Agreement on the Conservation of Albatrosses and Petrels

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Report of the Workshop to Review Seabird Bycatch Mitigation Measures for Hawaii's Pelagic Longline Fisheries

Gilman, E., Ishizaki, A., Eds.

SUMMARY

The Western Pacific Regional Fishery Management Council convened a *Workshop to Review Seabird Bycatch Mitigation Measures for Hawaii's Pelagic Longline Fisheries* in September 2018. The executive summary of the workshop report, identification of new Fact Sheets on seabird bycatch mitigation methods for use during setting and hauling by pelagic longline vessels, and information on an expert survey on the relative promise of alternative bycatch mitigation methods, including gear technology methods, temporal and spatial management of effort including dynamic spatial management, output controls of individual transferable and fleetwide quotas, and offsets, assessed against a suite of criteria on efficacy, cross-taxa conflicts, practicality, crew safety, economic viability and ability to facilitate compliance monitoring, are included in this Information. The full report is available at: https://tinyurl.com/seabird-bycatch-Hawaii.

Workshop participants reviewed and discussed causes of increasing seabird catch rates and levels in the Hawaii pelagic longline fisheries. Participants evaluated the relative promise of a comprehensive suite of alternative seabird bycatch mitigation methods for use in Hawaii's longline fisheries. Participants reviewed alternative seabird bycatch mitigation measures and assessed them against a broad suite of criteria. The participants discussed potential combinations of measures and associated research needs to inform options for modifying seabird bycatch mitigation requirements.

1. EXECUTIVE SUMMARY OF WORKSHOP REPORT

The Western Pacific Regional Fishery Management Council, at its 173rd Meeting, directed Council staff to convene a workshop to review seabird mitigation requirements and the best scientific information available for Hawaii's pelagic longline fisheries, considering operational aspects of the fisheries, seasonal and spatial distributions of seabird interactions, alternative bycatch mitigation measures and findings from cost-benefit analyses. To implement the Council's directions, a *Workshop to Review Seabird Bycatch Mitigation Measures for Hawaii's Pelagic Longline Fisheries* was convened at the Council office on September 18-19, 2018.

Workshop participants reviewed and discussed causes of increasing seabird catch rates and levels in the Hawaii pelagic longline fisheries. Catch levels of the black-footed albatross (*Phoebastria nigripes*) have been steadily increasing in the Hawaii deep-set longline fishery over the past decade, with a large spike in recent years. This significant increase was caused by a combination of increasing temporal trends in annual effort and in black-footed albatross catch rates over the time period. The rise in catch rates may have been due to variability in the temporal and spatial distribution of fishing effort, a unique captain effect (i.e., seabird catch rates are significantly explained by which person is the captain), an increase in the number of albatrosses attending Hawaii longline vessels, and a shift in the relative use of seabird bycatch mitigation methods. Notably, there was increased use of blue-dyed fish bait and decreased use of the more effective side setting. While the black-footed albatross population size has not changed significantly in the last decade, their distribution and attendance at longline vessels changed in response to inter-annual (El Niño – Southern Oscillation) and decadal (Pacific Decadal Oscillation) climate variability in the north Pacific Ocean.

Participants evaluated the relative promise of a comprehensive suite of alternative seabird bycatch mitigation methods for use in Hawaii's longline fisheries. These included methods currently prescribed in the Hawaii longline seabird regulations, seabird measures adopted by Pacific tuna regional fisheries management organizations (Inter-American Tropical Tuna Commission, Western and Central Pacific Fisheries Commission) and methods identified as best practice by the Agreement for the Conservation of Albatrosses and Petrels. Participants reviewed 35 seabird bycatch mitigation measures and assessed them against criteria on efficacy, cross-taxa conflicts, practicality, economic viability, safety, durability and ability to facilitate compliance monitoring (Table 1). While seabird bycatch mitigation methods are presented individually in Table 1, participants recognized that combinations of methods are prescribed, in Hawaii and elsewhere, to obtain desired reductions in seabird bycatch rates.

Table 1. Participants' rankings of the promise of seabird bycatch mitigation methods for potential use in the Hawaii deep- and shallow-set longline fisheries when assessed for efficacy, cross-taxa conflicts, practicality, economic viability, safety, durability and compliance monitoring.

