezealandiae* in JMA 7 were undertaken in 2007, although the assessment of *T. novaezealandiae* was rejected by the working group (MPI, 2017). For *T. declivis*, an age-based Bayesian stock assessment was fitted to two CPUE time series and commercial proportions-at-age data. The preliminary base case model estimated that biomass was at 53% of virgin biomass (B_0).

The most recent stock assessment of JMA 7 was undertaken in 2011 using catch curve analysis (MPI, 2017). Estimates of average instantaneous fishing mortality (F) were well below natural mortality (M) for *T. declivis* and about equal to M for *T. novaezelandiae* indicating that it is unlikely (< 40%) that overfishing is occurring. Nevertheless, MPI (2017) notes that the catch curve analysis may not provide accurate values of average fishing mortality.

Estimates of biomass relative to reference points are unknown and no abundance indices are available.

Estimates of maximum constant yield (MCY) were produced for the two endemic species (*T. declivis* and *T. novaezealandiae*) in JMA 7 in the early 1990s, totalling 21,600t. Catch has regularly exceeded this level since the early 2000s, and MPI (2017) note that the estimates were highly uncertain and may be conservative given the introduction of a third species.

While it's possible that all three stocks are currently above the point of recruitment impairment, the evidence is uncertain and largely dated. Nevertheless, the most recent assessment indicated that overfishing was unlikely to be occurring. Accordingly, we have scored this SI precautionary high risk.

PI SCORE	PRECAUTIONARY HIGH RISK – JMA1, JMA7

1B: Harvest Strategy

CRITERIA: (i) There is a robust and precautionary harvest strategy in place.

(a) Harvest Strategy

The harvest strategy in the commercial jack mackerel fishery consists of:

- Catch controls through TACs and ITQs;

- Disincentives to over-catch through application of deemed values;
- Gear restrictions;
- Monitoring through logbooks and catch returns;
- Monitoring through VMS
- Periodic review of stock status and recommended TAC levels through the MPI Working Group process.

All jack mackerels are managed under the QMS, and all three species are managed collectively in each QMA. The stock structure of the three jack mackerel species is uncertain, and the QMAs may not reflect distinct biological stocks.

TACs and/or TACCs are set according to the NZ Harvest Strategy Standard which establishes default target (25% - 45% B_0, depending on the productivity of the stock), soft limit (20% B_0) and hard limit (10% B_0) reference points which guide Ministry advice to the Minister (MFish, 2008; MFish, 2011). Under the Standard, TAC/TACCs are set at levels that aim to maintain biomass at levels consistent with the Target Reference Point (TRP), a breach of the soft limit triggers a requirement for a formal, time-constrained rebuilding plan and a breach of the hard limits leads to consideration for closure.

JMA1 PRECAUTIONARY HIGH RISK

Although many of the systems and tools comprising an effective harvest strategy are in place, stock status is unknown and there is no reliable index of abundance. MPI (2017) conclude that "it is not known whether catches at the level of the current TACCs or recent catch levels are sustainable in the long-term." Accordingly, we have scored this SI precautionary high risk.

JMA7 MEDIUM RISK

Many of the systems and tools comprising an effective harvest strategy are in place through the QMS framework. While there is no estimate of biomass against reference points and no reliable index of abundance, recent catch curve analysis suggests that catches at current levels are unlikely to result in overfishing. Nevertheless, it is not clear that the harvest strategy is responsive to the state of the stock. Accordingly, we have scored this SI medium risk.

(b) Shark-finning MEDIUM RISK

NA

CRITERIA: (ii) There are well defined and effective harvest control rules (HCRs) and tools in place.

(a) HCR Design and application MEDIUM RISK

The jack mackerel UoAs are covered by the requirements of the *Fisheries Act 1996* to maintain stocks at levels capable of producing MSY or higher [e.g. sub-section 13(2A) states that "*if the Minister considers that the current level of the stock or the level of the stock that can produce the maximum sustainable yield is not able to be estimated reliably using best available information, the Minister must … (c) set a total allowable catch … (ii) that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, a level that can produce the maximum sustainable yield*"], and the NZ Harvest Strategy Standard (HSS) which requires QMS stocks to be maintained at or above a target equivalent to B_{MSY}, and above a soft limit equating to ½ B_{MSY} (MFish, 2008). The HSS requires that target and limit biological reference points be set for all QMS fishstocks but is flexible about the means by which this is achieved. The intention is to make best use of available information for each individual stock.

While a framework exists to identify, examine and respond to issues of declines in the silver warehou stock, and a suite of tools is available to implement reductions in exploitation if needed, there is no agreed index of abundance currently available for either stock. Accordingly, while generally understood HCRs and tools exist which could be expected to reduce exploitation as PRI is approached, there are no well-defined HCRs which are robust to the main uncertainties.

PI SCORE	PRECAUTIONARY HIGH RISK – JMA1, JMA7

1C: Information and Assessment

CRITERIA: (i) Relevant information is collected to support the harvest strategy.

(a) Range of information MEDIUM RISK

Very good information on fleet composition is available through the QMS arrangements and observer coverage, particularly in the JMA7 region, has been relatively high in recent years. Nevertheless, stock assessments are complicated by the combined reporting of all three species and there is uncertainty around stock structure and the 'status' of *T. murphyi*. Accordingly, some relevant information is available to support the harvest strategy, although it is not clear it is sufficient yet.

(b) Monitoring and comprehensiveness PRECAUTIONARY HIGH RISK

UoA removals are closely monitored through the QMS reporting arrangements, with validation from observers. Recreational catch has been estimated periodically and is insignificant in the context of the commercial catch (MPI, 2017). Estimates of illegal fishing are not available, but anecdotal evidence suggests it is insignificant (MPI, 2017).

The main weakness of both UoAs against this indicator is the absence of a reliable measure of stock abundance. Assessments, particularly for JMA 1, have been infrequent and it is not clear how they have actively supported the harvest control rule.

CRITERIA: (ii) There is an adequate assessment of the stock status.

(a) Stock assessment

JMA1 PRECAUTIONARY HIGH RISK

The most recent assessment for JMA 1 was undertaken in 1993 as a qualitative evaluation involving an assessment of fishery trends (e.g., catch, effort and nominal CPUE, length-frequency information). There is no agreed index of abundance.

JMA7 MEDIUM RISK

The most recent (2011) assessment for JMA 7 used catch curve analysis to produce estimates of average instantaneous fishing mortality (F) against natural mortality (M) for *T. declivis* and *T. novaezelandiae*. The assessment estimated status relative to generic reference points appropriate to the species category.

(b) Uncertainty and Peer review

JMA1 PRECAUTIONARY HIGH RISK

The plenary working group process continues to review new information for JMA 1, although no new assessments have been undertaken since 1993. MPI (2017) reported that "recent work and discussions concerning the use of aerial sightings data for annual relative abundance indices concluded that the inter-annual variation was too great for these data to provide a reliable index."

JMA7 MEDIUM RISK

Stock assessments are reviewed through the working group process. MPI (2017) noted that the analyses (catch curves) may not provide accurate values of average fishing mortality.

