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TITLE: Congruent phylogeographic patterns in a young radiation of live?bearing marine snakes: Pleistocene vicariance and the conservation implications of cryptic genetic diversity

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ABSTRACT:

Abstract Aim To investigate phylogeographic patterns among and within co?occurring sea snake species from Australia's endemic viviparous Aipysurus lineage, which includes critically endangered species, and evaluate the conservation implications of geographically structured patterns of genetic divergence and diversity. Location Australia's tropical shallow water marine environments spanning four regions: Great Barrier Reef (GBR), Gulf of Carpentaria (GoC), Timor Sea (TS) and coastal WA (WAC). Methods Samples from >550 snakes representing all nine nominal Aipysurus group species were obtained from throughout their known Australian ranges. Coalescent phylogenetic analyses and Bayesian molecular dating of mitochondrial DNA , combined with Bayesian and traditional population genetic analyses of 11 microsatellite loci, were used to evaluate genetic divergence and diversity. Results Mitochondrial DNA revealed highly congruent phylogeographic breaks among co?occurring species, largely supported by nuclear microsatellites. For each species, each region was characterized by a unique suite of haplotypes (phylogroups). Divergences between the TS , GoC and/or GBR were invariably shallow and dated as occurring 50,000?130,000 years ago, coinciding with the cyclic Pleistocene emergence of the Torres Strait land bridge. By contrast, sea snakes from coastal WA were consistently highly divergent from other regions and dated as diverging 178,000?526,000 years ago, which was not associated with any known vicariant events. Main Conclusions Previously unappreciated highly divergent sea snake lineages in coastal WA potentially represent cryptic species, highlighting this region as a high?priority area for conservation. The cyclic emergence of the Torres Strait land bridge is consisted with observed divergences between the TS , GoC and/or GBR ; however, processes involved in the earlier divergences involving the WAC remain to be determined. The observed strong population genetic structures (as surrogates for dispersal) indicate that sea snakes have limited potential to reverse population declines via replenishment from other sources over time frames relevant to conservation.

SOURCE: Diversity and distributions

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