
Conservation genetics of *Pristis* sawfishes in Australian waters

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Australian Government

Department of the Environment, Water, Heritage and the Arts

DECLARATION

I declare that this thesis is my own account of my research and contains, as its main content, work that has not previously been submitted for a degree at any tertiary education institution.


Nicole Phillips

June 1 2012

Date

To Sean,

For your never ending support

ABSTRACT

Northern Australia is believed to contain the last 'viable' populations of the critically endangered Freshwater Sawfish, *Pristis microdon*, Dwarf Sawfish, *Pristis clavata*, and Green Sawfish, *Pristis zijsron*, making these populations of global significance. Mitochondrial and microsatellite markers were used to investigate the population structure, levels of genetic diversity, and evolutionary history of each of these species in northern Australian waters. *Pristis microdon*, which utilizes freshwater rivers as juveniles and marine waters as adults, has high levels of mtDNA heterogeneity and no nDNA heterogeneity; indicating that this species has female philopatry coupled with male-biased dispersal in northern Australian waters. The conservation plans for this species should, therefore, place a high priority on the protection of females, pupping grounds, and nursery areas to minimize the risk of extirpation. Conservation plans also need to consider the likelihood that a decline in the abundance of this species in one location could have an effect on its abundance and genetic 'health' in other locations via male gene flow. In contrast, *P. clavata* and *P. zijsron*, which spend their entire lives in marine and/or estuarine waters, each have heterogeneity in the mtDNA and nDNA markers, suggesting that gene flow in both males and females is restricted at large spatial scales in northern Australian waters. Consequently, the risk of extirpation for each of these species is relatively high since a decline in abundance is unlikely to be replenished by immigration from other locations. Therefore, conservation plans for *P. clavata* and *P. zijsron* should place a high priority on the protection of males and females, as well as pupping grounds and nursery areas. Most of the assemblages of each of the *Pristis* species contained moderate and high levels of diversity in mtDNA and

nDNA markers, respectively. This suggests that the prognosis for the short and medium-term survival of each of these species in Australian waters is relatively good, providing that measures are put in place to curb any further declines in abundance. However, the levels of mtDNA diversity in the assemblage of each of *P. clavata* and *P. zisron* in the Gulf of Carpentaria were reduced and, therefore, these assemblages may warrant special conservation status. Finally, the evolutionary histories of the *Pristis* species in Australian waters have most likely played an important role in shaping the observed patterns of population structure and levels of genetic diversity, however, the relative influence of contemporary *versus* historic factors on the amount and distribution of genetic variation in each of these species remains somewhat unresolved.

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