MANAGEMENT UNITS: CHALLENGES TO PROMOTE UNDERSTANDING AND CONSERVATION OF MARINE TURTLES IN OCEANIC AREAS

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SUMMARY

This document presents a discussion and some recommendations with regards to appropriate management units to promote the conservation of marine turtles in oceanic areas used by tuna longline fisheries under ICCAT. We comment on the utility of using Regional Management Units (RMUs) for marine turtles as proposed by Wallace et al. (2010). Per Wallace (2010 et al), RMUs refer to geographically explicit population segments, based on biogeographical data (e.g. nesting sites, genetics, telemetry) that can be applied to regionally appropriate management issues. RMUs are not intended to represent complete geographic distributions of species on global or regional scales, but rather distributions that are anchored to landmasses by known nesting site(s) and/or genetic stock origins and defined by biogeographical information. While RMUs are important to contribute to our understanding of key aspects of marine turtle populations, this analysis indicates that marine turtle RMUs do not cover all requirements to define management units to the ICCAT fisheries. Considering that the longline fishing are compose of different kind of fisheries, using distinct fishery strategies and operate in distinct at-sea regions, these fisheries interact with marine turtle mixed stocks in foraging and developmental areas. We recommend ICCAT adopt the "Fishery"as the principal concept to define Management Unit (rather than sea turtle RMUs) in order to understand and reduce marine turtle interactions in the ICCAT fisheries.

RÉSUMÉ

Le présent document fait état d'une discussion et de quelques recommandations concernant des unités de gestion appropriées en vue de promouvoir la conservation des tortues marines dans des zones océaniques utilisées par des pêcheries palangrières thonières relevant de l'ICCAT. Nous nous sommes penchés sur l'utilité de l'utilisation d'unités régionales de gestion (RMU) pour les tortues marines, comme le proposait Wallace et al. (2010). D'après Wallace (2010 et al), les RMU concernent des segments de population ciblées géographiquement, fondées sur des données bio-géographiques (p.ex. sites de nidification, génétique, télémétrie) qui peuvent être appliquées à des questions de gestion régionale. Les MU ne visent pas à représenter des distributions géographiques complètes des espèces à échelle mondiale ou régionale, mais plutôt des distributions qui sont ancrées à des masses continentales par site de nidification connu et/ou origine génétique du stock et définie par information biogéographique. Même si les RMU sont importantes pour nous aider à mieux comprendre les aspects fondamentaux des populations de tortues marines, cette analyse montre que les RMU des tortues marines ne couvrent pas toutes les exigences pour définir les unités de gestion des pêcheries de l'ICCAT. Étant donné que la pêche palangrière se compose de plusieurs types de pêcheries, utilisant différentes stratégies et opérant dans diverses régions de haute mer, ces pêcheries interagissent avec des stocks mixtes de tortues marines dans des zones de fourrage et de croissance. Nous recommandons que l'ICCAT utilise la « pêcherie » comme concept principal pour définir l'unité de gestion (plutôt que RMU des tortues marines) afin de comprendre et de réduire les interactions avec les tortues marines dans les pêcheries de l'ICCAT.

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RESUMEN

Este documento presenta una discusión y algunas recomendaciones respecto a las unidades de ordenación adecuadas para fomentar la conservación de las tortugas marinas en las zonas oceánicas utilizadas por las pesquerías de palangre de túnidos que recaen bajo el mandato de ICCAT. Se trata la utilidad de utilizar unidades de ordenación regionales (RMU) para las tortugas marinas tal y como propusieron Wallace et al. (2010). Según Wallace et al. (2010), las RMU se refieren a segmentos de la población geográficamente explícitos, basándose en datos biogeográficos (por ejemplo, sitios de anidación, genética, telemetría) que pueden aplicarse a temas de ordenación regionalmente adecuados. Las unidades de ordenación no están pensadas para representar distribuciones geográficas completas de las especies a escala global o regional, sino más bien distribuciones ancladas a masas continentales por sitios de anidación conocidos y/u orígenes genéticos del stock y definidas por información biogeográfica. Aunque las RMU son importantes para la comprensión de aspectos clave de las poblaciones de tortugas marinas, este análisis indica que las unidades de ordenación regionales de las tortugas marinas no cubren todos los requisitos para definir unidades de ordenación para las pesquerías de ICCAT. Considerando que la pesca con palangre se compone de diferentes tipos de pesquerías, que utiliza diferentes estrategias de pesca y opera en distintas zonas, estas pesquerías interactúan con stocks mezclados de tortugas marinas en zonas de alimentación y crecimiento. Recomendamos que ICCAT adopte la "pesquería" como el principal concepto para definir la unidad de ordenación (en lugar de unidades de ordenación regionales de tortugas marinas) con el fin de comprender y reducir las interacciones con tortugas marinas en las pesquerías de ICCAT.

