Agreement on the Conservation of Albatrosses and Petrels

Tenth Meeting of the Seabird Bycatch Working Group

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Toolbox for seabird bycatch mitigation advice in purse seine fisheries

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SUMMARY

It was agreed at SBWG9 to update a stand-alone toolbox to communicate the feasibility of mitigation measures to reduce seabird bycatch in purse seine fisheries. The present document presents a general context of purse seine fisheries, which has been under consideration since 2016 (SBWG7). A synthesis of the family of mitigation measures that have different alternatives for purse seine fisheries is presented, including: i) sensory, ii) physical barriers, and iii) structural modifications of the purse seine gear. In the last, *ad hoc* infographics are presented to communicate the sources of seabird bycatch by entangled and trapped individuals in purse seine gear, as well as audiovisual material that includes structural modifications as alternative for mitigation. Finally, the toolbox with alternative mitigation measures for purse seine fisheries is presented incorporating effectiveness to reduce seabird bycatch in general, as well as measures previously subjected to assessment for best practice criteria adopted by ACAP (*e.g.* SBWG8 Doc 21).

RECOMMENDATIONS

1. The Working Group endorse the format and contents of the toolbox for bycatch mitigation in purse seine fisheries.
2. The Working Group endorse the format and message of infographics and audiovisual material as supplementary material for effective mitigation measures.
3. The Working Group review and update the purse seine toolbox, as well as invite other fisheries to adopt the toolbox as a user-friendly and informative access instrument for users and decision-makers.

Herramientas de asesoramiento para la mitigación de la captura secundaria de aves marinas en pesquerías con red de cerco

RESUMEN

En la Reunión GdTCS9, se acordó actualizar un conjunto de herramientas independientes para comunicar la viabilidad de medidas de mitigación para reducir la captura secundaria de aves marinas en las pesquerías con red de cerco. Este documento presenta un contexto general de la pesca con red de cerco, incluida en la agenda del ACAP desde 2016 (GdTCS7). Se presenta una síntesis del conjunto de medidas de mitigación que ofrecen diferentes alternativas para la pesca de cerco, entre otras: i) recursos sensoriales, ii) barreras físicas y iii) modificaciones estructurales del arte de red de cerco. En este último caso, se presentan infografías especiales para comunicar las fuentes de captura secundaria de aves marinas debido a ejemplares enredados y atrapados en artes de pesca con red de cerco, así como material audiovisual que incluye modificaciones estructurales como alternativa para la mitigación. Por último, se presentan las herramientas con medidas alternativas de mitigación para pesquerías con red de cerco que suman eficacia para reducir la captura secundaria de aves marinas en general, así como medidas previamente sujetas a evaluación para los criterios de mejores prácticas aprobados por el ACAP (*por ejemplo*, SBWG8 Doc 21).

RECOMENDACIONES

1. Que el Grupo de Trabajo apruebe el formato y el contenido de las herramientas para la mitigación de la captura secundaria en pesquerías con red de cerco.
2. Que el Grupo de Trabajo apoye el formato y el mensaje de las infografías y el material audiovisual como material complementario para la adopción de medidas eficaces de mitigación.
3. Que el Grupo de Trabajo examine y actualice las herramientas para pesquerías con red de cerco y que invite a otras pesquerías a adoptar dichas herramientas como instrumento accesible, fácil de usar e informativo para los usuarios y las instancias decisoras.

Boîte à outils de conseils pour l'atténuation de la capture accessoire des oiseaux marins dans la pêche à la senne

RÉSUMÉ

La Neuvième réunion du GTCA était convenue de mettre à jour une boîte à outils spéciale afin d'informer sur la faisabilité de mesures d'atténuation visant à réduire les captures accessoires des oiseaux marins dans la pêche à la senne. Le présent document présente le contexte général de la pêche à la senne mis en place depuis 2016 (Septième réunion du GTCA). Une synthèse de la famille de mesures d'atténuation proposant des solutions alternatives pour la pêche à la senne est présentée, à savoir i) des dispositifs sensoriels, ii) des obstacles physiques et iii) des modifications de la structure des engins de pêche à la senne. Pour cette dernière, des infographies spéciales sont présentées afin d'informer sur l'origine des captures accessoires des oiseaux marins, enchevêtrés ou piégés dans les engins de pêche à la senne, et du matériel audiovisuel présente les modifications sur les structures permettant d'atténuer la capture accessoire. Enfin, la boîte à outils de mesures d'atténuation alternatives pour la pêche à la senne est présentée. Elle contient des mesures efficaces pour réduire la capture accessoire des oiseaux marins en général, ainsi que des mesures préalablement soumises à une évaluation fondée sur les critères des bonnes pratiques adoptés par l'ACAP (SBWG8 Doc 21).

