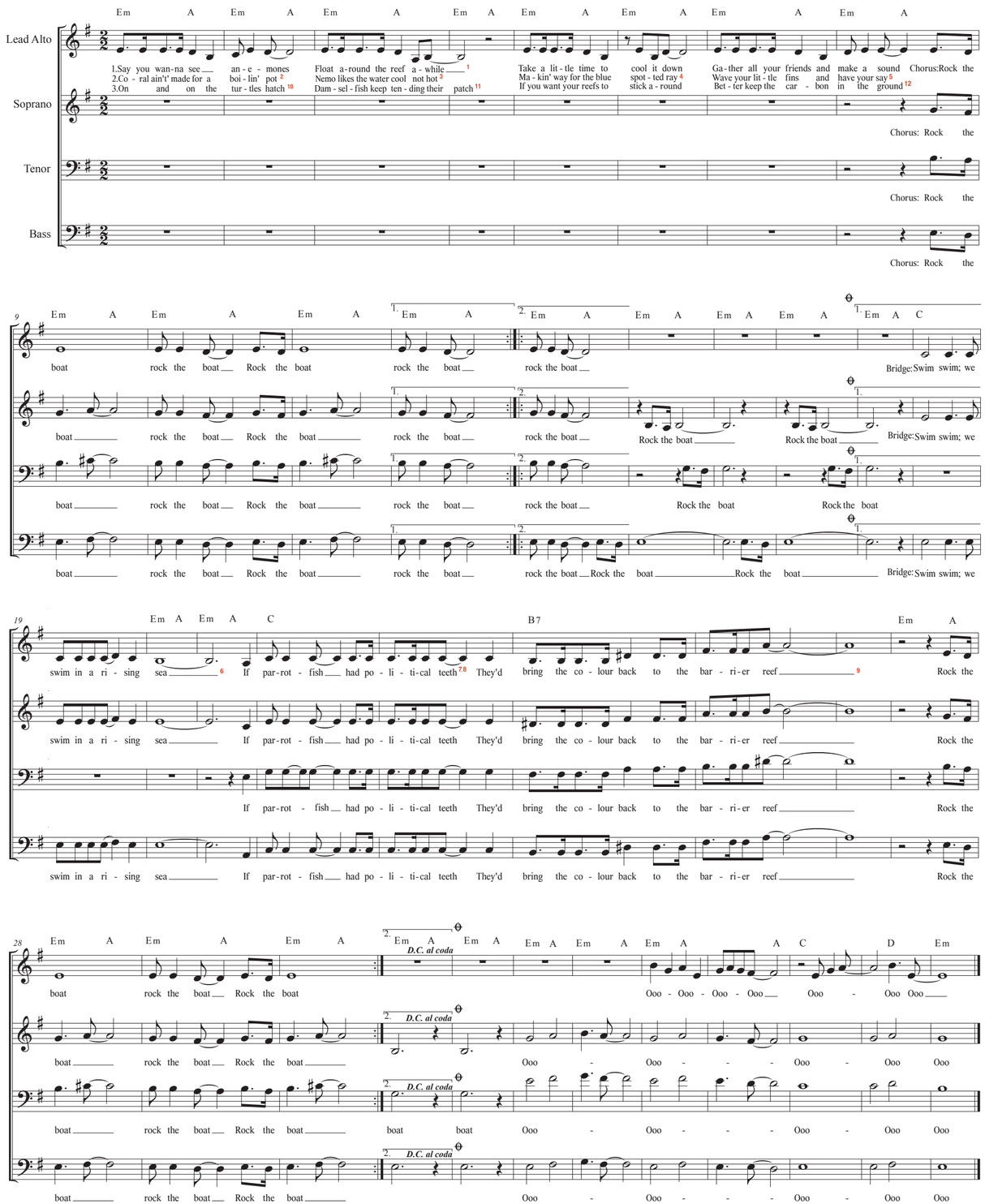
Rock the Boat

Music and lyrics by Kim Williams

As performed by the Blue Spotted Rays



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FOOTNOTES

1. The Great Barrier Reef attracts more than 1.6 million visitors per year (Australian Government, no date). It is the world's most extensive coral reef ecosystem. In 1981 it was listed as a World Heritage site, based on four of the World Heritage Convention's ten criteria: (vii) 'The GBR is of superlative natural beauty above and below the water'; (viii) it 'is a globally outstanding example of an ecosystem that has evolved over millennia'; (ix) 'the globally significant diversity of reef and island morphologies reflects ongoing geomorphic, oceanographic and environmental processes'; and (x) 'it is one of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation' (UNESCO, no date). As well as protecting tremendous ecological and physical diversity, the Great Barrier Reef contributes more than $5 billion to the Australian economy, and generates about 63,000 jobs (Australian Government, no date).

2. Climate change is having profound effects on coral reefs around the world. Rising sea surface temperatures place stress on corals and reef ecosystems. Over the past four decades, ocean warming has led to mass coral bleaching throughout the tropics. Coral bleaching occurs when thermal stress disrupts the relationship between the coral—an animal—and its algal symbiont, or companion. When corals experience heat stress, they expel their algae and lose their colour. Prolonged stress can lead to widespread coral mortality (Hughes et al. 2017). The Great Barrier Reef saw two major bleaching events in 2016 and 2017, triggered by climate change. Previous events of a similar scale occurred in 2002 and 1998.

3. The average summer sea-surface temperature on the central Great Barrier reef is approximately 29°C (Lough 1999). This is optimal for the aerobic performance of reef fish.

4. There are several types of blue spotted ray. Here we specifically refer to *Taeniura lymma*, a species commonly seen skittering across shallow reef flats.

5. Australia has a system of democracy, which provides formal means for citizens to participate in decision-making. The country also has a suite of formal and informal institutions that enable input. When publics are dissatisfied with formal decision-making processes and outcomes, protest is a common result. In Australia, all of these avenues—referred to collectively as 'environmental