

Range expansion of loggerhead turtles into the Western Mediterranean: spatial distribution, habitat connectivity and response to climate change

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Abstract

Global warming is affecting habitat quality and availability on our planet and some species, such as loggerhead turtles, are already in the process of changing their distribution range. In the Western Mediterranean, where loggerhead turtles have previously only nested sporadically, nest numbers have increased drastically from 1 – 3 to >100 nests/year over the past decade, contemporaneously to a rise in sea surface temperatures. This apparent nesting range expansion provides an exceptional opportunity to study how an ectotherm migratory long-lived species responds to climate warming. Unfortunately, loggerhead turtles face many anthropogenic threats at the new nesting beaches, which require urgent conservation actions. Moreover, comprehensive conservation management should also include those marine areas that are used by the adults as foraging and wintering habitats, and as nursery areas by their offspring. This project aims at identifying those habitats, and showing how they are connected with the emerging new nesting sites. To achieve this, satellite tracking devices will be installed on both nesting females and juvenile turtles retrieved from southwest Italian beaches. Females will be located during night beach patrols and restrained after they have finished nesting to apply satellite tags before they return to the sea. The tags will deliver high-resolution GPS-like positions (at least 1 per hour) to follow the turtles on their movements, for an average tracking duration of 6 months, with the possibility of tracking individuals up to two years. Juvenile yearling turtles will be obtained from a head-starting program in which hatchling turtles from the same beaches are raised for one year in a captive nursery facility at the SZN Turtle Point. At the age of one year, they are big enough to carry miniaturized solar-powered satellite tags that will allow to identify their dispersal patterns and developmental habitats, and to assess post-release survivorship. Movement paths will be reconstructed from the recorded GPS positions and integrated in a detailed analysis of the environmental and oceanographic variables along the trajectories. This will lead to gain new knowledge on the interplay of environment and spatial distribution of turtles, particularly in relation to climate related changes, which have so far been predicted to have detrimental effects on global sea turtle populations. The expected outcome of this project will thus support the sustainable management of natural resources in marine areas relevant to sea turtles while expanding their distributional boundaries.