RECOMMANDATIONS

1. Le groupe de travail approuve le format et le contenu de la boîte à outils pour l'atténuation de la capture accessoire des oiseaux marins dans la pêche à la senne.
2. Le groupe de travail approuve le format et le message des infographies et du matériel audiovisuel proposés comme ressource complémentaire des mesures d'atténuation efficaces.
3. Le groupe de travail examine et mette à jour la boîte à outils pour la pêche à la senne et invite les pêcheries et les décideurs à utiliser cet instrument pratique et informatif.

1. BACKGROUND

Five years ago, purse seine fisheries started to be part of the ACAP agenda (SBWG7, Debski *et al.*, 2016). These contents started to be discussed from understanding the fishing method, as well as identifying seabird bycatch in industrial and small-scale purse seine fleets. This, also included ACAP-listed species like the pink-footed shearwater *Ardenna creatopus* and the Balearic shearwater *Puffinus mauretanicus* (Baker & Hamilton 2016; Suazo *et al.*, 2017a; Fig. 1).

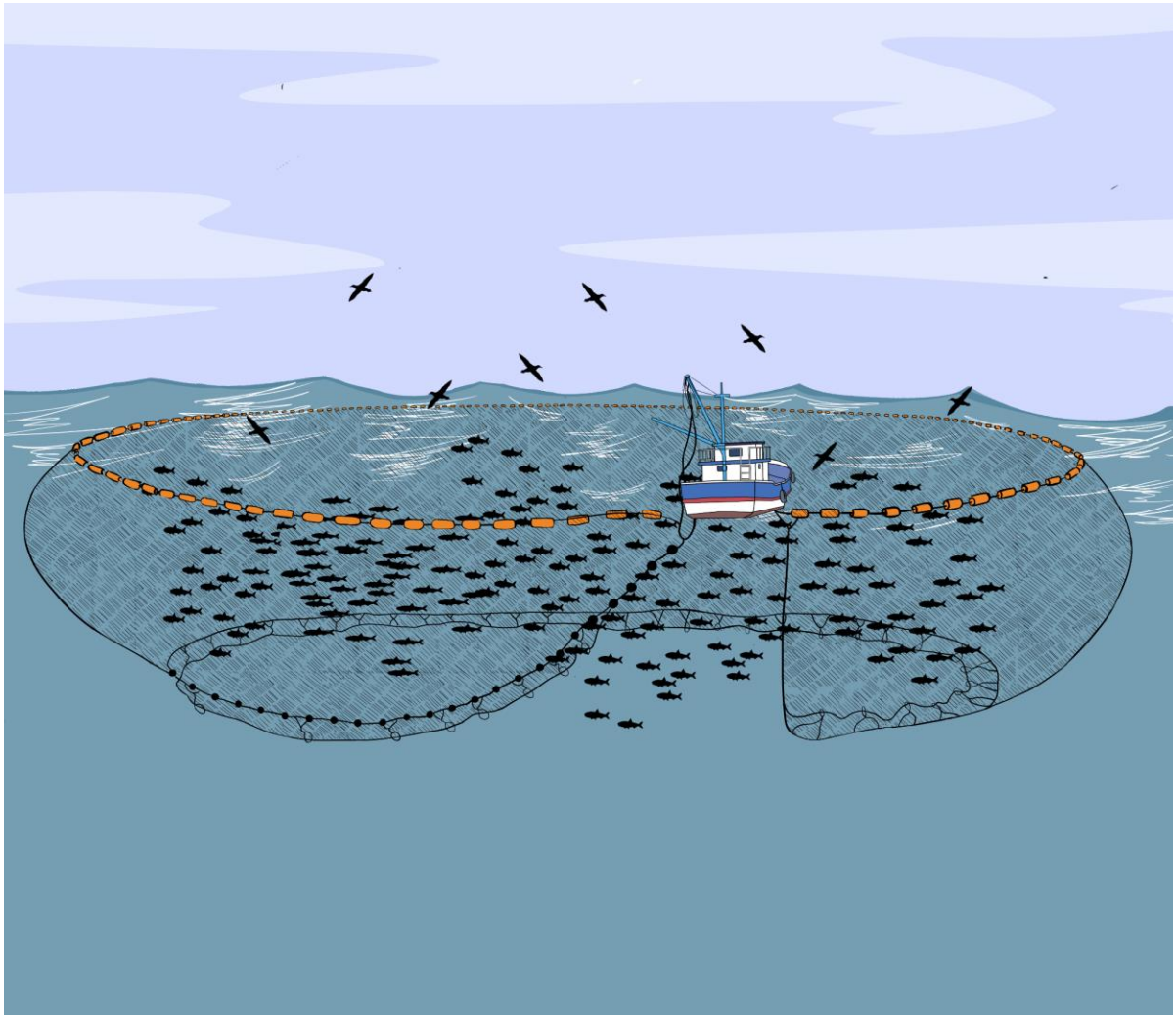

Figure 1. General scheme of purse seine fishing (*e.g.* net setting in small-scale fisheries). The rectangular-shaped net is deployed on the sea surface to enclose the school of fish in a circle while its upper part is kept afloat by a line of floats. The rest of the net is lowered to the depth supported by a system of weights that runs along the bottom of the net. Finally, steel wires running along the entire lower part are gathered with a winch to close the lower part of the net, resulting in a bowl-shape structure.

The distribution of purse seine fishing is global, involving - in addition to the two ACAP species mentioned above - other 31 seabird seabirds and two waterbird species as bycatch with an emphasis in purse seines targeting on small pelagic fish (Suazo *et al.*, 2017a). However, the

recent identification of shearwaters and albatrosses directly as bycatch or beached seabirds still emerges as a challenge to understand key periods and areas for the overlap of fleets and feeding sites in the breeding and migratory distribution of different seabird species (Carle *et al.*, 2019; Norriss *et al.*, 2020; Simeone *et al.*, 2021). Therefore, the identification of mitigation alternatives and best practices for purse seine fisheries is still a field in early development.

2. SEABIRD BYCATCH MITIGATION IN PURSE SEINE FISHERIES AND ITS COMMUNICATION THROUGH THE TOOLBOX APPROACH

2.1. Seabird bycatch mitigation for purse seine fisheries

