NSW WHALE ENTANGLEMENT MITIGATION PROJECT

WORKSHOP AND RECOMMENDATIONS REPORT

October 2022

This project was funded by the NSW Government under the NSW Marine Estate Management Strategy

OCEANWATCH AUSTRALIA

NSW GOVERNMENT NSW Marine Estate

PFA PROFESSIONAL FISHERS ASSOCIATION

Contents

EXECUTIVE SUMMARY

A workshop was held in August 2022 to present summary information on the trialling of modified New South Wales OTL fish trap gear (sunken head gear) under permit during the 2022 whale migratory period providing feedback on the practicality/logistics, safety, impacts on catch, and potential for further uptake by the wider industry. A survey completed for both demersal fish trap and spanner crab fishing endorsements were presented to assist in improved identification of OTL gear in reported whale entanglements.

Information was also presented to improve awareness of EAC and SOI influences to whale entanglement. Discussions also focused on NSW and WA rock lobster whale entanglement mitigation efforts and the potential for consideration in the NSW OTL fishery.

The NSW OTL industry code of practice to reduce risk of whale entanglement was reviewed and recommendations were made for improvement. Considered recommendations in this report are being forwarded to OTL endorsement holders for final feedback.

The workshop resulted in a number of recommendations (p.21), including:

1. Maintaining a 5-year minimum engagement with industry to further promote and encourage efforts to minimise whale entanglement, continued gear trials and increased industry communication to improve awareness/knowledge and implementation of the Code of Practice.

2. Increase marking of all trap head gear to assist in identifying problematic gear types/configurations, areas of operation or fishing behaviour.

3. Develop a glossy forward-facing Code of Practice (following industry consultation of the code of practice review) to guide and encourage adoption of industry best practice.

NSW fishers have show strong commitment to work towards minimizing whale interactions in NSW waters through this project. Good attendance at workshops and involvement in gear trials is a positive reflection on the NSW fishing industry's resolve to demonstrate best practice.

BACKGROUND

The workshop was the second in a series intended to further understand the issues associated with whale entanglement and processes to mitigate those entanglements, particularly for set fishing gear such as pots / traps used in the Ocean Trap and Line Fishery in New South Wales.

The research project "East Coast Whale Entanglement Mitigation Project" Final Report was published on 31 December 2020. This research was the driver for developing better strategies and operational arrangements, including a Code of Practice (CoP) for reducing interactions between whales and fishers off NSW.

OceanWatch Australia, the Professional Fishers Association Inc. and seafood industry representatives have an established protocol for dealing with the risks of entanglement developed from a workshop held in March 2021 with the support of the NSW Department of Primary Industries, Fisheries.

Key recommendations from the Workshop were:

OUTCOME	ACTION	STATUS
Continue to trial modified gear and fishing practices to identify the most cost-effective gear modifications that can be implemented to allow fishers to fish year-round, whilst still reducing whale entanglements	OceanWatch Australia and Industry to further develop and trial gear	Ongoing
Complete a detailed survey of gear used in the OTL fishery to establish if some aspects of the gear are overrepresented in the gear from dis-entangled whales.	Survey undertaken and reported at August 2022 workshop	Completed
Industry wide extension of the OTL Code of Practice.	Ongoing with OceanWatch Australia, PFA and industry champions	Ongoing
Prioritise research to evaluate changes in migratory patterns of whales in response to EAC and other oceanographic conditions as this may inform industry on likely location of whale migrations and assist in planning fishing effort and gear configurations to reduce	Research undertaken and reported at August 2022 workshop by Hayden Schilling	Completed

WHAT WE LEARNT

Whale Behaviour

Based on collaborative research undertaken by the University of NSW, NSW DPI, NPWS and Environment and Heritage Group funded by the NSW Marine Estate Management Strategy interactions between set fishing gear are influenced by:

- Oceanic influences, particularly the cooler nearshore waters of the East Australia Current (EAC),
- The Southern Oscillation Index (SOI).

As a result of these environmental factors, it was determined that:

- Despite declines in effort in the affected fisheries the number of entanglements has increased,
- The areas for entanglements are predominately north of Sydney NSW and are most common around 30.3°S where the current runs close to shore,
- Entanglements predominately occur as whales migrate north, presumably using the boundary of the EAC to aid in movement,
- Few entanglements occur as whales move south towards Antarctica as they predominately use the faster flowing current further offshore to return to feeding and breeding grounds.

