Operating Parameters of Trawl Gear in Relation to Fur Seal Mitigation

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Fishery Characteristics

The bulk fisheries that have the majority of fur seal interactions (hoki, southern blue whiting, squid and associated fish bycatch species) have the following relevant characteristics:

- The majority of the catch is taken by large (>28m) vessels which are often the same vessels in the squid fishery that utilise Sea Lion Exclusion Devices, or SLEDs).
- The inshore fleet involved in the above fisheries are less than 28metres in length and generally 450-1500 h.p.
- Fishing gear consists of two key types – bottom trawl and mid water trawl. Some dimensional information is presented below:

	Midwater Trawl	**Bottom Trawl**
Overall net dimensions		
Overall Length (m)	70 - 250	20 - 70
Headline Height (m)	20 - 100	2 - 9
Mesh size/number		
Netting – Head	1.8 – 40+m	30, 25, 15 cm
Netting – Tunnel (cm)	20 - 80	15, 11
Netting – Bagend (cm)	12	11
Lengthener (cm)	11	11
Mesh round (meshes)	100 - 150	60 - 150
Codend (cm)	11	11
Mesh round (meshes)	100 - 150	60 - 150

- The operation of mid water trawls can be pelagic (off bottom), semi-pelagic (on and off), or in full and continuous bottom contact. Head line heights when in pelagic mode are from 20-100m. This value may be halved when operated on bottom (net “closed up”).
- Due to the bulk nature of the relevant fisheries most vessels are operating significant lengtheners (e.g. 2 x 6.5metres of extension between net and codend) as well as multiple codend sections (e.g. 2 x 7metres). This means there is a large distance (25-30 metres) between the body of the net and the end of the codend. Netmakers involved in the development and building of SLEDs suggest that placement of exclusion devices is best at the intersection of net body and lengthener. This allows for excess catch to fill the lengthener if required and also more space for animals in front of the grid to make sensible escape decisions, rather than being constrained within a 13metre long tunnel of relatively limited diameter.
- Tow speeds are generally consistent and reasonably high (3.5 – 5.5 knots) across the relevant trawl fisheries (i.e. those with frequent fur seal interactions). SLEDs are operable at these speeds as demonstrated in the squid trawl fishery.

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Fishery Characteristics , Continued

- Fishery operating parameters that may influence or increase interaction risk have been long discussed and attempts to mitigate made on the basis of:
    - Offal discharge – attractant
    - Deck lights – attractant
    - Winch noise – attractant
    - "Stickers" in net – attractant
    - Doors up turns – higher entanglement risk
    - Gear on surface (breakdowns etc) – higher entanglement risk
- Vessels may operate at high density and close proximity in fisheries such as the Snares Shelf and Auckland Islands Shelf squid, West Coast hoki or Cook Strait hoki.
- Trawling can be characterised in some fisheries by vessels turning 180^{o} to tow back along their original tow path to re-target a fish aggregation. This operation is variable in the time taken depending on gear size and vessel power. Turns with trawl nets at or near the surface have been implicated in captures.
- Trawling depths for most relevant target species are in the range of 150-700metres. Squid and southern blue whiting fisheries are predominantly in less than 300m. NZ fur seals are certainly capable of diving to this latter depth but have seasonally varying average dive depths of between 30-75metres (Mattlin, Gales and Costa, 1997; Page, McKenzie and Goldsworthy, 2005). These depths are for fur seals targeting natural prey. This suggests that fur seals may be at most risk during shooting and hauling or when the gear is held at or near the surface, not while it is in active fishing mode. Anecdotal evidence shows fur seals actively feeding from either "stickers" (meshed fish) or catch in the codend directly from the gear on the surface.
- The hoki fishery in particular has at times a wide range of other fish species such as spiny dogfish, ling, hake and warehou present in the catch.
- Procedures proposed to help prevent fur seal captures have been documented and used for many years. Relevant parts are presented below.

Mitigation Measures Used in Vessel CoP

All vessels should adopt the following practices to minimise accidental catches of marine mammals.

Shooting and hauling

- Before shooting gear, all stickers must be removed from the trawl so marine mammals are not attracted to the net.
- Shooting and hauling fishing gear must be undertaken as quickly as possible in order to lessen the risk of capture of marine mammals at or near the sea surface.
- Gear failures, particularly when shooting or hauling can create high risk situations for marine mammal captures. Evidence suggests that fur seal captures occur when there are gear failures and the gear is left on the surface of the water with the net mouth open. In the event of a gear failure which may delay the shooting or hauling of the gear, the following should occur:
    - Keep the gear deep in the water even if this means re-shooting the gear – if the gear is to remain in the water the gear headline height should be at least below 50m and preferably below 100 m.
    - Bring the gear on board – or at least the ground rope and net headline to ensure the net mouth remains closed.

It is also critical that the net shape is maintained when trying to fix any gear failures. If shape is not maintained, this can make it difficult for marine mammals particularly dolphins to escape the net.

Mitigation of Risks

For well over a decade there has been a program to mitigate operational risks by an industry Code of Practice. To an extent there is uncertainty as to level of risk engendered by various aspects of operations; the improvement that this mitigation has delivered or which of the risks are currently unable to be mitigated well by changes in operational practice is uncertain

Probably the major risk is fishing gear on or very near the surface for prolonged periods due to slow deployment or retrieval (which can occur for a variety of reasons); this appears to lead to multiple capture events.

References

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