

8. Environmental Impact Assessment

The evaluation and ranking system in the tables below has been designed to assess the elements of risk considered most important in determining vulnerability and the significance of bottom fishing related impacts, based on the FAO Deepwater Guidelines (FAO 2008), and to include specific definitions for the various rating criteria. To the extent possible, allocation to ranks was based on quantifiable criteria. It must be noted that the allocated ranks in the tables below refer to the resultant impact itself (eg, area of seabed affected, and duration of the impact), and not of the cause thereof (level or extent of fishing effort). Elements of risk specifically evaluated are:

- **Description of Impact** - Provides a brief description of the expected impacts, answering the question, "What will be affected and how?"
- **Extent** - Indicates whether the impact will be: *Site Specific* (limited to within one kilometre of the fished site); *Local* (limited to within one fished 20' block, or 50km of the fished site); *Regional* (limited to the fishing area ~200-500 km radius); or *Oceanic* (extending across a significant proportion of an ocean basin, or of the SPRFMO Area).
- **Duration** - Gives the expected duration of the effects of the impact, being: *Short* (months, <1 year); *Medium* (years, 5-20); or *Long* (> 20 years, decades to centuries).
- **Intensity** - Provides an expert evaluation of whether the magnitude of the impact is destructive or innocuous and whether or not it exceeds set standards, and is described as: *None* (no impact); *Low* (where environmental processes are slightly affected); *Medium* (where environmental processes continue to function but in a noticeably modified manner); or *High* (where environmental functions and processes are altered such that they temporarily or permanently cease and/or exceed established standards / requirements).
- **Cumulative Impact** - An assessment of whether the impact is cumulative over time or space or not, and is expressed as being: *Unlikely* (the event is either a low-impact rare event, or recovery is rapid, such that effects will not accumulate over time or area); *Possible* (depending on extent, severity, natural disturbance levels and recovery rates); or *Definite* (at the intensities occurring, effects will endure such that, over time or space, impacts from a number of separate operations will accumulate).
- **Overall Significance** - The overall significance of each impact is then evaluated from the combination of duration, extent, intensity and cumulative effects. Overall Significance is determined as follows:
 - **Low:** Where the impact will have a negligible influence on the environment and no active management or mitigation is required. This would be allocated to impacts of low intensity and duration, but could be allocated to impacts of any intensity, if they occur at a local scale and are of temporary duration.
 - **Medium:** Where the impact could have an influence on the environment, which will require active modification of the management approach and / or mitigation. This would be allocated to short to medium-term impacts of moderate intensity, locally to regionally, with possibility of cumulative impact .
 - **High:** Where the impact could have a significant negative impact on the environment, such that the activity(ies) causing the impact should not be permitted to proceed without active management and mitigation to reduce risks and impacts to acceptable levels. This would be allocated to impacts of high intensity that are local, but last for longer than 5-20 years, and/or impacts which extend regionally and beyond, with high likelihood of cumulative impact..

- **Monitoring, Management and Mitigation Measures** - Description of specific monitoring, management and mitigation measures that are currently in place or can be considered when taking action to reduce impacts to acceptable levels.

8.1 Identification of Potential Adverse Impacts

Each of the main potential impacts and issues of concern related to bottom trawl and line fisheries in the SPRMO Area are listed in the tables below, evaluated and ranked in terms of the risk elements described above.

