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REPORT ON THE MIGRATORY SPECIES AND CLIMATE CHANGE EXPERT WORKSHOP

(Prepared by the Secretariat)

Summary:

The document contains a report on the Migratory Species and Climate Change Expert Workshop, held in Edinburgh, United Kingdom, on 11-13 Feb 2025.

Convention on the Conservation of Migratory Species of Wild Animals

CMS

REPORT ON THE MIGRATORY SPECIES AND CLIMATE CHANGE EXPERT WORKSHOP

Edinburgh, United Kingdom, 11-13 February 2025

Report on the Migratory Species and Climate Change Expert Workshop, Edinburgh, United Kingdom, 11-13 February 2025

COVER IMAGE:

Arctic Tern in natural environment © Gu Bra/Pexels.com

Copies of this publication are available from the CMS website: https://www.cms.int/en/publication/report-migratory-species-and-climate-change-expert-workshop

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Summary

A. Under the auspices of the Convention on the Conservation of Migratory Species (CMS) an Expert Workshop was held on 'Migratory Species and Climate Change' during 11-13 February 2025, in Edinburgh, UK. This implemented Decisions 14.212-14.215 of the 14th meeting of the Conference of Parties to CMS (COP14).

B. Following presentations on the policy context in relation to CMS, the UN Framework Convention on Climate Change (UNFCCC), and Convention on Biological Diversity (CBD), the meeting noted the three-part report on climate change and migratory species published in 2024.

C. Four workshop sessions were held on:

- Identification of species potentially/probably impacted by climate change which may require conservation actions to facilitate range changes
- Measures to manage migratory routes and range changes including Nature-based solutions and/or ecosystem-based approaches, embracing conserving migratory species' habitats, including maintaining or enhancing connectivity and ecosystem integrity
- How work under CMS on climate change could interact with implementation of the Kunming-Montreal Global Biodiversity Framework (GBF) and its monitoring framework
- Developing an interpretation of the term 'barrier', to ensure consistency in the obligation to remove obstacles to migratory species.

D. In addition, there was a joint session with the International Whaling Commission (IWC) on 'Cetaceans and climate change'; presentations under the headings of 'Impacts of climate change on migratory species', and 'Nature-based solutions to address the impacts of climate change'; a moderated discussion on Horizon Scanning; and presentations on case studies covering a wide range of species assemblages and regions. For each of these sessions detailed summaries are provided.

E. Important new findings are emerging from research and collaborative efforts on nature restoration which should be considered under CMS in relation to climate change.

F. The report includes recommendations which should be taken forward to the CMS Scientific Council in advance of CMS COP15 in March 2026.

Priorities include:

- Identifying migratory species most likely to be impacted by climate change, and those most in need of interventions (notably across those listed on Appendix 1) using a matrix approach, and for umbrella species where interventions might have wider benefits. It is proposed this work would be taken forward post-COP15;
- Developing the Decision Tree (Annex 2 of Resolution 12.21 (Rev COP14) to identify interventions to support the conservation of migratory species in the face of climate change, with different versions for marine and terrestrial environments;
- Undertaking a Horizon Scan of climate-related issues post-COP15, embracing AI applications;
- Strengthening alignment between CMS and the GBF, with emphasis on ecological connectivity, and noting also the 'IPBES Nexus Assessment: Summary for Policymakers' and opportunities in the planned 'IPBES Spatial Planning and Connectivity Assessment';
- Developing case studies to demonstrate how the wide range of 'barriers' can be overcome (in relation to Decision 14.214(h). These would illustrate effective actions to ameliorate the effects of barriers to species migration, with examples considering the resistance and porosity of landscapes and seascapes to species movements and specifying whether barriers are physical or non-physical;
- Improving practices for inclusion of Indigenous Peoples and traditional knowledge in discussions and decisions related to migratory species and climate change, in support of Decision 14.9(a));
- Providing clear examples of successful actions that have supported migratory species' adaptation to climate change, emphasising not only what needs to be undertaken, but how work it can be taken forward.

G. The organisers are grateful to the many participants and supporting organisations, particularly CMS, JNCC and the UK Government's Defra for supporting the Workshop.

Key Messages & Findings from Workshop Presentations

Climate Change Impacts on Migratory Species

- **Climate Change Hits All Migratory Species Groups**

  Warming, extreme weather events, and shifting water systems are affecting migratory species across the board, altering ranges, shrinking habitats, and threatening ecosystem service delivery. To safeguard migratory species, cross-border conservation networks and better monitoring are needed to track success and respond in real time.

  'Climate Change and Migratory Species: a review' by Sarah Scott

- **Melting Himalayas Disrupt Wildlife**

  Warming in the Himalayas is shrinking cold habitats, forcing species like musk deer and pheasants upslope into fragmented ranges. Small mammals in Uttarakhand could lose over 50% of their range, while migratory snow trout are also at risk.

  'Climate Change and Wildlife Movements in the Himalayas' by Sathyakumar Sambandam

- **Climate Change Makes Swallow Migrations Riskier**

  European barn swallows migrating to Africa now face expanded deserts, disrupted winds, and higher energy costs. As climate outpaces genetic adaptation, timing mismatches threaten breeding success and local survival.

  'Advanced Spring Migration Shifts in Response to Climate Change' by Fernando Spina

- **Climate-Stressed Whales Face Shifting Habitats**

  Climate change is altering whale migrations, shrinking prey, and reducing reproduction. North Atlantic right whales are especially vulnerable, with warming seas forcing dangerous detours.

  'Climate Change Impacts on Cetaceans and their Prey' by Viv Tulloch

- **River Dolphins in Hot Water**

  Climate-driven habitat loss, pollution, and human development are threatening river and coastal dolphins. In 2023, a record heatwave in the Amazon led to mass dolphin deaths.

  'Climate Change Effects on Habitats' by Lindsay Porter

- **Mediterranean Dolphins Under Pressure**

  Marine heatwaves in the Mediterranean are shrinking dolphin habitats and intensifying threats like pollution and food loss. Fin whales may lose up to 70% of their range by 2055.

  'Mediterranean Case Study' by Tilen Genov & Laetitia Nunny

- **Arctic Shorebirds Falling Out of Sync**

  Shorebird nesting in Alaska and the Arctic is misaligned with insect emergence due to warming and unexpected cooling, reducing chick survival and reproductive success

  'Responses of Arctic Shorebirds to Climate Change' by Brett Sandercock

- **Asian Elephants Face Habitat Gridlock**

  Climate and land-use changes are shifting elephant habitats eastward, but with limited connectivity, most elephants in India and Sri Lanka can't follow, escalating human-elephant conflicts.

  'Asian Elephant Range Shifts and Connectivity' by Shermin de Silva

Ecosystem Services, Carbon, and Nature–Climate Links

- **Seagrass: Carbon Sinks Under Siege**

  Seagrass meadows store nearly 20% of blue carbon and support marine life, but heatwaves and rising seas are threatening species like dugongs. A global 2030 action plan urges urgent protection.

  '2030 Seagrass Breakthrough' by Abdelmenam Mohamed

- **Migrating Geese Shape the Carbon Cycle**

  Migratory species like Pacific black brants influence carbon storage by altering soil and vegetation. Some help sequester CO_2, others don't, highlighting the need for balanced management.

  How Migration Influences Carbon Storage' by Trisha Atwood

- **Elephants, Apes, and Ecosystem Services**

  Migratory megafauna fertilize soils, disperse seeds, and enhance carbon storage, yet these services remain undervalued. PES schemes could reward their climate role.

  'Migratory Species as Allies in the Fight Against Climate Change' by Ian Redmond

Governance, Policy, and Conservation Solutions

- **CMS Sets Course on Climate-Migratory Policy Gaps**

  Via extreme weather and shifting habitats, climate change is altering migration patterns, reproductive timing, and survival rates. CMS Parties adopted Resolution 12.21 urging immediate action despite uncertainties and launched a comprehensive review to guide global responses.

  'Climate Change and Migratory Species – Policy Context' by Dagmar Zíková

- **"Tragedy of the Commons" Undermines Migratory Protection**

  The transboundary nature of migratory species leaves them vulnerable to fragmented governance, overexploitation, and uneven conservation capacity across nations.

  Bridging Climate Action and Conservation' by Julia Weatherhogg

- **Beware Misleading Language: Migration Is a Social System**

  Caution should be taken on framing species as consciously changing routes. Migration shifts result from social and generational changes, complicating predictions and planning.

  'Climate Change and Migratory Species: a review' by Sarah Scott

- **Scotland's Seagrass Comeback**

  Scotland's west coast seagrass beds—already protected in 45 Marine Protected Areas—are seeing expanded restoration through local projects and pending fishing gear restrictions.

  'Restoration of Seagrass Beds in Scotland' by Katie Gillham

- **Pasture Pressure in Kyrgyzstan Hurts Wildlife**

  A 65% rise in livestock is degrading rangelands in Kyrgyzstan and pushing herders into wildlife habitats. The CAMCA project promotes sustainable grazing, livelihoods, and climate adaptation via ecological corridors.

  'CAMCA Project in Central Asia' by Murat Zhumashev

- **Migratory Species Undermanaged in North America**

  Out of 928 migratory species, just 38% have management plans. While valued for their ecosystem services, cross-border governance remains weak.

  'A Survey of 928 North American Migratory Species' by Laura López Hoffman

1. Opening of the Workshop

1. Mr Thompson, CMS COP-Appointed Councillor for Climate Change, and Workshop Chair, welcomed participants to the Migratory Species and Climate Change Expert Workshop and expressed his gratitude to the UK Government (Department of Environment, Food & Rural Affairs) for funding the workshop and hosting it in Queen Elizabeth House, Edinburgh, plus to the UK Joint Nature Conservation Committee (JNCC) for their work on background papers to aid discussions during the meeting. He acknowledged the results of the previous CMS workshops on climate change, held in Costa Rica in April 2014, in Bonn, Germany, February 2017, and the 14th meeting of the CMS Conference of Parties (COP14) in February 2024 and the associated Resolution 12.21 (Rev.COP14) and Decisions 14.211-215. The discussions throughout the workshop would contribute to further Decisions on CMS work on climate change and migratory species at CMS COP15 in Brazil.

1.1. Welcome

Will Lockhart OBE, Deputy Director, International Biodiversity and Wildlife, UK Government

2. Mr Lockhart welcomed everyone to Scotland on behalf of Rt Hon Steve Reed OBE MP, the Secretary of State for Environment, Food and Rural Affairs, noting the sensitivity of migratory species to rates of environmental change, including climate change.

Colin Galbraith, Chair, NatureScot

3. Mr Galbraith highlighted the role of nature as our insurance against climate risks and thereby supporting our economies. We are not apart from nature, or in competition with it, but rather a part of nature. He stressed the need to be clear about what needs to be done, and how, under the CMS umbrella.

Amy Fraenkel, Executive Secretary, CMS Secretariat

4. Ms Fraenkel thanked the UK Government and the JNCC, Mr Thompson and Mr Galbraith. She highlighted the alarming trends of change in climate, the consequences for migratory species, the importance of international collaboration across their ranges, and the need for adaptive conservation measures.

1.2. Adoption of the Agenda

5. With no objections, the agenda was adopted (UNEP/CMS/CCWS2025/Doc.1.2/Rev.4).

1.3. Appointment of Rapporteur

6. Mr Clive Mitchell, Head of Terrestrial Science at NatureScot, was appointed Rapporteur.

2. Migratory Species and Climate Change – international context

2.1. Climate Change and Migratory Species – policy context

Dagmar Zíková, CMS Secretariat

7. The history and situation of climate change and migratory species in CMS policy context were examined. This highlighted the impacts of climate change on migratory species that have led to the increasing prevalence of the topic in negotiations under the Convention, and a recent strengthened commitment of Parties in supporting both adaptation and mitigating the threat of climate change to migratory species.

8. Wild animals face a range of threats including unsustainable use of species, habitat destruction or alteration by activities such as intensive agriculture and infrastructure development. Migratory species are particularly vulnerable due to their reliance on many habitats and natural resources spread over vast distances, and the need for unimpeded movement between them. Their movements and behaviour are directed and in tune with the natural, seasonal changes of important habitats. Extreme weather events can destroy or make these habitats inadequate or inaccessible leading to shifts in movements to find resources like prey and water and/or increased mortality risks. Changing climate is impacting the ecology of migratory species, altering their phenology and reproductive success due to changes in alignment with suitable conditions and resource availability, as well as other consequences e.g. changing disease dynamics. CMS negotiations and international policy more broadly have responded to these threats.

9. Climate change and its implications for the Convention were first considered by the Parties in 1997 at CMS COP5. Since then, a number of challenges have arisen including the complexities of climate change itself, and difficulties in assessing species across their entire lifecycles and their connectivity. These challenges have impeded our ability to assess and predict vulnerability and implications of climate change for migratory species. COP12 repealed and consolidated all previous COP outcomes on climate change and adopted Resolution 12.21, which

"Urges Parties, despite the remaining uncertainty surrounding the full scale of the impacts of climate change on migratory species, not to delay related decision-making and action". The first decisions on climate change and migratory species were formulated at COP13 and mandated CMS to conduct a comprehensive Review of Climate Change and Migratory Species, including impacts, conservation actions and recommendations. This review was funded and coordinated by the United Kingdom, and delivered by the British Trust for Ornithology. It was launched at UNFCCC COP28 and then taken forward to COP14, where it heavily influenced the discussions and outcomes.

10. Decisions 14.211-14.215 requested the Scientific Council to: convene an international in-person workshop on migratory species and climate change; collate information on the topic including migratory species most likely to be negatively impacted and case studies for adaptation and mitigation; propose interventions; and consider links to other international policy frameworks. These decisions underpin the discussions and objectives of this technical Workshop on Climate Change and Migratory Species that will inform us of timely future actions to tackle such a prominent issue.

2.2. Bridging Climate Action and Conservation: opportunities for migratory species under the United Nations Framework Convention on Climate Change (UNFCCC)

Julia Weatherhogg, UNFCCC Secretariat

11. The presentation examined the interconnections between climate change and migratory species conservation. It highlighted how climate change disrupts ecosystems, affects species migration patterns, and poses risks to biodiversity, while also exploring potential synergies with UNFCCC frameworks to address these challenges.