Entanglement Response

Duane March (Environment and Heritage Group – EHG) and Andrew Marshall (National Parks and Wildlife Service – NPWS) provided context to the status of entanglements. These included:

- Population growth of key species – Humpback whale. Morphology with tubercles which are sticking points for ropes and other debris leading to increased risk of entanglement,
- Of 318 events, 80% involved ropes from multiple identified sources,
- No research has been completed to quantify if rope colour could be factor that could mitigate entanglements,
- Rope thickness contributed to difficulties in crews removing entangled ropes from whales,

CONSIDERATIONS
Some types of ropes are “sticky” / more difficult to remove as are thicker ropes
Additional data collection – sharing of locations of migrating whales
Further gear modification based on other / international experiences

- Attributes of entangling rope are often not recorded therefore identification of its source is difficult.

Recent gear trials and gear survey summary results

During the 2021 whale migratory period, OceanWatch and DFT fishers worked with NSW DPI Fisheries and the PFA (industry association) in a research project to evaluate options to minimise entanglement in the fishery (refer Attachment 3). This work is intended to support further development of mitigation techniques and to inform the further development of best practice operations. This research was funded by the NSW Government under the Marine Estate Management Strategy. The ten-year Strategy was developed by the NSW Marine Estate Management Authority to coordinate the management of the marine estate - https://www.marine.nsw.gov.au/marine-estate-programs/marine-estate-management-strategy

In total 8 fishers successfully applied for and received Section37 research permits. Despite marking requirements prescribed under Clause 7A(1)(a) of the Fisheries Management (Ocean Trap and Line Share Management Plan) Regulation 2006 (the OTL Plan), permit holders were authorised to use modified fish traps (submerge head gear).

Results of the research were presented at this Workshop to inform discussion on further reefing best practice approaches by fishers to mitigating whale entanglements.

The following Table sets out some of the experiences and evaluation of the effectiveness of alternative methods.

	Grappling		GTR
	Fisher 1	**Fisher 2**	**Fisher 3**
Difficulty to modify	Moderate	Moderate	Moderate
Efficiency in setting	Similar	Similar	More difficult
Efficiency in retrieval	More difficult	Similar	More difficult
Impact of catch	No	Yes (increase catch)	Yes (increase catch)
Impact on crew	No	No	Yes (packing bags)
Impact on time at sea	Yes	Yes	Yes

Modifications to gear and practices are still undergoing improvements and may vary over time as innovations are introduced.

Operational arrangements that minimise the number of floats and reduces the amount of surplus rope in the water column may be effective mechanisms for reducing entanglements, particularly for interactions with Humpback whales.

OceanWatch Australia has also undertaken a survey with NSW ocean trap and line fishers providing a detailed analysis of fishing gear. configurations. In total, 10 Spanner crab and 17 Demersal trap fishers completed surveys (refer Attachment 4). The survey results were presented at this workshop.

The information gathered included:

Demersal Fish Trap configuration

- The number of polystyrene floats used per head gear configuration is predicated on the strength of the current in the area fished and swell height,
- Where current is minimal, less polystyrene floats and rope length is required,
- DFT head gear ropes are predominantly polypropylene and may consist of two rope thicknesses generally 7-12mm, generally heavier ply at the trap end of the head gear and heavier ply in areas that are subject to stronger ocean current,
- Rope length is generally between 1.5 to 3 times the depth of set.
- Some fishers use a Galvanic Time Release (GTR) back up bag and float to assist if head gear is accidentally cut-off by boat strike or other.

A GTR or Pop-ups is a device that essentially dissolves at a known rate in sea water. When the GTR dissolves it opens an oyster mesh bag with rope and floats inside.

Spanner Crab configuration

- Spanner crab ropes are predominantly polypropylene,
- The number of polystyrene floats used per head gear configuration is predicated on the strength of the current in the area fished and swell height,
- Some fishers are trialling NBR in head gear and foot rope,
- The thickness of foot rope is often tapered, i.e., consisting of multiple rope thickness to minimise centralised wear on hauling plates.

CONSIDERATIONS

Continue to encourage the use of GTR where practical

Alternate use and appropriate configurations using Negatively Buoyant Rope

Increased fisher reporting / sharing of information related to whale behaviour and movement

DPI Fisheries further evaluate the use of research permits or other permit types to facilitate industry uptake for ongoing development of practices / gear development

OTHER EXPERIENCES

Western Australia

Jason How a Fisheries Researcher from WA Fisheries provided information on the WA Rock Lobster Fishery's entanglement protocols and processes. These have led to a 64% reduction in reported entanglements (How et al., 2021)

Operational guidelines include:

Water depth <18 fathoms	Water depth 18>fathoms
Maximum 18 fathoms of rope	Maximum rope 2X depth
Maximum 2 floats	Rope weight required – top half must be vertical
Surface ropes permitted	No surface rope

A Marine Fauna Sighting app has been developed with support from FRDC to enable fishers to share data on movement and location. This may assist in predicting location and timing of whale movement to support shifting gear to reduce interactions. Industry / research surveys of the rock lobster stock have supported data gathering and research into entanglements. A study modelling whale morphology and rope relationships has begun.

