Sea turtle mitigation in longline fisheries

Six of the seven species of sea turtles found worldwide are considered to be threatened with extinction according to the International Union for Conservation of Nature red list criteria, with interactions with fishing gear posing a serious threat to their populations. The Western and Central Pacific Fisheries Commission (WCPFC) and the Pacific Community (SPC) are coordinating a joint-analysis by their members of sea turtle bycatch mitigation data from Pacific longline fisheries. The study is supported by funding from the Areas Beyond National Jurisdiction Tuna Project, a Global Environment Facility-funded and Food and Agriculture Organization of the United Nations-implemented programme of work designed to encourage and reinforce sustainable tuna fisheries.

*Hooked hawksbill turtle (*Eretmochelys imbricata*) (image: © naturepl.com /Jeff Rotman/WWF).*

The first workshop was held in Honolulu, Hawaii, from 16 to 19 February in conference facilities provided by the Western Pacific Regional Fishery Management Council.[1] There were 31 participants at the workshop, including 15 from SPC member countries (Australia, Cook Islands, Fiji, Federated States of Micronesia, Marshall Islands, Palau, Papua New Guinea, Tonga and United States of America).

The main objective of the first workshop was to characterise current sea turtle interaction and mortality rates under existing fishing operations. A second workshop, to be held in November 2016, will focus on reviewing the potential for various mitigation measures to reduce turtle interactions and mortalities. The dataset compiled for the study consists of observer data from a variety of sources: WCPFC Regional Observer Programme data; national observer programme data held by SPC on behalf of its members; national observer programme data provided by Japan and Chinese Taipei; and observer data for the Reunion longline fishery provided by the Institut de Recherche pour le Développement (IRD). The additional datasets made available to WCPFC and SPC increased the coverage of the combined dataset, including the range of gear configurations sampled by observers, and were critically important to the workshop's success.

An overview of the combined dataset was presented to facilitate discussion on how best to meet the workshop's objectives. This included summaries of information collected by observers in the combined dataset, noting that observer data collection forms and protocols can vary between years. Summary maps of the observer data were also generated to provide a high-level overview of available data For example, maps of interactions per unit of effort were generated to summarise where sea turtles had most frequently interacted with longline gear over the full time-series of the combined dataset (for example, see Fig. 1 for green sea turtle). Workshop participants agreed that three separate analyses of the

[1] The full workshop report is available from: http://www.commonoceans.org/fileadmin/user_upload/common_oceans/docs/Tuna/FirstSeaTurtleWorkshopReport.pdf