8.1.1 Adverse Impacts on Benthic VMEs

Impact of Bottom Trawling on VMEs		
<p><i>Description of Impact:</i> Damage to fragile and vulnerable, habitat-forming, biogenic benthic communities is the primary concern related to deep sea bottom trawl fisheries, and the main reason for current increased international concern regarding these fisheries.</p> <ul style="list-style-type: none"> • Bottom trawls conducted on hard ground areas supporting biogenic, habitat forming species will inevitably result in damage to such communities. Damage to such communities will be substantial in areas where fishing gear is towed in hard contact with the seabed. Very long recovery times for such communities mean that such impacts will be cumulative and enduring. 		
Extent: Site Specific	Duration: Long	Intensity: Low / Medium
Cumulative Impact: Definite		Overall Significance: High
<p><i>Extent</i> – Site Specific. Bottom trawls will only damage benthic communities on the specific seabed areas actually contacted by the fishing gear, including any contact by trawl doors, sweeps, bridles, ground-gear and the net itself. For the average tow length of 10.8 km reported in 2002-2006 data, and a door spread of 200m, maximum area impacted would be ~2 km² per tow. Impacts of the footrope alone, or of shorter tows observed in 2007, would be about one tenth of this.</p> <p><i>Duration</i> – The species forming these VMEs have extremely slow growth and recovery rates, generally of the order of centuries to millennia. While some colonising species have been found to show recruitment within decades, the duration of substantial impacts to coral-dominated deepwater communities will certainly be Long.</p> <p><i>Intensity</i> – This will depend on spatial scale of the area fished in relation to the distributional ranges of the VME species concerned, and the intensity of trawling in fished areas. In lightly fished areas, impact intensity will be Low. In more heavily fished areas, impacts on specific, individual heavily trawled seamount features have probably been heavy, but such features are limited in extent. In comparison with the spatial extent of the ecosystems and habitats affected, overall impact may be Medium. Within the New Zealand trawl footprint, there are probably no areas which have been so heavily fished, at large spatial scale, that ecosystem processes are substantially altered across the spatial scale of the ecosystems concerned.</p> <p><i>Cumulative Nature</i> – Definite, given the very slow recovery times of these ecosystems.</p>		
<p><i>Management & Mitigation</i> – Active management and mitigation measure are required by the interim measures to protect areas of deepwater VMEs from impacts of trawling. Management measures implemented by New Zealand to prevent significant adverse impacts of bottom trawling include:</p> <ul style="list-style-type: none"> • Closure of all areas outside the trawl footprint, in terms of the SPRFMO interim measures. • Stratification of the trawl footprint into lightly, moderately and heavily trawled areas. • Closure of all lightly fished (essentially unfished and non-impacted) blocks to trawling. 		

- Closure of an additional 10% of footprint blocks, distributed across moderately and heavily trawled areas, to protect representative blocks in these areas. Seabed bathymetric data were used to select closures that are representative of open areas in terms of depth and large-scale topography.
- Implementation of a VME Evidence protocol, and associated move on rule, in all moderately fished blocks.

The trawling industry is continually improving gear designs, rigging and other operational measures to minimise unnecessary contact of the gear with the seabed, with increasing success. Ongoing improvement in these measures is likely to result from the strong economic incentives to increase gear efficiency and minimize gear damage, while still permitting good catch rates.

In the longer term, effective protection of deepwater VMEs is likely to require implementation of a series of large-scale spatial closures to protect adequate and representative areas of specific vulnerable ecosystems.

Monitoring – New Zealand commercial catch and effort return systems provide for the collection of information necessary to monitor and analyse intensity and spatial extent of seabed impact by these fisheries.

The 100% observer coverage of high seas bottom trawl fisheries, coupled with implementation of the new detailed Benthic Materials Form, and the rapid VME ID Protocol and Guide, is providing information to monitor and evaluate composition of benthic-bycatches retrieved in trawl tows. High levels of observer coverage are necessary to ensure that such data collection continues at adequate levels.

However, trawl nets remain poor tools to sample benthic materials, and much of the benthic material damaged, and perhaps even initially caught, by trawl nets is lost through the meshes, particularly the fragile and vulnerable cold water corals. Dedicated before/after or control/impact scientific surveys are probably the only way to reliably and quantitatively evaluate benthic impacts of deepwater trawling operations.

Impact of Bottom Line Fishing on VMEs

Description of Impact: Bottom line fishing operations make some catches of benthic organisms, including vulnerable hard corals, gorgonians and sponges.

