Branch line weighting



20 Feb 2024

WCPFC CMM 2018-03 current options

Option for North Pacific (Column A) and South Pacific.

A single set of specifications:

a) one weight greater than or equal to 40g within 50cm of the hook; or

b) greater than or equal to a total of 45g attached to within 1 m of the hook; or

c) greater than or equal to a total of 60 g attached to within 3.5 m of the hook; or

d) greater than or equal to a total of 98 g weight attached to within 4 m of the hook.

Branch line weighting

Effectiveness:

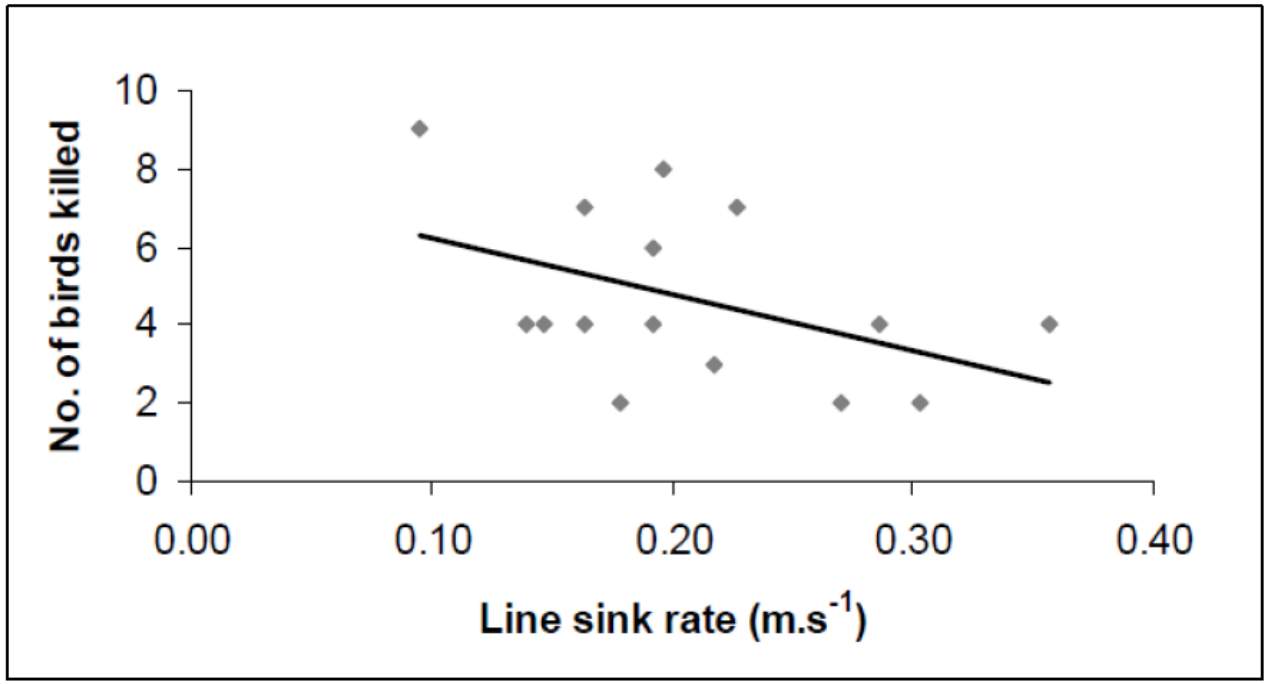
- Studies summarised in SC-19-EB-IP-15 which compared branch line weighting to no line weighting found up to 90+% reduction in seabird bycatch:

Control	Treatment 1	Treatment 2	Location	Metric	Effect per 1,000 hooks			Source
					Control	Treatment 1	Treatment 2	
Unweighted	60 g weighted swivel 3.7 m from the hook		Hawaii, USA	A A	LAAL: 0.69 BFAL: 0.83	0.06 0.06		Boggs et al. 2001
Unweighted	Double-weighted branchlines, weight unspecified		Western and central north Pacific	C C	LAAL: 7.7 BFAL: 1.6	2.4 (u) 0.5 (u)		Ochi et al. 2013