Ranking	Bycatch Mitigation Method
High	Bird curtain
	Branchline weighting
	Captain and crew training
	Side setting
	Tori (streamer) line
	Towed buoy
Medium	Night setting
	Offal management (strategic offal discards and offal retention)
Low	Artificial bait
	Automatic branchline coiler
	Bait caster
	Bait type
	Banned use of live bait
	Blue-dyed bait
	Compensatory mitigation
	Fish bait hooked in head or tail
	Fish bait with punctured swim bladders
	Fish and vegetable oil slick
	Fleet communication
	Fully-thawed bait
	Hookpod
	Hook size and shape
	Individual transferable vessel-based quotas on bird catch levels or rates
	Lasers
	Mainline line shooter
	Sliding weights
	Smart tuna hook
	Temporal and spatial management of fishing effort
	Underwater setting chute
	Underwater bait setting capsule
	Water cannon

Most measures ranked as high and medium priority are included in current seabird regulations for Hawaii's longline fisheries. Participants discussed how the seabird bycatch mitigation methods included in the current regulations have been found to significantly reduce seabird catch risk through at-sea research and, more importantly, through analyses of observer program data, where the latter documents efficacy in practice. Participants discussed how minor modifications could make the Hawaii seabird regulations simpler, more flexible and thus more practical, and could augment their efficacy. Participants identified tori (streamer) lines, which are not part of the Hawaii seabird regulations, as having high potential for use in Hawaii's deep-set longline fishery as they are likely to be highly effective and potentially more practical to use than existing regulatory options. Tori lines, which were tested in Hawaii's fisheries in 1999 prior to the adoption of seabird regulations, were not considered practical at that time due to gear entanglement problems. Subsequently, through trials and broad industry use of tori lines in other longline fisheries, researchers have identified tori line designs and materials that reduced the incidence of entanglement with gear and improved durability. Participants agreed that tori line trials in Hawaii and development of minimum standards would now be useful.

Participants categorized 23 measures as being of relatively low priority (Table 1) due to issues with one or more of the criteria used to assess their promise. Some methods were deemed to not effectively reduce seabird catch risk (bait species, hook size and shape, water cannon during setting, line shooter, puncturing swim bladders of fish bait). Others raised concerns over possible deleterious effects on seabirds (lasers, slicks of fish or vegetable oil). Participants considered several methods to not be economically viable and/or practical (underwater setting devices, hook shielding devices, night setting to target bigeye tuna, artificial bait, automatic bait caster, management of the temporal and spatial distribution of effort). For example, while participants recognized that a hook shielding device called the Hookpod has very high promise for substantially reducing seabird catch risk during setting, they expressed concern over the high cost for the initial outlay and for replacing damaged and lost devices, as well as concerns over low compliance with use of the device when setting is not observed.

Participants viewed additional methods as being impractical (automatic branchline coiler, fully thawed bait, sliding weights in deep-set gear with wire leaders) or not being applicable to Hawaii's fisheries (banned use of live bait, anatomical location of hooking fish bait, blue-dyed squid bait). Participants identified several concerns over compensatory mitigation and vessel-based individual transferable quotas on seabird catch levels or rates, including that they would create a safety risk for at-sea observers, and would not be perceived by the public as being a sufficiently robust approach to managing seabird bycatch. Participants felt that a fleet communication program where the government provides captains with information on areas with high abundance of albatrosses holds promise but should be voluntary. Participants viewed communication between vessels to share information real-time on the location of areas with high seabird interactions to not be feasible, as they expected that fishers would refrain from sharing commercially sensitive information on the location of their fishing grounds. Participants identified blue-dyed bait as a candidate for removal from Hawaii's seabird regulations because of concerns with efficacy and practicality. The requirement for using blue-dyed bait was intended to be used for squid bait, but currently only fish are used for bait in both Hawaii longline fisheries. Blue-dyed fish bait may be less effective at mitigating seabird catch risk than blue-dyed squid bait, and participants considered blue-dyed bait to be impractical. Additionally, participants noted that mainline line shooters, which are currently included in Hawaii's seabird regulations and are conventionally used by deep-set vessels to set the mainline slack in order to achieve the target gear soak depth, are not likely to affect seabird catch rates in the Hawaii

longline deep-set fishery because the sink rate of the mainline is unlikely to affect the sink rate of baited hooks until the hooks are below ca. 10 m depth, which is substantially deeper than black-footed and Laysan albatrosses can access.

