

### 3. Climate Change and the International Regulation of Migratory Species

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#### 1. INTRODUCTION

It is chillingly evident that global biodiversity is under unprecedented pressure, with many species now in marked decline and facing unparalleled risks of extinction across the planet.<sup>1</sup> While the root causes of this alarming trajectory are legion and multifaceted, and still most frequently attributable to the rapacious anthropogenic exploitation of natural resources and poorly coordinated development policies,<sup>2</sup> it is nevertheless abundantly clear that climate change is both amplifying current stressors upon species and their ecosystems,<sup>3</sup> as well as driving an unsustainable deterioration in the quality, abundance, and feasibility of critical habitats for global fauna and flora.<sup>4</sup>

One of the cornerstone achievements of modern international law, especially over the course of the previous half-century, has been the emergence and maturation of principles, norms, treaties, and institutions to advance the protection of the global environment.<sup>5</sup> This has culminated in the elaboration of a series of multilateral environmental agreements (MEAs), featuring discrete legal obligations and an institutional architecture designed to address specific environmental concerns, of which wildlife conservation is copiously represented.<sup>6</sup> This institutional bounty notwithstanding, many of these regimes were developed at a time at which climate change was a luxuriously peripheral consideration in comparison to the present day. Accordingly, many biodiversity treaties of the immediate post-1972 era were primarily conceived as mechanisms to halt the precipitous losses of flora and fauna caused by overharvesting, industrial pollution, and anthropogenically-driven habitat destruction. While many MEAs have demonstrated a remarkable capacity for reflection, reinvention, and the refreshment of their individual mandates, there are lingering concerns that climate change now represents a pervasive ‘mismatch’ between environmental treaties,<sup>7</sup> with biodiversity regimes

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<sup>1</sup> For a full analysis see ES Brondizio and others (eds), *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science – Policy Platform on Biodiversity and Ecosystem Services* (IPBES Secretariat, 2019).

<sup>2</sup> Sean L Maxwell and others, ‘The Ravages of Guns, Nets and Bulldozers’ (2016) 536 *Nature* 143; David Tillman and others, ‘Future Threats to Biodiversity and Pathways to their Prevention’ (2017) 546 *Nature* 73; Pedro Jaureguiberry and others, ‘The Direct Drivers of Recent Global Anthropogenic Biodiversity Loss’ (2022) 8 *Science Advances* abm9982.

<sup>3</sup> See further Riley, Chapter 13 in this volume.

<sup>4</sup> Brondizio (n 1); see also Gerardo Ceballos and others, ‘Accelerated Modern Human-Induced Species Losses: Entering the Sixth Mass Extinction’ (2015) 1 *Science Advances* e1400253; Mark C Urban, ‘Accelerated Extinction Risk from Climate Change’ (2015) 348 *Science* 571; Sandra Díaz and others, ‘Pervasive Human-Driven Decline of Life on Earth Points to the Need for Transformative Change’ (2019) 366 *Science* eaax3100.

<sup>5</sup> See Geoffrey Palmer, ‘New Ways to Make International Environmental Law’ (1992) 86 *American Journal of International Law* 259; Rakhyun E Kim and Brendan Mackey, ‘International Environmental Law as a Complex Adaptive System’ (2014) 14 *International Environmental Agreements: Policy, Law and Economics* 5; Daniel Bodansky and Harro van Asselt, *The Art and Craft of International Environmental Law* (2<sup>nd</sup> ed, Oxford University Press 2024) 32-60 and Caddell and McCormack, Chapter 1 in this volume.

<sup>6</sup> See further Michael Bowman, Peter Davies and Catherine Redgwell, *Lyster’s International Wildlife Law* (2<sup>nd</sup> ed, Cambridge University Press 2010) and Annecoos Wiersema, ‘Wildlife’ in Lavanya Rajamani and Jacqueline Peel (eds), *The Oxford Handbook of International Environmental Law* (2<sup>nd</sup> ed, Oxford University Press, 2021) 554.

<sup>7</sup> Arie Trouwborst, ‘International Nature Conservation Law and the Adaptation of Biodiversity to Climate Change: A Mismatch?’ (2009) 21 *Journal of Environmental Law* 419.

and the United Nations Framework Convention on Climate Change (UNFCCC)<sup>8</sup> coexisting uneasily in a state of unsplendid isolation. With the direct and indirect impacts of climate change posing an increasingly pressing existential threat to the biodiversity protected under their stewardship, an ability to both withstand the stress-tests of climate change and to evolve to meet these new conservation realities will be crucial to the ongoing relevance and effectiveness of these more mature treaty structures.

One of the leading treaties developed for the international protection of wildlife is the Convention on the Conservation of Migratory Species of Wild Animals (CMS),<sup>9</sup> adopted in 1979. As its titular intent suggests, the CMS provides for the global oversight of a vast and eclectic array of migratory wildlife, a cohort of species that will be acutely affected by the enhanced ecological stresses imposed by a changing climate. The CMS is a unique instrument, providing both overarching obligations for the protection of migratory fauna, as well as a framework through which subsidiary instruments may be elaborated to promote conservation action on a regional and species-specific level.<sup>10</sup> As one of the more longstanding biodiversity treaties, and one navigating the rigour and vigour of middle age, the CMS provides an intriguing context by which to appraise the extent to which this ongoing mismatch may be reviewed and reconciled. To this end, this chapter first considers the key conservation threats posed to migratory species by climate change, which will need to be addressed as operative priorities for the CMS regime. Thereafter, this chapter examines the extent to which the CMS and its subsidiary instruments have prescribed climate change obligations and how these policies have evolved in recent decades as this threat has received greater traction under its sprawling regulatory auspices. This chapter then considers how the CMS has collaborated with other regimes to foster cooperative strategies in the promotion of this mandate.