Branch line weighting

Effectiveness:

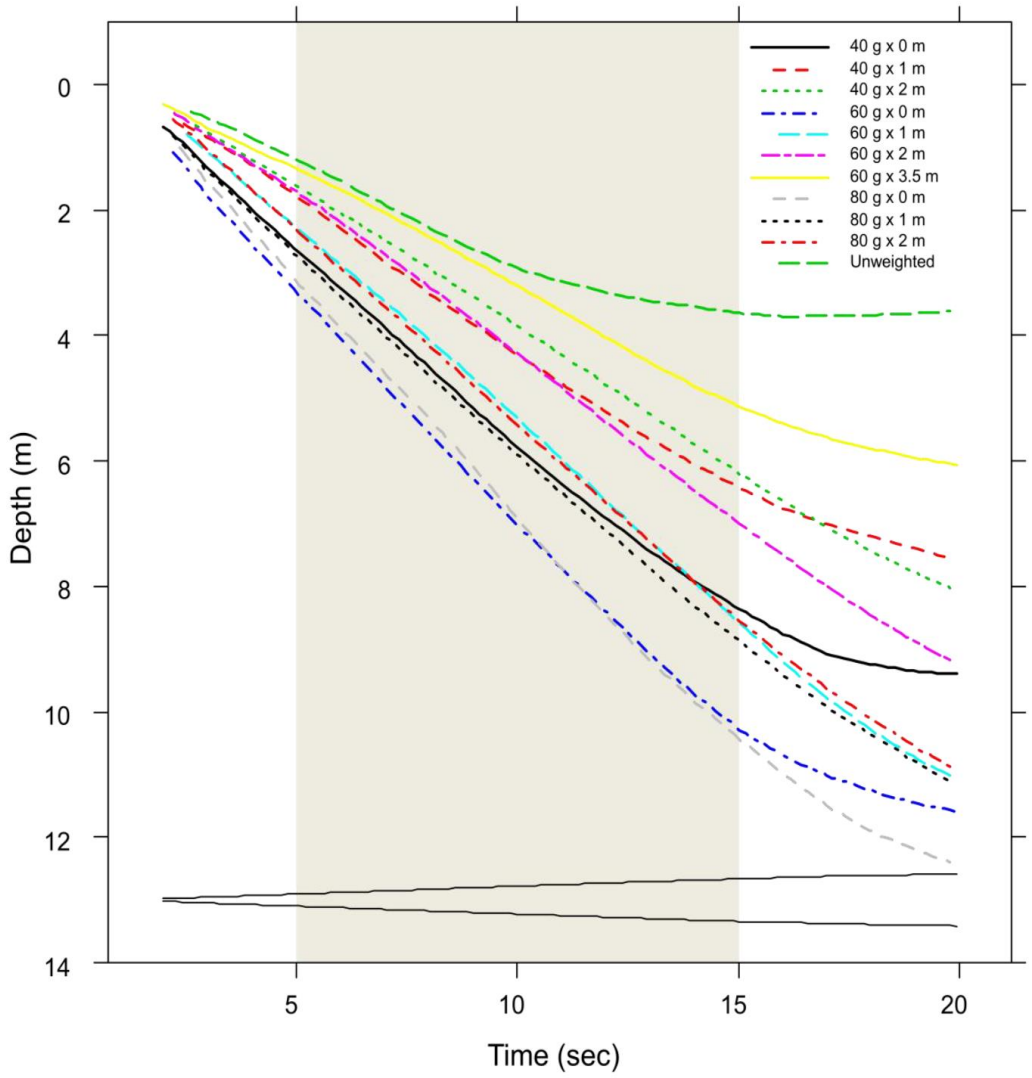
- Achieving a faster sink rate reduces the window of availability of baited hooks to seabirds and thus achieves greater effectiveness.
- Petersen et al (2008), using South African pelagic longline fishery records, summarise the number of seabirds killed per set as a function of longline sink rate, in sets during which two or more birds were killed