KEYWORDS

Management units, Marine turtle, Longline fishery, Conservation

1. Introduction

This document presents a discussion and some recommendations about the challenges to adopt appropriate management units to promote the conservation of marine turtles in an oceanic area used by tuna fisheries under ICCAT, mainly by pelagic longline fishing. We have been asked by ICCAT's Sub-committee on Ecosystems and By-catch (SC-ECO) to comment on the utility of using Regional Management Units (RMUs) for marine turtles as proposed by Wallace *et al.* (2010). Per Wallace *et al.* (2010), RMUs refer to geographically explicit population segments, based on biogeographical data (e.g. nesting sites, genetics, telemetry) that can be applied to regionally appropriate management issues. RMUs are not intended to represent complete geographic distributions of species on global or regional scales, but rather distributions that are anchored to landmasses by known nesting site(s) and/or genetic stock origins and defined by biogeographical information. RMU's were used in a previous attempt to conduct an ecological risk assessment (ERA) for sea turtles specific to their vulnerability to ICCAT by-catch fisheries as commissioned by the SC-ECO in 2012. Despite their value in improved understanding and classifying marine turtles on a global scale, we believe their use may not be appropriate to properly characterize and manage marine turtle populations affected by ICCAT fisheries.

2. Marine Turtles Genetics

Fisheries have been shown to interact with all species of sea turtles that are known to breed and/or forage in Brazilian waters. Gear types include longline, purse seine, net (e.g. gillnet, trammel nets), and trawl fisheries (Marcovaldi *et al.* 2009), all of which except the trawl fisheries are known to target tunas and therefore are managed, at least in part, under ICCAT. Fisheries have been identified as threats to sea turtle populations in the Southwest Atlantic and relative impacts of threats differ by species, gear types regions, etc. (Marcovaldi *et al.* 2009, Wallace *et al*. 2013). Since 2003 when the sea turtle specialist group of the Southwestern Atlantic Ocean (RED ASO) was created, Brazil and Uruguay have adopted transnational approach to analyze the information from incidental capture of sea turtles by pelagic longline fleet of both countries **Figure 1** illustrates a graphic representation of observed incidental capture of loggerhead sea turtles (*Caretta caretta*) in these fleets. The concern has been raised that the turtles captured in this region, which represents a single RMU, has a mixed genetic stock structure. Recent studies on the genetic stock structure of loggerhead turtles captured by Brazilian and Uruguayan longline fleets in the South Atlantic indicates that these fleets interact with at least five different

nesting populations, including areas in the Indian and Pacific Oceans (Shamblin *et al.,* 2014). This finding is not necessarily in contrast to Wallace and co-authors, who assert that RMUs "refer to geographically explicit population segments, based on biogeographical data (e.g. nesting sites, genetics, telemetry) and rather distributions that are anchored to landmasses by known nesting site(s) and/or genetic stock origins", but rather highlights the simplicity in utilizing RMUs for management purposes. According to Wallace *et al.* (2010), next step for refining RMUs would be to expand on the genetic stocks based on nesting sites by spatially characterizing at-sea mixed-stock foraging or developmental areas.

2.1 Fisheries as Management Units

We believe that management of ICCAT fisheries should have as the unit of measure the fishery or fisheries and not the RMU. This is especially important given the fact that pelagic fisheries (e.g. longline) mostly operate in oceanic waters were RMU boundaries have high levels of uncertainty. Significant gaps remain regarding information on sea turtle ecology in pelagic waters, including an understanding of turtle movements as different life history stages and genetic stocks. Therefore, we should consider redefining management areas and/or management units, specifically for longline fishing operations, taking into consideration the main turtle species and life stages impacted.