12. Climate change is a major driver of biodiversity loss, altering ecosystems and threatening the survival of migratory species. Rising global temperatures, shifting precipitation patterns, and extreme weather events impact species that depend on stable climatic conditions for migration, breeding, and feeding. Habitat loss, changes in food availability, and increased mortality rates have become widespread concerns. Species such as the hawksbill turtle, Arctic caribou, monarch butterfly, and dugong face mounting pressures as their traditional migratory routes and ecosystems are altered by human activity and climate shifts.

13. Beyond the direct impacts on wildlife, these disruptions also affect the ecosystem services migratory species provide. Pollination, nutrient cycling, carbon sequestration, and pest control – essential functions that sustain ecological balance and human well-being – are being compromised. The Living Planet Index reports a staggering 73% decline in monitored vertebrate wildlife populations between 1970 and 2020. Additionally, 22% of species listed under the CMS are threatened with extinction, with nearly all (97%) CMS-listed fish species at risk. These alarming statistics emphasize the urgency of integrating conservation efforts with climate policies.

14. While efforts such as habitat restoration, pollution reduction, and conservation initiatives aim to mitigate these threats, significant challenges remain. The transboundary nature of migratory species means that conservation strategies require international collaboration, yet policy and governance gaps persist. Unequal resource distribution among nations further complicates efforts, leading to disparities in conservation capacity. The "tragedy of the commons" phenomenon, where shared environmental resources are overexploited due to a lack of coordinated management, exacerbates the situation. Addressing these challenges requires a unified global response that aligns climate action with biodiversity conservation.

15. The UNFCCC framework provides a valuable opportunity to strengthen these linkages. The Conference of the Parties (COP) serves as a key forum for dialogue, where biodiversity concerns can be integrated into climate negotiations. Nationally Determined Contributions (NDCs) present another mechanism to align national climate goals with biodiversity protection. The Global Biodiversity Framework (GBF) is also relevant, as it sets targets for biodiversity conservation that can be reinforced through climate action. The Nairobi Work Programme, a knowledge-sharing platform under the UNFCCC, can support capacity-building and enhance understanding of the climate-biodiversity nexus.

16. Indigenous Peoples play a critical role in conservation efforts, offering traditional knowledge and land stewardship practices that support biodiversity resilience. Engaging Indigenous communities in climate and biodiversity initiatives ensures more effective and culturally appropriate conservation strategies. The Climate Resilient Food Systems Alliance and UNFCCC COP30 ambitions further highlight the potential for integrating biodiversity considerations into climate action, reinforcing the need for cross-sectoral collaboration.

17. Recognizing the deep interconnections between climate change and migratory species conservation is crucial to developing holistic, sustainable solutions. By leveraging synergies within UNFCCC mechanisms, strengthening governance, and fostering international cooperation, the global community can work toward protecting biodiversity while advancing climate resilience.

Discussion

18. Discussion centred on the risks associated with monocultures in forestry and agriculture, including as a climate mitigation measure, leading to increased displacement of species and additional obstacles to their movement. This could be addressed through reforestation and agroforestry projects under the Rio Conventions better considering wider species and habitat needs. Concerns included the emphasis on carbon alone (as a proxy for greenhouse gases) in nature restoration rather than wider ecological function, for example through the combined carbon-water cycle and water resilient food systems.

19. On the possibility of merging COPs for climate and biodiversity, it is important to note the differing mandates of UN agencies, but, for example, gaps can be bridged through common agendas such as showcasing the economic benefits of species. Quantifying these benefits can strengthen the case for policy makers and facilitate closer collaboration across the Conventions.

2.3. Synergies between Climate Change and Biodiversity through the CBD

Tristan Tyrrell, CBD Secretariat

20. Mr Tyrrell gave a short presentation. The sixteenth meeting of the Conference of the Parties (COP16) to the Convention on Biological Diversity (CBD) marked a significant milestone in global efforts to combat biodiversity loss and climate change. As the first COP following the adoption of the Kunming-Montreal Global Biodiversity Framework (KMGBF), the event focused on implementation, inclusivity, and cooperation across multiple stakeholders, embracing a whole-of-society approach under the guide of “the People’s COP”.

21. One of the landmark outcomes of COP16 was the establishment of a new Subsidiary Body dedicated to implementing Article 8(j) and other provisions related to Indigenous Peoples and local communities. This body is designed to ensure that traditional knowledge, cultures and practices are recognized

Picture 1.Parties of the Convention on Biological Diversity agreed on an enhanced process to identify ecologically or biologically significant marine areas. © jakubgojda/Canva.com

and safeguarded within biodiversity conservation efforts, including those linked migratory species and addressing climate change. In line with this, a new Programme of Work on Article 8(j) was adopted, extending until 2030.

22. Another key development was the enhancement of the process for identifying Ecologically or Biologically Significant Marine Areas (EBSAs). Since 2011, over 300 crucial and vulnerable oceanic regions have been identified, and this updated approach seeks to integrate the latest scientific knowledge into conservation planning. The goal is to contribute to a healthier ocean ecosystem, which is vital for migratory species, climate stability and human well-being.

23. The implementation of the KMGBF was supported by measures to strengthen capacity-building, technical cooperation, and technology transfer. COP16 endorsed the work of 18 subregional technical and scientific cooperation support centres and approved modalities for a global coordination entity. A new knowledge management strategy was also adopted to streamline and enhance information sharing.

24. One of the most significant decisions at COP16 was the recognition of the critical links between biodiversity and climate change. Parties emphasized the necessity for national biodiversity focal points to collaborate with counterparts working under other multilateral environmental agreements (MEAs). The integration of biodiversity conservation into national planning processes, ecosystem restoration efforts, and climate change mitigation and adaptation strategies were strongly advocated. The CBD Secretariat was tasked with strengthening the understanding of these interlinkages to promote a more holistic approach to environmental governance.

25. Despite these achievements, COP16 was temporarily suspended in Cali, Colombia, leaving key discussions unresolved. The meeting resumed[1] in Rome, Italy, in February 2025, where Parties finalised deliberations on critical issues such as resource mobilization, financial mechanisms, and the KMGBF monitoring and planning. One of the primary objectives was on mechanisms to mobilise $200 billion annually for biodiversity conservation and addressing $500 billion per year currently allocated to harmful subsidies.

26. A major emphasis was placed on cooperation with other conventions and international organizations. Parties reaffirmed the need for a unified approach across the United Nations system and beyond. Strengthening collaboration among biodiversity-related conventions was identified as essential for maximizing impact.

27. Overall, COP16 underscored the urgency of translating commitments into action through a whole of government and whole of society approach. By prioritizing implementation, inclusivity, and cross-sectoral cooperation, the conference set the stage for a transformative decade in biodiversity conservation.

24. Climate Change and Migratory Species: a review of impacts, conservation actions, indicators and ecosystem services

Sarah Scott, JNCC

28. Ms Scott gave a short presentation. A recently published three-part report on climate change and migratory species found that climate change is having severe impacts across all migratory species groups and the transfer of ecosystem resources they promote. Increases in temperature and the frequency of extreme climate events, as well as changes in water availability and changing oceanic conditions, are impacting the survival, breeding success and population sizes of many migratory species. Some migratory species are able to adapt by altering their migratory patterns and ranges, which are generally moving polewards, but many may be more constrained. As a consequence, the ranges of some species are changing. Conservation actions, such as the establishment of networks of protected areas and other effective area based conservation measures (OECMs), are needed to help migratory species adapt to climate change in the face of increased loss (and reductions in quality) of available habitat. However, these actions need to be coordinated between jurisdictions to ensure species are protected along their entire migratory route, and we must monitor, evaluate and share their success to inform future activities. Actions to protect migratory species can bring wider benefits to society through the delivery of ecosystem services that help to mitigate the impacts of climate change and increase ecosystem resilience. International cooperation to protect migratory species can therefore support the

[1] This workshop was held a week before CBD COP16, so strictly this paragraph should be in the future tense, but it has been edited to past tense as the workshop report will be issued after COP16 part 2 in Rome concluded.

delivery of wider policy goals and actions, such as those related to the CBD and UNFCCC.

Discussion

29. The discussion raised concerns about the language used to describe migration in scientific publications. Phrases like *"species are changing their migration"* or "*species are shifting the timing of migration"* can be misleading, suggesting that individual animals may have foresight and are capable of conscious, rapid and 'deliberate' responses. Rather, changes in migration patterns occur through generational changes, where individuals in a population exhibit different behaviours at varying frequencies. Social behaviour also plays a significant role, as migratory systems are inherently social: for example, once a population starts to build up in a new area it attracts more individuals, making the system more complex. These factors make predicting future distributions and timings of migration challenging.

30. Mr Thompson noted that commenting that "species are observed to change the timing and routes of migration" better reflects the important point regarding social behaviour influences.

Workshops I and II ran in parallel

3. Workshop I: Identification of species potentially/ probably impacted by climate change which may require conservation actions to facilitate range changes

Chair: Narelle Montgomery, CMS Scientific Councillor for Australia and Chair of the Scientific Council

31. The group considered:

    i. Clear interpretation and shared understanding of the Decision 14.214(b);
    ii. The timeframe and scope of the work; and
    iii. How best to undertake the work to achieve the outcome/decision

32. **Key points / recommendations:**

    i. **Agreement on interpretation of the decision** – two phases or sub-tasks of 1) identify those migratory species most likely to be impacted by climate change and 2) identify those migratory species most in need of intervention
    ii. **Agreement on scope** – recognizing the practicalities of producing initial outputs for CMS COP15, which allows only a short window for work to be done, the group agreed that it is important to refine our scope and prioritise focus on species or groups of species. It was proposed to focus on Appendix I-listed species in the first instance, with a view to producing outputs for COP15. Subsequently, Appendix II-listed species could be addressed and potentially others (such as those identified for future consideration for listing; e.g. those listed in Res.14.20) during the next intersessional period to COP16.
    iii. noted there are **existing resources** we should try to utilize if possible, including previous vulnerability assessments for some species, though some may require updating.
    iv. need to **maximise efficiency** particularly for Parties and touched on the idea of umbrella species for which interventions might provide wider benefits and discussed keystone species and ecosystem services
    v. **Agreement on the how** – the workshop participants agreed to prioritise the identification of species through a matrix approach, using the spreadsheet in workshop document 3.1d as a starting point. A relative ranking will allow us to identify specific groups of species that require prioritization.
    vi. covered **a range of different criteria that might help inform a matrix approach**, including: whether there have been effective interventions previously for the species, variation in climate change impacts/resilience between different populations of a species; and an ecosystem-based approach that factors in interdependence on other species and habitats e.g. vulnerability assessment of polar bears is difficult without first considering seal prey species, or interventions for marine turtles at nesting sites feasible but more challenging in the marine space / water column.
    vii. important to **facilitate consultation with specialist groups** within other bodies outside of Scientific Council (recognizing shared individuals).

33. **Outcomes/next steps/recommendations:**

    i. Focus on development of a matrix of Appendix I species in time for CMS COP15, including:
        - Refine the information and criteria required;
        - Ranking relative vulnerability;
        - Issue a call for data from Parties, particularly concerning examples of effective interventions, as well as consultation with

relevant bodies and experts.

ii. Utilise results to inform more detailed case studies for COP15/16.

iii. Subsequently expand this to cover Appendix II listed species during the COP15 intersessional period.

4. Workshop II: Measures to manage migratory routes and range changes including Nature-based solutions and/or ecosystem-based approaches, embracing conserving migratory species' habitats, including maintaining or enhancing connectivity and ecosystem integrity

Chair: Edison Gandiwa, CMS Scientific Councillor for Zimbabwe.

34. The workshop focused on the decision tree (Annex 2 of Resolution 12.21 (Rev. COP14), copied below, especially from a climate change viewpoint and further work required before COP15 in March 2026 in Brazil.

35. The decision tree was developed to help to interpret operational paragraph 10 of Resolution 12.21 (Rev. COP14) which considers historical range change. It aims to inform actions by identifying range changes and obstacles to movement in the context of a changing climate.

36. It was agreed that the valuable work done with the decision tree should be preserved, but edits were needed to ensure it remains relevant and adaptable to change, in particular to go beyond considerations of interpretation of historical range. The tree could be used as a starting point to lead conversation with policymakers. Supplementary guidance to address nuanced questions not captured by the decision tree may be needed, together with case studies to help show how it can be used.

37. Possible edits to the Decision Tree:

- The current design of the decision tree leads to a single outcome, but in certain situations, multiple outcomes (e.g. relocate AND conserve) are needed.