CONSIDERATIONS

Fishers consider greater reporting of sightings and gain access to data shared with other sectors

Industry to develop a process for better gear identification, other than on floats, such as a standard rope colour or other complimentary options.

New South Wales – Rock Lobster Fishery

NSW Lobster Fishery working group member provided advice on the NSW Lobster Fishery Code of Practice (Code). The Code summarises the broad principles under which fishers operate in the NSW Lobster Fishery and outlines measures to minimise gear interactions and entanglement risks (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/1278869/NSW-Lobster-Fishery-Code-of-Practice-2020.PDF).

The Code is largely adopted in the offshore sector of the fishery, as the inshore sector works in shallow water in close to reefs and rocky areas with little exposure to migrating whales.

The Codes outlines measures to minimise gear interactions and entanglement risks.

Ocean Trap & Line (OTL) Fishery

Adoption of alternative gear techniques by some operators e.g. sinking head gear is currently not permitted as traps must be set with marked surface floats. An alternative approach to this regulation should be considered including methods to ensure effective compliance, e.g. potential tagging system per endorsement allocation.

Industry adoption of alternative gear and practices is dependent upon:

1. Timely application of effective regulation and administrative provisions,
2. Support for the implementation of permits and other forms of more secure access entitlements,
3. Reduced administrative process and provisions to encourage the adoption of alternative arrangements.

CONSIDERATIONS

Regulation reform to provide more effective management of gear to meet the need for reduced interactions and entanglements between set gear and whales off NSW.

- Communications in support of the improvement in access and effective regulation
- Further extending the distribution and display of “Entanglement Stickers” on boats for reporting a whale entanglement (1300072757)

CODE OF PRACTICE UPDATES

The workshop discussion considered a wide range of new information and resources. The key items identified through the workshop process included:

1. Inclusion of a graph showing changes in effort and licence numbers / latent capacity over time, to demonstrate the contribution to reduced impacts through fishery buybacks and reforms.
2. Update data within the current Code of Practice (CoP) to clarify effort/ numbers of interactions / disentanglement details.
3. Update "Background" section of CoP.
4. Because of the nature of each operation consider separate sections to the CoP for Spanner crab and OTL fishing.
5. Update the current text in the Code of Practice re Spanner crab arrangements.
6. Identify need to improve reporting of lost and recovered gear, including information on location, type and numbers of lost and recovered gear.
7. Include a point to consider delaying gear deployment to avoid migratory whales where appropriate.
8. Encourage floats and gear be marked to make identification easier (potential for each region to identify with own colour, for example including one coloured float marked with a large F (fish trap) per head gear configuration may assist in improving identification of entanglement sources and minimise multiple reporting of one entanglement scenario.
9. Continue investigating alternatives to A grade NBR, which could be more easily spliced, minimises damage to hauling plates, and does not hold excess water which has potential safety risks (gear saturates and remains heavy for extended periods).
10. DFT head gear configurations could be weighted with NBR to hold it vertical in the water. Current trialling suggests using NBR between the bridle extension rope and the polypropylene rope at the surface. Configurations of up to 50 / 50 NBR and polypropylene on top are used.
11. Consider minimising the number of floats where possible by using larger floats to reduce numbers.
12. For Spanner crab fishing, consider configuring head gear and foot rope with NBR to minimise surface pooling or rope and to direct head rope more vertically in the water column. Weighting the footrope with NBR between spanner crab dilly pots can reduce lifting of rope (between each dilly). Trialling of NBR in the foot rope has proven difficult (A grade NBR very difficult to splice and is reported as picking up sand and wearing hauling plates).
13. Need to consider potential regulatory changes in code review, re. requirement to have surface floats.

