Institution: Newcastle University

Unit of Assessment: 7

Title of case study: Global Species Conservation: monitoring mechanisms and policy change to halt species extinctions

Period when the underpinning research was undertaken: 2010 - 2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Phil McGowan	Professor of Conservation Science and Policy	2013 - present
Louise Mair	Research Associate	2017 – present
Rike Bolam	Research Associate	2018 – present

Period when the claimed impact occurred: 2013 – 2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

Newcastle University research has made a leading contribution to the formation of global species conservation policy, and provided practical measures to meet ambitious global and national conservation targets. We assessed progress towards targets in the Convention on Biological Diversity's (CBD) 2011-2020 Strategic Plan, and helped formulate new global biodiversity policy post-2020. We responded to a request from CBD Secretariat to enhance the scientific input into global species conservation, and have done so by developing indicators to fill key gaps, and informing species aspects (outcomes, action needed, and milestones and indicators) of the Post-2020 Global Biodiversity framework. Our research has also transformed the management of captive vertebrate populations in Europe.

2. Underpinning research (indicative maximum 500 words)

Large-scale biodiversity loss indicates that we are entering a period of mass global extinctions with unknown implications for the functioning of our environment. The Convention on Biological Diversity (CBD) was negotiated by governments in 1992 to provide a global political response to this challenge. We have worked with the intergovernmental International Union for the Conservation of Nature (IUCN) and other partners to inform CBD's reporting on its 2011-2020 Strategic Plan and the development of its post-2020 Global Biodiversity Framework (GBF). Robust indicators are critical for measuring the attainment of globally agreed biodiversity targets. The CBD's Strategic Plan 2011-2020 contained 20 targets, which required indicators to track progress of each target. The mid-term review of the Plan in 2014 showed conspicuous gaps in indicators. We developed two indicators to meet this need. The first allows changes in the conservation status of wild relatives of important domesticated livestock to be tracked [P1] and the second assesses how many bird and mammal species would have gone extinct without conservation action [P2]. Paper 1 identified wild relatives of domesticated livestock and determined that their conservation status, according the IUCN Red List Index, had deteriorated by 2.02% between 1988 and 2016. It further found that 15 species were listed as Critically Endangered, indicating an extremely high risk of extinction in the very short term unless action was taken. Paper 2 identified species that may have gone extinct without conservation action since 1993, when the Convention on Biological Diversity came into effect, and since 2010, when the Convention's 2011-2020 Strategic Plan was agreed. We found that 28-42 species would have gone extinct since 1993 without conservation action, indicating that the extinction rate would have been 2-4 times higher without such action.

The need for a robust and coherent indicator framework reflects wider challenges of ensuring that global biodiversity policy draws on appropriate science, where available, and prioritises appropriate and effective management actions. We analysed this challenge specifically for species, showing limitations in both the peer-reviewed conservation planning literature in

providing guidance for holistic conservation planning [P3], and in the contrasting perceptions that species conservationists and government policy officials have on the barriers to achieving CBD's species conservation target (Aichi Biodiversity 12) [P4]. As a result, we developed a mechanism for ensuring that robust and focussed scientific information on species (e.g. on targets, milestones and indictors) informs the Post-2020 GBF negotiations. Paper 3 applied topic modelling to nearly 4500 relevant papers and revealed a highly fragmented literature during 2000-2016, with a severe lack of interdisciplinary research. Paper 4 used opinions on barriers to Aichi Biodiversity 12 that had been gathered from 98 countries during workshops run by the CBD Secretariat and contrasted these with views provided by 900 members of IUCN's Species Survival Commission. Species experts considered that the greatest need was for increased political will, while policy makers most frequently cited the need for increased knowledge of species conservation status. We concluded that improved communication, collaboration and data sharing is critical to aligning views of practitioners and policy makers and used this to develop a shared understanding of the key actions needed to accelerate progress towards global biodiversity targets.

Specific approaches and tools are needed to conserve threatened species, especially those with the highest probability of extinction. Captive breeding, or ex situ management, of species has long proved controversial and there has been an absence of robust guidance on when this approach should be used. An analysis of the change in conservation status of vertebrates showed that 64 species had improved their conservation status, and captive breeding had played a major part in 16 cases [P5]. McGowan then worked with colleagues across IUCN-SSC and beyond to develop objective guidelines for the use of ex situ management for conservation purposes that have been published in IUCN SSC's guidance series [P6]. The step change that our work identified in considering ex situ management is the need to take a strategic five step approach when determining the nature of any ex situ intervention so that its precise role in conserving a species is clearly identified.