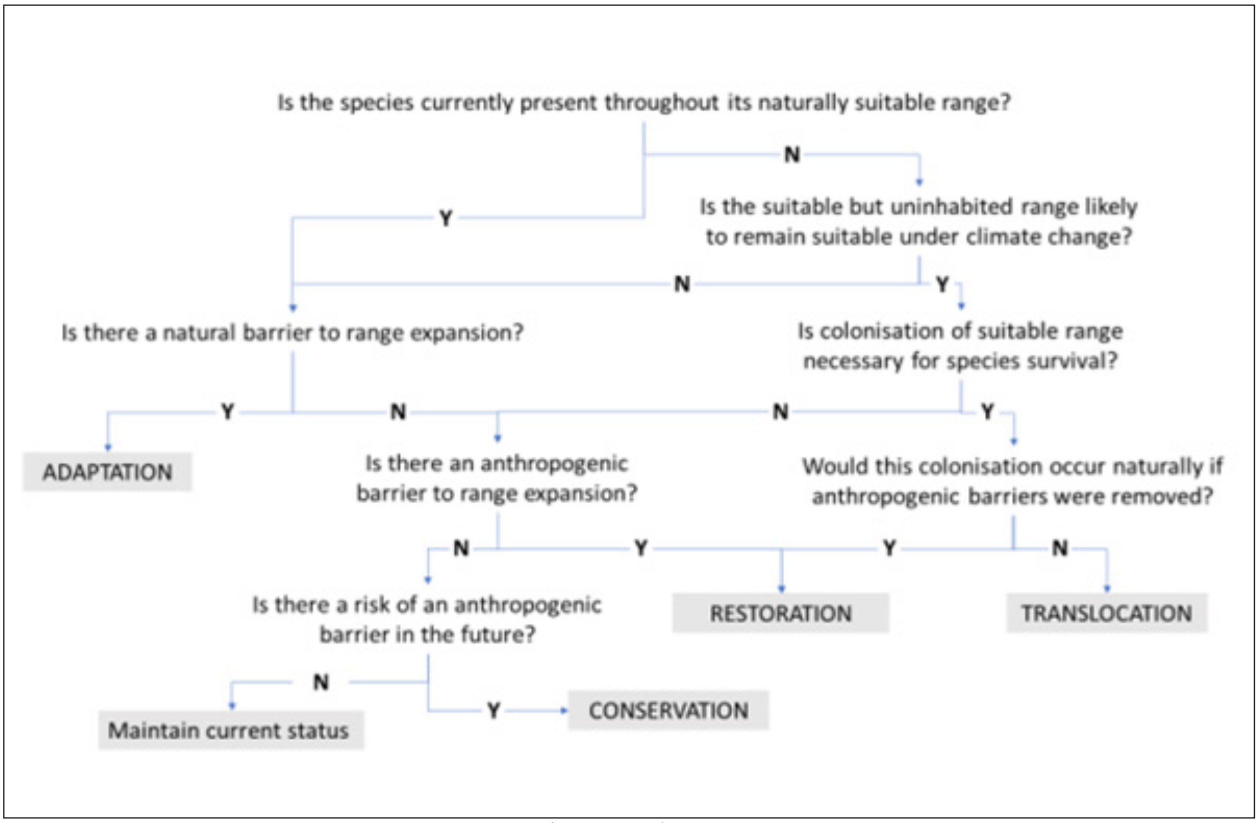


Figure 1. Decision Tree from Annex 2 of Resolution 12.21 (Rev.COP14)

Create a decision tree that considers multiple barriers and outcomes, or multiple decision trees for different purposes. Several participants agreed that multiple solutions and actions from the decision tree are necessary, including wider conservation actions to increase overall population resilience.

- Consider non-target conservation actions e.g. protecting suitable habitat or maintaining prey availability to increase population resilience and ensure suitable resources are available throughout a species/population's actual and potential range. This will help to ensure targeted actions e.g. translocations, have higher chance of success.
- The current design of the decision tree also considers anthropogenic and natural barriers to expansion separately. These barriers may exist concurrently, and participants noted that the tree ought to consider the effects of multiple barriers on necessary conservation interventions.
- Consider separate decision trees for land and marine environments, as different factors are at play in each (e.g. the concept of natural barrier).
- Incorporate the concept of triage – some populations may not be possible to save.
- Include additional steps in the decision tree. For example, add a point to determine whether the population is small or large, and another to assess if the species is declining.
- Case studies using the decision tree revealed difficulties in answering some questions with a simple "yes" or "no". While the decision tree helps guide thoughts, it is unhelpful when it leads to a single answer. Solutions should be diverse.
- The first step of the decision tree may need to focus on the status of the species or population in question – how is the species/population doing?
- Propose adding checkpoints to the decision tree where one can pause and assess the consequences of helping a particular species and how it affects other species. Checkpoints can also entail considerations about the level of available knowledge, information, and data needed to take decisions across the tree.

5. Impacts of Climate Change on Migratory Species

5.1. The Urban Exploration Project

38. Miguel Ferrer (Spanish National Research Council) was unable to attend due to illness. The Chair invited Christian Rutz (University of St Andrews) to step in and present an ambitious work programme on human–wildlife coexistence, devoted to monitoring animal movements in human-modified landscapes.

Christian Rutz, University of St Andrews

39. Mr Rutz gave a short presentation about the Urban Exploration Project – a collaborative initiative developed in close partnership with the National Geographic Society. The project combines the powers of inclusive community building, cutting-edge technology, local empowerment, education and storytelling, to forge innovative pathways towards sustainable human–wildlife coexistence in the world's unprotected areas, complementing the established 30x30 Initiative. Specifically, it aims to produce a holistic understanding of animal behaviour in human-modified landscapes, by building a global network of ~250 field teams over ~10 years, to track ~10,000 animals across gradients of urbanisation worldwide. This major collaborative effort will fill critical evidence gaps on human–wildlife interactions, enabling innovative, context-appropriate and scalable approaches to environmental planning, conservation management, and policy making.

Discussion

40. In response to questions about linkages with other tracking initiatives, it was clarified that the project aims to partner with existing networks, using a variety of technologies. This includes, for example, the Motus system, which employs ground-based (rather than satellite-assisted) tracking.

41. The project is currently in the consultation and co-design phase, with funding secured for pilot studies to establish workflows. The aim is to involve all interested and affected groups in refining the project model and implementation strategy. After the pilot phase, with additional funding, it is expected that additional teams will join the project through requests for proposals issued by the National Geographic Society, covering a wide range of species, including terrestrial mammals and birds. As the project matures, work in specific areas or on particular species may be incentivised through more targeted funding calls, to achieve good regional and taxonomic coverage for pooled analyses. The project will not launch globally all at once, but will instead focus sequentially on different regions, to ensure adequate resourcing and attention.

42. The vision for the Urban Exploration Project is to deploy a relatively large number of miniature GPS tags, with plans to collaborate with the ICARUS initiative, once the system has been relaunched. The project is following, and proactively refining, best practice in animal tracking, emphasizing the importance of using the smallest possible tags and the smallest number of deployments required to deliver the desired conservation impact. The

project also seeks to improve coordination and data sharing to improve research efficiency and, over time, reduce the number of animals tagged globally. Tags can be fitted with sensors to classify behaviour and detect mortality events, and machine learning will enable inferences from tracks and sensor data about animal well-being and disturbance. The goal is to develop tools for rapid assessments of environmental health and different land-use and conservation-management scenarios. Some groups have already expressed interest in expanding the vision of the project to encompass work in the marine realm.

43. The project aims 'to give animals a voice' through tracking tags, enabling them to indicate their preferred habitats and resources, as well as any barriers they cannot cross or areas where they feel are too disturbed. Recent efforts to aggregate animal tracking data for global-scale analyses, such as for studies on lockdown impacts by the COVID-19 Bio-Logging Initiative, revealed major sampling biases and evidence gaps – with insufficient data currently available to inform the design of landscapes that support safe animal movement, resource access, and reproduction. The goal is to understand where animals want to go, and where they face obstacles and risks, to reimagine environmental planning, creating benefits for both people and wildlife.

5.2. Climate Change and Wildlife Movements in the Himalayas

Sathyakumar Sambandam, CMS Party-Appointed Councillor for India

44. Mr Sambandam gave a short presentation. Climate change is rapidly altering the Himalayan region's snow-clad mountains, ice peaks, and high-intensity drainage systems, threatening species adapted to cold environments. Rising temperatures are leading to shifting species' distributions and affecting fundamental niches.

45. As part of one of India's key missions, the National Mission for Sustaining the Himalayan Ecosystem, long-term wildlife monitoring across the longitudinal and elevational gradients of the Himalaya was initiated in 2015. Investigations focus in four major river basins, Beas (Himachal Pradesh), Bhagirathi (Uttarakhand), Teesta (Sikkim), and Kameng (Arunachal Pradesh) using standardized taxa-specific sampling to document long-term trends in species distribution and the impact of climate change. A multi-species, multi-model (n= 5) ensemble assessed climate change impacts on 36 species of mammals, 27 species of birds, and 2 fish species under different Shared Socioeconomic Pathways (SSPs).

Picture 2. Climate change is rapidly altering the Himalayan region's snow-clad mountains, ice peaks, and high-intensity drainage systems, threatening species adapted to cold environments. © Charles Gibson/Getty Images

46. Small mammals in Uttarakhand showed the highest range loss (>50%) under both full and non-dispersal scenarios. In the case of large mammals, altitudinal shifts to higher elevations are predicted. Availability of habitats would be squeezed for musk deer at high altitude. For most of the species, climate refugia were concentrated above 1,500 metres. Pheasants exhibit high diversity in mid-elevations, with the Eastern Himalaya showing high weighted endemism, however future scenarios predict habitat fragmentation. The migratory snow trout, currently widespread in mid-elevation rivers, is predicted to lose a significant portion of its range, shifting to higher-altitude streams, creating a high-altitude squeeze.

47. We predict that high-altitude protected areas (PAs) may buffer climate impacts, but many areas outside PAs also serve as climate refugia. Conservation efforts must secure movement corridors, habitat islands, and refugia to mitigate biodiversity reorganization under climate change.

Discussion

48. Discussion focused on the extent to which protected areas might need to be both expanded, or new ones added, but also to de-notify some areas no longer used. It is likely that some species will be lost because there is no suitable habitat higher up to move into. Translocation has only been considered for freshwater species so far – it is felt that large animals don't need this yet. Other scientists are looking at treeline changes in response to factors such as snowfall and rainfall.

5.3. Advanced Spring Migration Shifts in Response to Climate Change

Fernando Spina, COP-Appointed Councillor for Connectivity/Network

49. Mr Spina gave a short presentation. Migration is tightly linked to seasonality, making species sensitive to climate-induced changes. Long-distance migrants, like Eurasian-African birds, face significant challenges during migration, especially when crossing ecological barriers such as deserts and seas. These crossings involve orientation, physical effort, water balance, and mortality risks, and are crucial for studying seasonality and climate impact. Optimal migration theory suggests that in autumn, birds minimize migration risks. For instance, barn swallows migrating from Europe to Africa show increased fat levels for energy storage as they approach barriers. Studies involving over 1 million swallows across 25 countries reveal that inexperienced swallows accumulate more fat to cross longer barriers, indicating that barriers influence migration strategies. Pre-breeding migration is typically more rapid than post-breeding migration and climate change can disrupt this timing, potentially causing mismatches with resource availability and declines in local populations. Males migrate earlier and faster than females to secure territories. Nighttime crossings are costly, causing progressive body mass decline as birds deplete energy reserves.

50. Species-specific differences in migratory conditions are linked to winter habitat locations in Africa. Climate change accelerates desert expansion and habitat loss, potentially increasing the energetic costs associated with migration. Wind conditions can play a key role in departure decisions. Birds can benefit from tailwinds during migration, and changes in wind patterns could therefore influence migration costs and timings. Vegetation productivity in Equatorial Africa is associated with arrival dates and conditions of barn swallows in Europe, and climatic conditions in sub-Saharan Africa are associated with spring migration dates.

51. These examples indicate the complexity of coping with climate change during migration. Long-term studies show advances in departure timing of trans-Saharan migrant species from South of the Sahara, and arrival dates in Europe, associated with climate change. This adaptation may involve microevolutionary changes in migratory timing mechanisms. Clock genes play a role in spring migration timing, with low genetic polymorphism suggesting limited capacity for rapid adaptation to climate change. Reduced evolutionary potential may lead to population declines and local extinctions. Collective action and political decisions are needed to address climate change impacts on migratory birds and their habitats.

Discussion

52. The meeting noted the exceptional detail being amassed on range and timings, and the connections with research on body condition.

6. Nature-Based Solutions to Address the Impacts of Climate Change

6.1. 2030 Seagrass Breakthrough: climate-resilient solutions for migratory species' habitats

Abdelmenam Mohamed, CMS Dugong MOU

53. Mr Mohamed gave a short presentation, which focused on the critical link between climate-resilient solutions and migratory species' habitats, with a particular emphasis on seagrass ecosystems and the 2030 Seagrass Breakthrough initiative.

54. The Dugong Memorandum of Understanding (MOU), established in 2007 as a non-legally binding agreement under CMS, serves as the key framework for ensuring the long-term survival of dugongs and their seagrass habitats across 46 range states, with 27 countries currently signatory to the MOU. The Dugong MOU Secretariat, hosted in Abu Dhabi by the Environment Agency – Abu Dhabi (EAD), supports coordination, scientific guidance through its Technical Advisory Group (TAG), and implementation of a Conservation and Management Plan (CMP), covering species and habitat protection, awareness, cooperation, and cross-cutting issues.

55. Seagrasses are of critical importance for dugongs, which rely almost exclusively on these habitats for food. Dugong populations face numerous threats, including bycatch, vessel strikes, direct hunting, and habitat destruction due to coastal development and pollution. Climate change further exacerbates these challenges, with marine heatwaves, cyclones, and rising sea temperatures directly impacting seagrass health and, consequently, dugong populations. For example, a severe marine heatwave in Western Australia's Shark Bay in 2011 resulted in widespread seagrass loss, reducing dugong reproduction and significantly impacting their long-term survival.

56. The 2030 Seagrass Breakthrough is part of the broader Ocean Breakthrough framework under the Sharm El Sheikh Adaptation Agenda. It aims to mobilize at least USD12 billion in investments by 2030 to halt seagrass loss, effectively protect existing meadows, and accelerate restoration efforts. The initiative seeks to secure global seagrass ecosystems by fostering collaboration between state and non-state actors, aligning efforts with global biodiversity and climate targets such as 30x30, and supporting innovative financing mechanisms.

57. The guiding principles of the 2030 Seagrass Breakthrough emphasize science-based decision-making, inclusivity, sustainability, local action, capacity building, transparency, innovation, and resilience. These principles frame a global call to action for governments, financial institutions, NGOs, and private sector stakeholders to commit to concrete actions for seagrass conservation

58. Key milestones achieved to date include the formal announcement at UNFCCC COP28 in 2023, political endorsements by the UAE and Saudi Arabia, and technical inputs from a global pool of experts who finalized the initiative's guiding principles and goals. There have also been side events at CBD COP16 and UNFCCC COP29 to further build political momentum and secure broader endorsement from state and non-state actors alike.

59. This work underscored the urgency of protecting seagrasses as a critical climate and biodiversity solution. Seagrass ecosystems store nearly 20% of the world's blue carbon, support coastal resilience, sustain fisheries, and provide habitat for hundreds of species, including dugongs and sea turtles. Immediate, coordinated action is essential to ensure these ecosystems continue to thrive, benefiting both nature and people.

