Bycatch Mitigation FACT-SHEET 1 (Updated September 2014)

Practical information on seabird bycatch mitigation measures

Demersal Longline: Streamer lines

Streamer lines are the most commonly prescribed mitigation measures for longline fisheries and are regarded as one of the most effective known mitigation measures (a primary measure). Streamer lines are cheap, simple to use and do not require modification of the fishing gear.

What are streamer lines?

Streamer lines (also called tori or bird scaring lines) consist of lengths of rope with brightly coloured streamers towed behind longline vessels during line setting to deter seabirds from attacking baited hooks. Currently, the design most commonly recommended for demersal longline fisheries is that prescribed by the Commission for the Conservation of Antarctic Marine Living Resources (SC-CAMLR, 2006). The CCAMLR recommended streamer line configuration is described in detail later in this Fact-sheet, under Technical Specifications.

Effectiveness at reducing seabird bycatch

When deployed properly under suitable conditions, streamer lines can be very effective at reducing seabird mortality. For example, in the North Atlantic, experimental trials showed a 98% reduction in seabird bycatch (Løkkeborg, 2003) when a streamer line was used. In Alaska, paired streamer lines have the potential to reduce seabird bycatch of surface feeding species, primarily northern fulmars and Laysan albatrosses, by 88–100% (Melvin *et al*., 2001). However, in this fishery, shearwater bycatch rates remained unchanged, as their superior diving abilities allow them to target baits beyond the effective protection of the streamer lines.

Figure 1. Streamer lines deter seabirds from feeding on baited hooks.

Key to the effective use of a single streamer line are: the aerial extent achieved, the ability to adjust the line's position, the attachment height above sea level (>7 m), and the overall length (150 m). The spacing and length of streamers and type of materials used in the line's construction are also important considerations.

Streamer lines are more effective as a seabird deterrent when multiple lines are deployed. Reid *et al*. (2004) showed a significant decrease in seabird mortality when demersal longline vessels used multiple streamer lines. Two lines resulted in a 75% reduction and three lines resulted in a 97% reduction in seabird mortality when compared with a single streamer line. Melvin *et al*. (2001) found strong statistical evidence for reduced seabird attacks on baits, resulting in lower bycatch rates, when paired streamer lines were used.

In several demersal longline fisheries, where the risk of seabird bycatch is high (Alaska, Heard Island and the French territories within CCAMLR), paired streamer lines are compulsory. Many biological and environmental factors influence the performance of a streamer line.

Seabird species

The number and species of seabirds associating with a fishing vessel are important considerations, as increased competition results in increasingly frenzied feeding activity. Under these conditions, birds are less likely to be distracted by streamer lines. Certain species of seabirds, particularly shearwaters, some petrels and albatrosses, dive to considerable depths and can access hooks beyond the protection of a streamer line. Where diving species are numerous, experimental trials of streamer lines have been less convincing (Melvin *et al*., 2004). Although effective in isolation, streamer lines alone are not sufficient to eliminate bycatch; a combination of mitigation measures is required.

Environmental variables

Wind strength and direction in relation to vessel course can deflect the streamer line away from its desired position over the hook line. If the hook line is exposed, a single streamer line becomes ineffective.

ACAP Best Practice Advice

The key factors affecting the performance of a streamer line are the degree of aerial extent and the position of streamers in relation to the hook line.

- The aerial section is the active part of the line, and acts as a 'scare-crow' keeping birds from reaching baited hooks. Aerial extent is achieved through a combination of attachment height above sea level, overall length of the line and the drag caused by a towed object. Greater aerial extent will contribute to improved protection of the hookline. In order to give hooks sufficient time to sink, the aerial section of a streamer line should extend at least 100 m past the stern of a vessel.

- To be effective, a single streamer line has to be placed directly above the hook line (or slightly to the windward side of the hookline). In order to achieve this in all weather conditions it must be possible to adjust the attachment position of the line.
- Paired or multiple streamer lines give better protection to the hook line in all weather conditions.
- The use of appropriate materials is an important consideration; if the line is too heavy it will sag under its own weight and not achieve the desired aerial extent, which is not only crucial to the line's function as a bird deterrent but also reduces the chances of entanglements with the fishing gear (Melvin, 2000).
- The Technical Specifications section of this Fact-sheet describes the recommended streamer line design.

