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## Fiddling with the proof: the Magpie Fiddler Ray is a colour pattern variant of the common Southern Fiddler Ray (Rhinobatidae: *Trygonorrhina*)

STEPHEN C. DONNELLAN<sup>1,2,6</sup>, RALPH FOSTER<sup>1</sup>, CLAUDIA JUNGE<sup>2</sup>, CHARLIE HUVENEERS<sup>3,4</sup>,  
PAUL ROGERS<sup>4</sup>, ANDRZEJ KILIAN<sup>5</sup> & TERRY BERTOZZI<sup>1,2</sup>

<sup>1</sup>South Australian Museum, North Terrace, Adelaide, Australia 5000

<sup>2</sup>School of Biological Sciences, The University of Adelaide, North Terrace, Adelaide, Australia 5005

<sup>3</sup>School of Biological Sciences, Flinders University, GPO Box 2100, Adelaide, Australia 5001

<sup>4</sup>SARDI Aquatic Sciences, PO Box 120, Henley Beach, Australia 5022

<sup>5</sup>Diversity Arrays Technology Pty. Ltd, LPO Box 5067, Bruce, Australia 2617

<sup>6</sup>Corresponding author. E-mail: [Steve.Donnellan@samuseum.sa.gov.au](mailto:Steve.Donnellan@samuseum.sa.gov.au)

### Abstract

The Magpie Fiddler ray, *Trygonorrhina melaleuca* Scott 1954, is presently South Australia's (SA) rarest fish, represented by only three museum specimens collected near Adelaide over the past 60 years and listed as Endangered in the IUCN Red List of Threatened Species. However, there is some doubt as to whether the Magpie Fiddler Ray is a different species from the widespread and common Southern Fiddler Ray, *Trygonorrhina dumerilii* (Castelnau 1873), resulting in two very contrasting scenarios for marine conservation. If the Magpie Fiddler Ray is a black and white patterned variant of the Southern Fiddler Ray then it will be removed from the Red List and appear as a synonym of *T. dumerilii*. Conversely, if it proves to be a different species then it remains SA's rarest fish species and highly data deficient. We analysed mtDNA and the largest ever nuclear gene dataset (>4,000 loci) applied to chondrichthyan species level systematics from the most recently collected Magpie Fiddler Ray specimens and a geographically representative selection of Southern Fiddler Rays to determine the species status of this enigmatic ray. We found that the Magpie Fiddler Rays share a mitochondrial haplotype with 23 Southern Fiddler Rays and are not differentiated from 35 Southern Fiddler Rays at more than 4000 SNPs derived from DArTseq data. The morphological trait values that are putatively diagnostic for the Magpie Fiddler Ray fall within the range of variation observed among Southern Fiddler Rays. Our analyses are consistent with the notion that the Magpie Fiddler Ray is a rare colour and pattern variant of the widespread and abundant Southern Fiddler Ray. We also identified two hybrids between the Eastern and Southern Fiddler Rays, only the third time that hybrids have been identified in nature in chondrichthyans. Our results provide critical guidance in the assessment of its conservation status and an ending to a 60 year old conundrum for marine conservation.

**Key words:** Rhinobatid, ray, taxonomy, mitochondrial DNA, nuclear genes, hybrid, southern Australia

### Introduction

Conservation of naturally rare or seldom encountered species presents a challenge for management agencies. Assessing abundance is problematic and documenting any changes to abundance an even more difficult task. The Magpie Fiddler Ray, *Trygonorrhina melaleuca* Scott 1954, a striking black and white patterned marine ray species from South Australia (see Fig. 1), is currently listed in the IUCN Red List of Threatened Species as Endangered (Stevens 2009). Given that the very few records that have appeared since the species was first described 60 years ago (Scott 1954) are from shallow inshore habitats in Gulf St Vincent and Kangaroo Island that are subject to regular trawling and are bordered by a well-populated coastline (Last and Stevens 2009), it is likely that the species is actually rare rather than difficult to observe.

However, some misgivings have been expressed in the literature about whether the Magpie Fiddler Ray is really a different species from the Southern Fiddler Ray, *Trygonorrhina dumerilii* (Castelnau 1873), or simply a black and white patterned variant (Last and Stevens 2009). This doubt is based on the low level of differentiation in