Purse seine fisheries for tuna have been recognized as non-problematic for seabirds, including mitigation as change in fishing practice (*e.g.* avoiding sets with non-target species) and entanglement prevention applied to cetaceans, sharks, and sea turtles (Swimmer *et al.*, 2020). On the contrary, in vessels for forage fish the seabird bycatch have been identified by the entanglement of seabirds in different parts (hotspots) of the purse seine gear (Suazo *et al.*, 2016, Fig. 2).

Figure 2. Infographic with sources of seabird bycatch identified for small-scale purse seine fisheries (sardine, anchovy, and jack mackerel in Chile).

Mitigation measures to reduce seabird bycatch in purse seine fisheries have included proposals ranging from sensory and physical barriers to modifications of purse seine gear. Among these, there are cases of sound and laser as deterrents, where coastal seabird species like gulls have presented a reduction in numbers in response to noise in northern Chile (Diez 2017). In the case of lasers, its effectiveness has not been efficient in purse seine fishing in

the same area. Actually, in controlled trials for trawl fisheries its effectiveness has been detected in specific operating conditions, such as amount of food (offal, discards), light conditions and even the speed of the vessel (Melvin *et al.*, 2016).

Other measures evaluated for purse seine fisheries correspond to structural modifications of the purse seine gear (*e.g.* The Modified Purse Seine, MPS). This is a package of adjustments that include buoy mounting, mesh size, among other modifications. These have shown the reduction of entangled and trapped birds belonging to the ACAP-listed species such as the pink-footed shearwater and the black-browed albatross *Thalassarche melanophrys* in Chile (Suazo *et al.*, 2017b, 2019). These structural modification measures have been evaluated against the best practice criteria adopted by ACAP, with its discussion compiled in Suazo *et al.*, (2017b). Animated infographic for the MPS is available in the following link: The Modified Purse Seine, MPS (Spanish).

Other recent mitigation measures include the use of a bird-scaring device (scaring kite) in purse seine fisheries in Portugal (Oliveira *et al.*, 2020). This device proved to be effective in reducing the number and activity of some seabird species like gulls but its effect on other seabird species such as shearwaters, requires further research. If these measures are effective, they might contribute to the reduction of bycatch in ACAP-listed species (Balearic shearwater) previously reported for purse seine vessels in these waters (Oliveira *et al.*, 2015).