governance'—are used by people wishing to contribute to society. Australia has a history of public intervention in environmental decisions; e.g. protests to protect the Franklin River and Tasmanian wilderness in the early 1980s triggered a landmark case for environmental conservation and constitutional law. Presently, public debate and action on climate change are escalating, nationally and internationally. On 30 November 2018 thousands of school students across Australia protested the lack of action on climate change by the Australian Government. Days later, on 3 December, tens of thousands marched in Brussels ahead of COP24 (the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change).

6. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2014), sea levels could increase by 1 to 3 meters by 2100, depending on future global emission levels.

7. Parrotfish teeth are remarkably hard because parrotfish eat corals. Their teeth are made of a 'chain mail-like' interwoven crystal structure, which allows them to chew up and grind down large volumes of live calcium carbonate coral (Marcus et al. 2017).

8. Who does have political teeth? The Grattan Institute report *Who's in the room? Access and influence in Australian politics* (Wood & Griffiths 2018) highlighted the vulnerability of Australian politics to well-resourced interests (big businesses and industry coalitions) who use money, resources and relationships to influence policy to serve their interests, often at the expense of the public interest. In *The Coal Truth*, David Ritter (2018) exposed multiple interweaving sources of political power in the Australian coal industry, stemming from excessive spending on political lobbying and donations and exaggerated claims of the national economic significance of coal. Another strong influential force within Australia's political systems is the continual shifting of individuals in and out of roles in politics, fossil fuel industry groups, energy and mining companies in a phenomenon dubbed the 'revolving door' (Krien 2017). Such influence operates through promises made, factions formed, donations offered, royalties and taxes agreed, and is thought to underpin remarkable changes in the attitudes of elected Prime Ministers towards coal (noteworthy transitions include Tony Abbott, Julia Gillard, Malcolm Turnbull and Scott Morrison). Against such powerful lobbying, how can the political teeth of parrotfish—and other non-humans invested in the survival of the Great Barrier Reef—be sharpened?