PI SCORE	PRECAUTIONARY HIGH RISK – JMA1, JMA7

COMPONENT 2: Environmental impact of fishing

2A: Other Species

CRITERIA: (i) The UoA aims to maintain other species above the point where recruitment would be impaired (PRI) and does not hinder recovery of other species if they are below the PRI.

(a) Main other species stock status

The intent of this scoring issue is to examine the impact of the UoA on 'main' other species taken while harvesting the target species. 'Main' is defined as any species which comprises >5% of the total catch (retained species + discards) by weight in the UoA, or >2% if it is a 'less resilient' species (MSC, 2014). The aim is to maintain other species above the point where recruitment would be impaired and ensure that, for species below PRI, there are effective measures in place to ensure the UoA does not hinder recovery and rebuilding.

JMA1 – Purse seine LOW RISK

Walsh *et al.* (2012) report that between 2009 and 2011, *T. novaezelandiae* accounted for 97% of purse seine landings in JMA 1. Jack mackerel is almost exclusively a targeted fishery in JMA 1, with small quantities taken as bycatch while targeting kahawai. Discards are thought to be minimal.

JMA7 – Mid water trawl LOW RISK

Anderson *et al.* (2017) summarised the bycatch and discards in the jack mackerel trawl fishery from 2002-03 to 2013-14. The three target jack mackerel species accounted for about 75% of the total reported catch. The remaining catch consisted of other commercial species, primarily barracouta (13%), blue mackerel (3%), frostfish (3%) and redbait (2%). All other species each accounted for less than 1%. Only barracouta meet the 5% threshold to be considered a 'main' other species.

Barracouta *(Thyrsites atun*)

Barracouta is caught in coastal waters around mainland New Zealand, Chatham Islands and the Snares, down to about 400m (MPI, 2017). Barracouta is considered a Tier 2 Deepwater species. The JMA 7 trawl fishery overlaps with the BAR 7 stock. The most recent assessment of the BAR 7 stock was undertaken in 2016, using standardised CPUE. While the status of the stock in relation to the target reference point is known, MPI (2017) conclude that it is very unlikely (<10%) that the stock is below either the soft or hard limits reference points. Accordingly, it is probably highly likely the stock is above PRI.

CRITERIA: (ii) There is a strategy in place that is designed to maintain or to not hinder rebuilding of other species; and the UoA regularly reviews and implements

(a) Management strategy in place LOW RISK

The strategy to manage 'main' other species across all JMA stocks includes:

- Control on catch and effort through TACs and ITQs on the target species;
- Gear restrictions;

- Monitoring through logbooks and catch returns;
- Monitoring through VMS and observers
- Periodic assessments of QMS species through the NZ Plenary process.

For the JMA 1 purse seine fishery, impacts on main other species are limited. For the JMA 7 fishery, these measures form at least a partial strategy which is expected to maintain BAR 7 at levels highly likely to be above PRI.

(b) Management strategy evaluation **LOW RISK**

The results of independent research sampling on each of the UoAs (e.g. Walsh et al, 2012; Anderson et al., 2017) and periodic stock assessments on main other species (e.g. MPI, 2017) provide an objective basis for confidence that the strategy will work.

(c) Shark-finning

NA

CRITERIA: (iii) Information on the nature and amount of other species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage other species.

(a) Information **LOW RISK**

Quantitative information is available through independent catch sampling (e.g. Walsh et al., 2012) and observer programs (e.g. Anderson et al., 2017) which provides information on catch composition. Together with periodic stock assessments of main other species, this information is adequate to assess the impact of the UoA on main other species with respect to status and to detect increases in risk.

PI SCORE	LOW RISK – JMA1, JMA7

2B: Endangered Threatened and/or Protected (ETP) Species

CRITERIA: (i) The UoA meets national and international requirements for protection of ETP species.
The UoA does not hinder recovery of ETP species.

(a) Effects of the UoA on populations/stocks

The main potential ETP species interactions in the jack mackerel fisheries are with seabirds and some marine mammals.

JMA1 – Purse seine **LOW RISK**

Between 2002–03 and 2014–15, there were five observed captures of all birds in mackerel purse seine fisheries. Observed captures were of New Zealand white-faced storm petrel (3), storm petrels (1), and giant petrels (1) (Abraham and Thompson, 2015). All were reported to be alive. Observer coverage ranged from 0% to ~18% of effort during that period. There were no observed captures of New Zealand fur seals, sea lions or cetaceans (Abraham and Thompson, 2015). Accordingly, it is highly unlikely that this rate of interaction will hinder recovery of ETP species.

JMA7 – Mid water trawl **PRECAUTIONARY HIGH RISK**

Seabirds

The majority of seabirds interactions in the JMA 7 trawl fishery occur in the Taranaki area. Between 2002–03 and 2014–15, there were 19 observed captures of all birds in jack mackerel trawl fisheries in the Taranaki area. Observed captures were of fulmar prion (9), fairy prion (5), New Zealand white-capped albatross (2), sooty shearwater (1), large seabirds (1), and Cape petrels (1). In the same period, there were three observed seabird captures each in the east coast North Island and east coast South Island areas (Abraham and Thompson, 2015).

Risks to sea birds associated with New Zealand's commercial fisheries have been assessed through a hierarchical series of risk assessments (e.g. Rowe, 2013, Richard and Abraham, 2013, Richard and Abraham, 2015, Richard and Abraham, in prep., in MPI, 2016a). The most recent iteration derives a risk ratio for each taxon, which is an estimate of annual potential fatalities (APF) across trawl and longline fisheries relative to the Population Sustainability Threshold, PST (an analogue of the Potential Biological Removals, PBR, approach) (Richard & Abraham in prep; in MPI, 2016a). This index represents the amount of human-induced mortality a population can sustain without compromising its ability to achieve and maintain a population size above its maximum net productivity (MNPL) or to achieve rapid recovery from a depleted state. The management criterion used for developing the seabird risk assessment was that seabird populations should have a 95% probability of being above half the carrying capacity after 200 years, in the presence of ongoing human-caused mortalities and environmental and demographic stochasticity (Richard & Abraham, 2013).

In the most recent assessment, only one species of seabird, black petrel (1.15), had a median risk ratio higher than 1 (or upper 95% confidence limit higher than 2) taking into account fishing related mortality across all trawl and longline fisheries (MPI, 2016a). For all other species, current median rates of fishing related mortality were not expected to hinder the achievement of management targets (i.e. the risk ratio was <1). There have been no observations of black petrel captures in jack mackerel trawl fisheries (Abraham and Thompson, 2015). For other species, the current level of interactions in the jack mackerel fisheries appears highly unlikely to hinder recovery.