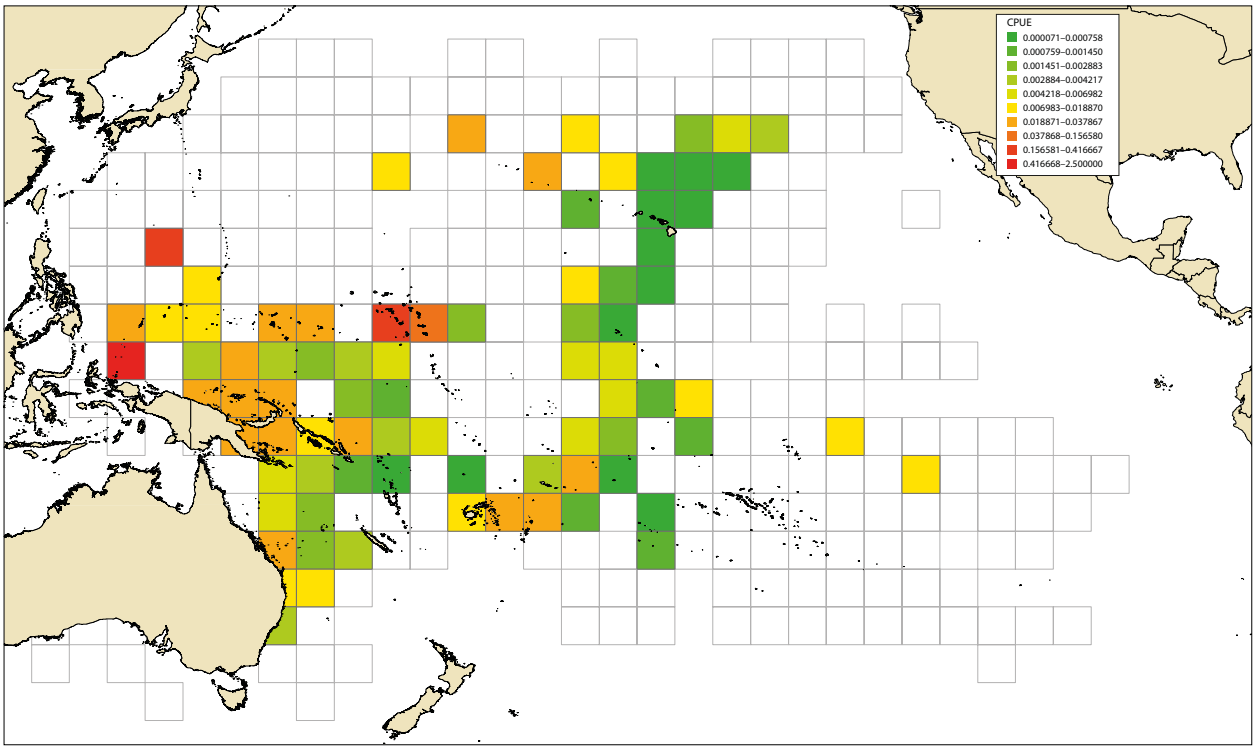

Figure 1. CPUE (number of interactions per 100,000 hooks) for green sea turtle by 5 x 5 degree grid for 1989–2015, based on the combined observer dataset.

combined observer dataset would be required to achieve the workshop's objectives: estimating the effects of various operational variables on interaction rates at the set level; estimating how turtle interaction rates vary by hook position within baskets; and estimating the effects of various operational variables on turtle at-vessel mortality rates. Workshop participants also agreed that the effects of gear configuration and other operational variables on interaction and at-vessel mortality rates were likely to differ between turtle species, and therefore, analyses should take these differences into account to the extent possible with the available data. There were sufficient data to include four species in the analyses: leatherback, loggerhead, green and olive ridley turtles. Post-release mortality rates were not considered due to a lack of available information.

Hook category (shape and size), bait species, hooks per basket, and soak time had the largest effect on set level interaction rates, with significant decreases in interaction rates with the use of large circle hooks and/or finfish bait. Interaction rates of olive ridley, loggerhead and green turtles with deep set longlines were highest for those hooks closest to floats. Interaction rates of leatherback turtles were not influenced by how close the hook is to the float. At-vessel mortality rates were influenced by turtle species, with the lowest mortality rates for leatherback and loggerhead turtles. At-vessel mortality rates also increased with increased fishing depths, as measured by both hooks per basket and float length. Participants concluded that mitigation measures based on hook shape and size, bait species, and removal of the hooks nearest each float in deep longline sets should be priorities for testing at the second workshop.

It will be important to take into account how turtle species are distributed across the Pacific Ocean when exploring the impacts of mitigation measure scenarios on sea turtle populations. For example, the impacts of a fishery adopting a particular mitigation measure will vary among turtle species if there are differences in the underlying densities of the turtle species in the area. Consequently, the workshop generated species-specific maps of relative abundances, using information from the State of the World's Sea Turtles as a starting point[2]. There are gaps in the current knowledge base of sea turtle distribution, and interpretation of existing information can vary among experts so options are currently being explored for expert peer review of the relative abundance surfaces.

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[2] Halpin P.N., Read A.J., Fujioka E., Best B.D., Donnelly B., Hazen L.J., Kot C., Urian K., LaBrecque E., Dimatteo A., Cleary J., Good C., Crowder L.B. and Hyrenbach K.D. 2009. OBIS-SEAMAP: The world data center for marine mammal, sea bird, and sea turtle distributions. Oceanography 22(2):104–115.