## 2. MIGRATION, MIGRATORY SPECIES AND CLIMATE CHANGE

Migration remains one of the most iconic and inspiring phenomena of the natural world. A vast array of animals may be termed ‘migratory’ in nature, ranging from birds, insects, mammals and fresh and saltwater species, all of which will undertake some form of regular movement pattern. Migration has been described as ‘a cyclical, and therefore predictable, phenomenon whereby certain animals perform periodic movements between two separate geographic areas, one area usually being where they breed’.<sup>11</sup> Such movements, which may involve arduous and perilous journeys, is generally attributed to changeable habitat quality at important stages in their individual life cycles.<sup>12</sup> In this manner migratory species are distinguished from ‘dormant’ species, non-migrants that are generally blessed with a consistent abundance of favourable living conditions and are not therefore obliged to abandon and return to such sites on a recurring basis.

Migration has been traditionally – and largely inaccurately – viewed through a primarily ornithocentric lens, with common trends in bird movement suggesting that all

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<sup>8</sup> United Nations Framework Convention on Climate Change (adopted 9 May 1992, entered into force 21 March 1994) 1771 UNTS 107.

<sup>9</sup> Convention on the Conservation of Migratory Species of Wild Animals (adopted 23 June 1979, entered into force 1 November 1983) 1651 UNTS 333.

<sup>10</sup> See further Richard Caddell, ‘Marine Mammals and Migratory Species’ in Rosemary Rayfuse, Aline Jaeckel and Natalie Klein (eds), *Research Handbook on International Marine Environmental Law* (2<sup>nd</sup> ed, Edward Elgar 2023) 333, and section 3 below.

<sup>11</sup> Cyril de Klemm, ‘Migratory Species in International Law’ (1989) 29 *Natural Resources Journal* 935, 935.

<sup>12</sup> Hugh Dingle and V Alistair Drake, ‘What is Migration?’ (2007) 57 *Bioscience* 113, 117; Claire S Teitelbaum and others, ‘How Far to Go? Determinants of Migration Distance in Land Mammals’ (2015) 18 *Ecology Letters* 545.

migrants undertake vast and regular roundtrips.<sup>13</sup> However, it has been increasingly recognised that migratory species present exceptionally diverse patterns of behaviour and movement and thus defy as a categorisation as a homogenous bloc, and instead have highly individualised conservation needs. Tracking the vulnerability of migratory species to multiple anthropogenic stressors, including climate change, is a highly challenging undertaking, with profound difficulties in acquiring meaningful data of highly mobile species which undertake lengthy movement patterns and utilise an array of different habitats.<sup>14</sup> This is particularly acute within isolated and dynamic marine environments, where knowledge of the true state of the conservation status of migratory species pales into near insignificance compared to terrestrial species.<sup>15</sup> Indeed, the first global review of the state of migratory species was collated only in 2024, revealing that a considerably larger number of species were in need of protective assistance than had previously been considered the case.<sup>16</sup>

Although migratory patterns vary markedly, such species are acutely vulnerable to anthropogenic and natural pressures during these key periods of movement.<sup>17</sup> While the act of migration itself can be perilous enough, this has been steadily compounded by infrastructure developments that present an increasingly obstructive barrier to biodiversity movement,<sup>18</sup> as well as poorly-regulated hunting activities and a failure to adequately protect particular species domestically across all jurisdictional stages of their migratory routes.<sup>19</sup> These challenges have been exacerbated further by climate change and habitat loss and fragmentation, which have affected the migratory pathways of large numbers of species, eliciting significant behavioural changes, including dramatic reductions in natural ranges<sup>20</sup> or even eschewing migration altogether as a biological imperative.<sup>21</sup> This steady fraying of habitat quality, exacerbated by changing environmental conditions, has significant conservation implications for migratory species, reducing the volumes of predictably viable areas required to support vital life-cycle

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<sup>13</sup> Hugh Dingle, *Migration: The Biology of Life on the Move* (2<sup>nd</sup> ed, Oxford University Press 2014) 1; see also Katherine A Cresswell, William H Satterthwaite and Gregory A Sword, 'Understanding the Evolution of Migration through Empirical Examples' in EJ Miller-Gulland, John M Fryxell and Anthony RE Sinclair, *Animal Migration: A Synthesis* (Oxford University Press 2011) 6 and Andrew M Hein, Chen Hou and James F Gillooly, 'Energetic and Biomechanical Constraints on Animal Migration Distance' (2012) 15 *Ecology Letters* 104.

<sup>14</sup> Richard Schuster, 'Optimizing the Conservation of Migratory Species Over Their Full Annual Cycle' (2019) 10 *Nature Communications* 1754.

<sup>15</sup> Justin L Penn and Curtis Deutsch, 'Avoiding Ocean Mass Extinction from Climate Warming' (2022) 376 *Science* 524; Forough Gourdzai and others, 'Thermal Vulnerability of Sea Turtle Foraging Grounds around the Globe' (2024) 7 *Communications Biology* 347.

<sup>16</sup> UNEP-WCMC, *State of the World's Migratory Species* (UNEP-WCMC 2024) 55.

<sup>17</sup> See Renee G Siedler and others, 'Identifying Impediments to Long-distance Mammal Migrations' (2015) 29 *Conservation Biology* 99.

<sup>18</sup> Kyle Joly, 'Longest Terrestrial Migrations and Movements around the World' (2019) 9 *Scientific Reports* 15333; Arie Trouwborst, Floor Fleurke and Jennifer Dubrulle, 'Border Fences and their Impacts on Large Carnivores, Large Herbivores and Biodiversity: An International Wildlife Law Perspective' (2016) *Review of European, Comparative and International Environmental Law* 291.