Marine Mammals

Cetaceans

Between 2002–03 and 2014–15, there were 181 observed captures of common dolphin in jack mackerel trawl fisheries (Abraham and Thompson, 2015). Estimated annual captures ranged from 7 to 128 over the same period, with the trend generally declining over time (Abraham and Thompson, 2015). Most of the captures occurred off the North Island west coast, in the fleet of vessels longer than 90 m. This fishery had the highest observer coverage among the trawl fisheries that caught dolphins: over the 18-year reporting period, almost 30% of the tows in this fishery were observed; since 2012‑13 over 85% of the tows have been observed each year. MPI (2016a) reported that during the 2002–03 and 2014–15 fishing seasons, less than three percent of the total trawl effort (number of tows) occurred in the jack mackerel fishery, yet 90% of the 206 common dolphin captures recorded by observers occurred in this fishery.

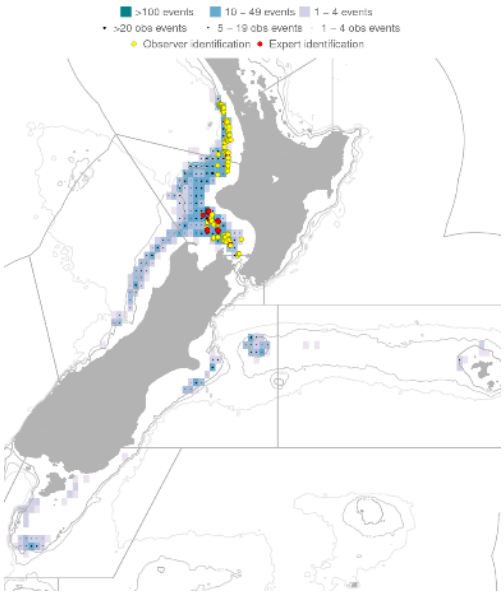

Figure 3: Map of fishing effort and observed captures of common dolphin in jack mackerel trawl fisheries between 202-03 and 2014-15. (Source: Abraham and Thompson, 2015)

MPI (2016a) report that MPI contract PRO2012-02 is currently in progress to deliver the first iteration of a New Zealand Marine Mammal Risk Assessment (NZMMRA, Abraham et al in prep) applying the Spatially Explicit Fisheries Risk Assessment (SEFRA) method. Preliminary results reviewed by the AEWG in 2016 suggest that common dolphins are the species most at risk from New Zealand commercial fisheries. Estimated fisheries related deaths to common dolphins are attributable primarily to pelagic trawl fisheries, for which historically observed captures are sufficient to estimate vulnerability and risk with some confidence, and also to inshore trawl and setnet fisheries, for which species vulnerability (hence total captures) is very poorly estimated due to very low historical observer coverage (MPI, 2016a).

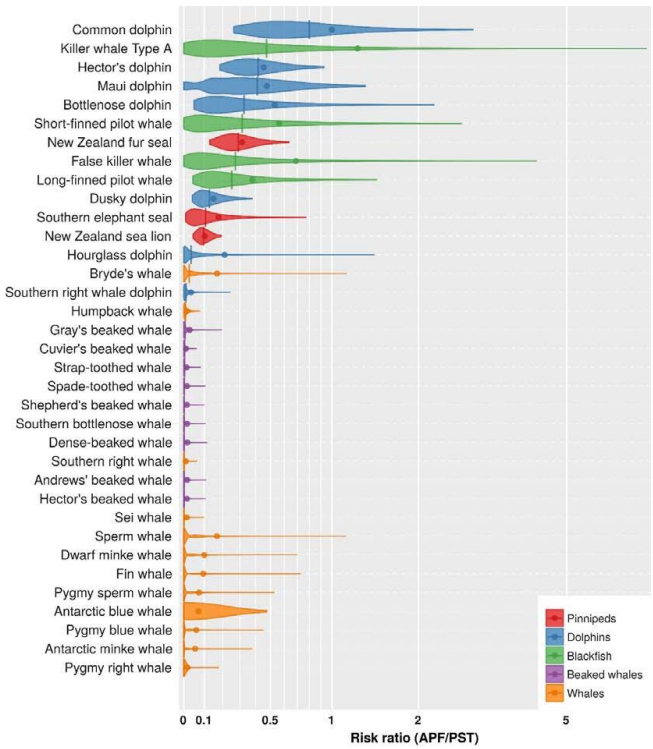

Figure 4: Cumulative fishery risk across all fishery groups as estimated by the 2016 New Zealand Marine Mammal Risk Assessment (NZMMRA; Abraham et al, in prep).

Given the uncertainty around setnet and inshore trawl fishery mortalities, cumulative fisheries risk for common dolphins remains highly uncertain, with an estimated risk score that may be less than half the Population Sustainability Threshold (PST) or may exceed the PST by a factor of two (MPI, 2016a). Preliminary estimates from the NZMMRA suggest setnets may account for the highest number of common dolphin mortalities, followed by pelagic trawl then inshore trawl, although the estimates for inshore trawl and setnets in particular are subject to very wide error bars.

Given the preliminary estimates of risk for common dolphins, including the possibility that the risk ratio from commercial fishing may be up to twice their PST, and that pelagic jack mackerel are important contributor to risk, we have scored this SI precautionary high risk. We note that final results from the NZMMRA are expected in 2017 and future scoring should take these into account.

Pinnipeds

Between 2002–03 and 2014–15, there were 57 observed captures of New Zealand fur seal in jack mackerel trawl fisheries (Abraham and Thompson, 2015). New Zealand fur seals are the most common seal in New Zealand. Their threat status is listed as least concern and their population trend is increasing[1]. Preliminary estimates suggest the cumulative risk across all New Zealand commercial fisheries is lower than their PST (MPI, 2016a). Accordingly, it appears highly unlikely that the level of incidental captures in the jack mackerel trawl fisheries are hindering recovery.

CRITERIA: (ii) The UoA has in place precautionary management strategies designed to:

- meet national and international requirements; and
- ensure the UoA does not hinder recovery of ETP species.

Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species

(a) Management strategy in place

The strategic framework for managing protected species interactions in New Zealand fisheries currently includes:

- Legislation: the Fisheries Act, Wildlife Act, and Marine Mammals Protection Act
- The National Plan of Action—Seabirds (MPI 2013a)
- The National Plan of Action – Sharks (MPI 2013b)
- The Marine Conservation Services Programme

When impacts of fishing are such that they are causing an adverse effect on protected species, measures are to be taken pursuant to s 15 of the Fisheries Act to avoid, remedy or mitigate that effect. If a Population Management Plan has been approved by the Minister of Conservation under either the Wildlife Act 1953 or the Marine Mammals Protection Act 1978 the Minister responsible for fisheries must give effect to those plans when managing the effects of fishing.

The Department of Conservation and Ministry for Primary Industries also contract research, including:

- population monitoring protected species;
- research relating to fishing effects on protected species;
- research on measures to mitigate the adverse effects of commercial fishing on protected species.

JMA1 – Purse seine **LOW RISK**

For seabirds, the main 'strategy' in place is the use of a gear type which has limited interaction with seabirds. Purse seine fisheries have been known to result in cetacean mortalities in other regions, however there are have been no observed interactions with cetaceans or pinnipeds in New Zealand jack mackerel purse seine fisheries between 2002-03 and 2014-15 (Abraham and Thompson, 2015). Although there are few specific regulatory measures in place to limit interactions, the available information indicates that current measures are adequate. Although variable, observers coverage is likely to have been sufficient to identify substantial sustainability risks.