WORKSHOP RECOMMENDATIONS

INDUSTRY

The following actions should be considered to support OTL fisheries to minimise whale entanglement:

1. Continue to trial Galvanic Time Release mechanisms to sink head gear of DFT used in the OTL where appropriate. Note GTR is noted as difficult/not possible at times in deep water and strong current, as submerged floats can lift the trap off the seafloor.
2. Improve marking of floats / gear to establish industry sources of entanglement from other sources such as debris or other maritime industries.
3. DFT fishers consider use of polypropylene rope on top of float lines, to minimise floats where possible by using larger floats. Top rope could be weighted with NBR to hold it vertical in the water. Current trials suggest NBR may be effective when configured between the bridle extension rope and the polypropylene rope at the surface (up to 50 / 50 NBR and polypropylene at the surface).
4. Spanner crab fishers consider configuring head gear and foot rope with sections of NBR to minimise surface pooling or rope and to direct head rope more vertically in the water column. Weighting the footrope with NBR between spanner crab dillys can reduce lifting of rope between dillys. Note: recent trialling of NBR has proven difficult (A grade NBR very difficult to splice and is reported as picking up sand and wearing hauling plates).
5. Spanner crab gear to be shot away from areas identified as having whales present or likely to have whales moving through.
6. Prepare an updated Code of Practice for distribution to industry for feedback prior to finalisation and communication to relevant fishers.
7. Develop industry education and awareness materials to assist in better understanding and adoption of code of practice.
8. Investigate alternative rope/gear types such as those used in the USA.
9. Further test alternative rope types.
10. Improve reporting of “lost or unrecovered gear”.
11. Consider “Real Time Reporting” system to improve sharing of information on whale movements, e.g., Western Australian App developed through FRDC funding.
12. Improve awareness and implementation of best practice in gear and operations as supported by the Code of Practice.

WORKSHOP RECOMMENDATION (Contd.)

GOVERNMENT

1. Regulation or other legislative constraints, such as licence conditions, be able to be varied as further development in best practice occur.
2. Consider revising fishery regulations to permit the “sinking” of head gear for traps in OTL traps fisheries.
3. Alternatively, NSW DPI Fisheries work with industry through OceanWatch and the PFA to improve processes to ensure timely and efficient access to permits or access arrangements for more than a year and up to 5 years.
   Permits or access arrangements should be able to be issued to individuals or at least enable individuals to be identified in the entitlement.
   Review on-going reporting arrangements for fishers with permits or entitlements.
4. NSW DPI Fisheries consider introducing number tags to assist in trap identification and improve data related to lost fishing gear.

ATTACHMENT 1

ATTENDEES

NAME	ORGANISATION
Neil MacDonald	Facilitator – NMAC(SA)
Daniel Johnson	NSW DPI Research
Duane March	Environment and Heritage Group (EHG)
Hayden Schilling	UNSW/NSW DPI Research
Andrew Marshall	NPWS
Anthony Harding	NSW DPI Management
John Joblin	NSW Fisherman
Troy Billin	NSW Fisherman
Danny Stewart	NSW Fisherman
Mitch Sanders	NSW Fisherman
Gary Bordin	NSW Fisherman
Daniel Gogerly	NSW Fisherman
Paul Sullivan	NSW Fisherman
Tricia Beatty	PFA
Jason How	Department of Primary Industries and Regional Development
Lowri Pryce	OceanWatch Australia (OWA)
Michael Wooden	OWA
Simon Rowe	OWA
Siobhan Threlfall	OWA
Claudia Santori	OWA
Emily Bastow	OWA
Kris Cooling	FRDC Extension

ATTACHMENT 2

WORKSHOP AGENDA

TIME	AGENDA ITEM
8:50 AM – 9:00	Welcome, introductions
9:00 – 9:20	Presentation – Oceanographic influence on Humpback whales Key messages
9:25 – 9:45	Large whale disentanglement program update 2021-22 Key messages
9:50 – 10:05	Ocean Trap & Line / Spanner crab Gear Survey Key messages
10:10 – 10:20	Ocean Trap & Line Demersal Fish Trap Gear Trials 2022 Key messages
10:25 – 11:10	Learnings from other fisheries & jurisdictions – Victoria, Western Australia, NSW Rock Lobster Key messages
11:10 – 11:40	Review and discussion OTL Code of Practice
11:40 – 12:30PM	Lunch
12:30 – 3:00	Facilitator session – NSW Fisheries, PFA, OceanWatch

This report was compiled by OceanWatch Australia and NMAC (SA) consultancy.

ATTACHMENT 3

OCEANWATCH AUSTRALIA

NSW Ocean Trap and Line (Demersal Fish Trap Field Trials, (Jan/June 2022)

During the 2021 whale migratory period, OceanWatch and DFT fishers worked with NSW DPI Fisheries and industry association PFA to minimise entanglement in the fishery.

In total 8 fishers successfully applied for and received Section37 research permits. Despite marking requirements prescribed under Clause 7A(1)(a) of the Fisheries Management (Ocean Trap and Line Share Management Plan) Regulation 2006 (the OTL Plan), permit holders were authorised to use modified fish traps (submerge head gear).