<sup>19</sup> Robert A Robinson and others, 'Travelling Through a Warming World: Climate Change and Migratory Species' (2009) 7 *Endangered Species Research* 87; see also Tim S Doherty, Graeme C Hays and Don A Driscoll, 'Human Disturbance Causes Widespread Disruption of Animal Movement' (2021) 5 *Nature Ecology & Evolution* 513.

<sup>20</sup> Marlee A Tucker and others, 'Moving in the Anthropocene: Global Reductions in Terrestrial Mammalian Movements' (2018) 359 *Science* 466.

<sup>21</sup> See Joel Berger, 'The Last Mile: How to Sustain Long-Distance Migration in Mammals' (2004) 18 *Conservation Biology* 320; Grant Harris and others, 'Global Decline in Aggregated Migrations of Large Terrestrial Mammals' (2009) 7 *Endangered Species Research* 55; David S Wilcove and Martin Wikelski, 'Going, Going, Gone: Is Animal Migration Disappearing?' (2008) 6 *PLoS Biology* e188; Tucker (n 20).

events for significant concentrations of animals,<sup>22</sup> for which adaptive translocation and other adaptation strategies have finite limits.<sup>23</sup>

A changing climate poses a further litany of existential threats to migratory species. Altered migratory patterns may lead to animals departing and/or arriving at less optimal times for key life events such as breeding, nesting, or hibernation.<sup>24</sup> Warming temperatures are also driving species shifts,<sup>25</sup> displacing animals – migratory and otherwise – from their natural ranges.<sup>26</sup> This creates further propensity for competition between species for dwindling habitats and food sources,<sup>27</sup> or predation by non-native interlopers,<sup>28</sup> elevated risks for the transfer of diseases,<sup>29</sup> displacement into areas of concentrated industrial activity,<sup>30</sup> and enhanced scope for human-wildlife conflicts.<sup>31</sup> Beyond the thorny conservation challenges posed by these trends, shifts in movement patterns also create increasing governance and resource tensions, as species with significant commercial and nutritional value are displaced across jurisdictional boundaries,<sup>32</sup> in which they may also receive correspondingly lower legal protections.

Notwithstanding the inherent value of the conservation of individual migratory species, the act of migration itself is also considered to play a significant role in ecosystem functioning across the planet, with animal movements triggering acts of pollination, seed dispersal and nutrient fertilisation, while also spreading the consumption of vegetation in a more even manner and, completing the circle of life, rather literally providing a moveable feast as a source of prey for more static species.<sup>33</sup> The protection of migration and migratory species is thus important not simply from the laudable standpoint of conserving an individual population of animals, but also to secure the cascading biological advantages that their migratory pathways bring to global ecosystems at a time of unprecedented pressure.

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<sup>22</sup> Robinson (n 19); Daniel C Dunn and others, 'The Importance of Migratory Connectivity for Global Ocean Policy' (2019) 286 *Proceedings of the Royal Society B* 20191472.

<sup>23</sup> Arie Trouwborst and Andy Blackmore, 'Hot Dogs, Hungry Bears and Wolves Running Out of Mountain – International Wildlife Law and the Effects of Climate Change on Large Carnivores' (2020) 23 *Journal of International Wildlife Law and Policy* 221.

<sup>24</sup> Stuart E Newson and others, 'Indicators of the Impact of Climate Change on Migratory Species' (2009) 7 *Endangered Species Research* 101; Timothée R Cook and others, 'Parenting in a Warming World: Thermoregulatory Responses to Heat Stress in an Endangered Seabird' (2019) 8 *Conservation Physiology* cox109; Niclas Jonzén, Anders Hedenström and Per Lundberg, 'Climate Change and the Optimal Arrival of Migratory Birds' (2007) 274 *Proceedings of the Royal Society B* 20063719; and Franz Barlein, 'Migratory Birds under Threat' (2016) 354 *Science* 6312.

<sup>25</sup> I-Ching Chen and others, 'Rapid Range Shifts of Species Associated with High Levels of Climate Warming' (2011) 333 *Science* 1024.

<sup>26</sup> Greta T Pecl and others, 'Biodiversity Redistribution under Climate Change: Impacts on Ecosystems and Human Well-Being' (2017) 355 *Science* 1389; see also Trouwborst, Chapter 10 in this volume.

<sup>27</sup> Pecl (n 26).

<sup>28</sup> Céline Bellard, Phillip Cassey and Tim M Blackburn, 'Alien Species as a Driver of Recent Extinctions' (2016) 12 *Biology Letters* 20150623.

<sup>29</sup> Sonia Altizer, Rebecca Bartel and Barbara A Han, 'Animal Migration and Infectious Disease Risk' (2011) 331 *Science* 296; Colin J Carlson and others, 'Climate Change Increases Cross-species Viral Transmission Risk' (2022) 607 *Nature* 555.

<sup>30</sup> Randall R Reeves and others, 'Distribution of Endemic Cetaceans in Relation to Hydrocarbon Development and Commercial Shipping in a Warming Arctic' (2014) 44 *Marine Policy* 375; Gregory K Silber, 'Projecting Marine Mammal Distribution in a Changing Climate' (2017) 4 *Frontiers in Marine Science* 413.

<sup>31</sup> Briana Abrahms and others, 'Climate Change as a Global Amplifier of Human-Wildlife Conflict' (2023) 13 *Nature Climate Change* 224; see also Blackmore, McCormack and Pooley, Chapter 14 in this volume.

<sup>32</sup> Malin L Pinsky and others, 'Preparing Ocean Governance for Species on the Move' (2018) 360 *Science* 1189; see also Richard Caddell, 'Where's the Catch? Shifting Stocks, International Fisheries Management and the climate change conundrum' in Jacques Hartmann and Urfan Khaliq (eds) *The Achievements of International Law: Essays in Honour of Robin Churchill* (Hart 2021) 283; Pecl (n 2); and Lennan, Chapter 6 in this volume.