JMA7 – Mid-water trawl **PRECAUTIONARY HIGH RISK**

Seabirds

Management measures to mitigate impacts of commercial fisheries on seabirds are included in the NPOA-Seabirds (MPI, 2013). The measures are given effect through the national fisheries planning process, and vary by vessel type. Table 2 summarises the measures across New Zealand's main commercial fishing gear/vessel types (MPI, 2013a)

Within cells in the table:

- R = regulated;
- SM = required via a self-managed regime (non-regulatory, but required by industry organisation and audited independently by Government);
- V = voluntary with at least some use known;
- Cells blacked out indicate that the measure is not relevant in a particular fishery;
- A year in ( ) indicates the year of implementation;
- Measures annotated with * are part of a vessel-specific seabird risk management plan; and
- Large vessels are those 28m and greater in length.

On trawl vessels, seabird scaring devices such as paired streamer (tori) lines, bird bafflers and warp deflector have been required on vessels >28 m in length since 2006. These measures are designed to achieve or maintain a favourable conservation status for albatrosses and petrels, as required by ACAP. Non-regulatory measures include vessel-specific Vessel Management Plans, which describe how fishery waste will be managed to reduce the risk of seabird captures. Offal management plans, vessel specific seabird risk management plans and codes of practice are also implemented via a self-management regime on trawl vessels >28m. The NPOA

[1] http://www.doc.govt.nz/nature/native-animals/marine-mammals/seals/nz-fur-seal/

defines a vessel-specific seabird risk management plan as "*a plan which specifies seabird mitigation devices to be used, operational management requirements to minimise the attraction of seabirds to vessels, and incident response requirements and other techniques or processes in place to minimise risk to seabirds from fishing operations*."

Table 2: Mitigation measures in place for New Zealand's fisheries under the National Plan of Action for Seabirds.(MPI, 2013a)

Mitigation Measure	Surface longline		Bottom longline			Trawl		Set net	Notes
	Large-vessel	Small-vessel	Vessels >20m	Vessels 7-20m	Vessels <7m	Large-vessel	Small-vessel		
Net sonde cable prohibition						R (1992)	R (1992)		Net sonde cables are also referred to as third wires
Seabird scaring device	R (Streamer line)	R (Streamer line)	R (Streamer line)	R (Streamer line)		R (2006)	V		On trawlers this is a recognised device which is designed to prevent warp captures and collisions
Additional seabird scaring device			V (second streamer line, gas cannon)			SM (2008)*	V		
Night setting	R (or line weighting)	R (or line weighting)	R (or line weighting)	R (or line weighting)	R (or line weighting)				Longline fleets must use night setting if not line weighting, or vice-versa.
Line weighting	R (or night setting)	R (or night setting)	R (or night setting)	R (or night setting)	R (or night setting)				
Dyed bait	V	V							
Offal management	V	V	R	R	R	SM (2008)*			
Vessel-specific seabird risk management plans						SM (2008)	V		Some vessel-specific seabird risk management plans have been developed for vessels < 28m
Code of Practice	V	V	V			SM (Vessel-specific seabird risk management plans)			

For larger trawl vessels (>28m), the measures outlined in the NPOA-Seabirds together with observer coverage and periodic risk assessments form a strategy to ensure the UoAs do not hinder recovery of ETP species. For smaller trawl vessels (<28m), fewer measures to mitigate seabirds are required and observer coverage has historically been lower. Nevertheless, risk assessments are updated periodically and there is evidence that new measures have been progressively introduced over time where required. No captures of black petrel were observed in the middle depth trawl fisheries between 2002-03 and 2014-15 (Abraham and Thompson, 2015), other seabird species have median risk ratios <1. Accordingly, the existing strategy appears likely to ensure the trawl UoAs do not hinder recovery of seabird species.

Marine mammals

All vessels managed under the DWG are required to follow specific operating procedures to reduce the risk of marine mammal captures. Procedures described in the Operating Procedures: Marine Mammals, based on data analyses and expert opinion (DWG, 2014). The measures are largely operational including removing 'stickers' (fish stuck in net), shooting and hauling as fast as possible, steaming away from large (>5) congregations of sea lions and designating a crew member to be on watch during setting and hauling. Although these measures have been sufficient to meet the SG80 scoring guideline against equivalent indicators in other deepwater fisheries (e.g. Ackroyd et al, 2012), the preliminary outcomes of the MMRA for common dolphin suggest there is uncertainty around the extent to which existing management measures are ensuring that the jack mackerel pelagic trawl fishery will not hinder recovery. Accordingly, we have scored this SI precautionary high risk.

(b) Management strategy implementation

JMA1 – Purse seine **LOW RISK**

Observer data showing very low rates of interaction with sea birds and marine mammals in the purse seine fisheries (Abraham and Thompson, 2015) provides an objective basis for confidence that the measures will work and are being implemented successfully.

JMA7 – Mid-water trawl **PRECAUTIONARY HIGH RISK**

For seabirds, periodic risk assessments (e.g. Richard and Abraham, in prep; in MPI, 2016a) provide an objective basis for confidence that the strategy will work. For marine mammals, preliminary results from the MMRA (Abraham et al, in prep.; in MPI, 2016a) cast doubt on whether the existing measures to limit interactions with common dolphins are sufficient to ensure the fishery will maintain the population at its current status and not hinder recovery. Accordingly, we have scored this SI precautionary high risk.

CRITERIA: (iii) Relevant information is collected to support the management of UoA impacts on ETP species, including:

- information for the development of the management strategy;
- information to assess the effectiveness of the
- management strategy; and
- information to determine the outcome status of ETP species.

(a) Information **LOW RISK**

Quantitative information is adequate to assess the UoA related mortality across both seabirds and marine mammals and to support strategies to minimise impact. Information includes interactions between the fishery and protected species from observer data, spatial fishing effort data from VMS and logbooks, as well as information on population parameters and ETP species distribution. This information has been sufficient to develop quantitative assessments of risk to both seabirds and marine mammals (Richard and Abraham, in prep; Abraham et al, in prep; in MPI, 2016a). The MPI protected species bycatch database contains good records and analysis of fisheries interactions by gear, vessel size, and ETP bird, mammal and reptile species across NZ commercial fisheries (MRAG Americas, 2016).

PI SCORE	LOW RISK – JMA1 – Purse seine
	PRECAUTIONARY HIGH RISK – JMA7 – Mid-water trawl

2C: Habitats

CRITERIA: (i) The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area(s) covered by the governance body(s) responsible for fisheries management

(a) Habitat status **LOW RISK**

Examples of "serious or irreversible harm" to habitats include the loss (extinction) of habitat types, depletion of key habitat forming species or associated species to the extent that they meet criteria for high risk of extinction, and significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the associated species assemblages (MSC, 2014). Further, MSC specifies that if a habitat extends beyond the area fished then the full range of the habitat should be considered when evaluating the effects of the fishery. The 'full range' of a habitat shall include areas that may be spatially disconnected from the area affected by the fishery and may include both pristine areas and areas affected by other fisheries.