- Bottom line operations can either catch benthic organisms directly on the fishing hooks, or may cause damage to benthic communities if lines are transversely pulled across the seabed by currents, or during hauling.

Extent: Site Specific	Duration: Medium	Intensity: Low
Cumulative Impact: Possible		Overall Significance: Low / Medium

Extent – Seabed impacts will be limited to areas directly damaged by the fishing gear, including areas across which it may move during hauling. For the average of ~1000 hooks per bottom longline set over 2002 - 2006, with a hook spacing of 3m (for bluenose and hapuku targeted longlines) and assuming an impact of 1m either side of the line, even if the line was dragged its full length again, or double this width, during hauling, impacted area would be ~0.012 km², two orders of magnitude less than maximum impacts of an average trawl tow.

Duration – Given the low growth rates of the benthic organisms which may be impacted, a duration of Medium must be assumed. However, at the current low fishing effort levels and spatial scales in the SPRFMO Area, duration of impacts, at an ecosystem level, may well be Low. For the limited areas expected to be damaged by bottom lining, recolonisation from adjacent areas would be expected to be more rapid than for a larger impact area.

Intensity – Impact intensity is Low at current fishing effort levels and spatial scales.

Cumulative Nature – Possible, particularly in areas fished often enough that line damage may result in reduction in biodiversity.

Management & Mitigation – At current low levels and spatial scale of fishing effort, active management or mitigation measures are probably not necessary. However, fishing effort intensity and spatial scale, as well as benthic bycatch rates and composition, need to be monitored to ascertain whether effort or impacts rise to levels requiring active management. Should this occur, similar measures, including possible precautionary closures or move-on provisions, as implemented for bottom trawling, may be necessary.

Monitoring – New Zealand commercial catch and effort returns include start and end position for bottom longline operations, but end positions are not always provided. Start position only is probably adequate for dahn line fishing. However, both start and end positions are required for bottom longline and trot line fishing, to allow the spatial scale of fishing effort to be monitored and analysed.

Current low levels of observer coverage on high seas bottom line fishing vessels would need to be increased to provide adequate information on benthic bycatches, using the new Benthic Materials form, to monitor and evaluate composition of benthic bycatches by bottom lines.

8.1.2 Over-Exploitation of Low Productivity Deepwater Species

Over-Exploitation of Deepwater Trawled Species

Description of Impact: Species such as orange roughy, the primary target in the high seas bottom trawl fisheries, have low productivity as a result of slow growth rates and extreme longevity (low natural mortality). Annual sustainable yields of such species are typically extremely low. These species tend to form dense aggregations at particular times and areas, which are easily targeted.

- High catch rates on dense aggregations of deepwater species with very low productivity typically result in over-fishing which can lead to rapid depletion of accumulated stocks.
- Failure to detect such declines, and to implement low catch limits at long-term sustainable levels, have resulted in the over-exploitation and depletion of many of the world’s stocks of species such as orange roughy.

<i>Extent:</i> Local / Regional	<i>Duration:</i> Long	<i>Intensity:</i> Medium / High
Cumulative Impact: Definite		Overall Significance: High

Extent – Local / Regional, depending on the distribution ranges of the stocks or populations being fished. There is conflicting information for species such as orange roughy, indicating that such species may form separate stocks at very small scales, such as on individual seamounts, or alternatively may form local aggregations on such features, but be gradually supplemented from a diffuse distribution of fish from a larger surrounding area. It is likely that such species at least form separate stocks in areas of the spatial scale of the various fishing areas constituting the footprint.

Duration – Considering the very long life span and slow growth of these species, duration of the effects of any fishing mortality above replacement yields will be Long (decades to centuries).

Intensity – This will depend on the level of fishing mortality in relation to the sustainable yield levels for each stock. While this may be Medium for some moderately exploited areas, an intensity of High is assumed on the basis of experience of rapid depletions on some fishing areas .