<sup>33</sup> S Bauer and BJ Hoyer, 'Migratory Animals Couple Biodiversity and Ecosystem Functioning Worldwide' (2014) 344 *Science* 54.

### 3 THE INTERNATIONAL REGULATION OF MIGRATORY SPECIES: THE CMS REGIME

Given that migratory species may cross multiple national boundaries, although national conservation activities are an innately valuable component of conservation strategies, the most effective and holistic regulatory responses for the protection of these animals will necessarily be multilateral in nature. While individual migratory species had received a degree of protective attention within early biodiversity and natural resources instruments,<sup>34</sup> notably birds<sup>35</sup> and marine mammals,<sup>36</sup> this was largely contingent upon these species being addressed within the spatial or thematic remits of the treaties in question. Moreover, such instruments were essentially concerned with the regulation of hunting and thus ensuring a ready supply of harvestable specimens, as opposed to actively recognising the specific vulnerabilities faced by migratory species and addressing their distinct conservation needs.<sup>37</sup>

However, by the 1970s, strong momentum towards the elaboration of protective measures for migratory species had begun to build in an array of different forums, with a series of European initiatives developed to protect avifauna.<sup>38</sup> In 1972 the UN Conference on the Human Environment called upon governments to ‘give attention to the need to enact international conventions and treaties to protect species inhabiting international waters or those which migrate from one country to another’.<sup>39</sup> While the conservation of high seas species would be addressed to at least some degree under the UN Convention on the Law of the Sea 1982 (LOSC),<sup>40</sup> for which negotiations commenced in 1973,<sup>41</sup> the Stockholm Action Plan

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<sup>34</sup> See further de Klemm (n 11) 938-976 and Marc Cioc, *The Game of Conservation: International Treaties to Protect the World's Migratory Animals* (Ohio University Press 2009) 14-147.

<sup>35</sup> Most notably the Convention between the United States and the United Kingdom for the Protection of Migratory Birds in the United States and Canada (adopted 16 August 1916, entered into force 6 December 1916), US Treaty Series No 628; see further Kirkpatrick Dorsey, *The Dawn of Conservation Diplomacy: US-Canadian Wildlife Protection Treaties in the Progressive Era* (University of Washington Press 1998) 165-237 and Bowman, Davies and Redgwell (n 6) 199-238.

<sup>36</sup> On seal arrangements see Nikolas Sellheim, *The Seal Hunt: Cultures, Economies and Legal Regimes* (Brill 2018) 119-130; on early whale conservation initiatives see Malgosia Fitzmaurice, *Whaling and International Law* (Cambridge University Press 2015) 6-28.

<sup>37</sup> Cioc (n 34) 1.

<sup>38</sup> On a regional basis, the Council of Europe adopted a series of Resolutions exhorting its Member States to protect numerous species of birds, of which migratory species were heavily represented, culminating in the adoption of the Convention for the Conservation of European Wildlife and Natural Habitats (adopted 19 September 1979, entered into force 1 June 1982) 1982 UKTS 56 (Bern Convention), which also contains numerous provisions addressing migratory species. Also in 1979, the European Economic Community adopted the first iteration of its Birds Directive, which also protects migratory birds as a central element of its mandate: subsequently revised and consolidated as Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds [2010] *Official Journal* L 20/7.

<sup>39</sup> Recommendation 32 of the Stockholm Action Plan, (1972) 11 *International Legal Materials* 1416. On the burgeoning regional protection of migratory birds prior to the development of the CMS see Jan-Henrik Mayer, ‘Saving Migrants: A Transnational Network Supporting Supranational Bird Protection Policy’ in Wolfram Kaiser, Brigitte Leucht and Michael Gehler (eds), *Transnational Networks in Regional Integration: Governing Europe 1945-83* (Palgrave MacMillan 2010) 176.

<sup>40</sup> United Nations Convention on the Law of the Sea (adopted 10 December 1982, in force 16 November 1994) 1833 UNTS 397.

<sup>41</sup> At the time, national jurisdictional waters were in a state of flux, as states were increasingly seeking to appropriate additional areas of maritime territory through the embryonic concept of the Exclusive Economic Zone (EEZ). The LOSC would ultimately prescribe a series of rights and responsibilities concerning the use of these waters, as well as specific obligations for individual migratory species: see Caddell (n 10) and Lennan and Roberts, Chapters 6 and 7 in this volume.

called for the conclusion of a ‘broadly based convention’ to provide a framework for the protection of migratory species.<sup>42</sup> This prompted a series of negotiations, under the leadership of the Federal Republic of Germany, towards the development of a treaty to expand more holistic protections to a wider array of migratory species. In June 1979 the CMS was opened for signature in Bonn, where it remains institutionally based, entering into force on 1 November 1983.

Despite its unprecedented scope and application, the CMS was initially disparaged by contemporary legal commentators as a ‘sleeping treaty’ that lacked the necessary impetus to effectively regulate a wide range of different species.<sup>43</sup> Hindsight would indicate that this was an unfairly pejorative description of a regime that would always require time to complete the protracted and ambitious listing process for a critical mass of species and to enfranchise a sustainable family of daughter Agreements. Even so, this sobriquet stuck during the earlier years of its operation, in which the CMS was justifiably subject to concerns over a lack of participants and resources.<sup>44</sup> These initial reservations aside, the modern CMS is very much awake and has consistently demonstrated its merits as an innovative laboratory for conservation ideas and a protective ‘ark’ for numerous species that have been often overshadowed by more charismatic fauna as candidates for multilateral protection.<sup>45</sup> Indeed, the CMS has expanded markedly in coverage and participation since the early 1990s – at which point its first subsidiary instruments began to emerge – and now features a global membership of 133 parties. Moreover, ratification of the CMS is not a pre-requisite to participation in any of its subsidiary instruments, which remain free-standing initiatives, even if their core obligations and regulatory philosophies generally reflect those of the parent convention.<sup>46</sup> Engagement with the broader work of the CMS thus extends beyond its formal parties, with vital conservation initiatives having now been developed under these auspices in most regions of the planet.