JMA1 – Purse seine **LOW RISK**

Purse seine gear is fished on the surface of the water column and is highly unlikely to result in serious or irreversible harm to habitat structure and function.

JMA7 – Midwater trawl **LOW RISK**

The majority of jack mackerel targeted trawl fishing utilised mid-water trawl gear in the most recent years. Even though this gear is fished near or on the seafloor in over 70% of trawl tows, mid-water gear is lighter and is not set-up to be fished hard against the seafloor. This limits the impacts of this fishery on the benthic environment (MPI, 2013c).

New Zealand's benthic habitats have been classified into a 15-class Benthic-Optimised Marine Environment Classification (BOMEC), based on a range of physical, chemical and biological data (MPI, 2016a) (Figure 5). The majority of jack mackerel trawl effort occurs in BOMEC class C, much of which comprises sand and mud. Baird et al (2015) estimated that jack mackerel trawl fisheries (including JMA trawl fisheries outside JMA 7) had an aggregate swept area between 2008-09 and 2011-12 of 24,327km^2, or around 27% of the total area of BOMEC class C. Given the lighter nature of jack mackerel trawl gear, the largely sand/mud composition of BOMEC class C and the large areas of class which remain unswept by jack mackerel trawls, there is probably sufficient evidence to conclude the UoA is highly unlikely to reduce the structure and function of habitats to a point where there would be serious or irreversible harm.

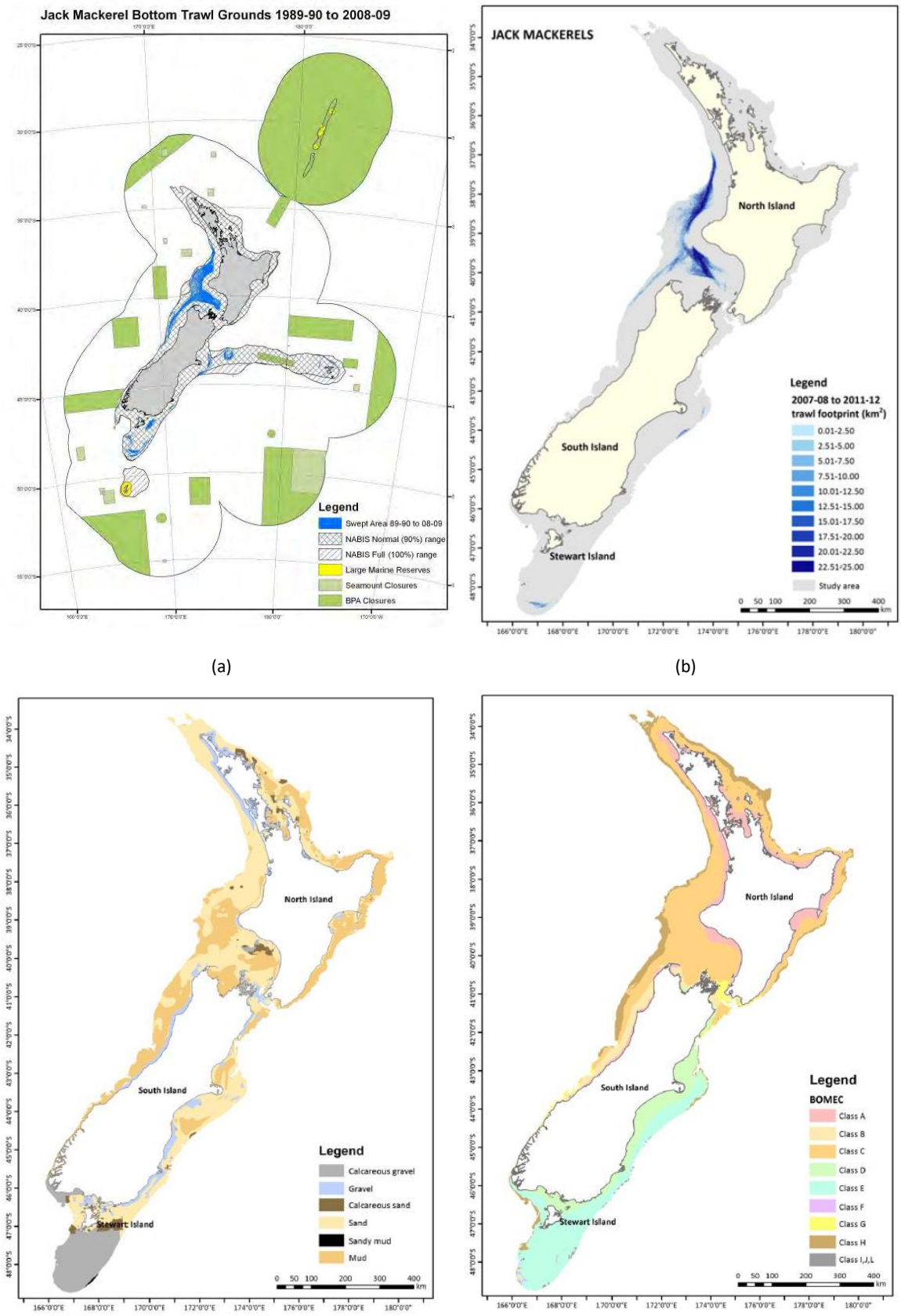

Figure 5: (a) Jack mackerel trawl footprint 1989-90 to 2008-09 in the context of BPAs and seamount closures (MPI, 2013b), (b) jack mackerel trawl footprint from 2007-08 to 2011-12, (c) distribution of broad sediment type within he 250m depth contour and (d) distribution of BOMEC classes within the 250m depth contour. (Sources: MPI, 2013b, Baird et al, 2015).

CRITERIA: (ii) There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.

(a) Management strategy in place **LOW RISK**

There are a number of key elements of the approach to managing fisheries impacts on habitat under a range of different legislative tools. These include:

- The closing of about one third of the New Zealand EEZ to bottom fishing though the designation of Benthic Protection areas (BPAs);
- The designation or Marine Protected Areas (MPAs);
- The designation of Marine Reserves;
- Monitoring vessel position;
- Research and analysis of footprints and impacts.

In the New Zealand Territorial Sea (TS) and EEZ there are substantial areas closed to bottom fishing, including marine reserves, marine protected areas (MPAs) and large Benthic Protected Areas (BPAs) and all contribute to protecting the environment generally and from the impact of trawling. These areas are largely based on the analysis of physical and some biological attributes and in total exclude bottom trawling from around 30% of the New Zealand EEZ to minimize benthic impact, safeguard habitats and protect representative marine benthic ecosystems and biodiversity in accordance with s 8(1) of the Fisheries Act 1996 which focuses on avoidance, mitigation or remedy of "*any adverse effects of fishing on the aquatic environment*." Marine reserves are closed to all fishing and BPAs are open only to trawling that does not contact the seabed (any trawling fewer than 100 meters directly above the seabed is prohibited, and trawling above this level has substantial verification requirements including Electronic Net Monitoring Systems). Penalties for violating bottom trawl bans in BPAs include fines of up to NZD 100,000 and criminal charges. To qualify as Marine Protected Areas (MPAs), sites must be under a level of protection that allows their habitats and ecosystems to remain at (or recover to) a healthy state.