2.2. The communication of mitigation effectiveness through the toolbox approach

The diversity of mitigation measures and the need to communicate these options clearly in terms of their evidence and effectiveness have found in the "toolbox" approach an informative instrument to support mitigation decisions (Mangel *et al.*, 2016, 2017).

This scheme, first proposed for artisanal and small-scale fisheries, is also applicable to purse seine fisheries. Likewise, the information summarized in tables reporting features of every potential measure can be supported by a questions guide on feasibility of the measure that are largely covered with the assessment under the ACAP best practice criteria (Suazo *et al.*, 2017).

The bycatch mitigation toolbox for purse seine fisheries is presented below including different levels of evaluation in relation to mitigation function, findings, limitations, and its status in the reduction of seabird bycatch in general, as well as those species belonging to the ACAP-list of priority species (Table 1).

TABLE 1. MITIGATION TOOLBOX FOR PURSE SEINE FISHERIES WITH STATUS ON EFFICACY. TESTING: NEED SYSTEMATIC EVALUATION (NSE) OR SYSTEMATICALLY TRIALLED (ST). ADDITIONAL BENEFITS: NO AVAILABLE (N/A).

Mitigation	Function	Testing	Findings	Additional benefits	Limitations/ considerations	Source	Status *
Water spraying	Physical barrier for seabirds (Mexico)	NSE	Preliminary trials may affect seabird presence in risk areas into the net (*e.g.* pelicans)	N/A	1. Needs to be handled by one person in a reduced crew (*e.g.* small-scale purse seine) 2. Absence of appropriate facilities and training would be harmful for seabirds (water cannon instead of water spraying) 3. The use of waters pumped from the same waste waters may contain edible oils can potentially affect seabird plumage	Suazo *et al.* (2017a)	
Edible oil release	Sensorial / physical deterrent to keep away seabirds (Australia)	NSE	Trials demonstrated no effects of shark oil *vs* controls on seabird feeding activity of shearwaters	N/A	1. Oil should attract other seabird or non-target taxa to fishing operations 2. Available re-supplies on board are needed 3. The use of oil may have other detrimental effects (*e.g.* plumage)	Puglisi (2007)	

Mitigation	Function	Testing	Findings	Additional benefits	Limitations/ considerations	Source	Status *
Sound	Sensorial deterrent to keep away seabirds (Chile)	NSE	Trials demonstrated effects of noise deterrents on the abundance of some sensitive seabird species (*e.g.* gulls) in contrast to Procellariiform species	N/A	1.Recommended additional sound devices to influence in other seabird species than gulls with unexpected harmful effects on seabirds and crews 2. Consideration of noise pollution when communal fishing exists (*e.g.* small scale purse seine)	Diez (2017)	
Laser	Sensorial deterrent to keep away seabirds (Chile)	NSE	Preliminary trials showed operational limitations during daylight and for certain seabird species like gulls	N/A	1. Potential detrimental effects on seabirds and crews must be taken into account and evaluated 2. Not recommended without an appropriate experimental design and safety protocols	Diez (2017)	
Modified purse seine (MPS)	Structural package of on fishing gear for the reduction of entanglement of seabirds with the purse seine gear (Chile)	ST	Trials showed the reduction in seabird bycatch for diving seabird species by 98% related to the reduction of entanglement in fishing gear	1. Modified purse seine showed improvement in catch success of the target fish species 2. Reduction in netting material with savings in future maintenance or new fishing gear		Suazo *et al.* (2016; 2017a,b; 2019)	

Mitigation	Function	Testing	Findings	Additional benefits	Limitations/ considerations	Source	Status *
Bird scaring device (Scaring kite)	Physical barrier to reduce the presence of seabirds in risk areas (Portugal)	ST	Trials showed the effect of this scaring device on activity of seabirds but with no bycatch events recorded for treatment and control sets. Reduction in numbers of certain seabird species like gulls but not for ACAP species like the Balearic shearwater	N/A	1. Need operation by a crew member 2. Need to be trialed in areas of high occurrence of ACAP listed species	Oliveira (2020)	

* Legend (proposed categorisation of status in terms of mitigation efficacy):

	Reduced bycatch of ACAP species
	Reduced seabird bycatch, not proven for ACAP species
	No reduction in seabird bycatch, but reduced other bycatch fauna
	Testing in progress
	No reduction in bycatch

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