### 3.1. Definitions, objectives, obligations, and approaches

The CMS acknowledges that ‘States are and must be the protectors of the migratory species of wild animals that live within or pass through their national jurisdictional boundaries’, thus requiring ‘concerted action’ from all countries in which such species ‘spend any part of their life cycle’.<sup>47</sup> Migratory species are defined under the CMS as ‘the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries’.<sup>48</sup> This is both an expansive and a contentious interpretation. The qualifying factor for coverage under the CMS is therefore framed not through express biological criteria, but by the essentially anthropomorphic trait that an animal will blithely and

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<sup>42</sup> Recommendation 32 of the Stockholm Action Plan (n 39).

<sup>43</sup> Simon Lyster, *International Wildlife Law: An Analysis of International Treaties Concerned with the Conservation of Wildlife* (Cambridge University Press 1985) 301.

<sup>44</sup> See Richard Caddell, ‘International Law and the Protection of Migratory Wildlife: An Appraisal of Twenty-Five Years of the Bonn Convention’ (2005) 16 *Colorado Journal of International Environmental Law and Policy* 113, 140-1, and Nele Matz, ‘Chaos or Coherence? Implementing and Enforcing the Conservation of Migratory Species through Various Legal Instruments’ (2005) 65 *Zeitschrift für ausländisches öffentliches Recht und Völkerrecht* 197, 208-10.

<sup>45</sup> Caddell (n 9).

<sup>46</sup> Although these are not always identical or harmonious: see Melissa Lewis, ‘Deciphering the Complex Relationship between AEWA’s and the Bonn Convention’s Respective Exemptions to the Prohibition of Taking’ (2019) 22 *Journal of International Wildlife Law and Policy* 173.

<sup>47</sup> Preamble.

<sup>48</sup> Article I(1)(a).

obviously traverse a human-designated boundary with some degree of cyclical predictability in pursuing its essential life functions. This creates a contentious disconnect with the scientific understanding of ‘migration’ – albeit one that is not uncommon for international treaties in which technical concepts are moulded to suit jurisdictional sensitivities<sup>49</sup> – and has some logic given that the Convention is reliant upon the cooperative exercise of national jurisdiction through which to discharge its protective framework.<sup>50</sup>

While this formulation provides helpful flexibility, it has also proven contentious and arbitrary in specific cases. Indeed, it expressly disqualifies those species that may cyclically and predictably move significant distances between areas of habitat, but which remain at all times confined within the confines of one large state. This is exemplified by the orange-bellied parrot, a critically endangered species considered to be scientifically migratory, since it undertakes arduous movements between Tasmania and the Australian mainland, but does not qualify as such under the CMS since it lives continuously within the same jurisdiction. Conversely, species that undertake regular but minimal movements could become ‘migratory’ for the purposes of Article I if these limited forays happen to traverse national borders. This has allowed the CMS to technically regulate certain charismatic species – notably gorillas – that might otherwise be subject to little or no transboundary conservation obligations pertaining to habitat quality.<sup>51</sup> Similarly, should geopolitical forces result in the dissolution of a large state, as occurred for instance in the case of the Soviet Union, the resulting emergence of new frontiers might also result in particular species becoming inadvertently migratory in legal classification, if not necessarily in nature. Accordingly, attempts have been made within the CMS to ensure that Article I does not trigger absurd designations that undermine the credibility of the regime, or inundate it with obligations to all but the most static of creatures, primarily by distinguishing ‘nomadic’ species from its operational focus.<sup>52</sup> This application to primates thus remains an outlier in CMS practice, and the Convention has otherwise focused on more obviously migratory fauna.

In keeping with common approaches of biodiversity legislation, the CMS prescribes tiered protection for individual species by listing them upon its Appendices to reflect the level of current peril faced by these animals and the degree of urgency for which conservation obligations should be prescribed and applied. Two Appendices apply to the CMS and, as with other MEAs, listing decisions are made during the regular Conferences of the Parties (COPs) to the Convention. Species that are ‘endangered’ are listed on Appendix I, with over 100 separate species having been listed to date, for which parties are to ‘endeavour to provide immediate protection’.<sup>53</sup> An endangered species is one that is ‘in danger of extinction throughout all or a significant part of its range’,<sup>54</sup> a requirement that has been further interpreted

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<sup>49</sup> For instance, Article 77(4) of the LOSC defines ‘sedentary species’ as ‘organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil’, legally capturing bivalve molluscs in a manner that would bemuse most marine biologists: see further Valentin J Schatz, “‘Crawling Jurisdiction’: Revisiting the Scope and Significance of the Definition of Sedentary Species’ (2022) 36 *Ocean Yearbook* 188. Oceanographers would be similarly perplexed by the legal understanding of a ‘continental shelf’ in Part VI of the LOSC.

<sup>50</sup> Dunn (n 19).

<sup>51</sup> Indeed, there was internal resistance to developing a CMS subsidiary agreement on gorillas given that they are ecologically non-migratory – but their truncated range encompasses frontier areas, thus triggering Article I: *Report of the Thirteenth Meeting of the CMS Scientific Council* (CMS 2005) 11. On transboundary conservation see further Hsiao, Chapter 4 in this volume.

<sup>52</sup> In 1995 the Global Register of Migratory Species (GROMS) database was initiated which, while still a work in progress, aims to establish an authoritative list of migrant species that merit protection while excluding exclusively nomadic species: Klaus Riede, ‘Conservation and Modern Information Technologies: The Global Register of Migratory Species (GROMS)’ (2000) 3 *Journal of International Wildlife Law and Policy* 152.