The network of MPAs and BPAs, the representativeness of habitat they encompass, and the restrictions on bottom trawling they include within the BNS trawl fishery areas and the bioregion as a whole comprise at least a partial strategy that is expected to achieve the outcome stated in Criteria 2C(i).

(b) Management strategy implementation **LOW RISK**

An objective basis for confidence that the partial strategy will work/is working includes evidence that the restrictions on bottom fishing in MPAs and BPAs are effectively enforced. Jack mackerel fishing in the UoA areas and elsewhere within the NZ EEZ is fully monitored through VMS and observer coverage and there have reportedly been no violations since the implementation of closed areas to bottom trawling by vessels targeting deepwater species (MRAG Americas, 2016). The spatial extent of the trawl fishery has been mapped in relation to BOMEC habitat classes, with less than 27% of all classes covered by jack mackerel trawl fishing between 2008-09 and 2011-12 (Baird et al, 2015).

For the JMA1 purse seine fishery, observer information on pelagic gear usage provides an objective basis for confidence the measures will work.

CRITERIA: (iii) Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.

(a) Information quality

JMA1 – Purse seine **LOW RISK**

Given the pelagic nature of the gear, the existing habitat information (see summarised in MPI, 2016a) is sufficient to understand the nature, distribution and vulnerability of habitats at a level of detail relevant to the fishery.

JMA7 – Midwater trawl **MEDIUM RISK**

Benthic habitats have been classified into broad habitat classes within the New Zealand EEZ based on physical, chemical, and biological data, including sediment grain size (BOMEC) (Leathwick et al, 2010). This information appears sufficient to broadly understand the type and distribution of the main habitats in the fishery. Nevertheless, Baird et al (2015) concluded that the data used to represent benthic habitats in the BOMEC classification for inshore regions "were ill-suited for the task" and relied heavily on use of biological data from research surveys beyond the 250m contour. Moreover, Bowden et al (2011; in MPI, 2016a) found that the BOMEC out-performs the original MEC at predicting benthic habitat classes on and around the Chatham Rise, but that none of the available classifications is very good at predicting the abundance and composition of benthic invertebrates at the fine scale of the sampling undertaken (tens of metres to kilometres). Accordingly, it is not clear that the nature, distribution and vulnerability of the main habitats is known at a level of detail relevant to the nature and scale of the fishery.

(b) Information and monitoring adequacy

JMA1 – Purse seine **LOW RISK**

Information is adequate to identify the main impacts on the main habitats.

JMA7 – Midwater trawl **LOW RISK**

Information on trawl footprint within the UoA is adequate to allow the nature of the impacts of the fishery on broad habitat types to be identified (e.g. Baird et al, 2015). While the physical impacts of the gear on habitat types have not been fully quantified, there is on-going collection of relevant data from observer, vessel monitoring and research programs providing robust information on trawl footprint and the impact of trawling. Through the implementation of MPI's benthic impacts/habitats strategy, habitat distributions are monitored on a regular basis with specific studies designed to measure the impacts of fishing. Good information is available on the timing and location of fishing.

PI SCORE	LOW RISK – JMA1 – Purse seine, JMA7 – Midwater trawl

2D: Ecosystems

CRITERIA: (i) The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

(i)(a) Ecosystem Status MEDIUM RISK

Serious or irreversible harm in the ecosystem context should be interpreted in relation to the capacity of the ecosystem to deliver ecosystem services (MSC, 2014). Examples include trophic cascades, severely truncated size composition of the ecological community, gross changes in species diversity of the ecological community, or changes in genetic diversity of species caused by selective fishing.

Although research into the ecosystem impacts of the jack mackerel fisheries in New Zealand specifically has been limited, the weight of evidence suggests that the fishery is probably at least unlikely to result in serious or irreversible harm to key elements of the ecosystem. A number of middle depth and deepwater species (e.g. hoki, southern blue whiting, ling) have undergone full MSC assessment and received 80 scores or above against the equivalent indicator. Some of the species (e.g. southern blue whiting, ling) have a similar trophic level to jack mackerel.

Given the relatively targeted nature of the fishing operations for JMA, and the limited impact on habitats, the main impact from the UoAs are likely to be the removal of the target species from the ecosystem. Uncertainties around stock status mean it would be difficult to conclude with confidence that the UoAs are highly unlikely to disrupt the key elements of the ecosystem to the point of serious or irreversible harm, however the available evidence suggests that (at least for JMA 7) overfishing is not occurring. Accordingly, we have scored this SI medium risk.

CRITERIA: (ii) There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.

(a) Management Strategy in place LOW RISK

The New Zealand Fisheries Act 1996 s 8 provides for "the utilisation of fisheries resources while ensuring sustainability." Ecosystem-based management is achieved through a multi-layered approach that considers fishery management (e.g., QMS), vulnerable species needs (e.g., National Plan of Action (NPOA) sharks), ETP management (a host of protected species and related initiatives such as NPOA seabirds, NPOA sharks, the protection of marine mammals), and habitat considerations such as BPAs. Vessel management plans deal specifically with outlining how avoidance and mitigation, and MMOPs, control interactions with marine mammals.

Legislated protection of areas of sea bottom to fishing activities, coupled with good quality monitoring of all fisheries removals that might impact on trophic structure and function and management of fishery removals (e.g. through TACCs) represent a partial strategy to prevent impacts from causing serious and irreversible harm to the ecosystem.

(b) Management Strategy implementation MEDIUM RISK

The measures in place to manage ecosystem impacts – management of the target and other species under the QMS, mitigation measures for ETP species and habitats – appear likely to work based on plausible argument. Uncertainties around stock status limit the objective basis for confidence that the strategy is being implemented successfully.

CRITERIA: (iii) There is adequate knowledge of the impacts of the UoA on the ecosystem.

(a) Information quality LOW RISK

Information is adequate to broadly understand the key elements of the ecosystem and to detect increased risks to them. The main weakness is the uncertainty around the status of both stocks, together with any potential impacts on associated species.

(b) Investigations of UoA impacts LOW RISK

The main impacts of the fishery on the ecosystem elements such as structure and function can be inferred from QMS catch trends, observer data, and risk-assessments (e.g. Richard and Abraham, in prep, in MPI, 2016a; Abraham et al, in prep). Some of these impacts have been investigated in detail (e.g. Richard and Abraham, in prep, in MPI, 2016a; Abraham et al, in prep; Baird et al, 2015), and there is ongoing research and data collection aimed at continuing to inform management with the aim of fulfilling the ecosystem objectives stated in the Fisheries Act.