60. Workshop participants were invited to join the 2030 Seagrass Breakthrough, committing to the guiding principles, and contributing to the global effort to secure the future of seagrass ecosystems.

Discussion

61. It was noted that seagrass is very difficult to grow, so the opportunities for plant breeding are limited – it is easier to translocate species that can withstand the greatest heat changes. In terms of costs, the initial figures for restoration were higher than $12 billion quoted, but were then adjusted to align with the mangrove and coral initiatives.

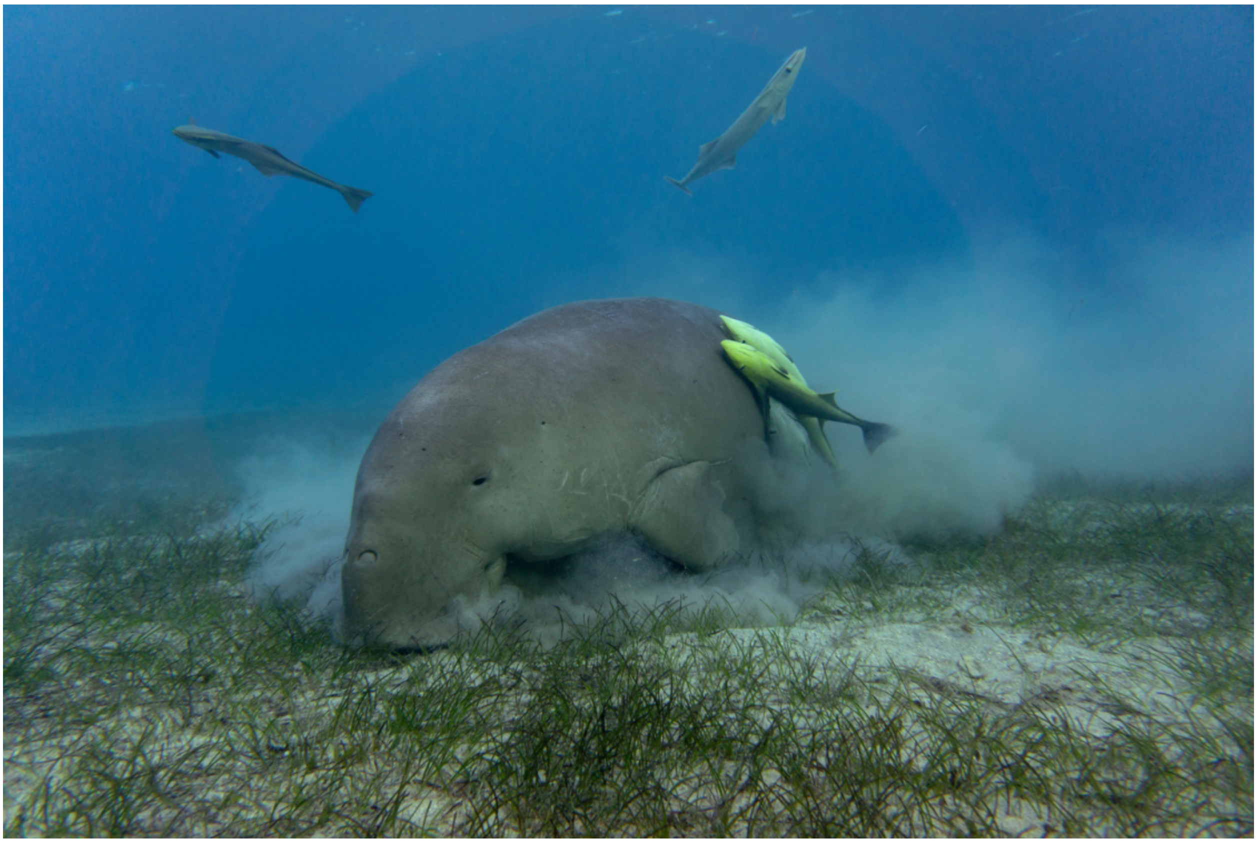
6.2. Restoration of Seagrass Beds in Scotland

Katie Gillham, NatureScot

62. Ms Gillham gave a short presentation, covering the following head points.

63. Protection of seagrass beds in Scotland:

    - Seagrass is mainly recorded on the west coast and islands, with some large intertidal beds in the east coast firths. Beds in Scotland were impacted by the wasting disease in the 1930s.



Picture 3. Seagrasses are of critical importance for dugongs, which rely almost exclusively on these habitats for food. © veterok_77/ Getty Images

- There are 45 Marine Protected Areas (MPAs) including seagrass beds, distributed right around the coast. Management measures for fishing activity were implemented in two MPAs in 2016. Work is ongoing on measures for the remaining subtidal beds.
- Seagrass beds are also a Priority Marine Feature (PMF) in Scotland which means they receive policy protection outside the MPA network.
- Alongside the work on management measures for MPAs, we are also working on management measures for fishing activity for PMFs considered to be vulnerable to bottom-contacting fishing gear, including seagrass beds.
- The next step in the protection work is expected to be a public consultation covering both MPAs and PMFs.

64. Current restoration work:

- Interest in seagrass restoration has grown rapidly, with NatureScot and others continuing work to help facilitate this.
- There are three active seagrass restoration projects in Scotland: Seawilding in Loch Craignish, Argyll; Restoration Forth in the Firth of Forth; and Mossy Earth in the Cromarty, Moray and Beauly Firth, Highland.
- There are a number of other groups interested in developing projects on both the east and west coasts, and the islands.
- There are increasing enquiries from companies seeking to carry out seagrass restoration for nature positive actions, credit markets, and mitigation for developments.

65. Funding and other support:

- NatureScot has produced guidance e.g. Seagrass Restoration Handbook and the Marine and Coastal Enhancement Framework and feeds into other relevant initiatives, for example the OSPAR seagrass restoration guidance.
- NatureScot is currently engaged with partners in a number of research projects including: opportunity mapping; genetics and selection of donor beds; better understanding seagrass declines; and use of eDNA linked to the provision of essential fish habitat.
- Seagrass restoration work has been funded through a variety of sources, including the Nature Restoration Fund and its predecessor, and more recently the Scottish Marine Environmental Enhancement Fund.
- On World Seagrass Day in 2024 announced a more than £2M as part of a new partnership to protect and restore seagrass meadows in Scotland.

66. Web links:

- NatureScot seagrass: https://www.nature.scot/landscapes-and-habitats/habitat-types/coast-and-seas/marine-habitats/seagrass
- NatureScot marine restoration and enhancement: https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/marine-restoration-and-enhancement
- Seawilding: https://www.projectseagrass.org/restoration-forth/
- Restoration Forth: https://www.projectseagrass.org/restoration-forth/
- Mossy Earth: https://www.mossy.earth/projects/cromarty-seascape
- Project Seagrass: https://www.projectseagrass.org/

Discussion

67. The importance of community involvement in conservation action was recognized in the discussion. A key part of this has been to allow the action to grow from the bottom-up rather than imposing a direction. Questions were raised about the interaction of seagrass restoration and impacts on other species e.g. native oysters – do they compete or do efforts combine to create multiple positive effects. It is difficult to make predictions; evidence is being accumulated, with further information available through the links provided above.

6.3. Central Asian Mammals and Climate Adaptation (CAMCA) Project in Kazakhstan, Kyrgyzstan, and Tajikistan

Murat Zhumashev, CAMP Alatoo, Kyrgyzstan

68. Mr Zhumashev gave a short presentation. The Kyrgyz Republic, a mountainous country where 65% of the population is engaged in animal husbandry, is facing increasing pressures on its ecosystems. Over the past two decades, livestock numbers have grown by 65%, surpassing sustainable limits. This expansion, combined with climate change impacts, has led to severe pasture degradation, affecting 29-82% of rangelands. Additionally, as herders move to higher altitudes in search of better grazing, competition between livestock and migratory wildlife intensifies, increasing habitat loss and human-wildlife conflict.

69. To address these challenges, the CAMCA project focuses on enhancing community and ecosystem resilience through ecosystem-based adaptation (EbA). Key interventions include improved pasture management, alternative livelihoods such as beekeeping and agroforestry, and energy efficiency measures to reduce environmental pressures. One of the project's most critical efforts is the integration of climate change adaptation and wildlife conservation into local land-use planning through the establishment of ecological corridors.

70. Ecological corridors are essential for maintaining habitat connectivity in Kyrgyzstan's fragmented landscapes. They provide safe passage for migratory species by linking protected areas, pastures, and forests while promoting coexistence between wildlife and human activities. However, their implementation is complex due to overlapping land governance structures. Pastures are managed by local pasture committees, forests by state forestry agencies, while hunting enterprises, protected areas, and recently established community-managed micro-reserves each have their own regulations. Ecological corridors must navigate these intersecting jurisdictions to be effectively integrated into land-use policies.

71. At present, the CAMCA project is working to determine how ecological corridors can be embedded into existing management plans, with a primary focus on pasture management plans. Since overgrazing is one of the most significant threats to biodiversity, developing climate-smart, wildlife-friendly pasture management strategies is a priority. These strategies aim to regulate grazing pressure, preserve key habitats, and maintain critical migration routes for species such as the snow leopard, ibex, and argali sheep.

72. Additionally, the project is developing guidelines for climate-smart pasture management that can serve as a model for other land users, including micro-reserves and hunting enterprises. These guidelines will help establish ecological corridors as a practical conservation tool that balances biodiversity protection with sustainable land use.
73. The experience in Kyrgyzstan underscores the importance of integrating ecological corridors into broader conservation and climate adaptation strategies. CMS can build on this work by:

- Promoting ecological corridors as a key mechanism for the conservation of migratory species in regions vulnerable to climate change and in ecosystems sensitive to high livestock pressure.
- Encouraging cross-sectoral cooperation to align policies across pasture management, forestry, and wildlife conservation.
- Strengthening local capacity and governance mechanisms to ensure the effective implementation and management of ecological corridors.
- Scaling up climate-smart land management

approaches to improve habitat connectivity.

- Embedding ecological corridors into national and regional policies, CMS can enhance resilience for migratory species in Central Asia and beyond, ensuring that climate adaptation and conservation go hand in hand.

Discussion

74. In discussion it was noted that livestock are heavily invested in due to lack of other land use opportunities, and that there are difficulties in mobilizing government funds to implement / integrate management plans.

6.4. A survey of 928 North American Migratory Species: regarding conservation status, presence/absence of management plans, cross-border conservation efforts, equity in inclusion of stakeholders, and ecosystem services – next steps in the face of climate change

Laura López Hoffman, University of Arizona

75. Ms Lopez Hoffman gave a short presentation. The EMIGRA team formed in 2009 as group of conservation biologists and ecologists with a shared interest in understanding how to conserve migratory species across borders. As the team expanded to include perspectives from cultural geography, anthropology, public administration, and economics, their focus shifted from the conservation of migratory species to the governance of migratory species and their socio-ecological systems. Sixteen years on, the team has concluded that that successful conservation is most effectively achieved by leveraging how migratory species connect people across space.

Picture 4. Not only do people care about the ways migratory species connect them to other people and locations across great distances, but many are willing to pay for migratory species conservation in other countries, for example for the conservation of the Monarch Butterfly. © JVHEPhoto/Getty Images Pro

76. The work has three major results. First, the provision of ecosystem services in one location often depends on conservation of habitat areas in distant locations (i.e. conservation investments in a migratory species habitat in one location often subsidize human benefits elsewhere). Second, not only do people care about the ways migratory species connect them to other people and locations across great distances, but many are willing to pay for migratory species conservation in other countries, whether or not they benefit directly. Third, in recent work – carried out by local researchers in rural communities across Canada, from the US, and Mexico – the team has found that local people care about migratory services those species that cross or reside in their lands, and they want to connect to the local communities in other countries that are caring for the same species provide.

77. However, governance systems often fail to account for how migratory species connect people through ecosystem services. For instance, in an analysis of 928 migratory species in North America, the team observed only 38% had management plans, and only a subset of those substantively considered the species' cross-border needs. This is true despite the fact that between 40 and 96% of the aforementioned 928 species, depending on taxa, provide ecosystem services.

78. The team is using Eleanor Ostrom's (2009) socio-ecological systems framework to identify design principles for sustainable governance of migratory species. As Ostrom demonstrated, tragedy is not an inevitable consequence of humans using natural resources – natural resources can be sustainably managed when systems are bounded such that local people and stakeholders have some measure of say and control. Migratory species would seem, with current governance systems in place, to be a poster-child for an unbounded system where 'tragedy of the commons' is the only outcome. As species migrate across seasons and habitats, many cross countries with differing governments, economies and cultures, exposing them to such an inconsistent patchwork of governance that their conservation might seem impossible.

79. However, the team argues there are ways of bounding the socio-ecological systems of migratory species. The team recommends that NGOs and other institutions invest in programs that connect diverse local communities across the species' various geographies. People working within their various jurisdictions, and as teams across political boundaries, can create coordinated, concerted cross border initiatives to protect and conserve species. By leveraging the ways that migratory species connect people across space the team advises that we may be able to transcend our singularly human penchant for dividing the world.

Discussion

80. Discussion focused on the balance between top-down and bottom-up approaches to transboundary conservation, noting that both are critical as local people cannot act without the resources to do so. This does not mean we have a discrepancy e.g. hunters in the US are charged a fee for their licence; they know the importance of the duck stamp to fund conservation work.

7. Workshop reports

81. Refer to items 3. and 4. above

8. Moderated Discussion: Horizon scanning - threats and opportunities for migratory species

Co-chairs: Des Thompson, CMS COP-Appointed Councillor for Climate Change, and Barry Baker, CMS COP-appointed Councillor for Bycatch

82. The discussion revolved around the need to conduct a horizon scan to identify threats, opportunities, and disruptors related to migratory species conservation, particularly in the context of climate change. The purpose and objectives of the horizon scan must be clearly defined to avoid confusion among respondents. Different types of horizon scans (prioritizing known issues, identifying new ones) require specific objectives and direction. A horizon scan is necessary to capture rich perspectives and identify new issues that may have been overlooked. The scan should cover both threats and opportunities (e.g. migratory species helping to deal with climate change) to leverage funding, and disruptors to provide a comprehensive understanding of the landscape. While political instability and geopolitical factors are crucial, it is essential to address them carefully to avoid alienating stakeholders. Initially, the focus should be on environmental issues, with political considerations introduced in a more general sense during the COP preparation.

