



Abstract ID: 6057 **Type:** Oral **Subject:** Genetics and Population Biology **Country:** Greece
Submitted By: John Halley

POPULATION RISK TO CLIMATE VARIABILITY FROM LIFE HISTORY

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Most studies of climate change impacts to biodiversity emphasize ecological shifts to habitat and not traits the organisms themselves possess. Geographic range, phenological mismatches, habitat tolerances, niche drift – these are the commonly examined factors in assessing the impacts of climate change. But climate variability, and climatic change, will affect different species through life history traits (and the ensuing demographic processes) over and above habitat shifts. Here we examine how demographic traits may act as buffers or conversely predispose certain life history strategies to climate forcing. We develop an analytical tool to quantify population risk to climate variability that arises from life history traits, and we apply it to a variety of well-studied taxa. Sea turtles feature prominently in this discussion, as their combination of life history traits (high fecundity, low offspring survival) means that their population growth is regulated primarily through early juvenile survival and the factors modulating this. These traits bear many similarities to fish, mollusks, cephalopods, and insects. By contrast, the population dynamics of African elephants and other species with low fecundity and high offspring survival are more sensitive to fluctuations in adult survival. All species are affected by climate, however, certain life history approaches are more sensitive to environmental variability, and therefore more exposed to climate change. We discuss the implications of our results for developing modeling approaches that appreciate both demographic and environmental forcing and for recent debates about the impacts of climate to the long-term dynamics of sea turtle populations.

Abstract ID: 6098 **Type:** Oral **Subject:** Genetics and Population Biology **Country:** Spain

Submitted By: Carlos Carreras

FROM ACCIDENTAL NESTERS TO POTENTIAL COLONISERS, THE SEQUENTIAL COLONISATION OF THE MEDITERRANEAN BY THE LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*)

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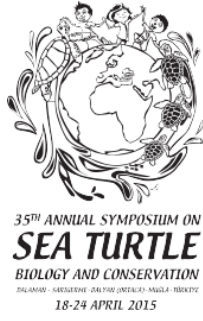
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Previous genetic and tagging-recapture studies have demonstrated that the loggerhead sea turtle (*Caretta caretta*) is a highly philopatric species, thus allowing further exploitation of nesting areas that succeed in the past. However, this reproductive strategy difficulties the colonisation of distant nesting beaches, decreases the adaptability to changing environments and hardly explains the worldwide distribution of the species. For instance, the colonisation of the Mediterranean sea by Atlantic individuals implies that a species, that hardly nests a few hundreds of kilometres from its beach of origin, has surpassed a gap of some thousands of kilometres of deep sea. Furthermore, this colonisation has been sequential with at least two independent colonising events from Atlantic individuals, one during Pleistocene that originated the populations nesting in eastern Mediterranean beaches and another more recently that originated the populations nesting in southern Italy. During the last decade, the number of accidental or sporadic nests recorded in the western Mediterranean has increased, and almost all of them yield viable hatchlings. These nest raised some questions like where these new nesters originated and whether could be potential colonisers. To answer these questions we compiled nesting data (21 nests), we analysed a fragment of the mitochondrial DNA (15 nests) and we simulated the probability that these sporadic events generate future populations under different incubation temperature scenarios, considering the temperature-dependent sex determination of the species. Our results indicated that the nesting females of these events originate both in the Atlantic and Mediterranean nesting beaches, associated to the composition of the nearby developmental foraging grounds inhabited by juveniles and subadults. Furthermore, we concluded that these nests produced generally a low proportion of females, thus making difficult the proliferation of a new population, but that a colonisation may succeed under temperatures slightly warmer than those actually found on these new nesting beaches. We thus hypothesize that accidental nesting events in beaches close to developmental foraging grounds, even at small frequency, may be a mechanism to overcome philopatry limitations thus increasing the dispersal capabilities of the species and the adaptability to changing environments, like the predicted global climate change.



35TH ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION
DALAMAN SARIGERME DALYAN (ORTACA) MUĞLA-TÜRKİYE

Compilers:
Yakup Kaska
Bektaş Sönmez
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Çisem Sezgin

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This book can be cited as
Kaska, Y., Sonmez, B., Turkecan, O., Sezgin, C. (2015). Book of abstracts of 35th Annual Symposium on Sea Turtle Biology and Conservation. MACART press, 250pp. Turkey.

Press in April 2015 ISBN 978-9944-0847-9-6

Press: MACART

MacArt Grafik Basım Yayın Sırapapılar Mah. 1521 Sk. No:23/1 DENİZLİ
TEL: (258) 265 96 24
E-posta: bilgi@macartajans.com
Web Adresi: www.macartajans.com
Cover Design:MACART
Press/ Volume: Asude Ofset Matb.Rekl.Oto.Mak.San.Tic.Ltd.Şti./ Antalya

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