9. Corals can recover from bleaching; bleached coral is not necessarily dead coral. But reducing the incidence of bleaching and coral mortality demands addressing environmental stressors (Hughes T et al. 2015). The greatest threat to the Great Barrier Reef is climate change (Hughes L et al. 2018). Nations around the world are attempting to curb climate change, through international agreements from the Rio Earth Summit in 1992 to the Paris Agreement of 2015. The central aim of these strategies is to reduce global warming. Specifically, 'to strengthen the global response to the threat of climate change by keeping global temperature rise this century well below 2 degree Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius' (UNFCCC 2018). But Australia is lagging behind. Its leadership has failed to develop appropriate emissions reduction policy; and as at November 2018, it was not on track to reach its emissions reduction targets under the Paris Agreement (UN Environment 2018).

10. On average, sea turtles lay 110 eggs in a nest (varying by species), and average between 2 and 8 nests in a season (Sea Turtle Conservancy 2017). Six of the seven species of sea turtles are currently listed on the IUCN Red List of Threatened Species as, variously: Vulnerable, Endangered and Critically Endangered (for one species data is deficient) (IUCN 2018).

11. Herbivorous damselfish are notoriously territorial and adopt 'farming' behaviours to maintain their algal 'lawns' (Lassuy 1980).

12. A report by the Climate Council (Steffen 2015) estimates that if the coal from the 250,000km² Galilee Basin in western Queensland was burned, it would release 705 million tonnes of CO_2 each year, more than 1.3 times Australia's current annual emissions. Consequences for the reef have been reported by scientists for decades. They include increased ocean acidification, which reduces the capacity of corals to build their calcified skeletons (Kleypas et al. 1999), and coral bleaching (Hoegh-Guldberg 1999).

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ACKNOWLEDGEMENTS

The *Blue Spotted Rays* share a passion for ethical relations with the land and sea. The group formed on a boat in the aftermath of a dive on the central Great Barrier Reef during which they witnessed both the beauty of the reef and the distressing effects of mass coral bleaching. The Reef Song was intended as a message to then Prime Minister, Malcolm Turnbull, about the importance of keeping The Galilee Basin coal in the ground. Rock the Boat continues the work of bringing together creative inspiration and scientific insight to make informed and upbeat socio-environmental commentary.

The Blue Spotted Rays are: Kim Williams, Rafael Cabral Carvalho, Mystery Carnage, Sarah Hamylton, Leah Gibbs, Lucas Ihlein

Song available at: https://bluespottedrays.bandcamp.com

Music and lyrics: Kim Williams
Arrangement: Kim Williams and The Blue Spotted Rays
Footnotes: Sarah Hamylton and Leah Gibbs
Musical notation: Adriana Lear
Insert design: Kim Williams and Lucas Ihlein