Operational factors

Streamer lines should be deployed before the first hook enters the water and retrieved after the last hook has been set.

Deployment

- Casting the towed object to the port or starboard side of the vessel (depending which is the lee side) will allow the streamer line to drift astern of the vessel without interfering with the deployment of anchor lines.
- Once the streamer line has reached its full extent, its position should be adjusted to protect the area directly above the hooks as they sink astern of the vessel.

Retrieval

- Constructing the streamer line from lightweight materials allows a single man to easily recover the line at the end of setting. The drag produced by the towed object at the far end of the line is an important consideration. There is a trade-off between creating sufficient drag to achieve the desired aerial extent and creating too much drag, hampering retrieval.

Figure 2. Streamer lines should be deployed before the first hook leaves the vessel.

Potential problems and solutions

- There are instances when a streamer line becomes tangled with the hook line. This is a hindrance and potential danger to fishermen and usually results in the loss of the streamer line, which increases the risk of seabird bycatch. The key to reducing tangles is in the design; by achieving the required height above sea level, any aerial extent tangles should be minimal.
- In strong crosswinds, streamer lines can be blown away from the hook line, which increases the likelihood of seabird bycatch. The towed object is a critical feature of the streamer line design. It should maintain a steady course in strong crosswinds, create sufficient drag to achieve the desired aerial extent yet be easily retrievable. Many different towed objects have been tried (e.g. buoys, road cones, thick rope) but there is currently no definitive recommendation for the most efficient towed object.

Combinations of measures

Streamer lines are regarded as a primary mitigation measure. That is, when used alone they significantly reduce seabird bycatch. However, they work even more effectively when used in combination with other mitigation measures including;

- ***Line weighting*** (Fact-sheets 2, 3 and 4)
- ***Night-setting*** (Fact-sheet 5)
- ***Offal management*** (Fact-sheet 12).

Further research

- The CCAMLR design of streamer line has been tested through deployment in CCAMLR fisheries for several years. However, there have been no empirical tests of its effectiveness compared with alternative configurations. Many variations on the CCAMLR design are in common use in commercial fisheries, but the details of these designs are mostly unrecorded. Key components requiring further testing are materials, towed object designs, and means of adjusting the position of the streamer line in relation to the hook line.
- Trials to investigate the relationship between streamer line extent, hook line sink rate, vessel speed, and the influence they have on seabird bycatch would help to refine the best practice recommendations.

Compliance and implementation

- The use of streamer lines is widely accepted as a seabird bycatch mitigation measure in many longline fisheries. Prior to the issuing of a licence, a vessels streamer line should be inspected to ensure it conforms to the regulation requirements.
- Without the deployment of onboard observers, the use of streamer lines at-sea is difficult to monitor.

Technical Specifications

The recommended best-practice streamer line for demersal longline fishing is:

- The streamer line should be a minimum of **150 m in total length**, be attached to the vessel at a point **>7 m above the sea surface** (using a pole if necessary) and **tow an object** at its seaward end, which creates drag and stability. These specifications are critical to achieve the desired **aerial extent (100 m)**, the active portion of the streamer line.
- Each branch streamer should consist of two or more strands and should be constructed from **brightly coloured, UV-protected rubber tubing**. Streamers should be spaced at **intervals of less than 5 m** along the streamer line backbone. Branch streamers should be long enough to reach the sea surface in calm conditions.
- Swivels positioned at the attachment point to the vessel, the towed object and where streamers join the backbone help to avoid twisting and wear. These can also incorporate breakaway points in the event of snags with the hook line.
- A means of adjusting the position of the streamer line, such as a boom-and-bridle system, will increase the versatility of a streamer line and allow side-to-side movement to maintain protection of the hook line in crosswinds.
- Streamer lines should be deployed in pairs, one on each side of the hook line, during line setting.
- Swivels or other attachment devices to attach branch streamers to the streamer line are recommended as they reduce the branch streamers tangling around the streamer line. However, they do add weight to the streamer line.
- A spare streamer line should be carried onboard the vessel to be deployed in the event of lost or broken streamer lines.
- Streamer lines are deployed and retrieved on a set-by-set basis (they are not a fixed part of fishing gear/operations). Requires fisheries observers, electronic monitoring (e.g. video surveillance) or at-sea surveillance (e.g. patrol boats or aerial over-flights).