Workshop participants also discussed and identified potential combinations of measures and associated research needs to inform options for modifying seabird bycatch mitigation requirements. Participants emphasized the importance of providing flexibility to fishers to use mitigation methods that are effective, safe and practical for individual vessels, while having tools in place to ensure that mitigation measures are implemented as intended when observers are not present. Some participants suggested that known sources contributing to relatively high seabird catch rates, such as a unique captain effect, should be addressed before considering requiring more stringent seabird bycatch management measures. Participants suggested that consequences for individual vessel owners from their seabird catch rates and levels, such as notifying vessels when they have relatively high seabird catch rates, might improve compliance with prescribed methods for using mitigation measures and might reduce seabird captures by vessels with relatively high interaction rates.

Participants discussed the following potential modifications to seabird regulations for the Hawaii deep-set longline fishery:

- Adding tori lines, either by adding tori lines as an additional option, replacing blue-dyed bait with tori lines, or replacing blue-dyed bait if and when tori lines are documented in a comparative experiment to be an effective alternative;
- Adopting a “menu” approach as used by tuna regional fisheries management organizations, where vessels can select a combination of a specified number of measures from each of two lists, in place of the current approach in the Hawaii regulations where vessels select between two suites of measures; and
- Moving the 23°N southern boundary for required use of seabird bycatch mitigation methods further south, or requiring the use of measures in all areas.

Participants identified research needs to inform the identification of options to modify seabird requirements for the deep-set fishery, including developing minimum standards for tori lines (e.g., to ensure that the areal extent effectively protects areas where baited hooks are available to Laysan and black-footed albatrosses during setting, and to prescribe minimum requirements for the design and materials of each component). Participants also prioritized trialing branchline weighting designs that reduce the leader length and/or increase the weight amount, and conducting comparative studies of seabird bycatch rates of single and paired tori lines, side setting and blue-dyed fish bait. Participants also brainstormed new methods and approaches to identify new concepts for seabird bycatch mitigation methods.

Discussion on potential modifications to the seabird regulations for the Hawaii shallow-set longline fishery centered on options for further reducing seabird catch rates during the haul. Participants discussed several methods to mitigate seabird bycatch during gear haulback, including using strategic offal discards only during the haul, discharging offal in batches instead of continuously, using a bird curtain, and using branchline weighting designs that increase baited hook sink rates, such as sliding weights above light sticks. Participants felt that required night setting should be maintained for the shallow-set fishery, while side-setting could be removed as an option given that almost no shallow-set vessels now opt to use the regulatory defined suite of measures that includes side setting. Participants identified analyses of observer data to assess seabird interaction rates between side-set and stern-set regulatory options, research to determine the effect of blue-dyed bait in combination with night setting on

seabird catch rates, and the use of alternative branchline weighting designs as research needed to inform potential modifications to seabird bycatch mitigation requirements.

Participants identified additional research needs of relevance to both the deep- and shallow-set fisheries that would inform options to modify prescribed seabird mitigation measures. This included research to identify the effects on baited hook sink rates and seabird interaction rates from minor modifications to branchline weighting designs of locating weights at the hook in the deep-set fishery and using sliding weights above light sticks in the shallow-set fishery. Participants identified a need for research on effects on seabird density around vessels and interaction rates from replacing 'strategic' offal discards with retention of offal and bait during setting and hauling, or discharging offal in batches. Participants prioritized research that would enable vessels to use more effective combinations of seabird bycatch mitigation methods when fishing at hotspots of high densities of Laysan and black-footed albatrosses and during seasons and at areas when and where more biologically important mature age classes overlap with vessels. Use of more effective combinations of methods could be implemented through dynamic spatial bycatch management and/or by identifying temporally and spatially predictable, fixed, bycatch hotspots. Participants prioritized research to determine the ability of electronic monitoring systems to monitor the employment of seabird bycatch mitigation methods and identify seabird capture events. Assessments of the effects of outreach and training activities on fisher behavior, including compliance with prescribed seabird bycatch mitigation methods, handling and release methods, and seabird bycatch rates, were also prioritized. Participants also identified research priorities to improve understanding of factors influencing captain and crew behavior related to their use of seabird bycatch mitigation methods. Participants also discussed research to improve the understanding of seabird interaction patterns and trends, and other research priorities.

Workshop participants also discussed and identified several non-regulatory approaches to mitigate seabird interactions in the Hawaii longline fisheries. This included expanding training and outreach on seabird bycatch mitigation to crew, conducting strategic outreach targeting vessels and captains with relatively high interactions, producing a seabird interaction "report card" to inform vessels/captains of how their seabird catch rate and level compares to other vessels in the fleet, and establishing liaison officers to work with individual vessels/captain to generate individualized plans for seabird bycatch mitigation.