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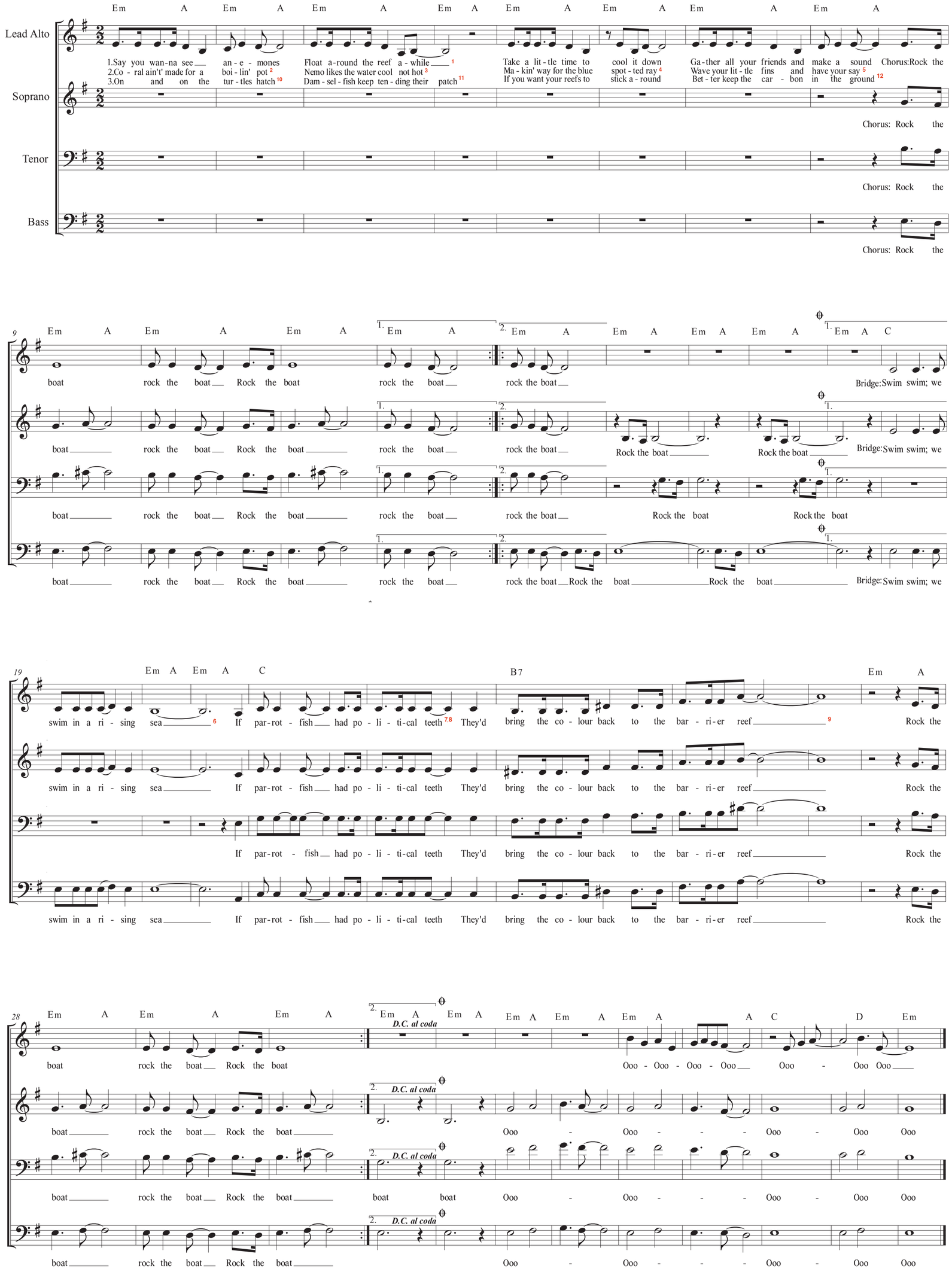

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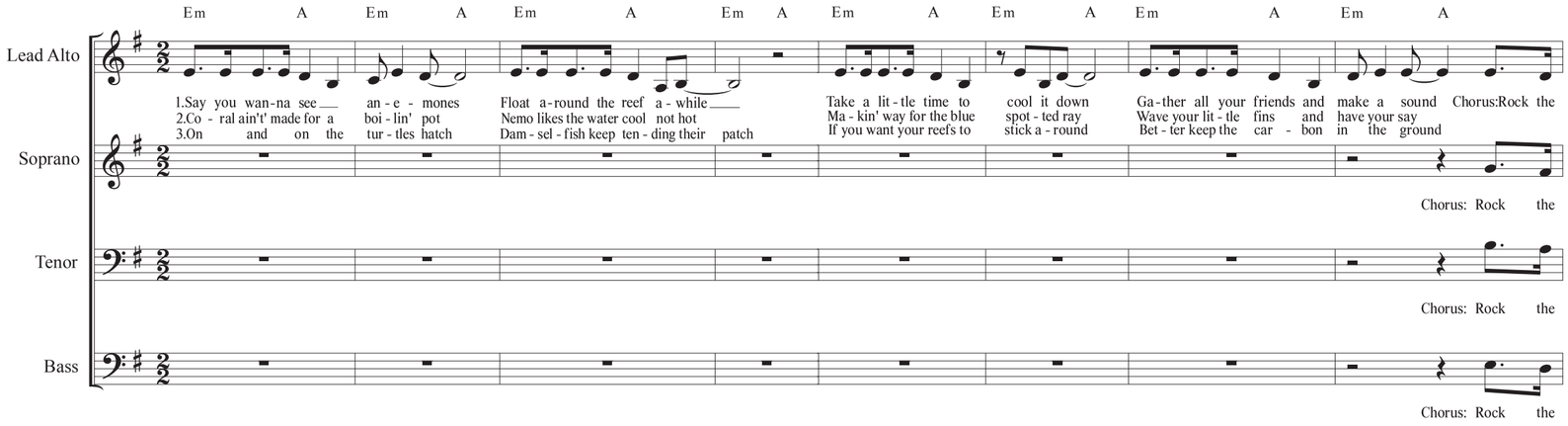