The submerging of head gear aims to reduce the time the rope and float component of the gear is actively in the water column, minimising risk of entanglement.

Field Trial Methods
The following methods were authorised:

a. Galvanic time release
A Galvanic Time Release device holds the buoy (and any additional buoys) below the surface of the water on deployment of the trap.

b. Programmable Time Release
A Programmable Time Release holds the buoy (and any additional buoys) below the surface of the water on deployment of the trap.

c. Sub-surface horizontal rope
A sub-surface horizontal rope attached to the trap to facilitate retrieval by grappling.

In addition to the sub-surface horizontal rope, the following may be attached separately to the trap to facilitate retrieval:
(1) a surface buoy meeting requirements of Clause 7A(1)(a) of the OTL Plan, or
(2) a backup buoy meeting requirements of the Galvanic time release method.

Fishers that activated permits were required to notify local fisheries compliance and marine park officers, and to submit reports 3-monthly to OceanWatch.

Method

A GTR or Pop-ups is a device that essentially dissolves at a known rate in sea water. When the GTR dissolves it opens an oyster mesh bag with rope and floats inside. This reduces time the rope and float component of the gear is deployed through the water column - minimising risk of entanglement.

A GTR can be have variable release times e.g. 1 day, 3day or 7 day timers etc.

When grappling the float rope is laid horizontally from the trap to a weight at the posterior end. Essentially the GTR bag creates an upside down "V" in the rope which stays close to the seafloor. Fishers can then grapple that rope and winch the trap onboard. The GTR set up can be used as a backup in case the trap cannot be located using grappling techniques and fishers are required to wait for the GTR to dissolve to locate the gear.

Alternatively, fishers can place a small float at the top point of the upside down "V" in the rope for grappling without a GTR.

Results

The fishing season was somewhat reduced for active ocean trap and line fishers during the 2021 migratory period, in part associated with the targeting of other species, i.e., actively participating in other fisheries, gear and vessel maintenance and widespread impacts from NSW flooding events during March 2021.

Of the 8 permit holders, 3 reported activating the permit and deploying modified head gear during the 2021 financial year, whilst targeting various finfish species using demersal fish traps (DFT).

Information was collected for the reporting period, January to June 2022 on the practicality/logistics, safety, impacts on catch, and potential for further uptake by the wider industry. Three fishers reported using modified fishing techniques in accordance with a NSW DPI issued permit. Information collected included the number of traps used (modified and typical gear configurations), the number of days fished, the number of lifts and the depth ranges of deployment.

Table 1: Number of modified OTL DFT trap deployments and method of retrieval

	Grappling		**GTR**
	Fisher 1	**Fisher 2**	**Fisher 3**
How many traps used?	1 out of 20	6 out of 6	20 out of 30
Number of days fished	8	11	24
Number of lifts	8	60	313
Depth ranges	25m	20-45m	50-120m

Table 1 presents the number of modified traps retrieved by grappling a submerged horizontal rope or GTR versus the number of typical traps deployed.

One fisher reported grappling 1 modified trap on 8 occasions. This fisher's season was limited to one month of reporting due to weather and vessel maintenance. A second fisher reported modification of all his deployed gear (6 traps) in depths of between 20-45 meters. Only 11 days were fished in the reporting period due to weather and family health concerns. A third fisher reported modifying 20 traps from his total maximum effort of 30 traps, with 313 lifts between 50-120m.

Fishers additionally reported on the utility of the gear, safety aspects, lost gear and future uptake.

Table 2: Utility of modified OTL DFT trap deployments and method of retrieval

	Grappling		GTR
	Fisher 1	**Fisher 2**	**Fisher 3**
Difficulty to modify	Moderate	Moderate	Moderate
Efficiency in setting	Similar	Similar	More difficult
Efficiency in retrieval	More difficult	Similar	More difficult
Impact of catch	No	Yes (increase catch)	Yes (increase catch)
Impact on crew	No	No	Yes (packing bags)
Impact on time at sea	Yes	Yes	Yes

Fishers reported that the difficulty to modify gear is moderate. Fishers that retrieved via grapple reported the efficiency in setting is similar to when using typical DFT head gear (Table 2).

The use of GTR was reported as more difficult as it takes time to pack and set GTR bags effectively impacting on crew. Floats and ropes must be cleaned with fouling removed to ensure the rope releases from the submerged bag.

Two fishers reported increased catch resulting from a reduction in lost fishing gear, however grappling and packing of GTR bags increases set up time and subsequently increases time at sea.

