SOCIETY FOR MARINE MAMMALOGY: SMALL GRANTS IN AID OF RESEARCH (2022)

PROJECT TITLE: **Disentangle How Shipping Activity Impacts Cetacean Ranging Behavior, China**

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SUMMARY REPORT:

It is generally accepted that cetaceans are susceptible to vessel activities. Apart from direct individual removal through bycatch and propeller collision, most vessel activities cause unlethal impact on cetacean, which are commonly difficult to be quantitatively measured. In the present study, we compared the spatiotemporal development of vessel activities and Chinese white dolphins' (*Sousa chinensis*, also known as Indo-Pacific humpback dolphin) occurrence in Dafeng River Estuary(DRE), northern Beibu Gulf in China, which was further compared with the demography of population since 2015. We showed that the core habitat of humpback dolphin shifted from the western of DRE to the suboptimal habitat in eastern DRE after 2015, during which the dolphins presented a low level of survival and a moderate decline in population size. We built the distribution of dolphin-vessel interaction risk between DRE white dolphin and five types of vessel activity, namely dolphin watching, fishing, low-speed traveling, high-speed traveling and stationary, under 1) the reality dolphin distribution, reflecting the interaction risk after home range shifting and 2) the optimum dolphin distribution, reflecting the interaction risk if the dolphin has never shifted their home range. By further examine the variation pattern of the dolphin-vessel interaction risk between the interaction risk under the reality dolphin distribution and the optimum dolphin distribution, we found that the DRE white dolphins present strongest avoidance to the interaction risk from dolphin watching activity. In the interaction risk with five types of vessel activity, only the interaction risk with dolphin watching and low-speed traveling show wild variations (Figure 1). And by dividing the interaction risk into three parts in the white dolphins' distribution range, dolphin watching activity is the only one that did not present opposite trend of variation between the west part and the east part. Based on these findings, we suggested that the eastern shifting core area could substantially reduce the interaction risk of dolphin with dolphin watching activity. Our recent research progress disentangles an indirect demographic impact of vessel activity through changing dolphin's ranging behavior. Moreover, we pinpoint the dolphin watching activity

outperform the rest, such as transportation, in determining dolphins' ranging strategy.

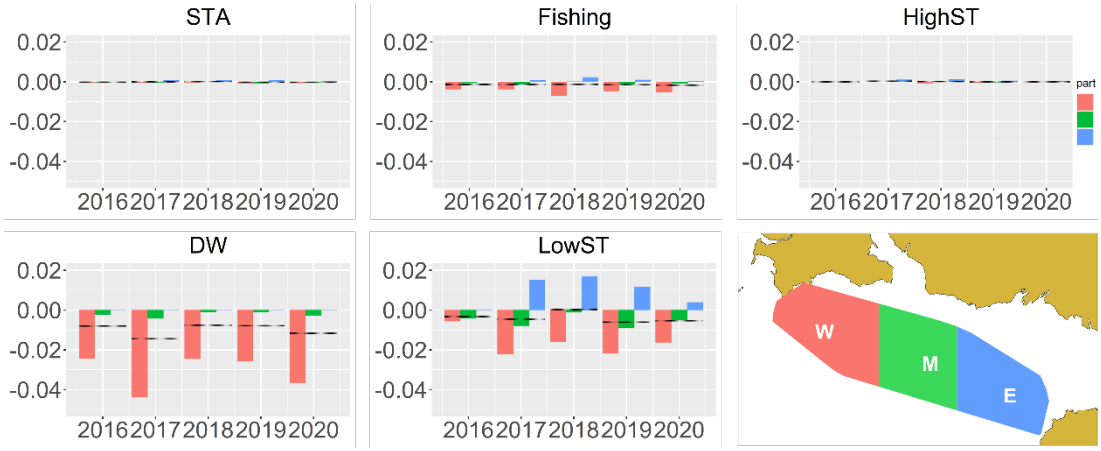

Figure 1. The variation of dolphin-vessel interaction risk between DRE Chinese white dolphin and five types of vessel activity, namely dolphin watching (DW), fishing (Fishing), low-speed traveling (LowST), high-speed traveling (HighST) and stationary (STA). The black dotted line shows the mean variation in the whole dolphin distribution range, and the red, green, and blue columns show the mean variation in the west, middle, and east part of the dolphin distribution range, respectively. Results show that the avoidance of interaction risk with dolphin watching is much stronger and more effective, indicating that the white dolphin shifting their home rang to avoid the interaction with dolphin watching activity.

PROJECT PROGRESS:

All analyzing has been finished and a research article is under review now. I am going to work on the age specific survivals research to find the most disturbed dolphin states in DRE white dolphin.