



# Bycatch Mitigation FACT-SHEETS (Updated September 2014)

## Practical information on seabird bycatch mitigation measures

### Introduction: Seabird bycatch mitigation measures

This series of 15 Seabird Bycatch Mitigation Fact-sheets describes the range of potential mitigation measures available to reduce seabird bycatch in longline and trawl fisheries. The sheets assess the effectiveness of each measure, highlight their limitations and strengths, and make best practice recommendations for their effective adoption. They are designed to help decision-makers choose the most appropriate measures for their longline and trawl fisheries.

#### The threat to seabirds

Seabirds are characterised as being late to mature and slow to reproduce; many albatrosses do not breed before they are ten years old and thereafter a maximum of a single egg is produced each year, with many species only breeding every other year. To compensate for this seabirds are very long-lived, with natural adult mortality typically very low. These traits make any considerable increase in human-induced adult mortality potentially damaging for population viability, as even small increases in mortality can result in population declines.

Fisheries bycatch is the single greatest threat facing many seabird populations. Albatrosses, in particular, are under extreme pressure with 15 of the 22 species threatened with extinction (BirdLife International, 2013). Seabird bycatch is unnecessary and preventable. In fact, it not only has disastrous consequences for the birds but also renders fishing operations less efficient. Fortunately, there are simple and effective solutions that can prevent seabird bycatch in longline and trawl fisheries.

#### Seabird bycatch in longline fisheries

Seabirds are most vulnerable to mortality on longline hooks during the short period between hooks leaving the vessel and sinking beyond the diving range of foraging seabirds. Mitigation measures are designed to prevent contact between seabirds and hooks during this critical period. The period during which bait are available to birds is determined by the sink rate of the line, the diving ability of the bird species present and the use, or not, of seabird deterrents. Seabirds can also be hooked and potentially injured during line hauling.

#### Seabird bycatch in trawl fisheries

Over recent years, mortality of albatrosses and petrels in trawl fisheries has been identified as a major threat. The causes of mortality in trawl fisheries are varied and depend on the nature of the fishery (pelagic or demersal) and the species targeted. However, it may be categorised into two broad types: cable-related

mortality, including collisions with netsonde cables, warp cables and paravanes; and net-related mortality, which includes all deaths caused by net entanglement.



Figure 1. Streamer lines are an example of a cheap seabird bycatch mitigation measure, which can be used in combination with other measures to great effect.

#### Mitigation measures

There are several simple, inexpensive yet effective mitigation measures available that, when used conscientiously, can reduce the number of seabirds killed in longline and trawl fisheries. A mitigation measure can be defined as a modification to gear design or fishing operation that reduces the likelihood of catching seabirds.

Mitigation measures tested in trawl fisheries are either based on the principle of deterring birds from coming into contact with the warp, paravane or netsonde cables, which are the parts of the trawl that cause the majority of seabird deaths, or reducing the attractiveness of the vessel by managing the discharge of offal/factory waste (Løkkeborg, 2008).

Mitigation measures for longline fishing have been classified somewhat differently, but are typically divided into four main categories:

1. Avoid fishing in areas and at times when seabird interactions are most likely and intense (night setting, area and seasonal closures).
2. Limit bird access to baited hooks (underwater setting funnel, weighted lines, thawed bait, line shooter, bait-casting machines, side-setting).
3. Deter birds from taking baited hooks (streamer (bird-scaring) lines, acoustic deterrents, water cannon).
4. Reduce the attractiveness or visibility of the baited hooks (dumping of offal, artificial baits, blue-dyed bait) (Løkkeborg, 2008).

To date no single mitigation measure has proven successful at eliminating seabird bycatch in all situations. In most cases, it is necessary to use a number of mitigation measures in combination to minimise seabird bycatch. Each fishery has different operational characteristics and interacts with a specific assemblage of seabirds, which may require specific considerations.

## Mitigating bycatch in longline fisheries

### *Sink rate*

A range of operational (e.g. line weighting regime, vessel speed, crew awareness) and environmental (e.g. sea state) factors determine longline sink rate. An appropriate line-weighting regime is the key to achieving a desired sink rate. In addition to the sink rate, the setting speed of a vessel has a direct effect on the distance behind a vessel that bait are accessible to birds, the faster the setting speed, the further behind the boat the baits are available, and the less likely they are to be covered by the protection of streamer lines.