3. References to the research (indicative maximum of six references)

[**P1**] **McGowan, PJK**, **Mair, L**, Symes, A, Westrip, JRS, Wheatley, H, Brook, S, Burton, J, King, S, McShea, WJ, Moehlman, P, Smith, AT, Wheatley, J & Butchart, SHM. (2018) Tracking trends in the extinction risk of wild relatives of domesticated species to assess progress against global biodiversity targets. *Conservation Letters* Article e12588. https://doi.org/10.1111/conl.12588.

[**P2**] **Bolam FC, Mair L**, Angelico M, Brooks TM, Burgman M, Hermes C, Hoffmann M, Martin RW, **McGowan PJK**, Rodrigues ASL, Rondinini C, Westrip JRS, Wheatley H, Bedolla Guzman Y, Calzada J, Child MF, Cranswick PA, Dickman CR, Fessl B, Fisher DO, Garnett ST, Groombridge JJ, Johnson CN, Kennerley RJ, King SRB, Lamoreux JF, Lees AC, Lens L, Mahood SP, Mallon DP, Meijaard E, Mendez Sanchez F, Percequillo AR, Regan TJ, Renjifo LM, Rivers MC, Roach NS, Roxburgh L, Safford RJ, Salaman PS, Squires T, Vazquez Dominguez E, Visconti P, Woinarski JCZ, Young RP, Butchart SHM (2020). How many bird and mammal extinctions has recent conservation action prevented? *Conservation Letters*, e12762. https://doi.org/10.1111/conl.12762). *Paper selected as one of 10 papers from 3 journals for the Society of Conservation Biology's inaugural Fall series of seminars in 2020.*

[**P3**] **Mair, L, Mill, AC, Robertson, PA, Rushton, SP, Shirley, MDF**, Rodriguez, JP & **McGowan, PJK** (2018) The contribution of scientific research to conservation planning. *Biological Conservation* 223: 82-96. https://doi.org/10.1016/j.biocon.2018.04.037

[**P4**] **Mair L**, Byers O, Lees CM, Nguyen D, Rodriguez JP, Smart J, **McGowan PJK**. (2020) Achieving International Species Conservation Targets: Closing the Gap between Top-Down and Bottom-Up Approaches. Conservation and Society. Epub ahead of print. https://doi.org/10.4103/cs.cs_19_137

[**P5**] Hoffmann M, Hilton-Taylor C, Angulo A, Bohm M, Brooks TM,…**McGowan PJK**, …. et al. (2010) The impact of conservation on the status of the world's vertebrates. Science 330: 1503–1509. http://dx.doi.org/10.1126/science.1194442 Citations: 809

[**P6**] **McGowan PJK**, Holzer-Taylor K, Leus K (2016) IUCN guidelines for determining when and how ex situ management should be used in species conservation. Conservation Letters 10: 361-

366. https://doi.org/10.1111/conl.12285 Citations: 31

4. Details of the impact (indicative maximum 750 words)

Human-driven changes in biodiversity and the consequences they have for global economies, societies and natural services are increasingly the focus of global environmental policy. It is now accepted that biological diversity is not only the foundation of a resilient environment, but that it also underpins robust societies and economic development. This is a fundamental principle of the Convention on Biological Diversity, of which all countries (bar the US) and the EU are Parties; the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) which has >130 member countries; and the Sustainable Development Goals (SDGs), which were adopted by all UN member states in 2015.

Our work on indicators fulfilled an urgent need of the CBD to measure progress towards species targets in its 2011-2020 Strategic Plan. Both indicators were adopted by the CBD in 2020 to measure progress towards elements of two targets: Aichi Biodiversity Targets 12 and 13 on the conservation status of species. Our findings on Target 12 provide one of few positive assessments of progress towards the 20 targets in the 2011-2020 Strategic Plan that are reported in Global Biodiversity Outlook 5 (GBO5): whilst the overall status of species continues to deteriorate, we showed that without conservation action, extinction rates of bird and mammal species would have been 2-4 times higher since 1993, when the convention came into force **[S1]**. Indeed, our research featured prominently in the CBD's press release for GBO5, where it was the only paper cited. Both papers on indicators contribute prominently to the GBO5 Technical Report, which acknowledges McGowan and Bolam's contribution, and the Summary for Policy Makers, with key findings included in the headline synthesis of progress towards the 20 targets **[S1]**.