Table 3: Safety of modified OTL DFT trap deployments and method of retrieval

	Grappling		GTR
	Fisher 1	**Fisher 2**	**Fisher 3**
Impact on vessel survey	No	No	No
Crew safety hazards	No	No	No
Vessel Damage	No	No	No
Hauling gear damage	No	No	No
Fishing gear damage	No	No	No
Entangled recreational fishing gear	No entanglement	Decrease	Decrease
Safety	Safe	Safe	Safe

There was no impact on vessel survey, crew safety hazards, no reported damage to vessels, hauling gear or fishing gear. Fishers reported decreased or no entanglement of recreational fishing gear in sunken head gear (Table 3). Overall, participating fishers reported the modifications trialed had no safety concerns.

Table 4: Lost OTL DFT trap deployments

	Grappling		GTR
	Fisher 1	**Fisher 2**	**Fisher 3**
Number of lost typical gear	2	N/A	9
Number of lost modified gear	0	0	1
Increase gear loss	No	No	No
Decrease gear loss	Yes	Yes	Yes
Gear loss retrieval	Yes	N/A	Yes

Less fishing gear was lost during sunken head gear trials (Table 4). In total, 11 typical traps were lost during the period compared with one modified (submerged head gear trap) reported as lost during the reporting period, January – June 2022.

Table 5: Potential uptake of modified OTL DFT trap deployments

	Grappling		GTR
	Fisher 1	**Fisher 2**	**Fisher 3**
Reduce risk of whale entanglement	Yes	Yes	Yes
Currently using modified gear	No	Yes	N/A (stopped fish trapping) *
Potential for expanded use of modified gear	Yes	Yes	Yes
Cost effectiveness	Yes	Yes	Yes
Operational barriers to future uptake	No	No	Yes
Would you recommend modified gear?	Yes	Yes	Yes

All fishers reported that sunken head gear modifications employed in the trials reduced the risk of whale entanglement (Table 5). Two fishers reported that the modified gear is not currently being used due to vessel maintenance and other factors influencing fishing effort. One fisher stopped fish trapping to focus on another fishery endorsement activity. One fisher reported current use of modified gear.

Fishers reported that modifications were cost effective, and reduced costs not needing to replace fishing gear (that may have been lost). Fishers indicated there were limited operational barriers to their future uptake except for current regulations permitting the sinking of head gear without permit requirements.

Further Demersal fish trap efforts made to minimise risk of entanglement

- Additional DFT fishers consulted as part of an industry gear survey indicated GTR bags and packed float set ups are currently used, to assist in retrieving fish traps if lost through boat strike or ocean current movement.
- This use of GTR gear with typical head gear meets current regulations and improves likelihood of any lost gear retrieval.
- Use of NBR, to keep rope from pooling at the surface. Some DFT fishers reported using a combination of polypropylene rope from the halfway point of the head rope to the floats, and NBR from the halfway point to the trap bridle.
- Some fishers not using NBR report using 2 separate rope thicknesses in the head rope configuration. Generally, 10mm polypropylene is used from the halfway point of the head rope to the trap bridle, and 7-8mm polypropylene or polyethylene is used from the surface floats and spliced at the halfway point.
- Some fishers report modifying conventional head gear ropes, for e.g., removing knots and splicing all rope joins.
- Some fishers are minimising the number of floats when setting, for e.g., where multiple 8-inch floats are required. One 10-inch is generally considered as similar in buoyancy to two and a half 8-inch floats.
- GTR dissolve times can be considered to factor in predicted weather conditions, or other factors that may influence ability to retrieve traps, for e.g., GTR with a 1, 3, 4, 7 or 9 day dissolve time.
- In late June, OceanWatch assisted an additional 10 OTL DFT fishers to attain NSW DPI Fisheries issued permits to submerge head gear of demersal fish traps (and Marine Park permits where applicable).

Fisher's behavioral responses to minimise risk of entanglement

- Fishers reported observing whale migratory pathways and wherever possible, actively reduced or moved trap effort away from high abundance areas.
  For example, two fishers reported that when whales were identified as mostly abundant in deeper water, fishing effort was reduced, or moved into shallower waters to target other inshore species.
- Fishers surveyed reported using a minimum of 33% and maximum of 44% of their endorsement (trap number limit) during whale migratory periods. Due mainly to

restrictions and logistics of weather, distance of travel to service fishing gear, bait availability and storage etc. Some OTL DFT fishers are actively associated with other fishing endorsements during the whale migratory period, for e.g., NSW ocean haul and lobster fisheries.

- It is assumed that the reduced potential trap effort and mindful avoidance measures implemented by individual fishers through an improved awareness of the issue has also helped to reduce risk of entanglement.