83. The pool of respondents should be diverse, considering geographic representation, expertise, and taxonomic coverage. The scan should include elements that consider future conservation actions and how they can be pragmatically implemented by people and their willingness to do so. Mobile marine

protected areas, for example, present opportunities but also practical challenges that need to be addressed. The findings should be disseminated through internal CMS channels and peer-reviewed publications to reach wider audiences. Effective communication is key to ensuring the scan's findings are accessible and actionable to target audiences.

84. Artificial Intelligence can be utilized to compile and prioritise the horizon scan process. It is important to acknowledge and address uncertainties in species responses to interventions for informed decision-making. The Scientific Council should seek the appropriate mandate to carry forward horizon scan work for the COP. The discussion concluded that a paper should be developed through the Climate Change Working Group and presented to the Scientific Council. The paper should be clear how the work will be useful to parties and enhance their work.

Workshops II and IV ran in parallel

9. Workshop III. How work under CMS on climate change could interact with implementation of the GBF and monitoring framework

Chair: James Williams, CMS Scientific Councillor for the UK

85. The Chair provided a short presentation. Within the Kunming-Montreal Global Biodiversity Framework (KM-GBF) adopted at CBD COP15, GBF Target 8 focusses on climate change. This is mirrored by target 3.4 in the Samarkand Strategic Plan for Migratory Species (SPMS, Resolution 14.1). The indicators adopted in the KM-GBF monitoring framework may also offer an opportunity to measure progress with SPMS target 3.4. At the recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) plenary the IPBES Nexus Assessment: Summary for Policymakers was adopted – looking at the interlinkages among the sustainable development goals related to food and water security, health for all, protecting biodiversity on land and in the oceans and combating climate change. The Intergovernmental Panel on Climate Change (IPCC) 6th Synthesis Report: Climate Change 2023 provides an up-to-date synthesis of climate change impacts, adaptation and vulnerability. Thinking forwards to revisions of CMS Resolution 12.21 (Rev.COP14), and the decisions on climate change and migratory species that could be adopted at CMS COP15, it is clear that dots need to be joined between the biodiversity conventions to make rapid progress in practical conservation as well as policy implementation.

86. **Themes / considerations**

- **Alignment of efforts (& avoidance of duplication):** alignment of the CMS Samarkand Strategic Plan Target 3.4 (Resolution 14.1) and GBF Target 8 are a good example of this. It was noted that there can be challenges domestically with a range of different Ministries that have an interest in migratory species (e.g. Agriculture, Energy, Fisheries, Forestry, Environment, Finance, Climate Change).
    - o Action: for Parties to strengthen or establish a mechanism for focal point coordination nationally.
    - o Action: propose addition to CMS Resolution 12.21 (Rev. COP14) on Climate Change and Migratory Species similar to current paragraph 13 encouraging collaboration between Secretariats for Parties to enhance coordination between national focal points of related MEAs and domestic policy & delivery teams.
    - o Action: review the internal coherence of CMS Decisions, Resolutions and Concerted Actions with regard to climate change and related actions.
    - o Action: review overlaps between CMS activities and those of closely related Multi-lateral Environmental Agreements, i.e. the International Whaling Commission (IWC), CMS Family Agreements, the Convention on Biological Diversity (CBD).

- **Trade-offs:** a focus on synergies is good but typically focusing on the positive overlaps or benefits. There tends to be less focus on overlaps where, e.g. actions to address climate change (renewables) may have a negative impact on migratory species.
    - o Action: develop a mechanism to, at least, identify and make explicit (with a view to resolve) negative impacts in these areas across Conventions / work programmes. This requires careful consideration and needs to be explored further to ascertain if there are only site-specific issues that can be resolved by a domestic or unilateral mechanism.

- **Ecological connectivity:** reflection that ecological connectivity is the hook that CMS have been using to be active in cross-cutting discussions or frameworks, i.e. GBF, rather than migratory species per se (captured in CMS Resolution 14.16).

- Action: retain this as a unifying concept fundamental to support migratory species.
- Action: explore opportunities within the planned IPBES Spatial Planning and Connectivity Assessment due for completion in 2027.

- **Communication:** lots of good material already exists, but different formats may be needed, as well as exploring the various avenues for dissemination (different international frameworks, local communities, Indigenous Peoples, domestic audiences). Exploration is needed to determine how to best communicate the important findings of ecological researchers to those who aren't domain experts.
  - Action: Development of fact sheets and case studies as shorter form materials tailored for different audiences, particularly for those audiences that may have found previous materials inaccessible.
  - Action: for COP-appointed Councillor for Climate Change (Des Thompson) and CMS Secretariat to act as advocates for ecological connectivity and collaboration in the context of climate change with other frameworks, for example with Brazil hosting both CMS COP15 and UNFCCC COP30.

10. Workshop IV: Develop an interpretation of the term 'barrier', to ensure consistency in the obligation to remove barriers[2] to migratory species

87. The discussion focused on the complexities surrounding the definition of "barrier" in relation to migratory species, emphasizing the need for clarity to enhance conservation efforts. The background paper highlighted the challenges posed by both human-made and natural barriers, as well as the impact of climate change on these definitions. Participants suggested a matrix approach to differentiate between barriers affecting individual migratory journeys and those influencing population dynamics. There may also be a need to distinguish between day-to-day dispersal, and larger scale migrations, and to consider the cumulative impacts of barriers on species/populations. The inclusion of marine environments and species in the definition was also deemed essential and the urgency of establishing effective definitions to guide future policy was acknowledged.

88. Further discussions addressed the need for a balance between scientific and legal interpretations for discussion by the Conference of the Parties. For example, Article III of the Convention refers to obstacles to migration, rather than barriers, while Decision 214 explicitly requests the Scientific Council to develop an interpretation of the term "barrier". It was recognised that it would be important to clearly articulate the inter-relatedness and common interpretation of obstacles and barriers in any material to be considered by COP. The classification of migratory species, such as the Atlantic salmon, was examined, emphasizing their role in cultural and ecological contexts. GEO BON's Move BON network was introduced, which focuses on animal movement and biodiversity monitoring, stressing the need for nuanced definitions of barriers that consider both natural and human influences.

89. The Workshop group agreed on the importance of creating case studies to illustrate effective actions to ameliorate the effects of barriers to species migration, with suggestions to consider the resistance and porosity of landscapes and seascapes to species movements and specify whether barriers are physical or non-physical, and in either case whether they are anthropogenic or natural. Case studies should inform conservation interventions, and consider whether particular barriers are subject to regulatory intervention.

11. Cetaceans and Climate Change

11.1. An Overview of the Work of The International Whaling Commission (IWC) in Relation to Climate Change, including Relationships to CMS Work

Mark Simmonds, CMS COP-Appointed Councillor for Marine Pollution

90. This was a special session devoted to cetaceans, organised in conjunction with the International Whaling Commission (IWC). The session consisted of a range of presentations, with contributors introduced by Mr Simmonds.

[2] The term 'barrier' does not exist within the Convention's text, but is used here as shorthand for 'the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species'.

91. The session opened with Mr Simmonds introducing the work of the IWC, including consideration of the effects of climate change on both large whales and small cetaceans, including river dolphins; and a regional case study looking at the Mediterranean, featuring a well-studied local population of bottlenose dolphins in the Northern Adriatic. Some of the primary conclusions that had been made via the IWC's processes were presented and finally some reflections on how perceptions of climate change impact on cetaceans have evolved.

92. The IWC was established in 1946 as the global body responsible for the management of whaling and conservation of whales and, currently, has 88 members. In recent decades its work has expanded from the management of whaling to encompass the multitude of factors affecting cetaceans and their status. The IWC has a relatively long history of assessing the influence of climate change on the ~90 species of cetaceans that are under its purview in all of the world's aquatic habitats.

93. Work on climate change formally started when the Commission asked its Scientific Committee to look at the effects of global change on cetaceans and a workshop on this theme was duly held in 1996. Other international workshops on climate change were held in 2009, 2010 (specifically focused on small cetaceans) and, most recently, in 2021. Other related activities of the IWC include a 2014 workshop on the impacts of increased human activities on cetaceans in the Arctic and the development of a workstream within the Scientific Committee on the role of cetaceans in ecosystem functioning. An overview of the IWC's work to date on this topic can be found on its website.

94. In 2022, the Commission endorsed the establishment of an Intersessional Correspondence Group (ICG) with the purpose of assessing the latest information on the impact of Climate Change on cetaceans, providing advice on tools to mitigate impacts, ways in which to build resilience and to develop a climate change response programme. This presentation was prepared by members of this ICG. In the decades that the IWC has been considering the impacts of climate change, the number of published scientific papers has hugely increased and likewise the ability of scientists to make predictions about population level consequences has greatly improved.

11.2. Climate Change Impacts on Cetaceans and their Prey – predicted and observed effects

Viv Tulloch, International Whaling Commission

95. Ms Tulloch gave a short presentation, which was subsequently published in March 2025. Climate change is affecting baleen whales, with significant implications for ecosystems. Many whales undertake vast migrations, relying on critical migratory corridors to reach breeding and feeding grounds. However, many populations remain critically endangered, having not recovered from historical commercial whaling. Their dependence on specific migration routes makes them particularly vulnerable to environmental changes.

96. Rising ocean temperatures, marine heatwaves, and intensifying climate-related changes are increasingly overlapping migratory corridors, affecting food webs and ecosystem dynamics. Both observed and predicted impacts indicate shifts in whale populations, behaviour, and distribution.

97. A review of distributional changes linked to climate impacts has identified emerging trends (van Weelden et al. 2021). Whales are initiating migrations earlier and delaying their return, with some species altering their migratory routes. Physiological impacts have also been recorded, including reduced body condition due to environmental stress, leading to increased mortality rates.

98. Pacific gray whales are showing notable changes in their behaviours and distribution patterns, migrating later and staying longer in the Arctic to eat. This can lead to malnutrition because their benthic prey are sensitive to sea ice cover – less ice results in less algae and less amphipod prey. These changes do not bode well for the species.

99. For some species and populations, reproductive rates are also declining, particularly in response to prey shortages. Climate change has driven significant shifts in the plankton community, altering the geographical and seasonal composition of copepods and krill, with krill distributions shifting poleward. These changes force whales to adapt their migration routes and feeding habitats, often resulting in increased competition for food. Reduced prey availability has led to whales spending more time feeding / foraging during migration to meet their energy demands.

100. **Future considerations**

- Anticipated Changes – Climate change will continue to shift habitat availability and migration patterns, with new connectivity emerging, such as access to new habitat in an ice-free Arctic.
- New Challenges for Whales – Environmental changes may expose whales to novel threats from human activities, increased competition between species, and increased predation.
- The Role of Predictive Models – Robust process-based models are essential for understanding ongoing changes and forecasting future impacts (Tulloch, 2025).
- Prey Availability as a Key Factor – Since the ranges of whales depend on prey availability, future models must incorporate environmental data, including prey interactions, to accurately predict how populations will respond to climate change.

Challenges and research gaps

101. While some whale species may adapt to environmental changes, without significant reductions in greenhouse gas emissions, many populations will face severe challenges. Research gaps persist, particularly for data-deficient species, and urgent action is needed. Climate change has already caused significant shifts in population distribution and migration patterns, particularly in the Northern Hemisphere, where more research has been conducted. However, there are major knowledge gaps regarding Southern Hemisphere populations.

102. The ability to track and study certain species varies based on their behaviour and habitat, but researchers must continue addressing these data deficiencies. Although reviews of climate impacts on whales continue to update our knowledge of responses globally (e.g. Nunny & Simmonds 2021 (Ch. 11), van Weelden et al. 2021, Tulloch, 2025), more mechanistic studies are needed to understand how whales physiologically adapt to climate stressors and how ecosystem interactions are shifting.

103. Most vulnerable whale population:

- North Atlantic right whales – Highly sensitive to climate change due to their small population and dependence on prey sensitive to temperature changes, making them less resilient.
- Sub-Arctic whales – Bowhead whales face prey shortages, while they, belugas and other

Summary of Observed Changes

Observed changes in the oceans include:
- Rising sea temperatures (global average increase of 0.13°C per decade)
- Ocean acidification (pH decreased by 0.1 units since pre-industrial era)
- Changes in ocean circulation patterns
- Shifting marine productivity zones

Direct Physical Impacts on Marine Ecosystems:
- Sea ice reduction in polar regions (critical for Arctic and Antarctic species)
- Changes in upwelling patterns affecting nutrient distribution
- Altered thermocline depths impacting prey distribution
- More frequent marine heatwaves disrupting ecosystems

Observed responses in cetacean populations include:
- Physical Distribution
  - Changes in migration timing, distribution patterns
  - Expansions into novel areas (e.g. Arctic ice-free)
- Physiological
  - Reduced body condition in some populations
  - Nutritional stress resulting in increased mortality
- Reproductive
  - Altered breeding schedules and breeding success
  - Decreased calving associated with low prey availability

Figure 2: Summary of observed changes in the oceans, and cetacean responses.

ice-dependent species are vulnerable to ice retreat and loss of critical habitat.

- Gray whales – Increased mortality has been linked to poor body condition resulting from reduced prey availability.

Cumulative stressors and climate change impacts

104. Climate change does not act in isolation. Multiple overlapping stressors increase the vulnerability of whale populations, making conservation and management efforts more challenging. Factors such as shipping, fishing, and habitat displacement are intensifying due to climate change. For instance, reduced polar sea ice has led to increased shipping activity in areas that were once inaccessible, which increases the likelihood of human-whale interactions, including ship strikes and bycatch. Effective conservation strategies must address cumulative impacts by implementing measures that enhance the resilience of vulnerable species.