Critically, regular communication with the CBD Secretariat ensured that the findings of our research were available for inclusion in GBO5, and therefore informed policy, even though the primary research was published less than a week before GBO5, [*REDACTED*] **[S2].** The overall outcome of these contributions is threefold. First, nations worldwide have a more complete picture of the success of the 10-year global plan to conserve biodiversity, revealing extinctions have been avoided but also the deteriorating status of wild relatives of important livestock. Second, this information was provided in time to inform negotiations for the Post-2020 GBF. Finally, the CBD (i.e. 195 nations plus the EU) now has capability for the first time to monitor these components of species conservation efforts, and thus shape policy and management both globally and nationally. Both of these indicators are included in the present list of indicators for inclusion in the Post-2020 GBF **[S3]** and our papers are included as Key Resources for these indicators for both CBD and the SDGs by the Biodiversity Indicators Partnership **[S4].** These indicators are critical for evaluating the attainment of targets and thus the effectiveness of policy responses, nationally and globally.

A key output from the first IPBES work programme was its Global Assessment, the first comprehensive assessment of the status of biodiversity and the ecosystem services they provide, and the transformational change required to safeguard nature for present and future generations. Our work on the status of wild relatives of domesticated birds and mammals was a principle underpinning source for the Summary for Policy Makers' Key Message on the deteriorating status of domesticated species and their wild relatives, and the threat this presents to future food security **[S5]**. [*REDACTED*] **[S2].**

We have provided the critical science to inform the species aspects of the Post-2020 GBF, by leading the IUCN's Species Survival Commission submission to CBD **[S7].** [*REDACTED*] **[S6].** IUCN is an intergovernmental organisation that has Observer status of the UN General Assembly and is widely acknowledged as the most respected source of science-led technical input into a range of global processes. First, we established a Task Force concerned with species in the Post-2020 GBF **[S8]**. Second, we undertook the work necessary to characterise the knowledge and communication challenges at the global species conservation science-policy interface. We then brought those strands together so the mechanism was in place to respond directly to the challenges, and that the most appropriate scientific information was available for negotiators in developing the Post-2020 GBF. [*REDACTED*] **[S7].**

McGowan, Mair, and Bolam have led the Task Force by presenting research findings at four CBD meetings, co-hosting events at each with the CBD Secretariat (and one with Norway), and contributed 4 meeting documents **[S8].** They have also made substantive contributions to shaping IUCN's position statements for CBD meetings and responses to CBD consultations **[S6/7].** These inputs have been critical in first defining, and then meeting, the challenges faced by this target, and communicating them to an audience who can then enact necessary change. Newcastle research has therefore been critical to inform the key elements of the Post-2020 GBF for species: a) desired outcome (captured in an outcome goal): b) what needs to be done (action targets); and c) milestones and indicators. [*REDACTED*] **[S6].**

These contributions lay out the roadmap for conserving species in the Post-2020 GBF by identifying three key aspects that determine species health (extinctions, threat status and population abundance). They then provide the actions necessary to achieve those outcomes; and finally assess the current status of indicators used to track progress. In this way the Newcastle research has defined a key element of species conservation; provided the means to meet this challenge; and given the method by which progress towards meeting this challenge can be monitored by all 196 signatories of the Post2020 GBF. All aspects of this work, including progress on underpinning research prior to publication, were shared with the Co-Chairs of CBD's Post 2020 Open Ended Working Group and have informed the negotiations of the GBF **[S9]**. [*REDACTED*] **[S9].**

Our work to link reduction in threats to measurable outcomes for species would have been publicly available if the post-2020 GBF negotiations had proceeded as planned, with the final technical meeting due to have taken place in May 2020, and the framework agreed in November 2020 at CBD CoP15. Our work provides the scientific mechanism to quantify the contribution of actions to reduce threats (i.e. GBF Action Targets) to a measurable change in species outcomes (i.e. GBF Outcome Goal). Given these Covid-induced delays, this engagement continues (see accompanying COVID note).