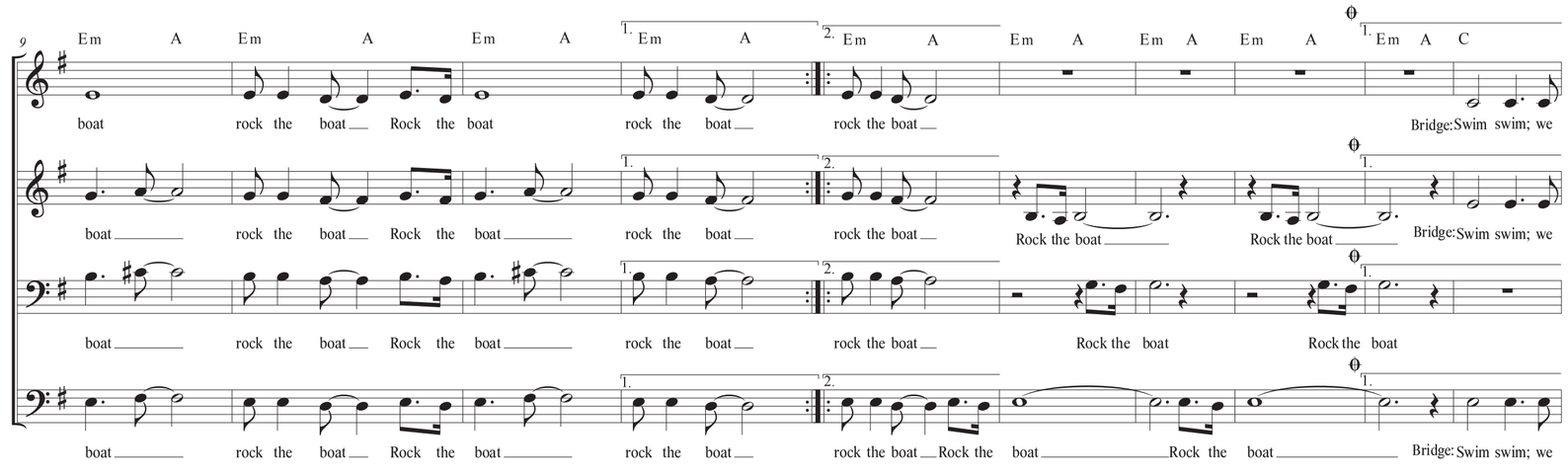

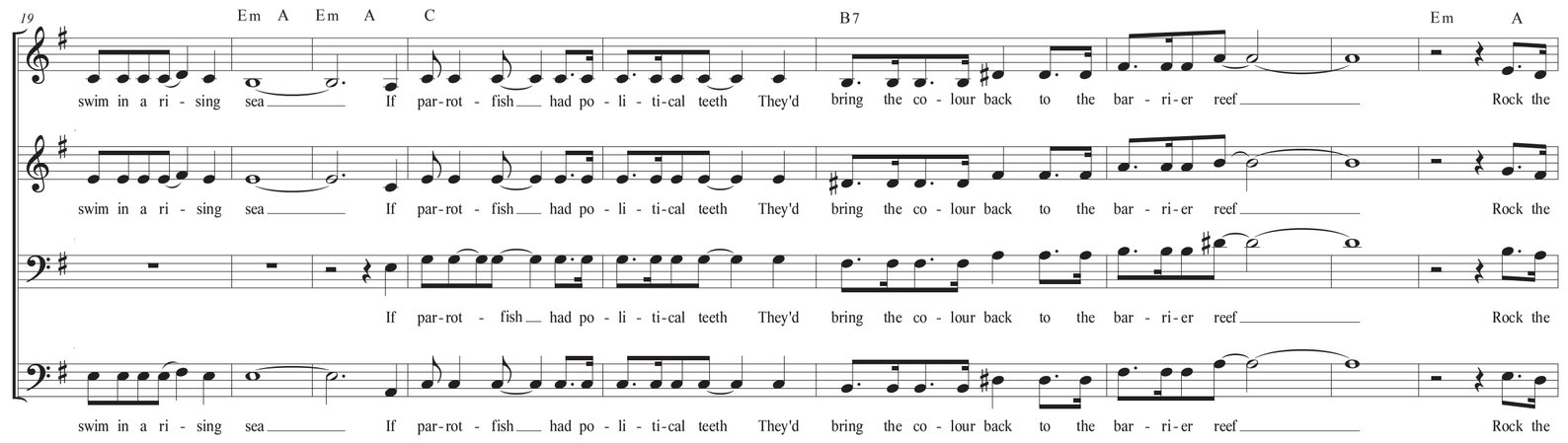