PI SCORE	LOW RISK – JMA1 – Purse seine, JMA7 – Midwater trawl

COMPONENT 3: Effective management

3A: Governance and Policy

CRITERIA: (i) The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:

- Is capable of delivering sustainability in the UoA(s)

- Observes the legal rights
- Created explicitly or established by custom of people dependent on fishing for food or livelihood; and
- Incorporates an appropriate dispute resolution framework.

(a) Compatibility of laws or standards with effective management **LOW RISK**

The 1996 Fisheries Act and subsequent amendments provide a binding legal framework for delivering the objectives of Components 1 and 2. The law identifies and sets requirements for cooperation among the parties involved in fishing activities.

(b) Respect for Rights **LOW RISK**

Ackroyd et al (2017) report that "*MPI is responsible for the administration of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, which implements the 1992 Fisheries Deed of Settlement under which historical Treaty of Waitangi claims relating to commercial fisheries have been fully and finally settled. The Ministry is also responsible for the Maori Fisheries Act 2004, which provides that the Crown allocates 20% of quota for any new quota management stocks brought into the QMS to the Treaty of Waitangi Fisheries commission. For non-commercial fisheries, the Kaimoana Customary Fishing Regulations 1998 and the Fisheries (South Island Customary Fishing) Regulations 1998 strengthen some of the rights of Tangata Whenua to manage their fisheries.*

These regulations let iwi and hapü manage their non-commercial fishing in a way that best fits their local practices, without having a major effect on the fishing rights of others.

The management system therefore has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2."

CRITERIA: (ii) The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.

(a) Roles and Responsibilities **LOW RISK**

The Minister responsible for the Fisheries Act, the Ministry of Primary Industries (responsible for effective fishery management), the Department of Conservation (responsible for conservation issues such as ETP species and MPAs) are the main government entities involved in the management process. Each has clearly and explicitly defined roles. Stakeholders and independent experts are involved in the fisheries working group process which provides advice to MPI and the Minister. For JMA7 the MOU between DWG and MPI provide in detail the responsibilities for managing the deepwater fisheries.

(b) Consultation Process **LOW RISK**

The Fishery Act requires consultations among stakeholders with an 'interest' in the decision to be made, and the Stakeholder Consultation Process Standard provides guidelines for implementing the consultations. The consultation regularly seeks and accepts information, explains the use and results, and provides opportunity and encouragement for engagement. The Minister of Fisheries is required to consult with those classes of persons having an interest (including, but not limited to, Maori, environmental, commercial and recreational interests) in the stock or the effects of fishing on the aquatic environment in the area concerned.

In practice, MPI has a number of forums that provide for interested party participation in the assessment and management of the fishery. All stakeholders are actively encouraged to participate in the meetings or to provide submissions. These forums include specific working groups on management and research issues. Commercial, customary, and environmental fishery interests participate in each of these processes. In addition, interested groups representing environmental and wildlife interests, along with local community interests, are given opportunities to participate in these discussions or provide submissions.

CRITERIA: (iii) The management policy has clear long-term objectives to guide decision making that are consistent with the outcomes expressed in Components 1 and 2, and incorporates the precautionary approach.

(a) Objectives **LOW RISK**

Long-term objectives to guide decision making are set out in the Fisheries Act, in Fisheries 2030 and other supporting documents (e.g. the Harvest Strategy Standard). These documents provide clear long-term objectives to guide decision-making, consistent with the outcomes expressed in Components 1 and 2. The Fisheries Act (s10) also requires the application of a precautionary approach to decision making: "*All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles:*

a) Decisions should be based on the best available information;
b) Decision makers should consider any uncertainty in the information available in any case;
c) Decision makers should be cautious when information is uncertain, unreliable, or inadequate; and
d) *The absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act."*

Accordingly, clear long-term objectives to guide decision-making, consistent with Components 1 and 2 and the precautionary approach, and are explicit within and required by management policy.

PI SCORE	**LOW RISK**

3B: Fishery Specific Management System

CRITERIA: (i) The fishery specific management system has clear, specific objectives designed to achieve the outcomes expressed by Components 1 and 2.

(a) Objectives

JMA1 MEDIUM RISK

While objectives broadly consistent with Components 1 and 2 are specified in the Act and Fisheries 2030, and are therefore implicit in the fishery specific management system, it is not clear that explicit short and long term objectives for inshore jack mackerel fisheries are in place at this stage. Accordingly, we have scored this SI medium risk.

JMA7 LOW RISK

The management system has explicit short- and long-term objectives which are set out in long-term plans e.g., Fisheries 2030, National Deepwater Fisheries Plan and Annual Operational Plans. Objectives are subject to an annual review report and are explicit within the fishery's management system.

CRITERIA: (ii) The fishery specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives and has an appropriate approach to actual disputes in the fishery.

(a) Decision making LOW RISK

Domestically, sections 10, 11, and 12 of the Fisheries Act establish the requirements for the decision-making process, and Section 10 further requires the use of best available information for all decisions. This results in measures and strategies to achieve the fishery-specific objectives. The Fisheries Act requirement for best available information leads to scientific evaluation in advance of decisions. The Fisheries Act further requires consultation with such persons or organisations as the Minister considers are representative of those classes of persons having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned including Maori, environmental, commercial, and recreational interests.

The MPI ensures that the Minister is provided with analysed alternatives for consideration before making any decisions (information is both from within and outside the Ministry [stakeholders, science]). The feedback process is formalised, involving planning, consultation, project development, and scientific enquiry. The Initial Position Paper/Final Advice Paper process highlights the extent of consultation, engagement and transparency of the decision making process. Thus, decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.

(b) Use of the Precautionary approach LOW RISK

The precautionary approach must be followed by MPI. Section 10 of the Fisheries Act Information principles states: "*All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles:*

a) Decisions should be based on the best available information:
b) Decision makers should consider any uncertainty in the information available in any case:
c) Decision makers should be cautious when information is uncertain, unreliable, or inadequate:
d) *The absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act*."

(c) Accountability and Transparency LOW RISK

Information on the fishery's performance is produced through the MPI Fisheries Assessment Plenary process and is available on the MPI website. Scientific and other research reports commissioned by MPI are also available on the Ministry website. Information on proposed management changes are published through Initial Position Paper which allow for stakeholders to comment. MPI's Final Advice Paper to the Minister is also publicly available together with a summary of submissions and alternative policy options. Feedback on any actions or lack of action is provided to stakeholders through a variety of forums, as well as directly through published decision letters of the Minister (e.g. Guy, 2016).

Disclosure of information can be requested from the Ministry, under the Official Information Act. Information is released except when it is decreed by the Minister to be commercially sensitive or breaches confidentiality between the parties.

CRITERIA: (iii) Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.

(a) MCS Implementation LOW RISK

MPI operates a comprehensive monitoring control and surveillance system including:

- fishing permit requirements;
- fishing permit and fishing vessel registers;
- vessel and gear marking requirements;
- fishing gear and method restrictions;
- vessel inspections;
- control of landings (e.g. requirement to land only to licensed fish receivers);
- auditing of licensed fish receivers;
- monitored unloads of fish;

- information management and intelligence analysis;
- analysis of catch and effort reporting and comparison with landing and trade data to confirm accuracy;
- boarding and inspection by fishery officers at sea; and
- aerial and surface surveillance.

