Weedy Seadragon genomics reveal highly distinct populations

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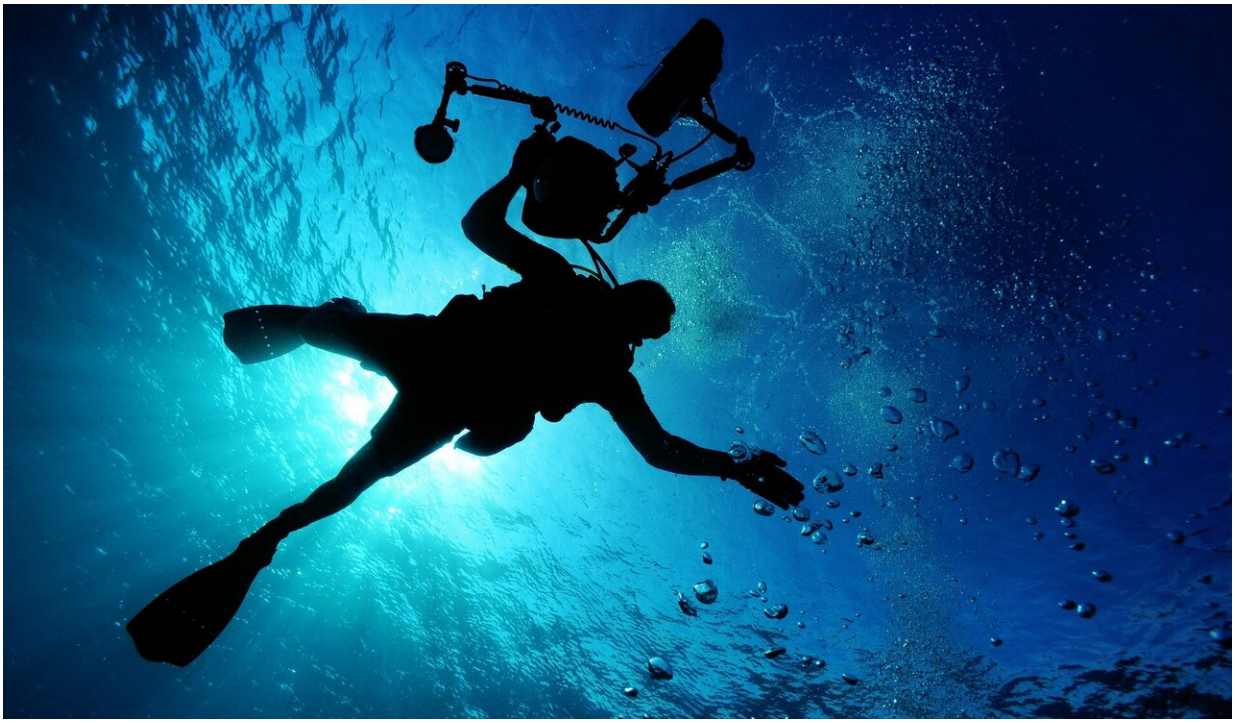

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Charismatic, iconic and Instagram-friendly, the weedy seadragon is a favorite with divers and snorkellers. The first genomic study of east coast Australian seadragon populations can now reveal "weedies" from NSW, Victoria and Tasmania are significantly different.

The study, published in *PLOS ONE*, also reveals that Victorian weedy seadragons may form a subspecies which has implications for conservation management. The researchers recommend that, as a precautionary approach, these distinct populations be managed separately by each state.

Lead investigator Dr. Selma Klanten, from the University of Technology Sydney (UTS) Fish Ecology Laboratory, said that despite the public popularity of these fish few scientific studies exist.

"The research aimed to understand the genetic structure and diversity of weedy seadragon populations along Australia's east coast," Dr. Klanten said.

"This is important because like all sygnathids, seadragons are endemic to temperate Australia. As adults they might only move 50-500 metres away from where they were born. This can make them susceptible to loss of habitat and changing environmental conditions.

"Although 'weedies' aren't listed as endangered, there is concern that populations are in decline and recent surveys confirm this. If numbers continue to fall this might lead to further loss of genetic diversity which could have an impact on future generations of weedy seadragons," she said.

Using the latest genomics (NGS, or next generation sequencing), the researchers identified four distinct genetic clusters—central NSW, southern NSW, Victoria and Tasmania. High-resolution images were also used to measure seadragon length and shape, revealing NSW individuals differed in a few measurements to those from Mornington Peninsula in Victoria.

The combined results suggest that not only are weedy seadragon

populations significantly different along the east coast of Australia but that the Victorian weedy seadragons may form a subspecies.

"They are highly distinct to NSW and Tasmania and do not interbreed with any of the other populations. Biologists refer to this as being reproductively isolated.

"Because Victorian 'weedies' are the only animals used in the aquarium trade, worldwide, a bias towards this population exists in captivity. This has implications for conservation management," Dr. Klanten said.

Co-author Professor David Booth, also of UTS Fish Ecology Lab, noted "as an ecologist it was clear to me that weedies from the populations were shaped differently and occupied different habitat types, but we were surprised how different they were genetically.

"Most global aquariums that exhibit weedies have sourced them from the Melbourne area, and this was quite distinct in our study, so we recommend extra care in managing the wild populations there," Professor Booth said.

The study sites were located in Sydney, Jervis Bay and Eden in NSW; Mornington Peninsula in Victoria; and Tasmania, and were surveyed over three years between 2016 and 2019. Sampling these masters of camouflage involved removing a small piece of tissue from their leaf-like appendages. Tissue samples were also taken from dead individuals washed up onshore and collected by citizen scientists.

The paper "Genomic and morphological evidence of distinct populations in the endemic common (weedy) seadragon Phyllopteryx taeniolatus (Syngnathidae) along the east coast of Australia" is published by *PLOS ONE*.

More information: Genomic and morphological evidence of distinct populations in the endemic common (weedy) seadragon Phyllopteryx taeniolatus (Syngnathidae) along the east coast of Australia, *PLOS ONE* (2020). DOI: 10.1371/journal.pone.0243446

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