2 Biogeography

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INTRODUCTION

Biogeography is the study of patterns in the distributions of organisms and the ways those patterns have arisen. While documenting patterns is straightforward, trying to explain them often is not. Many explanations are based on historical events, and there may be multiple possible explanations which cannot be distinguished. We are limited in our ability to conduct experiments to test hypotheses, but we can use fragmentary evidence to offer explanations for observed patterns due to unobservable events in the past. Our interpretations are strongly linked to our understanding of Earth history (geology, climatology etc.) and to an assumption that any molecular or morphological markers used are appropriate and not misleading. If our ideas and assumptions are wrong, our interpretations could fail. Consider, for example, how early interpretations were overturned by emergence of the theory of continental drift. Thus, biogeography is a controversial subject and most biogeographic explanations should be viewed with healthy scepticism.

This chapter is intended to complement rather than replace previous works. It summarises key information and offers new perspectives on patterns of endemism and relationships between Australia's biogeographic provinces. Readers with broader interests should consult McDowall (1981), Allen (1982, 1989, 1991), Merrick and Schmida (1984), Bishop and Forbes (1991), Harris (1995), Unmack (2001a), Allen *et al.* (2002), Pusey *et al.* (2004), Merrick (2006) and the World Wildlife Fund's (WWF) Freshwater EcoRegions website (<http://www.feow.org/index.php>). Biogeographic overviews of the global freshwater fish fauna include those by Matthews (1998), Banarescu (1990), Lundberg *et al.* (2000), Berra (2007) and Abell *et al.* (2008), and ichthyological texts those by Moyle and Cech (2004), Barton (2007) and Helfman *et al.* (2009).

AUSTRALIAN FISHES IN A GLOBAL CONTEXT

Currently, more than 32 000 fish species are recognised globally, and each year more than 300 new species are described (Eschmeyer and Fong 2012). Over 80% of the known species belong to two groups within the Teleostei (Fig. 1.2), the Ostariophysi and Acanthopterygii.

Freshwater fishes number about 15 170 species (Eschmeyer *et al.* 2010), and about 63% are ostariophysans, including catfishes (Siluriformes), characins (Characiformes) and minnows, loaches and their relatives (Cypriniformes). There are about 16 764 marine species (Eschmeyer *et al.* 2010). Most are acanthopterygians, including groups like the billfishes, dories, flatfishes, groupers and puffer-fishes. Freshwater acanthopterygians are comparatively few; they include