Case Study: North Atlantic Right Whale

105. The North Atlantic right whale, a critically endangered species, has been extensively studied. Climate-driven changes have caused warm waters to enter its primary habitat, reducing the suitability of foraging grounds. As a result, right whales have shifted their feeding areas to the Gulf of St. Lawrence, where they face an increased risk of ship strikes and entanglement in fishing gear.

106. A study by Meyer-Gutbrod et al. (2021) highlighted that in 2017, persistent unfavourable ocean conditions led to low calving rates and multiple mortality events, putting the population in a precarious position. To address these challenges, adaptive management strategies such as dynamic management approaches have been implemented, reducing vessel strike mortality and demonstrating how targeted, science-driven interventions can mitigate climate change effects on baleen whales.

Case Study: Climate Change and Whale-Fishery Interactions

107. The North Pacific humpback whale in California has experienced significant changes in migration routes due to climate-driven habitat shifts. This has increased entanglement risks in crab fisheries, as whales move into new areas. To mitigate these risks, fisheries have implemented dynamic management measures, including:

Picture 6. The North Pacific humpback whale in California has experienced significant changes in migration routes due to climate-driven habitat shifts. © Craig Lambert/Getty Images

- Seasonal restrictions on fishing activity.
- Real-time monitoring to track whale movements.
- Modifications in fishing gear to reduce entanglement risks.
- Collaborative approaches between fisheries, conservation organisations, and government agencies have proven effective in reducing human-induced threats to whales.

108. Key messages

- A shift in cetacean management from a focus on sustainability to resilience-building has been recommended. This involves addressing and mitigating external stressors to improve the overall adaptive capacity of whale populations.
- Climate change mitigation must be integrated with ongoing and future conservation efforts.
- Whales provide essential ecosystem services – Healthy whale populations contribute to ecosystem stability and could function as natural climate solutions. Ongoing research, including IWC-led workshops and academic research (e.g. Durfort et al. 2022), is investigating the role of cetaceans in marine ecosystems.
- Conservation must consider entire ecosystems – Protecting whales requires protecting their prey, as well as maintaining the overall health of the ocean and the planet's climate system.
- Interdisciplinary research and integrated approaches are necessary – Addressing the complex impacts of climate change on cetaceans requires collaboration across disciplines, including marine biology, climate science, economics, etc.
- Collaborative efforts are essential – Strong partnerships, such as those between the IWC and CMS, are crucial for effective conservation and policy implementation.

11.3. Climate change Effects on Habitats e.g. changes to fluvial systems; and climate-driven changes to human populations affecting habitat and resource use

Lindsay Porter, Chair IWC Scientific Committee

Impacts on riverine cetaceans

109. Ms Porter gave a short presentation. Under the auspices of the International Whaling Commission, “Small Cetaceans” are all toothed whale species, other than the sperm whale, and includes some 77 species from 10 different families which occur in riverine, coastal and open ocean systems. Small cetacean species with restricted habitats, such as riverine and coastal dolphins, are particularly vulnerable to the impacts of climate change. Fluvial systems are complex ecosystems that support multiple habitats and hundreds of species, many of which are listed in the CMS Appendices.

110. Riverine systems are also vital for human populations, providing essential ecosystem services such as:

- Water supply and storage
- Flood risk reduction
- Food production
- Recreation and habitation
- Carbon and nitrogen sequestration

111. Human reliance on riverine and fluvial habitats has led to extensive habitat modifications aimed at protecting resources which many riverine and coastal species have been able to adapt to, however, as climate change physically alters these habitats through increased erosion, flooding, saltwater intrusion and storm surges, human modification of both river and coastal habitats, such as shoreline and channel modifications, is increased so that human infrastructure and resources can be safeguarded. As a result, cetaceans are subject to an ongoing cycle of habitat loss, prey depletion and increasing anthropogenic stressors, such as underwater noise pollution, in addition to the physical changes of the aquatic habitat itself as a result of climate change.

Climate change impacts on river dolphins

Rising temperatures and prey productivity

112. Increased water temperatures reduce prey productivity, putting fish stocks under pressure and leading to increased exploitation of already overexploited resources. All river dolphin species are already impacted by prey depletion.

Contaminant exposure

113. Climate-driven flooding and rising temperatures increase the transport of contaminants from riverine systems into coastal areas. This results in higher contaminant exposure for cetaceans, leading to reduced reproductive success, weakened immune systems, and greater susceptibility to disease.

114. There are five species of river dolphins worldwide, all of which are endangered, in addition to several facultative freshwater species, i.e. those species that can use both marine and freshwater environments, such as the Irrawaddy dolphin. A common threat to all river dolphins is habitat modification, particularly river management through damming and channelling. A negative consequence of river damming is the risk of population fragmentation, for example, in the

Mekong River, a series of dams isolated a small group of Irrawaddy dolphins, thereby removing them from the reproductive population. There was much discussion as to how to manage this group, including removing them from their isolated habitat and relocating them downstream to a section that was frequented by other dolphin groups, however, before any decisions were made, all of the isolated individuals had died, representing a significant loss for the already endangered population of approximately 90 individuals.

Impacts on coastal dolphin populations

115. Coastal dolphin populations are also affected by human development and climate change. For example:

- Artificial shoreline expansion – in regions such as Hong Kong, resident dolphins are increasingly forced to navigate artificial coastlines.
- Population influx into port cities – this exacerbates climate change impacts by expanding human activities.
- Prey reduction and contaminant accumulation – in the Strait of Gibraltar, prey availability for dolphins has declined, while contaminants have accumulated in their systems, leading to increased injuries, poor nutritional status and an increased incidence of skin diseases.
- Skin conditions and environmental stressors – changes in dolphin skin conditions correlate with rising sea temperatures, although their direct link to body condition is still poorly understood.

Case Study: Amazon River Dolphin Mass Mortality Event

116. In 2023, an unprecedented drought and heatwave severely impacted Amazon River waters, leading to high mortality of both fishes and river dolphins (Amazon river dolphin *Inia geoffrensis* and *Tucuxi Sotalia fluviatilis*). Five of 10 lakes monitored showed exceptionally high daytime temperatures (>37°C), with one large lake reaching 41°C throughout the entire ~2m deep water column. Large diurnal variations in water temperature were also recorded, in some areas up to a 13°C difference. Previous analysis of data gathered between 1990 and 2023 led to predictions and increases in the magnitude of 0.6°C per decade, this extreme heating of Amazon waters was driven by a combination of high solar radiation, reduced water depth and wind speed. Monitoring of contaminants influx, including algal blooms, indicated that although there were some increases during the high temperature event, these were not severe enough to cause cetacean mortality.

117. The management response from the Brazilian government was swift and included: daily patrols, animal counts and documentation of behaviours. There is extremely limited information on how cetaceans react to heat stress and there are no procedures established as to how to treat or mitigate the effects of high temperatures and even less is known of individual tolerances to large temperature change within the environment.

118. Necropsies revealed common results across individuals and both species, i.e. obstructed blood flow, excess fluid in the lungs and heart and internal haemorrhaging. There are no available medical interventions to reverse or treat these effects. Moving forward, temperatures that approach or exceed thermal tolerances for aquatic life are likely to become more common in tropical aquatic systems representing an additional threat to already compromised cetacean species and their prey.

119. **Actions under the IWC:**

- Integration of Climate Change Impacts into the IWC's Conservation Management Plans (CMPs): IWC CMPs provide a scientific and management framework that contracting governments have committed to.
- Development of Early Warning Systems: Strengthening management protocols to detect and respond to climate-related events and determine how individuals could be saved. Given the risks of mass mortality events, CMPs for river dolphins must account for climate change impacts and generate early warning systems.
- Population and Genetic Studies: Understanding genetic isolation is essential to assessing population viability and the impacts of mortality events in populations that have a strong sub-structure.

Key messages

120. A more comprehensive and harmonised approach across multilateral environmental agreements (MEAs) is necessary to mitigate the effects of climate change on riverine and coastal cetaceans. Collaborative efforts between organisations, researchers, and policymakers will be crucial in protecting these vulnerable species.

11.4. Mediterranean Case Study

Tilen Genov, Morigenos - Slovenian Marine Mammal Society and Laetitia Nunny, OceanCare

Introduction to climate change in the Mediterranean

121. Ms Nunny and Mr Genov gave short presentations. Mediterranean Sea Surface Temperature (SST) monitoring data shows a continuous warming trend since the beginning of the 1980s. The hottest day on record for its surface waters was recorded on 15th August 2024 with a mean temperature of 28.47 degrees Celsius. Marine Heatwaves (MHWs) have been increasing in the Mediterranean; between 1982 and 2022 there were 20 major MHW events, five of which were extreme.

122. Suitable habitat for fin whales, striped dolphins and common bottlenose dolphins is predicted to be reduced under a warming climate (D'Amen et al. 2024). Details regarding fin whales in the western Mediterranean were presented showing that a reduction of range between 55% and 70% is predicted for the period 2045-2055. The reduction in suitable habitat could drastically limit the number of fin whales that the Mediterranean Sea can support, and the potential reduction of prey abundance could negatively affect whale health. Habitat reduction could also impact movement patterns of fin whales within the Mediterranean. The Mediterranean subpopulation of fin whales is listed as Endangered by the IUCN Red List (Panigada et al. 2021).

123. The northern Adriatic Sea represents one area within the Mediterranean Sea where the climate change impacts on cetaceans may be particularly strong. Based on the region's characteristics, some predictions can be made about the likely consequences. The Gulf of Trieste is home to a resident population of common bottlenose dolphins, the only regularly present species in the northern Adriatic. This region is characterised by a semi-enclosed, shallow basin with large temperature variations and strong anthropogenic pressures, making it one of the most heavily impacted areas of the Mediterranean Sea.

124. The resident dolphin population consists of approximately 150 individuals, and climate change is expected to affect them in several ways:

- Changes in prey availability and abundance. Shifts in prey composition, including the possible introduction of invasive species.
- Increased intraspecies competition. As increasing water temperatures push dolphin populations northward, competition for resources is likely to rise.
- Introduction of novel pathogens. Warmer temperatures and incursion of new animals may facilitate the spread of new diseases affecting cetaceans.
- Potential thermal stress. Rising water temperatures could exceed the species' physiological tolerance.
- Cumulative Impacts. Climate change is not the sole threat to cetaceans in the Mediterranean and Adriatic; it is one of many overlapping stressors that exacerbate existing risks including prey depletion, bycatch and ingestion of fishing gear, recreational boating and ship traffic causing increased underwater noise pollution, disturbance, and boat strikes, and pollution including chemical pollutants, marine debris, and microplastics.

125. While climate change may not be the most immediate threat, it acts as a compounding factor, intensifying the effects of other stressors and further challenging the resilience of cetacean populations in the Mediterranean.

11.5. Research Recommendations

Viv Tulloch, International Whaling Commission

126. Ms Tulloch gave a short presentation. A series of research recommendations have been made by the IWC Scientific Committee to further our understanding of climate change on cetaceans and to develop mitigation strategies, including:
    - Building Resilience – prioritising the identification and mitigation of key stressors, and regions or species most vulnerable or under the greatest threat, considering cumulative effects across different regions and species.
    - Improving Research Methods and Best Practices – enhancing methodologies for studying climate change and cetaceans by developing and implementing best practice guidance and advancing mechanistic studies to capture cause-effect relationships (e.g. Tulloch, 2025).
    - Expanding Partnerships and Monitoring – strengthening collaborative action among intergovernmental agencies and parties to improve monitoring and conservation strategies.

Challenges in research and management

Aligning Research and Management with Climate Change Scales

127. Climate change operates at large spatial and temporal scales, making it difficult to align research

and conservation efforts accordingly. There is a need to match scientific processes with conservation actions to ensure effective management.

Spatial-Temporal Mismatch Between Climate Change and Cetacean Life Histories

128. Climate change operates at different scales that most cetacean species do not match. This mismatch creates significant management challenges, particularly for Marine Protected Areas (MPAs). Many conservation actions remain too small-scale to encompass the full range of a species' movements.

Incorporating Long-Term and Large-Scale Research into Decision-Making

129. Research should prioritise long-term studies to capture climate change trends over time. Alongside temporal research expansion, spatially expanded (possibly transnational) conservation efforts are needed.

Integrating Physiological Considerations into Methodologies

130. Climate change studies should incorporate physiological changes in cetaceans to enhance predictive models. A more integrated approach should combine multiple data sources to ensure detailed and accurate assessments using process-based models.

Adaptive Spatial Protection and Dynamic Management

131. While spatial protection for large whales can be useful it must be adaptable to shifting distributions, dynamic, and integrate transnational considerations. However, MPAs alone are insufficient; a more comprehensive strategy addressing multiple threats – including pollution reduction, bycatch mitigation, and habitat degradation – is necessary. IWC Conservation Management Plans are an example of a flexible management tool that can provide a framework for multiple states to work together on addressing threats to shared cetacean populations, as part of a resilience-based approach.

132. Complementary management across political boundaries is essential to ensure effective

Picture 7. Suitable habitat for fin whales, striped dolphins and common bottlenose dolphins is predicted to be reduced under a warming climate. © Vaughan Jones/Getty Images

conservation measures for migratory species. Intergovernmental agencies play a critical role in standardising research and monitoring protocols to ensure protection throughout cetaceans' migratory ranges.

11.6. Conclusions and Conservation Recommendations

133. Mr Simmonds reported that this issue has changed in the last ten years: a decade ago, concerns primarily focused on range expansion and contraction, human activities and their interactions with cetaceans, eutrophication (nutrient-driven ecosystem changes) and population displacement. Since then, there has been a huge increase in published information and changes in the distribution and behaviour of several cetacean populations are now being documented rather than simply predicted.

134. Concerns for some species and populations have become more focused, particularly the North Atlantic right whale. Changes in river flow regimes and how this affects riverine and coastal species are receiving greater attention. In addition, marine heatwaves have emerged as a critical threat to cetacean populations.

135. New important and large-scale approaches to marine mammals conservation include the Important Marine Mammal Areas initiative (IMMAs) and it was stressed that there is an urgent need to address non-climate change related factors that impact cetaceans and their environment with the purpose of building resilience.