Cumulative Nature – Definite, given the very low productivity of such species, over-fishing effects of fishing mortality levels that typically exceed long-term optimal exploitation levels of the order of $F = F_{msy}$ or $F = M$.

Management & Mitigation – The *FAO Deep-Sea Guidelines* (FAO 2008) specifically call for precautionary effort and spatial catch limits to prevent serial depletion of low productivity species, as well as processes to revise such limits downwards when significant declines are

detected. They further note that ‘for low-productivity species, fishing mortality should not exceed the estimated or inferred natural mortality’. Current best estimate of natural mortality (*M*) for orange roughy is ~0.45 (Ministry of Fisheries 2008), indicating that exploitation rates should be less than 5%.

New Zealand intends to implement a catch limit for orange roughy set at the average annual catch level over the SPRFMO reference period 2002 - 2006, as required by paragraph one of the bottom fishing interim measures. Further work is being done to establish a basis for determining likely long-term sustainable catch levels of orange roughy in each area, based on information on species biology, standardised CPUE trends, niche-factor analysis and estimates of likely carrying capacity of seamount-type features. Such long-term sustainable limits are likely to be lower than average over 2002 – 2006 catches. However, effective implementation of limits at such levels will require international cooperation, coupled with effective monitoring and compliance, to ensure that catch limits apply to, and are respected by, all participants in SPRFMO bottom trawl fisheries.

Monitoring – New Zealand commercial catch return systems are already designed to collect the necessary high-resolution catch and effort data for such species.

Scientific observers on high seas bottom trawlers are also already required to monitor catch and effort for all target species, and to supplement this with length-frequency and biological sampling (gonad staging and otoliths). High levels of observer coverage are necessary to ensure that adequate data are collected to monitor inter-annual trends in these fisheries, to allow for the implementation of a process to revise catch limits downwards when significant declines are detected, as recommended by the FAO.

Over-Exploitation of Bottom Lined Species

Description of Impact: Bottom line fisheries primarily target hapuku / bass and bluenose, both of which are slow growing species:

- Hapuku are large, slow-growing and apparently fairly resident species that have been found to undergo moderately rapid localised depletions when targeted at moderate fishing effort levels.
- Bluenose have recently been found to be slow growing, although with somewhat higher productivity than species like orange roughy (Ministry of Fisheries 2008). Bluenose appear to be wider ranging than hapuku, but do form feeding or spawning aggregations on high profile seabed features as adults, which are targeted. There are indications that such aggregations may show CPUE hyper-stability, followed by sudden declines if heavily fished. All bluenose stocks within the New Zealand EEZ were recently assessed to have been over-exploited as a result.

<i>Extent:</i> Regional	<i>Duration:</i> Medium	<i>Intensity:</i> Low
--------------------------------	--------------------------------	------------------------------

Cumulative Impact: Likely	Overall Significance: Low - Medium
----------------------------------	---

Extent – Regional, as bottom line targeted species, particularly bluenose, appear to be wider ranging than species such as orange roughy. However, stocks are still likely to be largely confined to areas of the spatial scale of the fishing areas constituting the footprint, particularly for hapuku.

Duration – At current fishing effort and mortality levels, duration of impacts are likely to be Medium, despite the slow growth of these species. However, if exploitation rates increase to the level where fishing mortality exceeds sustainable levels and over-fishing occurs, duration of impacts may be Long.

Intensity – Low, at present, given the very low level of bottom line fishing effort in the SPRFMO Area. However, there are indications of increasing market demand, and resultant increasing fishing effort, for species such as bluenose

Cumulative Nature – Likely, considering the slow growth rates of these species, but this will depend on exploitation rates. Stock depletion will occur if fishing mortality exceeds long term

sustainable levels.

