

MULTIYEAR ANALYSIS OF SEA TURTLE BYCATCH BY PERUVIAN LONGLINE FISHERIES: A GENETIC PERSPECTIVE



Peru

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RESULTS BY SPECIES

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INTRODUCTION

• The capture of non-target species (i.e. bycatch) by longline fisheries is a major cause of the decline of many marine species including sea turtles; however

. We have a limited knowledge of the impact over focal populations or subpopulations and it is usually based on a single sampling event; Since 2003 we have been monitoring the interaction between Peruvian longline fisheries and the aggregations of sea turtles in the open ocean;

. Here, we investigated the genetic diversity, structure, origin and temporal variation of the sea turtles incidentally captured from 2003 to 2009 using mtDNA as a molecular marker.



Peruvian longline fisheries have a wide regional impact over sea turtle populations underlining the importance of collaborative conservation efforts in the South Pacific









HP Genetic **Temporal Composition** Species Ν Natal rookeries (PS) Diversity man aboard a longline fishing vess Temporal genetic composition of the aggregation of EP releasing a Pacific green turtle incidentally captured that night. Picture was taken in December 2009 during the mahi-mahi fishing season. (Picture by S. Kelez) en turtle Haplotype ID EP green 97 h=0.76816 combines current nomenclature (i.e CMP) for short (SD ±0.024) (Chelonia mydas) (14)Dacific Ocer sequences and or $\pi = 0.0019$ nporary IDs for onger sequence (SD±0.0001 86% contribution of Galapagos rookery (GAL) No significant temporal changes in haplotype and in minor percent from Mexican rookeries composition (P-value=0.5851) but we observed (Colola, Maruata, Paso de Noria, Arenas Bla changes of low- frequency haplotypes and Revillagigedos) DE DK DLOPby1 DLOPby2 DLOPby3 DM DN Temporal ger composition of the olive ridley h=0.4495 **Olive ridley** 31 7 aggregation Three new (SD ±0.108 (9) (Lepidochelvs olivacea) haplotypes w observed over th seven-vear $\pi = 0.0013$ (SD±0.0010 Similar contribution of Colombian (Gorgona & E Valle) and Mexican (Baia California Sur) rookerie · No significant temporal changes in haplotype Less contribution from other Mexican and Costa composition (P-value=0.9767) Rican rookeries (GNC-OST) One unknown · Haplotypes CCP1 and CCP5 characterize haplotype in low frequency (n=1) the rookeries of East Australia (AUS) and 3 h=0.104Loggerhead 43 C caret New Caledonia (NCD). (SD ±0.067 No significant (2) (Caretta caretta) changes in haplotype composition 100% L olivace $\pi = 0.0003$ Contribution of AUS and NCD

Sea turtles incidentally captured during longline fisheries off Peru. Colored points indicate geographic position of each individual. The map depicts only the turtles sampled fron

TABLE 1. Summary of results for three species. Information includes sample size (N), number of haplotypes and polymorphic sites [HP(PS)], gene (h) and nucleotide (m) diversity with estimated standard deviation (SD), temporal genetic composition, and MSA estimated contribution of rookeries of origin.

BCS

SIN

COLGRO

OAXCHIS

GAL

OST

GUA

GOR

EV

EP GREENS

METHODS

 Tissue samples collected from shoulder area using scalpel or biopsy punch and preserved in buffer at room temperature

vear 2003 to 2009.

· Genomic DNA isolation with Qiagen DNAeasy kit, amplification and sequencing of portion of mtDNA control region using LTEi9 and H950 primers (Abreu-Grobois et al 2008)

 Sequencing cleaning and alignment using ClustalW implemented in MEGA 4.1 (Tamura et al. 2008)

Molecular Estimates and tests with Arlequin (Excoffier et al. 2005) Origin of individuals inferred using Mixed stock analysis with Bayesian approach implemented in R-package Mixstock (Bolker et al. 2007) and using available genetic composition from East and West Pacific rookeries as baseline information (Bowen et al 1997, Briseño-Dueñas 1998, Chassin-Noria et al. 2004, Shanker et al. 2004, Lopez-

Castro and Rocha-Olivares 2005, Boyle et al. 2008, Camacho-Mosquera et al. 2008, Cheng et al. 2008, Dutton et al. 2008, Barrientos and Ramirez unpublished data)

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Origin of Peruvian sea turtles Most likely rookeries of recruitment of sea turtles aggregated off Peruvian waters and incidentally captured by longline fisheries. Colored arrows indicate turtle species and their origin. Three-letter initials indicate specific rookery. EP green and olive ridley turtles in Peru are recruiting from rookeries along the East Pacific, and loggerheads cross the entire Pacific Ocean to feed in waters **OLIVE RIDLEYS** off Peru.

AUS

NCD

LOGGERHEADS

(SD±0.0002 among years