In addition, MPI has a fishery outreach programme of informed and assisted compliance, in which enforcement agents work with the industry in a proactive way to ensure understanding of regulations and to prevent infractions (Ackroyd and McLoughlin, 2017). In combination with at-sea and air surveillance supported by the New Zealand joint forces, vessel activity can be monitored and verified to ensure compliance with regulations and with industry-agreed codes of practice.

While statistics on the JMA fisheries specifically were not found, it is clear that the MPI MCS system has demonstrated an ability to enforce relevant management measures. For example, Heron (2016) reports that MPI undertakes about 300 fishing related prosecutions per year with (ordinarily) over 80% or more resulting in convictions.

(b) Sanctions and Compliance

For offences against the Fisheries Act 1996 or any of the Fisheries Regulations, the offender has to satisfy a reverse onus and establish that the offence was outside their control, that they took reasonable precautions and exercised due diligence to avoid the contravention, and, where applicable, they returned fish that was unlawfully taken and complied with all recording and reporting requirements. A wide range of sanctions from fines ($250 to 500,000) and imprisonment, forfeiture of catch and potential forfeiture of vessel, to prohibition from participating in fishing in the future constitute an effective deterrent to offenses and lead to industry compliance.

JMA1

To meet the medium risk SG against this SI, sanctions to deal with non-compliance must exist and fishers must be generally thought to comply with the management system, including providing information of importance to the effective management of the fishery. The low risk SG requires some evidence to demonstrate fishers comply with the management system. In the first instance, it is clear that sanctions to deal with non-compliance exist for a range of offences, and these sanctions are regularly applied by MPI (e.g. Heron, 2016). It is also true that fishers are required by law to submit a range of information of importance to the management of the fishery (e.g. catch-effort returns, which are cross-checked against returns from Licensed Fish Receivers (LFRs). While there is no specific information available on compliance rates in the jack mackerel purse seine sectors, there is some evidence that fishers are generally compliant with the management system. For example, MPI (2016b) reports that rates of compliance generally amongst the commercial and recreational sectors in the 2015/6 year were 89% and 94% respectively (Table 3). Moreover, Kazmierow et al (2010) concluded there were likely to be relatively high levels of compliance based on interviews with fishers in the South East fin fish fishery. Accordingly, we have scored the fishery medium risk.

Table 3: Compliances rates amongst New Zealand fisheries (from MPI, 2016b).

SERVICE PERFORMANCE MEASURE	ACTUAL 2015/16	STANDARD 2015/16	VARIANCE
Percentage of commercial operators inspected found to be voluntarily compliant	89%	90%	-1%
Percentage of recreational fishers inspected found to be voluntarily compliant	94%	95%	-1%
Percentage of serious offenders do not reoffend within the next year	96%	95%	1%
Percentage of complex investigations completed within legislative requirements	98%	100%	-2%
Percentage of non-complex investigations completed within six months	92%	100%	-8%

Nevertheless, we note there has been considerable debate in recent years about the adequacy of the MPI compliance system, and in particular its response to alleged dumping of QMS species (e.g. Simmons et al, 2016; Heron, 2016). Email correspondence quoted by Heron (2016) suggests there has been a view internally amongst MPI that discarding has been a more general problem amongst inshore fisheries harvesting a diverse mix of species. The fishery would be better placed against this scoring issue if evidence of strong compliance with all laws was available.

JMA7 **LOW RISK**

To meet the low risk SG against this SI, sanctions to deal with non-compliance must exist and some evidence must exist that fishers comply with the management system under assessment including, where required, providing information of importance to the effective management of the fishery. In the first instance, it is clear that sanctions to deal with non-compliance exist for a range of offences, and these sanctions are regularly applied by MPI (e.g. Heron, 2016). Evidence also exists from compliance monitoring of deepwater fisheries that fishers comply with the management system. In the 2013/4 management year, MPI (2015) reports 70 compliance inspections were completed covering 24 vessels. Very high rates of compliance were evident across both fishing authorisation and gear requirements, as well as catch and effort reporting (Table 4).

Table 4: Summary of 2013/14 performance against pre-fishing preparation and fishing documentation regulatory requirements (from MPI, 2015)

Inspection detail	# of inspections	# of breaches	Compliance rate
Certificate of registry	43	1*	95%
Fishing gear	25	0	100%
Fishing permit	52	0	100%
SLED	16	0	100%

Inspection detail	# of inspections	# of breaches	Compliance rate
Effort returns	27	0	100%
Landing documents	11	0	100%
Landing return book	23	1	94%

In addition, MPI (2016c) reports that towards the end of the 2013 calendar year, MPI introduced 'interim observer trip reports'. Under these reports, observers rate the performance of vessels against 15 questions with a rating of A, B, C or N/A. It is considered that ratings of A and B are acceptable performance. Overall, 160 interim trip reports relating to observed trips on deepwater vessels were completed in the 2014/15 year. The majority of factors were rated A (81%) or B (7%), however over the year, six C ratings were given by observers (less than 1%). Observer coverage in the squid trawl fisheries has been >85% in recent years.

Accordingly, evidence is available for deepwater fisheries that sanctions to deal with non-compliance exist, and are applied if necessary, and that fishers comply with the management system, including providing information of importance to the effective management of the fishery.

(c) Systematic non-compliance **LOW RISK**

The results of compliance inspections in Table 3 and Table 4 together with observer reports (MPI, 2016c) appear to indicate no systematic non-compliance.

CRITERIA: (iv) There is a system for monitoring and evaluating the performance of the fishery specific management system against its objectives.
There is effective and timely review of the fishery specific management system.

(a) Evaluation coverage **LOW RISK**

For JMA7, the development and implementation of the Fisheries Plan framework – National Deepwater Plan, fishery specific chapters, Annual Operational Plan and Annual Review Report – ensures there is a structured process to ensure the performance of the fishery specific management system against its objectives. There is full stakeholder engagement on the development of all components of the Fisheries Plan framework and all documents are publicly available. The Ministry implements a comprehensive peer-review process for all science research that is used to inform fisheries management decisions. For JMA1, the Fisheries Working Group process and annual Plenary reporting provide mechanisms to evaluate key parts of the management system (e.g. catch trends, composition, stock assessments). Where changes are required to sustainability measures, IPPs/FAPs are prepared to evaluate and present alternative management options. Processes for review are also built into policy and regulatory documents (e.g. NPOAs).

(b) Internal and/or external review **LOW RISK**

The Deepwater fishery management system has internal and external review through the Fisheries 2030, Statements of Intention, the National Deepwater Plan, the Annual Operational Plan and Annual Review Report. The inshore fishery management system is subject to regular internal review through the fisheries Plenary reporting process. The Ministry implements a comprehensive peer-review process for all science research that is used to inform fisheries management decisions.

PI SCORE	LOW RISK

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