Impact has also been achieved on species conservation via *ex situ* management in zoos and aquaria. Our research has made a seminal contribution to policy and practice on *ex situ* management in organisations across the world, by McGowan's co-authoring of the IUCN SSC's *Guidelines on the Use of Ex situ Management for Species Conservation* [**S10**]. These have in turn influenced the European Association of Zoos and Aquaria (EAZA), [*REDACTED*] **[S10]**. The Guidelines are the [*REDACTED*] affecting over 400 institutions across 48 countries [**S10]**. So far, 258 EAZA Ex situ Programmes (EEPs), which determine the conservation strategy for a species or group of species, have been developed following the guidance, 83% of which include a critical role for the EEP in the survival of the taxa involved **[S10].** Newcastle research has therefore played a critical role in the *ex situ* conservation of species across Europe and West Asia; [*REDACTED*] **[S10].**

5. Sources to corroborate the impact (indicative maximum of 10 references)

S1: Global Biodiversity Outlook 5 Full Report; available from: https://www.cbd.int/gbo/gbo5/publication/gbo-5-en.pdf. *Includes Summary for Policy Makers acknowledging McGowan and Bolam's contribution on p.9, and Newcastle research which shows that without conservation action, extinction rates of bird and mammal species would have been 2-4 times higher.*
S2: Testimonial from David Cooper, CBD Deputy Executive Secretary. *Details importance of Newcastle research to Aichi Biodiversity Targets and post 2020 global biodiversity framework.*
S3: CBD post 2020 monitoring framework, available from: https://www.cbd.int/sbstta/sbstta-24/post2020-monitoring-en.pdf, proposed by CBD's Subsidiary Body of Science, Technology and Technical Assistance (SBSTTA) *Includes indicators based on our research on rows 30/40.*
S4: Cached Biodiversity Indicators Partnerships web page, listing our research as a key resource supporting the Number of extinctions avoided indicator for Aichi Target 12. Accessed 3/3/21. Avail from: *https://www.bipindicators.net/indicators/number-of-extinctions-avoided*
S5: Chapter 3 of the Global Assessment on Biodiversity and Ecosystem Services, and the Summary for Policy Makers, produced by the Intergovernmental science-policy Platform for Biodiversity and Ecosystem Services (IPBES). *Includes Newcastle research citation on page*

289 of Chapter 3; and as a principle underpinning source on threats to wild relatives, Key message A6 on page 12 of the Summary for Policy makers.
S6: Testimonial from Braulio Dias, CBD Executive Secretary 2010-2017. *Confirms important contribution of Newcastle research to the Post-2020 GBF by leading a taskforce and providing research.*
S7: Testimonial from Dr Thomas Brooks, IUCN Chief Scientist (*details significant contribution made to IUCN's Species Survival Commission response to CBD on post 2020 GBF)*; cached version of taskforce website (*details McGowan as taskforce chair; avail from:* https://www.iucn.org/commissions/ssc-groups/cross-cutting/post-2020-biodiversity-targets-task-force); and IUCN documents drawing significantly from Newcastle research (avail here*:* https://www.iucn.org/theme/global-policy/our-work/convention-biological-diversity-cbd/post-2020-global-biodiversity-framework/post-2020-resources)
S8: CBD evidence: list of CBD events we have run and documents produced for CoP and SBSTTA/SBI meetings.
S9: Testimonial from Basile van Harve (Environment Canada), Co-chair of CBD's Post-2020 Open Ended Working Group. *Details important contributions to post 2020 GBF.*
S10: Testimonial letter from Danny de Man (EAZA Deputy Director) and Dr Kristin Leus (Population Biologist), European Association of Zoos and Aquaria (EAZA); and the IUCN Species Survival Commission's Guidelines on the Use of Ex situ Management for Species Conservation (available: https://www.eaza.net/assets/Uploads/Position-statements/IUCN-Guidelines-on-the-Use-of-ex-situ-management-for-species.pdf) *Guidelines detail McGowan as an author on page I; letter details importance of the guidance to EAZA and* ex situ *conservation across Europe and West Asia.*