Continued challenges

- Whale migratory period coincide with the distribution of fishing effort, i.e., gear is deployed (set) in both shallow and deeper waters.
- Gear configuration for individual fishers is dependent on target species, strength of current and other seasonal/geographical variables, and therefore there is a high degree of variability amongst fishing gear configurations throughout the industry.
- GTR and grappling has an obvious risk reduction by minimising the time or amount of rope deployed in the water column. However, in deep water and strong currents it is not possible to sink the number of floats required to resurface the head gear and facilitate retrieval.
- Simply minimising the length of rope is not always suitable (i.e., to minimise slack rope at the surface). In areas with strong current for example, fishers report that adding more floats to the head rope to ensure it remains above the surface for compliance reasons can result in the trap lifting off the seafloor and potentially moving the trap in the current.
- Need to continue NBR trials and provide recommended use to suit variable conditions, identify appropriate ratio of NBR to be configured between the bridle extension piece and the polypropylene surface end of the head rope, considering variability in depth and strength of current.
- Improved identification of fishing gear to identify problematic configurations and identify any locations that may be a high entanglement risk.

Recommendations

1. Continue to encourage the use of GTR where practical
2. Continue to trial and determine appropriate configurations using Negatively Buoyant Rope
3. Increased fisher reporting/sharing of information related to whale behaviour and movement
4. DPI Fisheries further evaluate the use of research permits or other permit types to facilitate industry uptake for ongoing development of practices / gear development
5. Consider the introduction of a DPI managed numbered tagging system for individual trap identification for those wishing to submerge head gear.
6. Identification tags could potentially be attached to demersal fish traps and/or head rope to improve identification of industry whale interactions.
   Fishers could apply for individual trap identification tags (limited in number by individual endorsements) and allocated by the department. Any lost tags would require fishers apply for replacement tags.
   Improved trap loss data may assist in the identification of problematic configurations, conditions or locations that may increase risk of whale entanglement or trap loss.
7. Consider emerging technology/advancements in other fisheries and jurisdictions.
8. Continue to build relationship between fishers, management, compliance, disentanglement teams and community to in efforts to communicate potential solutions to problematic gear types or other high-risk activities that impact migratory whales.

ATTACHMENT 4

OCEANWATCH AUSTRALIA

NSW Ocean Trap and Line (Spanner crab and demersal fish trap gear survey, 2021/2022)

OceanWatch Australia completed fishing gear surveys completed with NSW Ocean trap and line fishers with DFT and SC endorsements.

Summaries of individual fishing gear materials and configurations are presented for typical gear deployed in DFT and SC endorsements between May to October (whale migratory period).

Key information presented on typical fishing gear includes typical trap design, type, thickness and length of ropes used, float types, sizes and colours

Demersal fish trap gear configuration (n=17 survey participants)

Demersal fish traps in NSW OTL commonalities include a heavy rope bridle attached to a steel or timber frame trap, a bridle extension piece spliced into a polypropylene head rope (which may consist of various thickness and generally thickness greatest at the trap end).

Ropes are held by surface floats which are mostly white (or painted) polystyrene floats ranging between 8-12-inch diameter. The number of floats increasing with the depth of set and strength of current.

Fish trap design

- Fish traps are generally being phased to steel as the desired timber type (turpentine) and quality has become more expensive/difficult to source.
- Fish traps are generally 1800mm in length, 1200/1500mm width, and 900/1200mm in height.

Rope length and depth fished

- Rope length is determined by the depth of the set (depth fished) and the strength of the ocean current.
- Generally, head rope length is set at minimum of 1.5 times greater than the depth of set predominantly in shallow sets with minimal ocean current strength.
- The average head rope length used in demersal fish traps was approximately twice the depth of set.
- In areas with stronger current:
  - the head rope length may be increased to the maximum 3 times the depth of set.
  - increasing head rope length aims to ensure the trap remains on the seafloor.
  - the head rope is held taught due to the pressure asserted by the strong current.

- excess rope may accumulate through the water column or surface if the current weakens.
- the use of weighted or negatively buoyant rope may assist reduce in reducing surface accumulation of excess rope if the current weakens.

Types and thickness of ropes used

- The bridle at the trap is generally between 10 and 12mm polypropylene.
- 75% of respondents predominantly use 'Danline' polypropylene in headrope. Configuration. Polyethylene rope was used but in less volume.
- Reported head rope colour included polypropylene ropes of white with a black fleck, green, green with yellow stripe, orange, and orange and black.
- Most fishers surveyed used rope of between 8 and 10mm thickness
- Most rope configurations consist of a variety of rope thicknesses, e.g., head rope 7mm thickness to half of depth, spliced with 10mm rope to bridle.
- The minimum thickness of the head rope was 7mm (top half). The maximum thickness reported (1 fisher) was 12mm.
- 29% of respondents reporting use of negatively buoyant rope, lead core rope, chain or weights; generally attached at the bottom half of the head rope between bridle extension and surface polypropylene rope to minimise surface rope.