<sup>53</sup> Article II(3)(b).

<sup>54</sup> Article I(1)(e).

as “facing a very high risk of extinction in the wild in the near future”.<sup>55</sup> This formulation means that the impact of climate change can be factored in to proposals for the listing of species on Appendix I, albeit that the time horizon envisaged under the CMS in this regard is one that would seemingly favour the short-term. Accordingly, the CMS continues to largely the practice ‘deathbed conservation’<sup>56</sup> associated with older protective structures, in which the most significant conservation ministrations are triggered only when population numbers have plummeted to the point of near collapse, a trend that is considered to represent the ongoing mismatch in international biodiversity law towards climate change concerns.<sup>57</sup> This would appear to be a formulation that is ripe for ambitious revisitation. Indeed, a greater scope for more proactive protective designation has become apparent under national legislation, where climate modelling may predict with increasing accuracy the future point at which habitats will become compromised by ecological changes to the extent that individual species will meet the threshold for endangerment. Notably this has been the approach in the United States under the Endangered Species Act, where species have been pre-emptively listed for protective designations on the basis of the projected threats from climate change.<sup>58</sup>

Where a species is listed on Appendix I, Parties undertake to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction; to prevent, remove, compensate for or minimise, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and ‘to the extent feasible and appropriate’, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling and regulating the presence of exotic species.<sup>59</sup> These obligations were not drafted with climate change expressly in mind, they do nonetheless offer significant scope for parties to act proactively to address the impacts of environmental changes upon migratory species and their core habitats, notably by the restoration of climate-compromised habitats and addressing the impacts of invasive species displaced by warming conditions.<sup>60</sup>

## Appendix II

The CMS also considers species with an ‘unfavourable conservation status’, which are assigned to Appendix II, for which parties may conclude subsidiary instruments to address their long-term conservation and management needs.<sup>61</sup> A relatively small number of species have been listed on both Appendices simultaneously, which both prioritises their conservation under the CMS and raises the possibility of the development of subsidiary measures, which could also potentially engage non-parties to the CMS.

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<sup>55</sup> CMS Resolution 13.32.

<sup>56</sup> John Charles Kunich, ‘The Fallacy of Deathbed Conservation under the Endangered Species Act’ (1994) 24 *Environmental Law* 501.

<sup>57</sup> Trouwborst (n 7) 424. See also David Tilman and others, Future Threats to Biodiversity and Pathways to their Prevention’ (2017) 546 *Nature* 73.

<sup>58</sup> See further Richard Caddell, ‘Marine Mammals at the Poles’ in Karen N Scott and David L Vanderzwaag, *Research Handbook on Polar Law* (Edward Elgar, 2020) 218; Kevin Godfrey, ‘Redefining What is Foreseeable: Trump’s Near-Sighted Interpretation of the Endangered Species Act’ (2021) 11 *Arizona Journal of Environmental Law and Policy* 119.

<sup>59</sup> Article III(4).

<sup>60</sup> See also Arie Trouwborst, ‘Transboundary Wildlife Conservation in A Changing Climate: Adaptation of the Bonn Convention on Migratory Species and Its Daughter Instruments to Climate Change’ (2012) 4 *Diversity* 258, 265 and Trouwborst, Chapter 10 in this volume.

<sup>61</sup> Article II(3)(c).

Limited exceptions apply to these commitments, allowing for ‘taking’ individuals in circumstances broadly reminiscent of the terms of the ICRW.<sup>62</sup> Taking is permitted for ‘scientific purposes’, albeit that this provision has not been actively raised in the context of marine mammals – primarily because those states that have conducted scientific hunting are not parties to the Convention – and has thus proved far less contentious than in other bodies. Similarly, echoing the ASW exemption under the ICRW, Appendix I species may be taken to accommodate the needs of ‘traditional subsistence users’.<sup>63</sup> Again, this has not been actively invoked in the context of endangered marine species and the CMS has thus avoided the sustained difficulties associated with non-commercial catches experienced within the IWC.

Much of the substantive work of the CMS to date has focused on Appendix II species, whereby a complex but innovative framework facilitates the elaboration of further subsidiary instruments to promote their conservation, which may range from binding agreements to informal approaches. Species are listed on Appendix II if they fail to meet criteria for a ‘favourable conservation status’<sup>64</sup> which is triggered in essence by diminishing natural ranges, habitat quality and distribution and abundance.<sup>65</sup> To date a wide array of marine species have been so listed, including forty-four species of cetaceans and thirty-six species of sharks.

Two distinct types of formal CMS subsidiary instruments are envisaged in respect of migratory species. These are inelegantly and confusingly delineated as an ‘AGREEMENT’ elaborated under Article IV(3) of the Convention and an ‘agreement’ concluded pursuant to Article IV(4), with the former term capitalised to distinguish such instruments from the latter category. Under Article IV(3), the CMS mandates the development of AGREEMENTs for species listed in Appendix II, while Article IV(4) applies more loosely to ‘any population or any geographically separate part of the population of any species or lower taxon of wild animals, members of which periodically cross one or more national jurisdiction boundaries’. Accordingly, while Article IV(3) AGREEMENTs are reserved for listed species, Article IV(4) agreements could technically apply to a far broader array of animals, some of which may not ultimately meet the precise threshold for listing, but are migratory in nature and would benefit from multilateral action. The distinction appears to be a relic from early drafts of the Convention, where individual species were intended to be deleted from the Appendices once a suitable subsidiary instrument had been concluded, although this requirement did not survive into the final text. The precise inter-relationship between the two concepts is blurry<sup>66</sup> and any previously intended hierarchy has long been disregarded for the sake of practical expediency. Ultimately, Article IV(4) has proved to be a far more attractive legal avenue for the conclusion of subsidiary instruments. Given their qualifying restrictions, AGREEMENTs remain a comparatively rare initiative: of the twenty-six daughter instruments concluded to date, only four were conceived under Article IV(3).<sup>67</sup> With the exception of migratory birds with a marine presence, all the CMS subsidiaries with a focus on aquatic species have been established under Article IV(4).