Discussion

136. The ecological restoration efforts by Shinnecock kelp farmers in Long Island Sound were noted, including the need to include indigenous practices and language in environmental management. There are challenges in a lack of representation in research and the significance of educational components to bridge this gap was stressed. The emotional and cultural importance of conservation for Indigenous communities was also highlighted.

137. Differences in conservation management were noted between the Yangtze and Amazon rivers, specifically in handling endangered porpoises and dolphins. The Chinese government's well-managed oxbow lakes along the Yangtze River serve as controlled environments for translocating and rescuing Yangtze finless porpoises, as well as safeguarding them from impacts within the open river system. In contrast, the Amazon river lacks similar infrastructure, making any need to remove or safeguard dolphins from events such as extreme heat more challenging. The session also addressed the need for comprehensive rescue and rehabilitation plans for the Amazon River.

138. Marine heatwaves and their impact on whale populations was highlighted and the need to develop robust mitigation strategies, such as reducing other stressors, was noted as a critical step towards building resilience in cetacean species. The effects of thermal stratification and potential deeper water refuges during heatwaves were explored.

139. The session had delved into the evolution of the IWC over the past 20 years. Initially focused on managing whaling, the IWC has expanded its mandate to address broader environmental threats and conservation efforts. The importance of understanding impacts beyond direct takes, such as climate change and deep-sea mining, was emphasised. The critical role the IWC plays in advising its members on the status of whale stocks was reiterated, while also noting that there remains a need for improved public awareness of the purpose of today's IWC, including its work on climate change.

12. Case Studies from Participants

12.1. How Changes in Migration as a Result of Climate Change also Influence Landscape and Seascape Carbon Storage

Trisha Atwood, Utah State University

140. Ms Atwood gave a short presentation. Natural climate solutions, such as reforestation, wetland restoration, and soil management, have the potential to mitigate up to 5 Gt of CO_2 annually. However, an additional 1 Gt of CO_2 removal is still required to meet global climate targets. While much attention has been given to vegetation-based carbon sequestration, growing evidence suggests that animal communities also play a critical role in regulating ecosystem carbon storage.

141. For example, studies on Pacific black brant geese demonstrate how climate-driven changes in migratory patterns influence grazing behaviours, which, in turn, affect plant chemistry, soil composition, and microbial communities. These changes alter greenhouse gas emissions and landscape-level carbon storage capacity. Similar research has shown that other animals – across freshwater, marine, and terrestrial ecosystems – can significantly impact carbon storage and retention, potentially helping to

close the emissions gap.

142. However, not all species contribute positively to long-term carbon storage, and some may even have negative effects. Managing animal populations for carbon benefits may also present trade-offs with biodiversity conservation and other sustainability objectives. Further research is needed to assess how migratory species influence carbon cycling and to identify strategies that maximize co-benefits while minimizing conflicts.

143. To fully leverage the role of animal communities in climate mitigation, policymakers and scientists should integrate biodiversity conservation with climate goals. This includes evaluating the carbon-related ecosystem services of migratory species, aligning conservation efforts with sustainability targets, and developing strategies that support both biodiversity and climate resilience. Expanding financial mechanisms, such as ecosystem-based carbon credit programs, could further incentivise habitat protection and climate-smart conservation. A holistic, integrated approach is essential to harnessing the climate benefits of animal-driven carbon storage.

Discussion

144. Creating effective strategies requires crossing political boundaries and extracting financial support from various sources, including carbon credits, whether compliancy-based like in the EU or voluntary from companies and individuals. Governments need to be stricter but also provide incentives to encourage voluntary participation. For instance, the public might prefer investing in environmental restoration for future generations over other major spending.

12.2. Responses of Arctic Shorebirds to Climate Change

Brett Sandercock, Norwegian Institute for Nature Research (NINA)

145. Mr Sandercock gave a short presentation. Arctic habitats support a high diversity of migratory shorebirds but are also undergoing rapid environmental change. Migratory shorebirds travel long distances between the Arctic circle and the Equator but can also show strong site fidelity. Socially monogamous species often return to the same breeding territory and can even reuse the same nest cup. The Arctic Shorebird Demographics Network was developed as a distributive research network to investigate the demographic causes for population declines in shorebirds. The project included 16 study sites in three Arctic countries with intensive field work in 2010-2014. Standardized field methods were used to estimate key demographic rates and to evaluate the role of climate change and altered trophic interactions as ecological drivers.

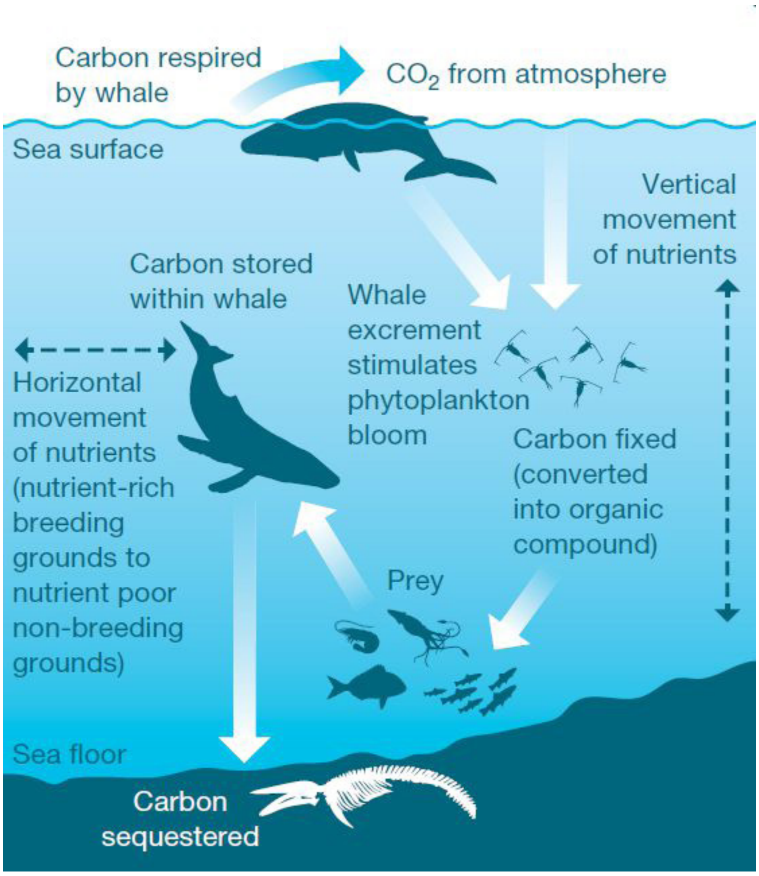
146. Patterns of climate change during the critical period of pre-laying varied across the network with cooling in the west arctic but warming in the eastern arctic. Temperatures during pre-laying determined the timing of nesting in western Alaska with changes of 1-2 days per degree C. Due to climatic cooling, timing of nesting was unexpectedly delayed by 4-5 days over a decade. Timing of nesting had strong effects on reproductive success with seasonal declines in the probability of laying a 4-egg clutch, egg size, duration of incubation, and daily nest survival. Climatic warming also affected timing of emergence and peak biomass of arthropods, especially at cold arctic sites. Climatic warming has increased the trophic mismatch between food availability and the peak energy demands of young during the brood-rearing period, which has reduced chick survival in some species.

147. Adult survival was the only demographic rate buffered against environmental change with relatively high survival among many small-bodied species. One exception was the arcticola subspecies of dunlin, which migrates along the East Asian-Australasian Flyway with extensive habitat loss in coastal estuaries. Overall, arctic-breeding shorebirds have slow life-history strategies that show widespread evidence of the effects of climate change on productivity.

148. Project success was due to collaborative goodwill among the research partners and important contributions from early career scientists with strong quantitative skills. Challenges included securing block funding for network science, developing replicable field protocols, and maintaining continuity for remote field sites. Collaborative research networks provide a valuable model for advancing conservation science for migratory species.

Discussion

149. The geophysical drivers of warming and cooling in the Arctic, with regional weather dynamics and productivity gradients affecting ecosystems was discussed. Significant habitat changes in the Hudson Bay Lowlands due to light phase geese impact wader breeding grounds. Questions arise about modelling predictions under different climatic scenarios and potential warming in the Western Arctic.



Picture 8. Increasingly, evidence points to how animals contribute in their daily lives to enhance ecosystem function, including carbon sequestration and storage, as illustrated here by the example of a whale. © JNCC

150. The potential consequences of the North Atlantic conveyor (also known as the Atlantic Meridional Overturning Circulation, AMOC) stopping, leading to ecological changes in Scandinavia, were discussed. Concerns about extreme weather events versus average conditions and long-term studies documenting breeding pattern changes during late springs were highlighted.

151. Bird species with slow life histories can skip breeding in unfavourable years. The impact of permafrost changes on ground-nesting birds and habitats in Northern Norway was explored, with concerns about habitat loss affecting breeding waders and waterfowl. The final discussion touched on the correlation between breeding success and food availability, differential migration patterns, and the tendency to focus on habitat loss rather than changes in food resources.

12.3. Migratory Species as Allies in the Fight Against Climate Change - apes and elephants

Ian Redmond, Born Free Foundation and Ecoflix

152. Mr Redmond gave a short presentation, which had been expanded on during his Spring Signature Lecture to the Royal Society of Edinburgh on 11th February 2025.

153. Mr Redmond noted that the workshop is full of people who understand the important role that animals play in their ecosystem, but most members of the public think we should conserve wildlife because animals are nice and our children like them – which is true but not the main reason for their conservation. Increasingly, evidence points to what animals DO in their daily lives to enhance ecosystem function, including carbon sequestration and storage. But the water cycle is at least as important as the carbon cycle, yet there is not much climate action that deals with this. Trees and other vegetation generate rain through evapotranspiration and release of volatile organic compounds around which water molecules cluster to form rain drops, and slow the run-off of resulting rain, preventing erosion and filling aquifers. Animals are not only the #GardenersoftheForest, pollinating, pruning, seed-dispersing and fertilising forest soils, but are also gardeners of the savannahs, wetlands and oceans. Moreover, the impact of migratory animals is seasonal, so the ecosystem has time to recover and invertebrates in the soil and phytoplankton in the seas have time to process the bodily wastes they leave behind. We can describe

migratory animals as the peripatetic workers of the biosphere, but the ecosystem services attributable to them are not currently paid for – Rebalance.Earth set out to change that but last year switched from a focus on forest elephants to restoring UK watersheds.

154. Perhaps the CMS needs to be renamed as the UN's Convention on Migratory Species and their Gut Contents and Hitch-hikers. They move around significant quantities of nutrients in their viscera and mud containing micro-organisms on their feet, fur or feathers. After mentioning to a RSPB colleague the biomass of the estimated 510,000 pink-footed geese in the UK, being roughly 1,530 metric tons in weight (almost 3kg being the weight of each bird) and wondering what weight of nutrients each bird arrived with, I was advised that their flight across the North Sea to their UK wintering grounds is likely to be made on an empty stomach to carry less weight. But terrestrial and marine migratory species carry huge amounts of nutrients with them and, depending on their through-put time, will deposit them along the pathways and swim-ways of their route. Elephants, for example, eat about four per cent of their body weight in vegetation each day, so an average adult individual produces roughly one metric tonne of dung each week, 52 weeks a year. Not only is this packed with nutrients that fertilises the soils, but it may also contain fragments of wood that raises the soil carbon storage, and seeds of trees that get a better start in life miles from the parent plant, and will be sequestering and storing carbon for centuries to come.

155. Research by Fabio Berzaghi revealed that areas of the Congo Basin with elephants have 7-14% more above-ground biomass than similar forest where elephants have long been extirpated. He reasoned that by eating soft vegetation (low in carbon) they both reduce competition for nutrients and fertilise the big trees in which most of the forest carbon is stored (this study did not look at below-ground carbon but others have found that savannah mega-fauna enhance soil carbon sequestration and storage, e.g. Sitters et al. 2020). Ralph Chami and colleagues used Fabio's data to do a valuation of the additional carbon sequestration attributable to elephants and at the 2019 price of carbon, estimated that each individual elephant is responsible for the storage of $1.75 million worth of carbon. He currently uses a figure of $2.6 million per elephant over a 60 year lifespan and we are working to set up a pilot project to deliver payment for ecosystem services to the communities and agencies responsible for monitoring and keeping such elephants safe. This has the potential to set a precedent to help bridge the biodiversity funding gap of $700 billion per year.

156. Unlike tourism, Payments for Ecosystem Services (PES) is less likely to be impacted by war or pandemics, and can be expanded taxonomically and geographically. Similar data are not yet available to do a valuation for other species, but by extrapolation, a family group of about 20 gorillas with have a similar biomass to a single forest elephant, playing a similar role in nutrient cycling, seed dispersal and pruning.

12.4. Asian elephant range shifts and connectivity under climate change

Shermin de Silva, University of California

157. Ms de Silva gave a short presentation. Asian elephants are likely to alter their movements in response to anthropogenic land-use and climate change. Such movements can potentially be disruptive and expose human populations to risks of conflict with the species. Moreover, suitable habitats may shift over the long term to areas that are unaccustomed to the presence of elephants. We used ecological niche modelling to identify areas of suitable habitat for elephants in the past and under future scenarios, as well as predicted connectivity in the future. We then compared these predictions to projections of human population density to identify areas of concern. While today the bulk of the Asian elephant population resides in South Asia (primarily India and Sri Lanka, accounting for >73% of the global population), suitable habitat in South Asia is likely to decrease across multiple scenarios. There is predicted to be more available habitat in Southeast Asia, where elephant populations currently are small and in decline. Contrary to general expectations, this indicates an easterly shift rather than a northward shift.

158. While habitat connectivity overall is declining, the best remaining connectivity is also in Southeast Asia. This raises several biological and sociological issues – elephants that are unable to move will be at risk themselves as well as put human lives and livelihoods at risk (e.g. on islands, those that are isolated); local adaptations of elephant populations may differ among regions along a rainfall gradient; human populations unaccustomed to elephants may not be willing to have elephants introduced into areas. This presents a severe conundrum – the bulk of the Asian elephant population, which also overlaps heavily with human populations, will be unable to move directly to areas of suitable habitat due to lack of connectivity, therefore local and international coordination strategies will be required despite uncertainty in how exactly elephant populations will respond.