Management & Mitigation – Current low effort and catch levels on the high seas probably do not require any active management or mitigation measures. Nonetheless, the FAO Deepwater Guidelines recommend the implementation of precautionary effort or catch limits for all low productivity deepwater species, set at levels likely to ensure long term sustainability. Current best estimate of natural mortality (*M*) for bluenose is ~0.8 (Ministry of Fisheries 2008), indicating that exploitation rates should not exceed 8%.

Should high seas bottom line fishing effort levels continue to increase to the level where fishing mortality exceeds this natural mortality, precautionary effort or catch limits would need to be established for the primary target species, such as bluenose and hapuku, in the main targeted fishing areas.

Monitoring – Existing commercial catch return systems are already specifically designed to collect the necessary high-resolution catch and effort data for such species. Scientific observers on high seas bottom liners are also already required to monitor catch and effort for all target species, and to supplement this with length-frequency and biological sampling (gonad staging and otoliths). Observer coverage levels would need to be increased to ensure that adequate data are collected to monitor inter-annual trends in these fisheries, to allow for the implementation of a process to revise catch limits downwards when significant declines are detected, as recommended by the FAO.

8.1.3 Incidental Mortality of Deepwater Elasmobranchs

Incidental Trawl Mortality of Elasmobranchs		
<p><i>Description of Impact:</i> All trawl fisheries make catches of elasmobranch species (sharks, skates and rays), many of which are unmarketable, and usually discarded. All elasmobranch species have low fecundity and many have slow growth rates, particularly deepwater elasmobranchs. Populations of these species therefore typically have very low productivity.</p> <ul style="list-style-type: none"> As many elasmobranchs caught incidentally in trawls are discarded, they are usually not reflected on catch returns. Estimates of elasmobranch bycatches are therefore usually poor, making evaluation of impacts difficult. 		
<i>Extent:</i> Local / Regional	<i>Duration:</i> Medium / Long	<i>Intensity:</i> Low / Medium
Cumulative Impact: Possible		Overall Significance: Medium
<p><i>Extent</i> – Depending on the residency, migratory behaviour and distribution ranges of the species caught, the species may be locally or regionally distributed. It is likely that elasmobranchs caught at the depths of these fisheries at least form separate regional populations in each of the fishing areas, separated by abyssal plains between such areas.</p> <p><i>Duration</i> – Given the slow growth rates and low productivity of these species, any significant fishing-related reduction in the populations would certainly take many years, and possibly decades, to rebuild.</p> <p><i>Intensity</i> – Low / Medium. Although bycatches of such species are relatively low, in the absence of better information on elasmobranch population sizes and actual catches, and resultant fishing mortality rates in relation to population sizes, a precautionary intensity of Medium should be allowed for. Improved information on population distribution ranges and bycatch rates may confirm the intensity to be Low, if adequate areas supporting populations of these species remain largely unfished.</p> <p><i>Cumulative Nature</i> – Possible, given the slow growth rates, low productivity and potentially long recovery times of such populations. Fishing mortality rates which exceed long term sustainable levels will result in depletion of the populations.</p>		
<p><i>Management & Mitigation</i> – Given the poor knowledge of total catches, distributional ranges, productivity and stock status of most deepwater elasmobranchs, it is difficult to propose sensible and effective mitigation measures, other than closure of fisheries. In the long term,</p>		

such species could best be protected in specific areas as a consequence of large-scale and representative closures of certain deepwater habitats to protect VMEs, with consequential protection of elasmobranchs inhabiting these areas.

Monitoring – Commercial fishers typically do not report minor catches of these species on catch returns, particularly if these are discarded. It is unlikely that catch return systems could efficiently be modified to ensure reporting of all such catches.

Observers on high seas bottom trawlers are already required to document all catches of all species, and this is the best source of data on elasmobranch catches. High levels of observer coverage should be maintained on high seas bottom trawlers, and observers should specifically document discards of such species, to enable subsequent raised estimate of elasmobranch discards using commercial catch return data.