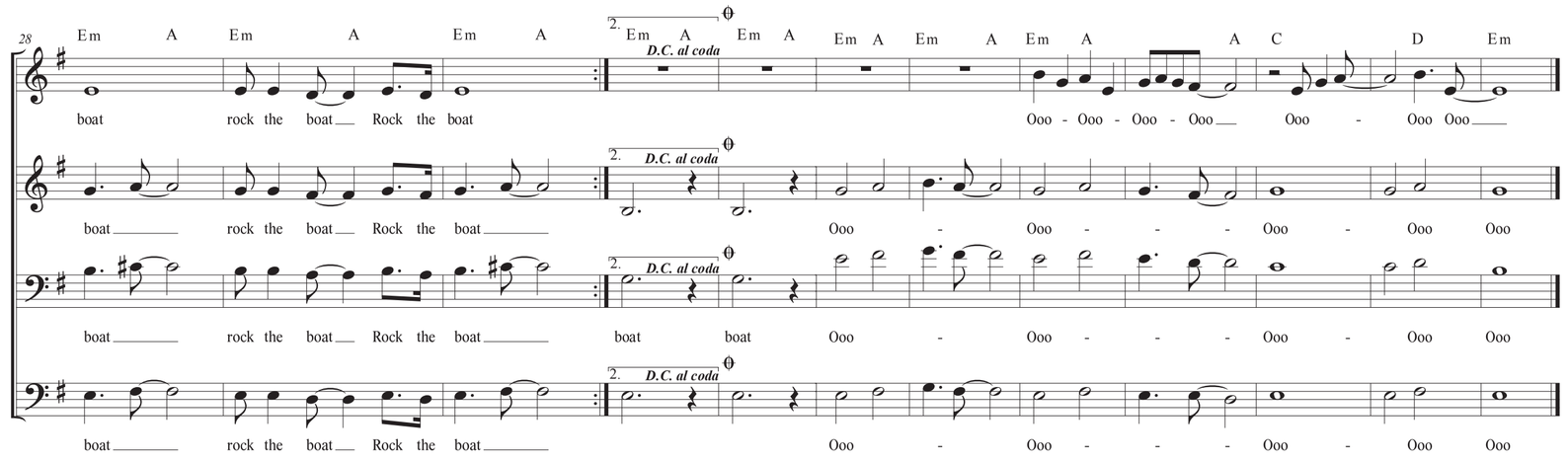

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