Longline fisheries can be divided into different fisheries each with its own characteristics and therefore individual management needs. Important characteristics to consider include spatial and temporal effort, gear specifications [e.g. hook depth, type], and target species. These characteristics are closely linked with marine turtle capture rates, which differ by species, populations, and all of these at different life history stages and different RMUs. When longline fisheries with distinct characteristics are grouped into a single longline fishery, we lose the capacity to understand why some turtle specie (or turtle size classes) are more susceptible than others.

3. Recommendation

We recommend ICCAT adopt the Fishery as the principal management unit (rather than sea turtle RMUs) in order to understand and reduce marine turtle interactions in fisheries. The definition of fishery or fisheries should relate to a fishing activity performed in a specific area, using specific fishing gear and interacting with one or more sea turtle species at a different life history stage. Of importance to this recommendation is to consider specific aspects of the fishing operation that are likely to play important roles in their threats to sea turtles. These characteristics include information regarding fishing gear (hook depth, hook type), vessel characteristics, spatial distribution, temporal distribution, target species, and fishing effort

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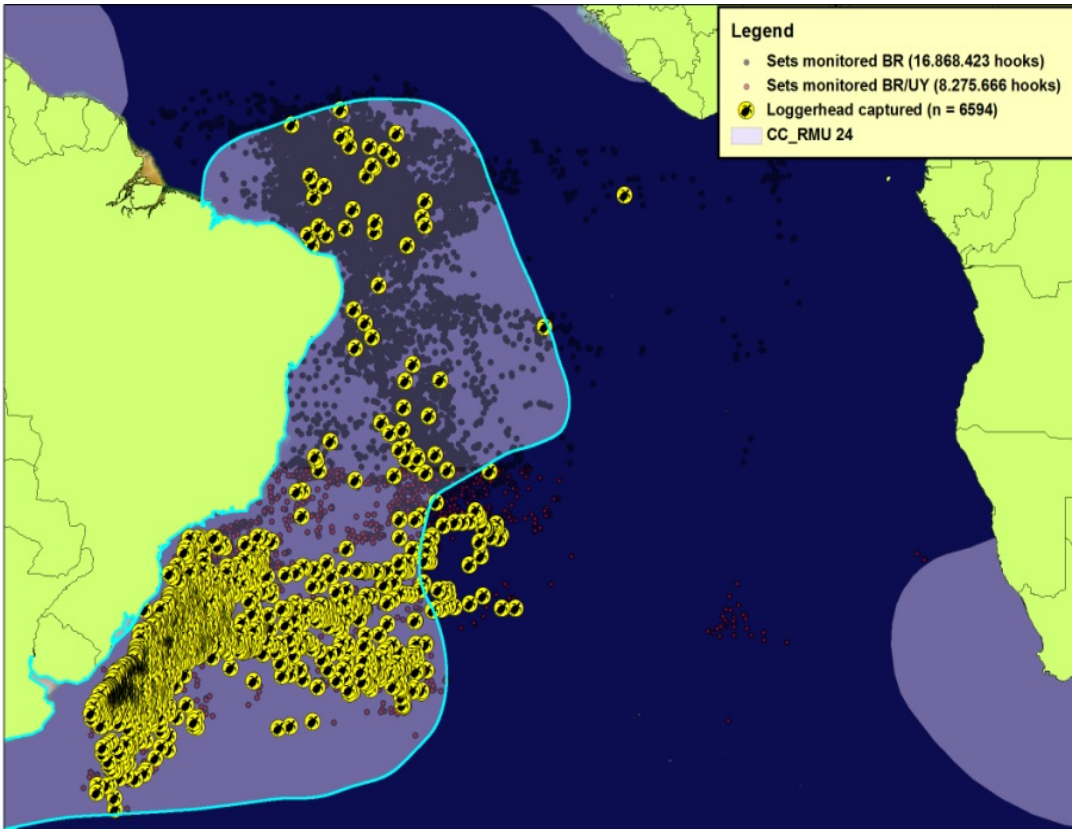

Figure 1. Loggerhead RMU Captured by Brazilian and Uruguayan longline fleets in the Southwest Atlantic.