2. FACT SHEETS ON SEABIRD BYCATCH MITIGATION METHODS FOR PELAGIC LONGLINE FISHERIES

The Western Pacific Regional Fishery Management Council commissioned Eric Gilman to develop fact sheets on methods to mitigate seabird bycatch for use during setting and hauling by pelagic longline vessels that involve changes in fishing methods and gear to fill a gap in availability of synthesized information on these methods. Gilman prepared Fact Sheets on the following bycatch mitigation methods, available in Appendix 5 of the workshop report :

- Bait species
- Thawed vs. frozen bait
- Live vs. dead bait
- Hook threading

- Baits with swim bladders
- Bird curtain
- Branchline coiler
- Fish and vegetable oil
- Lasers
- Artificial bait
- Hook shape (circle vs. J-shaped)
- Hook minimum width
- Hook shielding devices
- Sliding branchline weights
- Towed buoy
- Underwater setting devices
- Water cannon

BirdLife International and ACAP have prepared Fact Sheets on several additional mitigation methods for pelagic longline fisheries (streamer lines, branchline weighting, side setting, blue-dyed bait, bait caster, mainline line shooter, night setting, haul mitigation methods) – available online at https://www.acap.aq/en/bycatch-mitigation/bycatch-mitigation-fact-sheets and https://www.birdlife.org/bycatch.

The scope of the fact sheets excludes mitigation approaches other than those that employ fisheries technology changes in gear and changes in fishing methods – such as input and output controls (i.e., restrictions on catch and effort), offsets (compensatory mitigation), fleet communication, mitigating ghost fishing efficiency, handling and release practices and other methods, some of which are described and discussed in the workshop report .

While the Fact Sheets review bycatch mitigation methods individually, it is important to clarify that combinations of methods are prescribed, in Hawaii and elsewhere, to obtain desired bycatch rate reductions.

3. SURVEY FORM TO RANK BYCATCH MITIGATION METHODS

Gilman and Ishizaki developed a survey form to enable workshop participants to rank alternative individual seabird bycatch mitigation methods according to their relative promise for use in Hawaii's pelagic longline fisheries during setting and gear haulback. The survey form used in the workshop is available in Appendix 6 of the workshop report.

A comprehensive list of bycatch mitigation methods was included in the survey form, including gear technology (e.g., bait type and treatment, branchline weighting design, hook shape, hook shielding devices, lasers, sliding weights, streamer line, underwater setting devices), fishing methods (e.g., ban the use of live bait, time-of-day of setting and hauling, management of offal and spent bait), temporal and spatial management of effort (e.g., reduce fishing effort during seasons and in areas with highest seabird catch rates), dynamic spatial management (e.g., voluntary industry fleet communication and government restrictions on the location of effort based on near real-time identification of bycatch hotspots), output controls (e.g., individual

transferable quotas, fleetwide quota), compensatory mitigation (offsets), methods for handling and release to increase the probability of post-release survival, and fisher training.

As with the Fact Sheets, the survey form is designed for experts to rank individual methods, and discussion of results addressed how combinations of methods may be necessary to achieve management objectives.

Adapted from the workshop survey form, individual and combinations of bycatch mitigation methods could be assessed against the following suite of criteria:

- **Efficacy**: Has the method been demonstrated to reduce seabird bycatch rates [e.g., relative to fishing without any seabird bycatch methods, or to close to 0, or below a threshold bycatch rate], under various conditions, demonstrated through an adequate number of studies with adequate sample sizes, with robust study designs, including control or explicitly account for potentially confounding factors.
- **Cross-taxa conflicts**: Does use of the method risk increasing catch rates or injury of other endangered, threatened or protected species?
- **Practicality**: How does use of the bycatch mitigation method affect fishing operations, e.g., effect on the hook setting rate, time to retrieve gear, tangles in the gear, time required to maintain bycatch mitigation equipment, space on the vessel to make room for the mitigation method equipment?
- **Crew safety**: Does use of the method create a safety risk the crew?
- **Economic viability**: How does the method affect the catch rates and economic value (e.g., at-vessel condition and quality, size) of market species? What is the cost for the initial outlay and ongoing costs to maintain or replace equipment required for the method, including considerations of how durable the method is over long-term use?
- **Compliance monitoring**: Can fisher compliance with prescribed procedures to employ the method be determined, such as through dockside inspection, human at-sea observers, electronic monitoring, satellite-based vessel monitoring systems, or other methods?