Branch line weighting

Effectiveness:

- Barrington et al (2016) provided a statistical analysis to support the categorisation of branch line weighting for pelagic longline fishing according to sink rates.
- Sink rates were measured for 11 branch line weighting regimes during dedicated at-sea trials

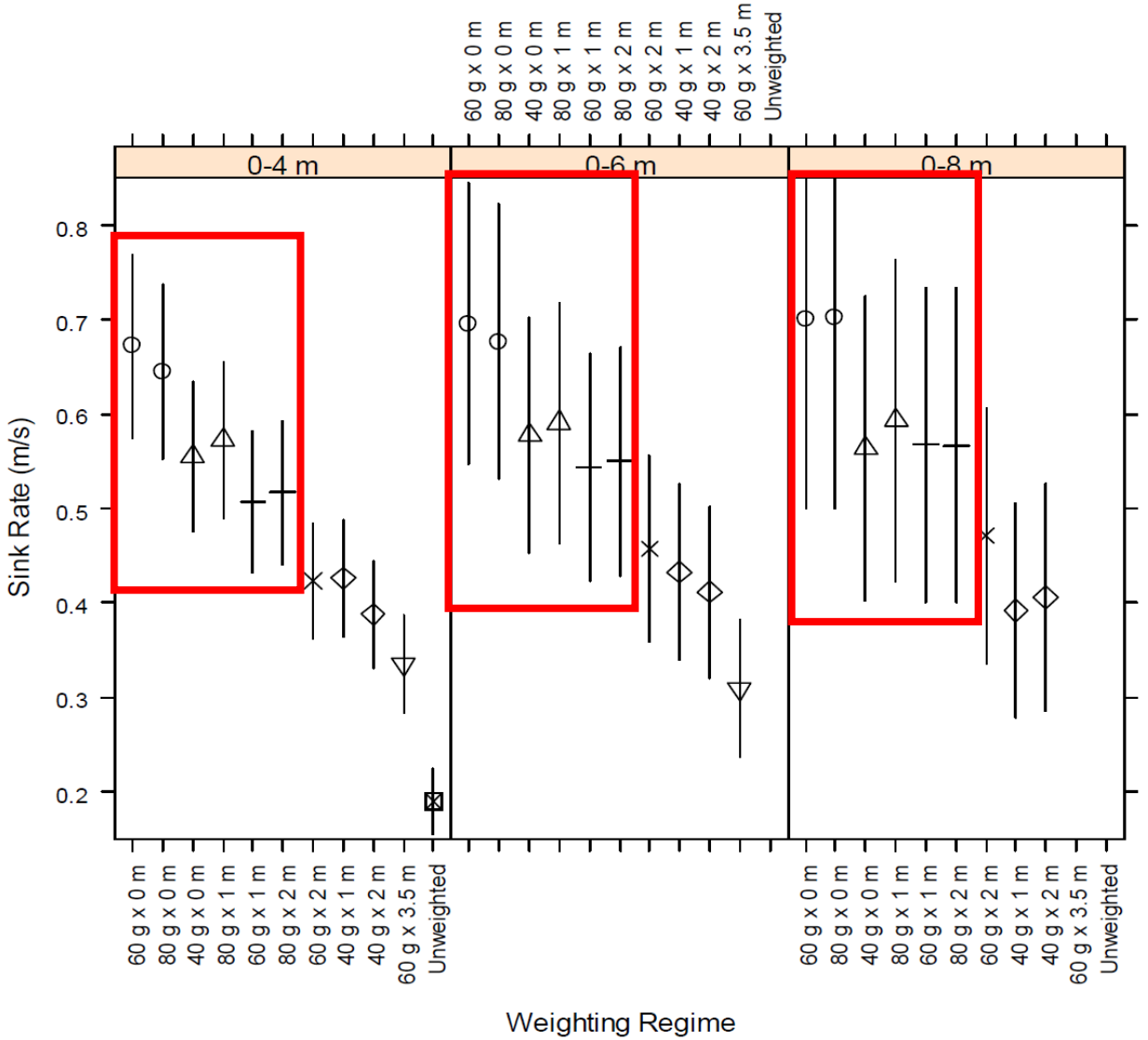


Barrington et al (2016) Figure 2. Mean depth-time profiles for 11 line weighting regimes using at-sea Trials on FV Samurai during November 2013. The “tuning fork” at bottom of graph shows approximate 95 per cent confidence limits for any pair of differences between means (see Robertson et al., 2010b). If the difference between mean sink profiles in a pair exceeds the width of the tuning fork for a given time point, then the difference can be considered statistically significant at the 95 per cent confidence level. Shaded area corresponds to the range of data used in the Canonical Variates Analysis. The depth-time profiles without the tuning fork correspond to Figure 1 of SBWG6 Doc 13.

Branch line weighting

Effectiveness:

- The analysis confirmed physical observations that line weighting, and the distance of the added weight from the baited hook, affect the sink rate and sink profile.
- The following line weighting regimes achieved an average sink rate equal to or above 0.5 m/s:
  - 40 g or greater attached at the hook; or
  - 60 g or greater attached within 1 m of the hook; or
  - 80 g or greater attached within 2 m of the hook.