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<sup>62</sup> Article III(5).

<sup>63</sup> *Ibid.*

<sup>64</sup> Article I(1)(d).

<sup>65</sup> Article I(1)(c).

<sup>66</sup> See further C Wold, *A History of “AGREEMENTS” under Article IV.3 and “agreements” under Article IV.4 in the Convention on Migratory Species*; Document UNEP/CMS/COP11/Inf.31.

<sup>67</sup> These concern European bats, African-Eurasian waterbirds, African gorillas, and albatrosses and petrels.

For Appendix II species, Article V(1) envisages that AGREEMENTs should ‘restore the migratory species concerned to a favourable conservation status or to maintain it in such a status.... [and] deal with those aspects of the conservation and management of the migratory species concerned which serve to achieve that object’. They should ‘cover the whole of the range of the migratory species concerned and should be open to accession by all Range States of that species’, irrespective of accession to the parent convention<sup>68</sup> and ‘wherever possible’ address more than one migratory species.<sup>69</sup> Article V(4) specifies five fundamental features that should be common to each AGREEMENT, namely that they should identify the migratory species concerned; describe the range and migration route of the species in question; make provision for each party to designate a national authority concerned with the implementation of the AGREEMENT; establish appropriate machinery to assist in implementing the AGREEMENT, monitor its effectiveness and prepare reports for the COP; and to provide for procedures for the resolution of disputes.

A sixth requirement is also established for AGREEMENTs specifically addressing cetaceans, whereby ‘at a minimum’ they must prohibit takings and allow for accession by non-Range States.<sup>70</sup> This provision thus frames co-existence between the CMS with the IWC. Unlike the whaling regime, however, Article V(4)(f) refers simply to ‘migratory species of the Order Cetacea’ thereby applying to any species of cetacean that meets the Convention’s definition of ‘migratory’: the CMS accordingly represents a rare international framework that applies unequivocally to both ‘large’ and ‘small’ species of cetaceans. In this regard, as noted further below, it has carved a valuable regulatory niche for itself as a body with undisputed competence over the smaller species.

Given the specific emphasis placed upon cetaceans under Article V(4)(f), the CMS clearly envisaged that Article IV(3) AGREEMENTs would be prioritised for these species, an approach further advocated in early Resolutions of its COP.<sup>71</sup> However, this has not transpired in practice, primarily because the requirements of Article V(4) set an extremely high threshold of data concerning migratory routes in order to legitimately establish an AGREEMENT, impeding efforts to proceed on this basis.<sup>72</sup> In contrast, the CMS does not specify any guidelines for the elaboration of Article IV(4) agreements, allowing the parties greater freedom to determine their structure and species coverage, as reflected in the practice and design of these instruments to date.

In addition to Agreements, the CMS also facilitates non-binding Memoranda of Understanding (MOUs),<sup>73</sup> a number of which have been adopted for marine species. The range of non-binding approaches under the CMS is further complemented by single- or multi-species Action Plans, adopted both by the parent convention as well as by subsidiary regimes,<sup>74</sup> and Concerted

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<sup>68</sup> Article V(2).

<sup>69</sup> Article V(3).

<sup>70</sup> Article V(4)(f). The practice of parallel IV(4) Agreements suggests that the application to non-Range States was intended to address parties habitually fishing in these waters.

<sup>71</sup> Resolution 2.3: Small Cetaceans.

<sup>72</sup> H Nijkamp and A Nollkaemper, ‘The Protection of Small Cetaceans in the Face of Uncertainty: An Analysis of the ASCOBANS Agreement’ (1997) 9 *Georgetown International Environmental Law Review* 281, 288-289.

<sup>73</sup> C Shine, ‘Selected Agreements Concluded Pursuant to the Convention on the Conservation of Migratory Species of Wild Animals’ in D Shelton (ed), *Commitment and Compliance: The Role of Non-Binding Norms in the International Legal System* (OUP 2003) 196-222.

<sup>74</sup> See <https://www.cms.int/en/documents/action-plans>.

Actions<sup>75</sup> that build partnerships between range states and other pertinent actors for the conservation of certain migratory species. Both approaches have been utilised frequently in the context of aquatic species and provide scope to test the regulatory mood for the prospective development of more formalised initiatives.<sup>76</sup>

### 3.1 Scientific assessment and further research

### 3.2 Renewable energy and migratory species

The transition away from fossil fuels to mitigate and decelerate the trajectory of climate is firmly established both as a key political objective and, in many jurisdictions, increasingly required as a legal imperative.<sup>77</sup> Nevertheless, the transition to net zero and greener and cleaner technology is far from seamless or harmless. The production of renewable energy is considerably more material-intensive than current fossil fuels,<sup>78</sup> and in the mid-term will drive greater demand for mining, with its attendant threats to biodiversity.<sup>79</sup>

Despite their clear role in weaning humanity away from fossil fuels, longstanding concerns have been raised over an array of renewable energy sources and their prospective impact upon biodiversity.<sup>80</sup> Particular concerns have been raised over

The historical evidence base for the impact of windfarms has been considered weak, with relatively few long-term longitudinal studies, and also needs to be weighted against the cataclysmic impacts of not transitioning to such alternative sources of energy.<sup>81</sup> As Allison, Root and Frumhoff observe, '[t]hreats to wildlife can be reduced by strategic siting and operation, yet the threat of global extinctions rises the longer it takes to reduce carbon emissions'.<sup>82</sup> Nevertheless, renewable energy projects and protected areas are generally planned and pursued in isolation to each other, often considering territories that are geographically removed from human settlements and areas of agricultural importance,<sup>83</sup> and in the process inadvertently target the same locations.<sup>84</sup>

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<sup>75</sup> See <https://www.cms.int/en/documents/concerted-actions>.