13. Workshop Reports

159. See items 9. and 10. above

14. Moderated Discussion: key gaps for action

Chair: Vanesa Tossenberger, CMS COP-Appointed Councillor for Aquatic Mammals, and Party-Appointed Councillor for Argentina

160. Participants emphasized the need for short-term actions, such as updating resolutions and scientific papers, to address immediate needs. Enhancing the resilience of migratory species and ensuring their conservation across routes were critical goals. There was a call for increased collaboration between conventions, including closer cooperation between CMS, IWC and UNFCCC, and continued horizon scanning efforts. Recognizing and including indigenous communities, and addressing global oceanic and riverine environments, were also seen as crucial.

161. Proactive outreach, community workshops, resuscitating grants, and sharing information widely were seen as key strategies. Integrated action across conventions and local levels, more research and case studies, self-assessment, and engaging the public with accessible key takeaways were highlighted. Utilizing connections to restore natural abundance, prioritizing vulnerable species, and making information digestible were discussed.

162. Participants also emphasized maximizing scientific expertise, incorporating indigenous knowledge, using storytelling to engage decision-makers, ensuring long-term funding, and focusing on protected areas. Engaging youth and diverse communities, taking immediate action based on existing knowledge, and highlighting ecosystem services were deemed important. Connecting conservation efforts globally, considering animal welfare impacts, and telling compelling conservation stories were discussed. Lastly, connecting local communities, addressing renewable energy impacts, and acknowledging the role of nomadic people were key points.

163. Participants were requested to highlight specific actions felt to be necessary in taking CMS work on climate change forward. A number of the points may work together in interventions focussed on particular circumstances or individual species.

Head points in discussion:

a) **Urgency and accountability:** Recognize the urgency of addressing climate and nature emergencies. There is a disconnect between an increase in research and participation yet a decrease in wildlife diversity. Are our actions getting across to deliver tangible results in the present?

b) **Decision Tree adjustments:** Refine decision trees for broader applicability.

c) **Operational integration:** Enhance collaborative operational efforts. Promote integrated actions at both international and local levels and focus on creating tangible, actionable solutions.

d) **Horizon scanning:** Identify and address potential obstacles for migratory species.

e) **Indigenous inclusion:** Improve practices for incorporating indigenous voices globally. Respect and integrate indigenous practices, upholding their sovereignty.

f) **Triage acknowledgment:** Focus on manageable threats, recognizing for some populations targeted management actions for climate change are needed, and in other areas action to address threats may be less effective in improving the resilience of some species/populations.

g) **International collaboration:** Include relevant international bodies in CMS and proactively engage with other conventions. Assist new parties in implementing their Convention obligations .

h) **Language review:** Assess and optimize the language used in CMS without reinventing the wheel.

i) **Local highlights:** Showcase positive local efforts aiding migratory species.

j) **Research and participation:** Increase research and public participation, addressing political issues affecting wildlife diversity. Promote data sharing and accessibility.

k) **Public communication and community engagement:** Share key achievements with the general public. Highlight the importance of providing clear evidence linking climate change to animal impacts to gain public understanding. Work closely with communities and incorporate their voices in conservation efforts. Create resources the public can understand, regardless of their level of scientific knowledge. Consider novel communications methods or channels.

l) **Ecosystem restoration:** Focus on restoring natural abundance and forming ecosystem alliances.

m) **Climate solutions and demonstrating success:** Promote climate change solutions and success stories through creative engagement.

n) **Tracking benefits and impact visibility:** Highlight the benefits of tracking migratory species and increase visibility of the results observed.

o) **Youth and diversity:** Conduct workshops engaging youth and diverse communities, addressing global conflict zones.

p) **Abundance recognition:** Emphasize the economic benefits of environmental protection.

q) **Migratory species benefits:** Highlight the various benefits provided by migratory species.

r) **Stakeholder connections:** Connect with other conservation efforts and local stakeholders.

s) **Animal welfare:** Address the impact of climate change on animal welfare.

t) **Scientific case studies and policy:** Present more case studies and research digests in a policy context

u) **Continuous monitoring:** Emphasize the need for ongoing monitoring and leveraging new scientific data to protect migratory species.

15. Moderated discussion: next steps

Des Thompson, CMS COP-Appointed Councillor for Climate Change, and Workshop Chair

164. **Principal conclusions**

165. **Species priorities (workshop I)**

- Prioritise vulnerability assessments for Appendix I species and create a matrix scoring system – building on the work done in advance of the workshop.
- List species in need of interventions
- Review how previous interventions have worked
- Devise case studies on successful interventions/ actions
- List species/assemblages vulnerable to extreme events (e.g. raptors)

166. **Nature-based solutions (Workshop II)**

- Review the Decision Tree, to take account of status of species/assemblage, and risks of unintended consequences for restoration and reintroductions, threats and tipping points
- Consider responses to climate change beyond range expansion, for marine and terrestrial species/assemblages
- Disseminate examples of ecosystem services provided by migratory species/assemblages

167. **Synergies with GBF and other international levers (Workshop III)**

- Set out connections and synergies e.g. with UNFCCC, GBF, IPBES
- Identify connections to facilitate urgent actions
- Clarify opportunities through synergies, and joint meeting of secretariat

168. **Barriers (Workshop IV)**

- Develop guidance on the different types of barriers faced by migratory species, building on the work done in advance of the workshop.
- Develop case studies showcasing how migratory species have adapted to barriers and how interventions have helped migratory species overcome barriers.

169. **Devise case studies to illustrate the revised decision tree**

170. **Horizon scanning**

- Consider threats, opportunities, disruptors and applications of artificial intelligence.

171. **In addition, develop benefits of:**

- Working with indigenous peoples, youth groups, and community groups
- Communicating clearly, with evidence digests
- Keep abreast of science base, and ensure adequate monitoring in response to climate change in tandem with other drivers
- Give examples of what success looks like
- Focus on restoration of 'natural abundance'

16. Closure of the Workshop

Acknowledgements:

The presenters of the IWC session, Simmonds, Tulloch, Porter, Nunny and Genov, thanked the UK government and CMS for the opportunity to present at this workshop and looked forward to further collaboration. They also thanked the IWC Conservation Committee and OceanCare for support, and Valentina DaCosta for serving as rapporteur. Additionally, Ms Tulloch thanked Basin Scale Events and Coastal Impacts and North Pacific Marine Science Organisation.

172. After expressions of thanks to chairs, rapporteurs and note takers, participants, supporting organisations and staff of CMS, JNCC and the UK Government's Defra, the Chair declared the workshop closed at 12:30 GMT on 13 February 2025.

Annexes

Annex 1: Attendance

[1] **Online**

Members of the Scientific Council or its Sessional Committee

Last name	First name	Affiliation	Country
Baker[1]	Barry	COP-appointed Councillor for Bycatch	Australia
Clay[1]	Rob	COP-appointed Councillor for Birds	Paraguay
Cromie	Ruth	COP-appointed Councillor for Wildlife Health	United Kingdom
Gandiwa	Edson	Party-appointed Councillor for Zimbabwe	Zimbabwe
Montgomery	Narelle	Scientific Council Chair; Party-appointed Councillor for Australia	Australia
Sambandam	Sathyakumar	Party-appointed Councillor for India	India
Simmonds	Mark	COP-appointed Councillor for Marine Pollution	United Kingdom
Spina[1]	Fernando	COP-appointed Councillor for Connectivity/Network	Italy
Thompson	Des	COP-appointed Councillor for Climate Change	United Kingdom
Tossenberger	Vanesa	COP-appointed Councillor for Aquatic Mammals	Argentina
Williams	James	Party-appointed Councillor for the United Kingdom	United Kingdom

Participants and Invited Experts

Last name	First name	Affiliation	Country
Aare	Aleksander	Animal and Plant Health Agency (APHA)	United Kingdom
Al Nouri[1]	Osama	International Fund for Animal Welfare (IFAW)	Syria
Atwood	Trisha	Utah State University	United States of America
Baker[1]	Jason	US Marine Mammal Commission	United States of America
Barbosa Filho[1]	Roberto Cavalcanti	Chico Mendes Institute for Biodiversity Conservation (CEMAVE)	Brazil
Batjargal[1]	Khandarmaa	Ministry of Environment and Climate Change	Mongolia
Blake	Kristopher	Department for Environment, Food and Rural Affairs (DEFRA)	United Kingdom
Campbell[1]	Elizabeth	International Whaling Commission (IWC)	United Kingdom
Chester	Charles	Migratory Species and the Respectful Governance of their Habitats (EMIGRA) / Brandeis University	United States of America

Last name	First name	Affiliation	Country
Collier	Jack	Department for Environment, Food and Rural Affairs (DEFRA)	United Kingdom
Collis	Matthew	International Fund for Animal Welfare (IFAW)	United Kingdom
Costa[1]	Lilian	Ministry of Environment and Climate Change	Brazil
Dacosta	Valentina	Cet Law, Inc	United States of America
Daisley	Caroline	Department for Environment, Food and Rural Affairs (DEFRA)	United Kingdom
De Silva	Shermin	University of California San Diego	United States of America
Dennis	Roy	Roy Dennis Wildlife Foundation	United Kingdom
Dimbleby[1]	James	Joint Nature Conservation Committee (JNCC)	United Kingdom
Diwan[1]	Nandini	UNFCC Secretariat	n/a
Duffield[1]	Simon	Natural England	United Kingdom
Ewing	Steven	Royal Society for the Protection of Birds (RSPB)	United Kingdom
Galbraith	Colin	NatureScot	United Kingdom
Genov[1]	Tilen	Morigenos - Slovenian Marine Mammal Society	Slovenia
Gill	Jennifer	University of East Anglia	United Kingdom
Gillham	Katie	NatureScot	United Kingdom
Gissi[1]	Elena	National Research Council, Institute of Marine Sciences	Italy
Gottfried	Cooper	Brandeis University	United States of America
Grossi[1]	Francesca	CIMA Research Foundation	Italy
Harris[1]	Rosina	Joint Nature Conservation Committee (JNCC)	United Kingdom
Hitziger[1]	Martin	Secretariat of the Pacific Regional Environment Programme (SPREP)	n/a
Hudson-Jones[1]	Rhiannon	Department for Environment, Food and Rural Affairs (DEFRA)	United Kingdom
Hunter	Katie	Whale and Dolphin Conservation (WDC)	United Kingdom
Khela[1]	Sonia	Joint Nature Conservation Committee (JNCC)	United Kingdom
Lawrence	Keshia	Harvard University	United States of America
Li[1]	Cathy Yitong	BirdLife International	United Kingdom
Lindley	Patrick	Natural Resources Wales	United Kingdom
Lockhart	William	Department for Environment, Food and Rural Affairs (DEFRA)	United Kingdom

Last name	First name	Affiliation	Country
López Hoffman	Laura	University of Arizona	United States of America
Mitchell	Ian	Joint Nature Conservation Committee (JNCC)	United Kingdom
Mitchell	Clive	NatureScot	United Kingdom
Newton[1]	Ian	UK Centre for Ecology and Hydrology	United Kingdom
Nunny[1]	Laetitia	OceanCare	United Kingdom
Pearce-Higgins[1]	James	British Trust for Ornithology (BTO)	United Kingdom
Porter	Lindsay	International Whaling Commission (IWC)	United Kingdom
Redmond	Ian	Born Free Foundation	United Kingdom
Rizzi[1]	Alessia	Institute of Marine Sciences (CNR-ISMAR)	Italy
Robinson	Rob	British Trust for Ornithology (BTO)	United Kingdom
Rutz	Christian	University of St Andrews	United Kingdom
Sandercock	Brett	Norwegian Institute for Nature Research	Norway
Scott	Sarah	Joint Nature Conservation Committee (JNCC)	United Kingdom
Singh-Johnstone	Cameron	Global Youth Biodiversity Network (GYBN)	United Kingdom
Smith	Melanie	Atlantic Salmon Trust	United Kingdom
Stroud	David	Independent consultant	United Kingdom
Stuart[1]	Eileen	NatureScot	United Kingdom
Tebbott	Beth	Animal and Plant Health Agency (APHA)	United Kingdom
Tepsich[1]	Paola	CIMA Research Foundation	Italy
Tort[1]	Beatriu	EDMAKTUB Association	Spain
Tulloch[1]	Vivitskaia	International Whaling Commission (IWC)	Australia
Tyrrell[1]	Tristan	CBD Secretariat	n/a
Weatherhogg	Julia	UNFCC Secretariat	n/a
Webster[1]	Imogen	International Whaling Commission (IWC)	United Kingdom
Wheatley	Hannah	Joint Nature Conservation Committee (JNCC)	United Kingdom
Zhumashev	Murat	CAMP Alatoo Public Foundation	Kyrgyzstan

CMS Secretariat

Last name	First name	Affiliation	Country
Breimann[1]	Louisa	CMS Aquatic Species Team Intern	n/a
De Leur[1]	Daan	CMS Aquatic Species Team Intern	n/a
Fraenkel[1]	Amy	CMS Executive Secretary	n/a
Frisch-Nwakanma[1]	Heidrun	CMS Aquatic Species Team / IOSEA Marine Turtle MOU	n/a
Hills[1]	Sasha	CMS Terrestrial Species Team/Scientific Officer Intern	n/a
Mohamed[1]	Abdelmenam	CMS Dugong MOU	n/a
Pauly[1]	Andrea	CMS Aquatic Species Team / Sharks MOU	n/a
Renell	Jenny	CMS Aquatic Species Team	n/a
Zíková	Dagmar	CMS Scientific Unit	n/a
Tossenberger	Vanesa	COP-appointed Councillor for Aquatic Mammals	Argentina
Williams	James	Party-appointed Councillor for the United Kingdom	United Kingdom

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) is an environmental treaty of the United Nations that provides a global platform for the conservation and sustainable use of migratory animals and their habitats. This unique treaty brings governments and wildlife experts together to address the conservation needs of terrestrial, aquatic, and avian migratory species and their habitats around the world.

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