Number of floats used

- Sizes and number of floats is predicated on the strength of the current in the area fished and the depth of set.

- Generally, the number of floats required (Figure 1) to keep the float above the surface increases as the depth of the set and the strength of ocean currents increase.

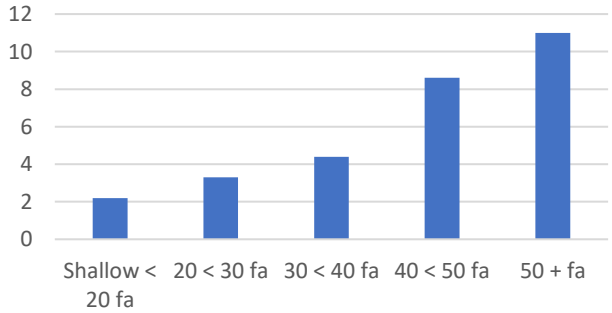

Figure 1: Number of floats used in varying depths

Types and sizes of floats

- All polystyrene floats were round and white.
- 8-inch polystyrene float most common, 82.4% of survey respondents.
- For personal identification 22% paint polystyrene floats predominantly half red.
- Larger polystyrene floats were predominantly used by operators working deeper water (52.9 and 23.5 % of float configurations surveyed include 10 and 12-inch polystyrene floats respectively).
- 41.2% of OTL DFT fishers reported use of nokalon plastic floats (predominantly in deeper fish trap sets and red/orange and occasionally blue in colour).
- The number of floats used in shallower waters <30fa and in areas with minimal current is generally only one or two 8-inch floats.
- A maximum of twelve 8-inch floats and 2 plastic drums were used in a 60-70fa depth of set.
- The number of 8-inch floats are sometimes reduced (depending on sea conditions) by replacing multiple 8-inch floats with 10-inch floats (10-inch polystyrene float has the buoyancy of approximately two and a half 8-inch floats).
- Survey respondents indicated that there are limitations on the number of floats that can be used in strong current. Excess floats may lift the trap from the seafloor and increase risk of trap loss.
- Floats are attached generally by a separate loop of rope spliced or knotted and attached by shark clip or simple loop knot to the head rope.

Spanner crab

Spanner crab gear configuration (n=10 survey participants)

Spanner crab fishers retrieve a weighted head rope with a line hauler, marked with a flag and polystyrene floats. The attached foot rope with baited dillies is then retrieved to the to remove catch, rebait where appropriate and reset (up to 6 sets per day).

The configuration of the typical gear deployed in the fishery is described below.

Spanner crab dilly

- A spanner crab dilly generally consists of a 1 – 1.6m^2 steel frame that is covered in mesh and is baited.
- Multiple spanner crab dillies are attached to a footrope, spaced generally 15 to 50m apart.
- A set of spanner crab dillies attached to a rope is referred to as a string.
- Fishers use either 3, 4 or 5 strings for max of 30-40 dilly's
- A spanner crab string is generally set for one hour.
- The average depth of a spanner crab set was reported as approximately 57m.
- The minimum depth of set was 20m and maximum reported as 80m.

Head rope length and depth

- Spanner crab ropes are 90% polypropylene and 10% use Polyethylene.
- The average length of a spanner crab head rope was reported as approximately 145m.
- Fishers reported coiling up to a half of the head rope in shallow sets when there is minimal current.
- 30% of survey respondents trialing NBR in the head rope and footrope.
- Head rope thickness was varied amongst respondents with 40% using 6mm, 40% using 8mm, and 20% using 7mm.
- Colours of the rope generally were orange (polypropylene) most common (70%), orange/green 20% and 10% green.

Foot rope length and thickness

- The average length of the foot rope was 590m; dependent on number of dillies attached to a string.
- Foot rope thickness was often reported as tapered, i.e., consisting of sections of 6, 7 and 8mm thickness to reduce wearing on haulers (70% use 8mm, 20% use 6mm, 10% use 7mm).
- Foot rope comprised combinations of rope colours including orange (70%), green (10%), orange/green (10%), green/grey (10%)

Types and sizes of floats

- Spanner crab fishers reported using 8-inch, 10-inch or 12-inch polystyrene floats attached to the head rope (average of 5.1 floats per string).