Barrington et al (2016) Figure 5. Line weighting regime mean sink rates over the depth range from zero to target depths of 4, 6, and 8 m showing single SE bars and common symbols representing the categorisation of weighting regimes using mean Canonical Variate 1 scores and their 95 per cent confidence bounds (see Figure 3) (i.e. common symbols represent the same category). Mean sink rates are based on mean depth-time profile (see Figure 2). Missing means for the slowest sinking regimes are missing if, on average, the target depth was not reached.

Branch line weighting

Effectiveness:

- Experimental evidence from various studies summarized in SC-19-EB-IP-15 support the findings from Barrington et al (2016):

Control	Treatment 1	Treatment 2	Location	Metric	Effect per 1,000 hooks			Source
					Control	Treatment 1	Treatment 2	
60 g weighted swivel 3.5 m from the hook	60 g luminous sliding weight 3.5 m from the hook	60 g luminous sliding weight 1.0 m from the hook	Brazil	C	0.85	0.33 (u)	0.11 (u)	Santos et al. 2016
60-75 g weighted swivel 5.5 m from the hook	60-75 g weighted swivel 2 m from the hook		Brazil	Attacks/ min	0.72	0.18		Gianuca et al. 2011
75 g weighted swivel 4.5 m from the hook	65 g Safe Lead 1 m from the hook		Uruguay	A C	215 3.3	88 (u) 1.9 (u)		Jiménez et al. 2013
75 g weighted swivel 4.5 m from the hook	65 g luminous sliding weight 1 m from the hook		Uruguay	A C	120 6.4	47 (u) 3.7* (u)		Jiménez et al. 2019a

Branch line weighting

Effect on fish catch:

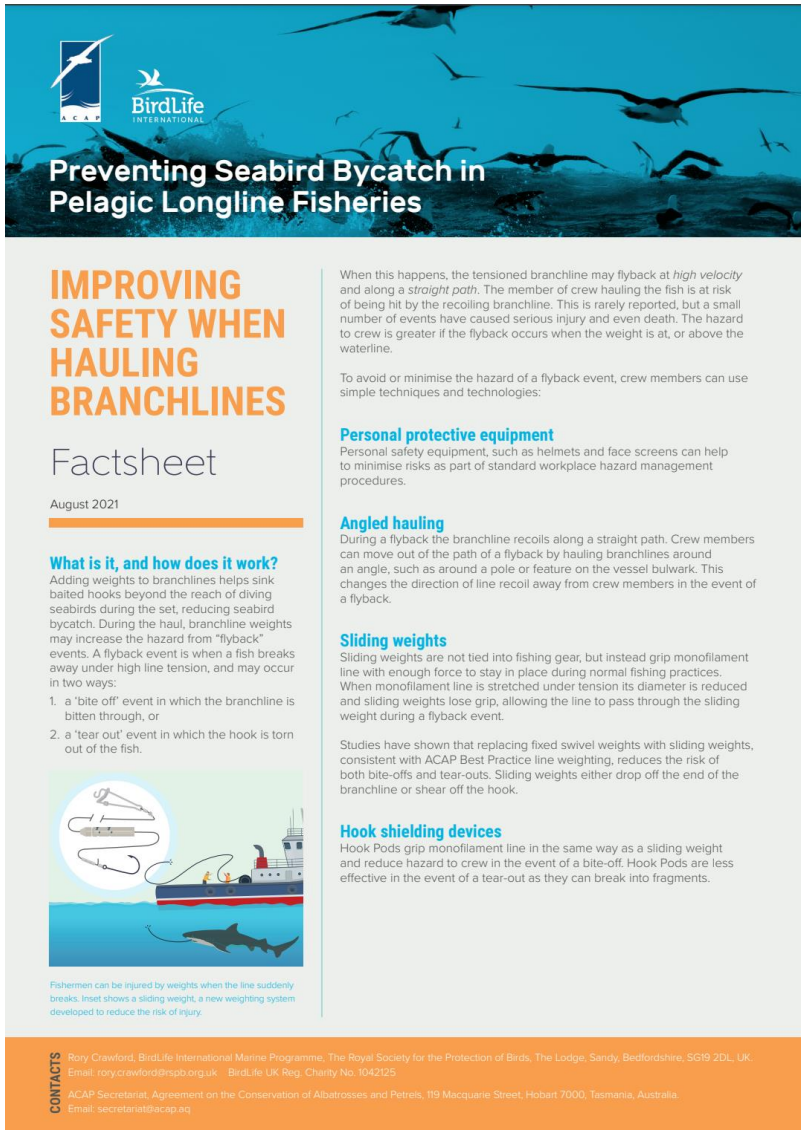
- SC-19-EB-IP-15 summaries extensive literature. No effects or small and variable effects were found.

Effect on fish catch rates	Control	Treatment(s)	Species/groups	Effect size	Location	Source
No effect	'Normal' branchlines+	40 g luminous sliding lead	Tuna, swordfish (G)		New Zealand	Pierre et al. 2015
	60 g sliding Safe Lead 3.5 m from the hook	120 g sliding Safe Lead 2 m from the hook	Yellowfin (SS) Other tuna, swordfish, sharks, common dolphinfish (G)		Australia	Robertson et al. 2012, 2013
	60 g sliding Safe Lead 3.5 m from the hook	40 g luminous sliding weight 0.5 m from the hook	Yellowfin (SS) Bigeye (SS) Swordfish, common dolphinfish, sharks (G)		Australia	Robertson et al. 2012, 2013
	Unweighted	Double-weighted branchlines, weight unspecified	Bigeye (SS) Albacore (SS) Swordfish (SS)		Western and Central North Pacific	Ochi et al. 2013
	60 g weighted swivel 3.5 m from the hook	60 g luminous sliding weight 1.0 or 3.5 m from the hook	Tuna (G) Sharks (G) Billfish (G) Other fish (G)		Brazil	Santos et al. 2016
	60-75 g weighted swivel 5.5 m from the hook	60-75 g weighted swivel 2 m from the hook	Tuna (G) Sharks, swordfish (G)		Brazil	Gianuca et al. 2013
	75 g weighted swivel 4.5 m from the hook	60 g Safe Lead or 65 g luminous sliding weight 1 m from the hook	Albacore (SS) Yellowfin (SS) Swordfish (SS) Blue shark (SS)		Uruguay	Jiménez et al. 2019a
Increase	60-75 g weighted swivel 5.5 m from the hook	60-75 g weighted swivel 2 m from the hook	Yellowfin tuna (SS)	+18%	Brazil	Gianuca et al. 2013
Decrease	Unweighted	Double-weighted branchlines, weight unspecified	Blue shark (SS)	-16%	Western and Central North Pacific	Ochi et al. 2013
	'Normal' branchlines+	40 g luminous sliding leads	Sharks (mostly blue shark) (G)	-19%	New Zealand	Pierre et al. 2015

