Population monitoring and management

Preliminary assessment of loggerhead sea turtle (*Caretta caretta*) overlap with industrial fisheries in the Adriatic Sea

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Loggerhead sea turtles (*Caretta caretta*) are the most abundant marine turtle species in the Mediterranean. Due to recent increases in nest numbers, the Mediterranean regional management unit has been delisted by the IUCN to the status of Least Concern, but remains conservation dependent. Incidental catch in both passive and active fishing gear is considered to be the biggest threat to sea turtles in marine habitats. In the Mediterranean, industrial fisheries represent a small fraction of the fleet (~13%) but are responsible for ~89,000 catches and ~17,500 deaths per year. Within the Mediterranean, the Adriatic Sea is one of the most important foraging and overwintering grounds for loggerhead turtles, utilised year-round by individuals of different life stages. Small juveniles consume both pelagic and benthic prey, retaining plasticity in habitat use, while large juveniles and adults predominantly forage on the sea bottom. For all life stages, spatial distribution and diving patterns depend on thermoregulation and shift in accordance with the seasonal sea surface temperature (SST) changes in the Adriatic Sea. These life history traits influence exposure and susceptibility of loggerhead turtles to bycatch.

As the Adriatic Sea is heavily exploited by industrial fisheries, this study aims to identify areas with the highest overlap of sea turtles and industrial fisheries, interaction 'hotspots', and analyse changes across seasons and life stages to advance understanding of spatiotemporal bycatch risk in the Adriatic Sea. We obtained space use data from 21 satellite tagged loggerhead turtles, tracked between 2014 and 2024. Location data was filtered in order to remove invalid locations and locations with large error estimates, and analysed separately for small juveniles (n=11) and large juveniles and adults (n=10). Fisheries data was obtained from European Marine Observation and Data Network in the form of monthly aggregated vessel densities (h/km^2) for the period 2017-2023. We split locations and fisheries data according to temperature changes in the Adriatic Sea into cold (Nov-Apr; SST range 13.5-18.0°C) and warm season (May-Oct; SST range 17.7-26.2°C). The overlap was quantified as the number of turtle locations multiplied by fisheries data within 10x10 km grid and rescaled to obtain index values between 0 (no interaction) and 1 (highest relative interaction). Our results show that the overlap between turtles of both life stages and fishing vessels was concentrated in the northern Adriatic in the warm season, then shifted southwards and extended into the central Adriatic during the cold. Interaction hotspots were identified in the Gulf of Venice and south of the River Po delta during the warm season, and off the Istrian peninsula year-round. These preliminary results provide a basis to inform targeted onboard monitoring programs and improve sea turtle bycatch mitigation in the Adriatic Sea.