8.1.4 Loss of Fishing Gear

Loss of Bottom Trawl Fishing Gear	
<i>Description of Impact:</i> Bottom trawling operations targeting species such as orange roughy on rough ground have a definite risk of losing fishing gear as a result of coming fast on the seabed.	
<ul style="list-style-type: none"> • As nets are the primary fishing component of the gear contacting the seabed, greatest risk is damage to nets, and loss of net components, ranging from the codend to entire nets. • In circumstances where trawl doors hook up on the seabed, gear losses may include sweeps, doors, and perhaps even trawl warps themselves. 	
<i>Extent:</i> Site Specific	<i>Duration:</i> Low / Medium
<i>Intensity:</i> Low	
Cumulative Impact: Unlikely	Overall Significance: Low
<i>Extent</i> – Site Specific, as lost trawl gear will remain on the seabed where it was lost, unless retrieved.	
<i>Duration</i> – Low / Medium. Duration of impact on fish stocks will be Low, as lost trawl gear is not considered to ghost fish. Impact on biodiversity may be Medium as, at the depths of these high seas fishing operations, growth and recovery of biogenic benthic communities is slow and it is likely to take years to decades for lost gear to become covered with benthic growth, and integral with the seabed communities. However, such ‘recovery’ is likely to occur.	
<i>Intensity</i> – Low, given the effort that operators put into minimising gear loss, and attempting to retrieve significant gear losses (nets, warps or doors). The combination of these efforts, plus increasing knowledge of seabed characteristics in currently fished areas, has resulted in decrease in gear losses. Certain experienced skippers have never lost gear, and most will spend time attempting to retrieve any substantial gear losses.	
<i>Cumulative Nature</i> – Unlikely, given the combination of relatively low gear losses and the low likelihood of ghost fishing or subsequent impact on the seabed.	
<i>Management & Mitigation</i> – Industry are continually improving gear design, rigging and operational measures to minimise gear losses. Given the substantial financial cost of any gear loss, and the strong incentives to minimise this, responsibility for mitigation of gear loss within currently fished areas should be left to industry.	
The situation in exploratory fisheries is likely to be different. With little knowledge of seabed characteristics in new areas, the risk of gear loss increases. However, this risk is being increasingly reduced by improved seabed mapping and sonar technology, allowing new areas to be fished with reduced risk of gear loss.	
<i>Monitoring</i> – Scientific observers on high seas bottom trawling vessels are not currently required to formally document type and quantity of gear loss, although some do record such events in daily logs. Observers should be required to document all significant (to be defined) gear losses in a way that permits GIS plotting of such positions, and analysis of gear losses.	

Options should also be investigated for industry to similarly record gear losses. Industry reports that most skippers already record such positions as areas to be avoided during future fishing operations. This would be particularly important for any exploratory fisheries in new fishing areas.

Loss of Bottom Line Fishing Gear

Description of Impact: Bottom line fishing operations targeting species such as bluenose and hapuku / bass intentionally target areas of steep, high profile, rocky seabed, usually also under conditions of current across these features. There is an inevitable risk of gear loss in such areas:

- Greatest risk is loss of weights and anchors, and gear may be rigged with weak links to such gear to prevent loss of fishing components and catch, should anchors stick fast. This would be particularly relevant to dahn line and trot line gear, where the fishing components are suspended above the seabed. Lost anchors pose little ongoing threat to the seabed.
- For bottom longline gear, particularly using bottom main lines with integrated weighted cores, there is a significant risk of sections of bottom line plus snoods being lost. This may be of concern, should such gear continue to ghost fish for any appreciable length of time.

Extent: Site Specific	Duration: Medium	Intensity: Low
Cumulative Impact: Unlikely / Possible		Overall Significance: Low

Extent – Usually Site Specific, as weighted lost gear will remain at the site at which it was lost. There is some risk of loss of floating components which may then drift away from the fished area. These pose no threat to the seabed, but may be of concern if they ghost fish for any appreciable length of time.