### *Seabird diving capabilities*

The 'safe' depth, below which seabirds are not vulnerable to becoming caught, is a function of the foraging bird's diving proficiency. Albatross diving ability ranges from zero (wandering albatross) to about 12 m (light-mantled albatross). Most small albatross species (mollymawks) fall somewhere in between. Of other species regularly caught on longlines, northern fulmars are restricted to surface waters, white-chinned petrels dive to depths of 13 m while sooty shearwaters have been recorded diving to 67 m. The deeper diving species are not only caught themselves but can cause 'secondary mortality', whereby they retrieve baited hooks from depth making them available to less proficient divers, like albatrosses. This is particularly prevalent in pelagic longline fisheries.

### *ACAP Best Practice*

For pelagic longline fisheries, a combination of weighted branch lines, streamer lines and night setting are best practice mitigation. These measures should be applied in areas where fishing effort overlaps with seabirds vulnerable to bycatch to reduce incidental mortality to the lowest possible levels. Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in most pelagic longline fisheries. The most effective approach is to use the above measures in combination.

For demersal longline fisheries, the most effective measures to reduce incidental take of seabirds during line setting are: use of an appropriate line weighting regime to maximise hook sink rates, use of streamer lines and setting by night. Measures for line hauling include use of bird deterrent curtains at the hauling bay and responsible offal management. Avoidance of peak areas and periods of seabird foraging activity is another method to minimise interactions. Current knowledge indicates the Chilean, or trotline, system with appropriate line weighting and branch line length will prevent albatross and petrel mortality and is considered best practice mitigation for demersal longline fishing. Although the Chilean system effectively prevents mortality as a sole measure, it would be prudent to use in combination with a single streamer line.

With other demersal longline fishing methods, it is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds, and that the most effective approach is to use the measures listed above in combination.

## Mitigating bycatch in trawl fisheries

The key to cable related mortality is managing the discharge of offal and discards, although such measures can require vessel re-fits and so are often seen as a long-term, albeit extremely effective, option. There are a range of interim and highly effective measures (e.g. streamer lines) currently available. The adoption of mitigation measures during the shot can also largely eliminate net-related entanglement of seabirds, but during haul, the problem is more difficult to mitigate.

### *ACAP Best Practice*

The following measures have been demonstrated to be effective at reducing seabird bycatch in trawl fisheries and are thus recommended as best practice by ACAP:

#### **Cable strike**

- Deploy streamer lines while fishing to deter birds away from warp cables and net monitoring cable
- Install a snatch block at the stern of a vessel to draw the net monitoring cable close to the water to reduce its aerial extent.

#### **Net entanglement**

- Clean nets after every shot to remove entangled fish ("stickers") and benthic material to discourage bird attendance during gear shooting
- Minimise the time the net is on the water surface during hauling through proper maintenance of winches and good deck practices
- For pelagic trawl gear, apply net binding to large meshes in the wings (120–800 mm), together with a minimum of 400kg weight incorporated into the net belly prior to setting

#### **Offal management**

- Avoid any discharge during shooting and hauling
- Where possible and appropriate, convert offal into fish meal and retain all waste material with any discharge restricted to liquid discharge / sump water to reduce the number of birds attracted to a minimum
- Where meal production from offal and full retention are not feasible, batching waste (preferably for two hours or longer) has been shown to reduce seabird attendance at the stern of the vessel. Mincing of waste has also been shown to reduce the attendance of large albatross species.

## The next step

Once a bycatch problem has been identified and appropriate solutions (mitigation measures) identified, the challenge is to ensure mitigation measures are adopted. The presence of skilled observers who can provide assistance and advice is a key step toward the effective use of mitigation measures.

#### **References**

- BirdLife International (2013)** <http://www.birdlife.org/datazone/species/index.html>
- Løkkeborg, S. (2008)** Review and assessment of mitigation measures to reduce incidental catch of seabirds in longline, trawl and gillnet fisheries. FAO Fisheries and Aquaculture Circular. No. 1040. Rome, FAO. pp. 24.

**Fact-sheets available include:**

<b>Fact-sheet number</b>	<b>Target fisheries</b>	<b>Mitigation measures</b>
1	Demersal longline	Streamer lines
2	Demersal longline	Line weighting – external weights
3	Demersal longline	Integrated weight longlines
4	Demersal longline	Line weighting – Chilean system
5	Demersal and pelagic longline	Night-setting
6	Demersal longline	Underwater setting chute
7a	Pelagic longline	Streamer lines (vessels $\geq$ 35 m)
7b	Pelagic longline	Streamer lines (vessels < 35 m)
8	Pelagic longline	Line weighting
9	Pelagic longline	Side-setting
10	Pelagic longline	Blue-dyed bait (squid)
11	Pelagic longline	Bait caster and line shooter
12	Demersal and pelagic longline	Haul mitigation
13	Trawl	Warp strike
14	Trawl	Net entanglement

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