<sup>76</sup> As has been recently considered for the European eel (previously subject to Concerted Action 12.1); see further C Wold, 'Bringing the European Eel Back from the Brink: The Need for a New Agreement under the Convention on Migratory Species' (2018) 35 *Pace Environmental Law Review* 168.

<sup>77</sup> See further Eales and McCormack, Chapter 16 in this volume and Varvastian, Chapter 17 in this volume.

<sup>78</sup> René Klein and others, 'Metal Requirements of Low-carbon Power Generation' (2011) 36 *Energy* 5640.

<sup>79</sup> Laura J Sonter and others, 'Renewable Energy Production Will Exacerbate Mining Threats to Biodiversity' (2020) 11 *Nature Communications* 4174.

<sup>80</sup> SA Abbasi and Naseema Abbasi, 'The Likely Adverse Environmental Impacts of Renewable Energy Sources' (2000) 65 *Applied Energy* 121; Richard Inger and others, 'Marine Renewable Energy: Potential Benefits to Biodiversity? An Urgent Call for Research' (2009) 46 *Journal of Applied Ecology* 1145.

<sup>81</sup> Gavin B Stewart, Andrew S Pullin and Christopher F Coles, 'Poor Evidence-Base for Assessment of Windfarm Impacts on Birds' (2007) 34 *Environmental Conservation* 1.

<sup>82</sup> Taber B Allison, Terry L Root and Peter C Frumhoff, 'Thinking Globally and Siting Locally – Renewable Energy and Biodiversity in a Rapidly Warming World' (2014) 126 *Climatic Change* 1, 2.

<sup>83</sup> Johann Köppel and others, 'Cautious but Committed: Moving Toward Adaptive Planning and Operation Strategies for Renewable Energy's Wildlife Implications' (2014) 54 *Environmental Management* 744.

<sup>84</sup> Jose A Rehbein and others, 'Renewable Energy Development Threatens Many Globally Important Biodiversity Areas' (2020) 26 *Global Change Biology* 3040,

Particular concerns have been raised by the impacts of wind turbines on an array of migratory species, notably bats<sup>85</sup> and birds.<sup>86</sup>

In the marine environment such uncertainties are particularly acute, given the longstanding difficulties of collating data on highly mobile marine species in parts of the ocean with limited baseline knowledge.<sup>87</sup> Offshore renewable energy developments have been shown to have positive impacts upon conservation, creating space and shelter for numerous species while also acting as de facto protected areas given the displacement of other anthropogenic activities.<sup>88</sup> Nevertheless, significant adverse impacts upon marine species have been modelled and observed, notably through habitat losses, collision risks, the prospective introduction of invasive species and the pervasive impact of acoustic disturbances caused by the construction and operation of turbines and other equipment.<sup>89</sup>

### 3.3 Habitat fragmentation and connectivity

The value of flyway-based conservation has been considered transferrable to other environments, notably rivers,<sup>90</sup> which have been especially affected by anthropogenic impediments to migration.<sup>91</sup>

### 3.4 Inter-treaty cooperation

## 4. CONCLUDING REMARKS

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<sup>85</sup> Paul M Cryan and Robert MR Barclay, 'Causes of Bat Fatalities at Wind Turbines: Hypotheses and Predictions' (2009) 90 *Journal of Mammalogy* 1330; Edward B Arnett and Erin F Baerwald, 'Impacts of Wind Energy Development on Bats: Implications for Conservation' in Rick A Adams and Scott C Pedersen, *Bat Evolution, Ecology, and Conservation* (Springer 2013) 435; Thomas J O'Shea, 'Multiple mortality events in bats: a global review' (2016) 46 *Mammal Review* 175; WF Frick and others, 'Fatalities at Wind Turbines May Threaten Population Viability of a Migratory Bat' (2017) 209 *Biological Conservation* 172

<sup>86</sup> Stefan Garthe and others, 'Large-Scale Effects of Offshore Wind Farms on Seabirds of High Conservation Concern' (2023) 13 *Scientific Reports* 4479.

<sup>87</sup> Stephen CL Watson and others, 'The Global Impact of Offshore Wind Farms on Ecosystem Services' (2024) 249 *Ocean and Coastal Management* 107023.

<sup>88</sup> MC Ashley, SC Mangi and LD Rodwell, 'The Potential of Offshore Windfarms to Act as Marine Protected Areas – A Systematic Review of Current Evidence' (2014) 45 *Marine Policy* 301.

<sup>89</sup> Watson (n ); see also Helen Bailey, Kate L Brookes and Paul M Thompson, 'Assessing Environmental Impacts of Offshore Wind Farms: Lessons Learned and Recommendations for the Future' (2014) 10 *Aquatic Biosystems* 8 and Ibon Galparoso and others, 'Reviewing the Ecological Impacts of Offshore Wind Farms' (2022) 1 *Ocean Sustainability* 1.

<sup>90</sup> Thomas A Worthington, 'Global Swimways for the Conservation of Migratory Freshwater Fishes' (2022) 20 *Frontiers in Ecology and the Environment* 573.

<sup>91</sup> G Grill and others, 'Mapping the World's Free Flowing Rivers' (2019) 569 *Nature* 215 (noting that only 37 per cent of rivers longer than 1000 kilometres remain free flowing over their entire length and 23 per cent flow uninterrupted to the ocean).