Duration –Medium: at the depths of these high seas fishing operations, growth and recovery of biogenic benthic communities is slow, and it is likely to take years to decades for lost gear to become covered with benthic growth, and integral with the seabed communities. However, such ‘recovery’ is likely to occur.

Intensity – Low, if there is little or no risk of ghost fishing by lost gear, but medium if gear may continue to fish for any length of time. Risk of ghost fishing may be low if the gear ceases to become effective once baits have been removed, or decayed away.

Cumulative Nature – Unlikely / Possible, but only if gear continues to ghost fish for any appreciable length of time, exceeding months. More information is required on the likelihood of ghost fishing by various bottom line fishing gears.

Management & Mitigation – Economic costs of gear loss in the bottom line fisheries are lower than in trawl fisheries and, while some incentive clearly remains, there is less economic incentive for industry to minimise gear loss. Industry should be consulted on the extent of gear loss and options for improving gear design and deployment to minimise gear loss (for example, by incorporating sacrificial components), and particularly for minimising the risk of ghost fishing by lost gear.

Monitoring – Scientific observers on high seas bottom lining vessels are not currently required to formally document type and quantity of gear loss, although some do record such events in daily logs. Observers should be required to document all significant (to be defined) gear losses in a way that permits GIS plotting of such positions, and analysis of gear losses. Options should also be investigated for industry to similarly record gear losses. Industry reports that most skippers already record such positions as areas to be avoided during future fishing operations. This would be particularly important for any exploratory fisheries in new fishing areas.

8.1.5 Seabird Injuries and Mortalities

Trawl Induced Mortality of Seabirds

Description of Impact: High seas bottom trawling operations targeting species, such as orange roughy may have the following impacts on seabirds:

- Mortality via net or trawl warps captures.
- Injury and/or mortality of seabirds as a result of warp-strikes during trawl tows.

Extent: Oceanic	Duration: Medium	Intensity: Low
Cumulative Impact: Unlikely		Overall Significance: Low

Extent – Oceanic due to the migratory nature of many seabirds. For example, Chatham albatross are known to cross the Southern Pacific to feed along the coast of Peru and Chile and return to breed on a small rock island south of the Chatham Islands.

Duration – Given a low intensity of impact (below), the duration of the impact is likely to be Medium, between age at first maturity (up to ten years for albatross species) and the lifespan (up to fifty years or more for some species).

Intensity – Low. Trawling for orange roughy fishing within the New Zealand EEZ has been observed to have low bycatch rates of seabirds. The rate of seabirds captures since 2000-01 has been between 0.04 and 0.39 birds per hundred tows except in 2004-05 when 14 Cape petrels were observed caught thereby increasing the bycatch rate to 1.21 birds per hundred tows (Baird & Smith 2007, 2008). If the seabirds are captured during their breeding phase, the capture will result in the death of their chick and in rare cases their mate as well. If the mate survives the wait on the nest for the captured bird, they may not breed in the following season, as many seabirds mate with the same partner for long periods, although there are cases of ‘divorce’.

Cumulative Nature – Unlikely, given the low mortality rates in these fisheries. As some threatened seabirds species, including Northern royal albatross (considered Endangered by IUCN), Salvin’s albatross (Vulnerable), and Wandering albatross (Vulnerable), are caught by deepwater trawling there may be a cumulative impact at the population or species level, if taken together with the cumulative impacts of all bycatch from fisheries that catch individuals from that population/species.

Management & Mitigation – While the overall significance is rated as Low, improved estimates of bycatch rates on the high seas and knowledge of the current industry practices and mitigation measures are necessary. This may consequently warrant consideration of mandatory management measures such as those required for vessels fishing inside the New Zealand EEZ eg, use of paired tori lines, bafflers or warp scarers and/or the reduction or elimination of offal discharge during certain fishing operations, for instance shoot, trawl and haul. It should also be noted that the species caught by bottom longline vessels within the New Zealand 2002-2006 footprint in SPRFMO may vary from that caught within the New Zealand EEZ due to the change in location and distance from shore.