Branch line weighting

Practical considerations:

- Crew safety must be considered as part of the use of branchline weighting in pelagic longline fisheries.
- Vessel safety plans and crew training should set out how to implement line-weighting safely.
- Sliding weights help to reduce the hazard posed by flyback events, compared with fixed weighted swivels
- Advice is available (e.g. ACAP 2021)



BirdLife INTERNATIONAL

Preventing Seabird Bycatch in Pelagic Longline Fisheries

IMPROVING SAFETY WHEN HAULING BRANCHLINES

Factsheet

August 2021

What is it, and how does it work?

Adding weights to branchlines helps sink baited hooks beyond the reach of diving seabirds during the set, reducing seabird bycatch. During the haul, branchline weights may increase the hazard from "flyback" events. A flyback event is when a fish breaks away under high line tension, and may occur in two ways:

1. a 'bite off' event in which the branchline is bitten through, or
2. a 'tear out' event in which the hook is torn out of the fish.

Fishermen can be injured by weights when the line suddenly breaks. Inset shows a sliding weight, a new weighting system developed to reduce the risk of injury.

When this happens, the tensioned branchline may flyback at *high velocity* and along a *straight path*. The member of crew hauling the fish is at risk of being hit by the recoiling branchline. This is rarely reported, but a small number of events have caused serious injury and even death. The hazard to crew is greater if the flyback occurs when the weight is at, or above the waterline.

To avoid or minimise the hazard of a flyback event, crew members can use simple techniques and technologies:

Personal protective equipment

Personal safety equipment, such as helmets and face screens can help to minimise risks as part of standard workplace hazard management procedures.

Angled hauling

During a flyback the branchline recoils along a straight path. Crew members can move out of the path of a flyback by hauling branchlines around an angle, such as around a pole or feature on the vessel bulwark. This changes the direction of line recoil away from crew members in the event of a flyback.

Sliding weights

Sliding weights are not tied into fishing gear, but instead grip monofilament line with enough force to stay in place during normal fishing practices. When monofilament line is stretched under tension its diameter is reduced and sliding weights lose grip, allowing the line to pass through the sliding weight during a flyback event.

Studies have shown that replacing fixed swivel weights with sliding weights, consistent with ACAP Best Practice line weighting, reduces the risk of both bite-offs and tear-outs. Sliding weights either drop off the end of the branchline or shear off the hook.

Hook shielding devices

Hook Pods grip monofilament line in the same way as a sliding weight and reduce hazard to crew in the event of a bite-off. Hook Pods are less effective in the event of a tear-out as they can break into fragments.

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ACAP Secretariat, Agreement on the Conservation of Albatrosses and Petrels, 119 Macquarie Street, Hobart 7000, Tasmania, Australia.
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Branch line weighting

CMM line weighting specification comparison to ACAP advice:

CMM	ACAP
a) one weight greater than or equal to 40g within 50cm of the hook; or b) greater than or equal to a total of 45 g attached to within 1 m of the hook; or c) greater than or equal to a total of 60 g attached to within 3.5 m of the hook; or d) greater than or equal to a total of 98 g weight attached to within 4 m of the hook.	a) one weight greater than or equal to 40g within 50cm of the hook; or b) greater than or equal to a total of 60 g attached to within 1 m of the hook; or c) greater than or equal to a total of 80 g attached to within 2 m of the hook

Is there any scientific evidence that branch line weights at >2m from the hook are sufficiently effective to include as options?

References

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