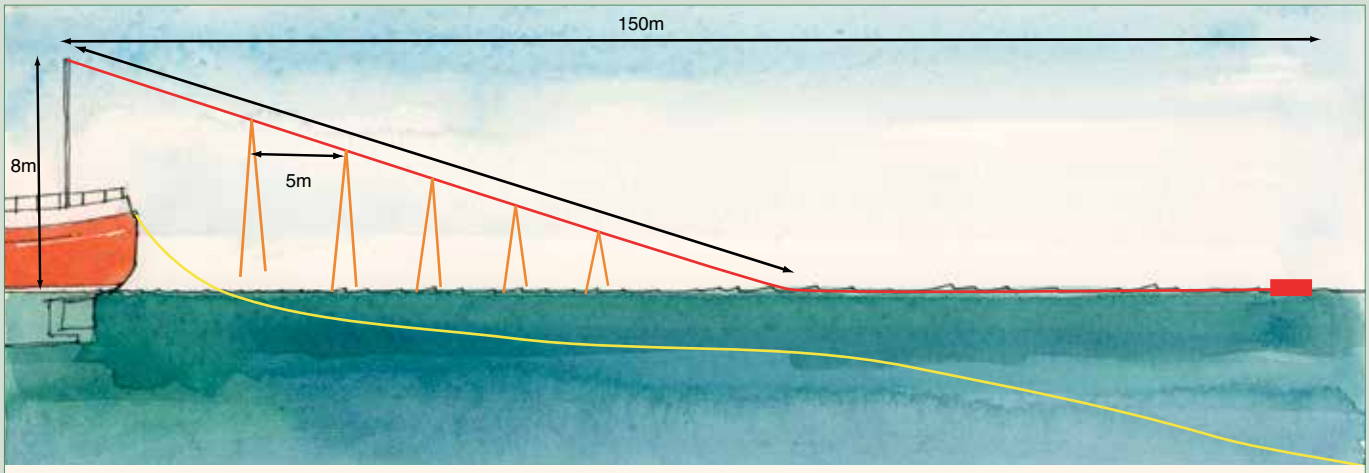

Figure 3. Recommended streamer line configuration.

References

SC-CAMLR (2006) *Scientific Committee for the Conservation of Antarctic Marine Living Resources. Report of the 25th meeting of the Scientific Committee.* CCAMLR, Hobart.

Løkkeborg, S. (2003) Review and evaluation of three mitigation measures-bird scaring line, underwater setting and line shooter-to reduce seabird bycatch in the northern Atlantic longline fishery. *Fisheries Research*, **60**, 11–16.

Melvin, E.F. (2000) *Streamer lines to reduce seabird bycatch in longline fisheries*. Washington Sea Grant. WSG-AS 00-03.

Melvin, E.F., Parrish, J.K., Dietrich, K.S. and Hamel, O.S. (2001) Solutions to seabird bycatch in Alaska's demersal longline fisheries. Washington Sea Grant Program.

Melvin, E.F., Sullivan, B., Robertson, G. and Wienecke, B. (2004) A review of the effectiveness of streamer lines as a seabird bycatch mitigation technique in longline fisheries and CCAMLR streamer line requirements. *CCAMLR Science*, **11**, 189–201.

Reid, T.A., Sullivan, B.J., Pompert, J., Enticott, J.W. and Black, A.D. (2004) Seabird mortality associated with Patagonian Toothfish (*Dissostichus eleginoides*) longliners in Falkland Islands waters. Emu, **104**, 317–325.

CONTACTS

Rory Crawford , Senior Policy Officer, BirdLife International Marine Programme, The Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire, SG19 2DL, UK. Email: rory.crawford@rspb.org.uk BirdLife UK Reg. Charity No. 1042125

ACAP Secretariat, Agreement on the Conservation of Albatrosses and Petrels, 27 Salamanca Square, Battery Point, Hobart, TAS 7004, Australia. Email: secretariat@acap.aq