Monitoring – The 100% observer coverage of high seas bottom trawl fisheries, enables the observation of all hauls for seabird captures, as well as warp strike observations. Observers will also record the implementation seabird avoidance measures.

With permission from the Department of Conservation where required, observers should return carcasses of any bird mortalities for necropsy and confirmation of species identification. Observers will also record the implementation of seabird avoidance.

Line Fishing Induced Mortality of Seabirds

Description of Impact: High-seas bottom line fishing, primarily using bottom longlines, targeting species such as bluenose and hapuku / bass in the fishing areas within the new Zealand 2002 - 2006 bottom fishing footprint may have the following impacts on seabirds:

- Capture, injury and/or mortality of seabirds taking baits during setting and hauling of longlines.

Extent: Oceanic	Duration: Medium	Intensity: Medium / High
Cumulative Impact: Possible		Overall Significance: Medium / High
<p><i>Extent</i> – Oceanic due to the migratory nature of many seabirds. For example, Chatham albatross are known to cross the Southern Pacific to feed along the coast of Peru and Chile and return to breed on a small rock island, ‘The Pyramid’, south of the Chatham Islands.</p> <p><i>Duration</i> – Even at a medium to high intensity of impact (below), the duration of the impact is likely to be medium, between the age at first maturity (up to ten years for albatross species) and the lifespan (up to fifty years or more for some species).</p> <p><i>Intensity</i> – Medium to High. Dependent on the fishing gear configuration and setting techniques used, bottom longlining for bluenose and hapuku / bass can pose medium to high risk in terms of the intensity of seabird mortalities. Within the New Zealand EEZ, an incident was observed in 2007 when 10 Chatham albatross and 22 Salvin’s albatross were caught by a bottom longline vessel while targeting bluenose and ling on the Chatham Rise.</p> <p>If the seabirds are captured during their breeding phase, the capture will result in the death of their chick and in rare cases their mate as well. If the mate survives the wait on the nest for the captured bird, they may not breed in the following season, as many seabirds mate with the same partner for long periods, although there are cases of ‘divorce’.</p> <p><i>Cumulative Nature</i> - Possible. As some threatened seabirds species, including Chatham albatross (considered Critically Endangered by IUCN), black petrel (Vulnerable), Salvin’s albatross (Vulnerable) and Wandering albatross (Vulnerable), are caught by bottom longlining within the New Zealand EEZ targeting ling, bluenose and hapuku (Rowe 2008), there may be a cumulative impact at the population or species level. However, impact at the population or species level would include the cumulative impacts of all bycatch from fisheries that catch individuals from that population/species.</p> <p>Note that the species caught by bottom longline vessels within the New Zealand 2002-2006 footprint in SPRFMO may vary from that caught within the New Zealand EEZ due to the change in location and distance from shore.</p> <p><i>Management & Mitigation</i> – Given the status of some seabird species and the overall significance rating of Medium/High, improved estimates of bycatch rates on the high seas and knowledge of current industry fishing practices and mitigation measures are necessary. This may consequently warrant consideration of mandatory management measures such as those required for vessels fishing inside the New Zealand EEZ eg, use of streamer lines, restrictions on setting times, and/or offal discharge requirements.</p> <p><i>Monitoring</i> – When in place, the 10% observer coverage on bottom longliners will enable the observation of a proportion of hooks retrieved for seabird captures. This will allow for an extrapolation of total seabird bycatch (although this extrapolation is likely to be reasonably uncertain) for the fishery and consideration of the impact of this bycatch on the population/species affected.</p> <p>With permission from the Department of Conservation, observers should return carcasses of any bird mortalities for necropsy and confirmation of species identification. Observers will also record the implementation of seabird avoidance.</p>		

9. References