

THE OXFORD MARTIN PROGRAMME ON WILDLIFE TRADE

PROGRESS REPORT, YEAR 4

OCTOBER 2019 - DECEMBER 2020

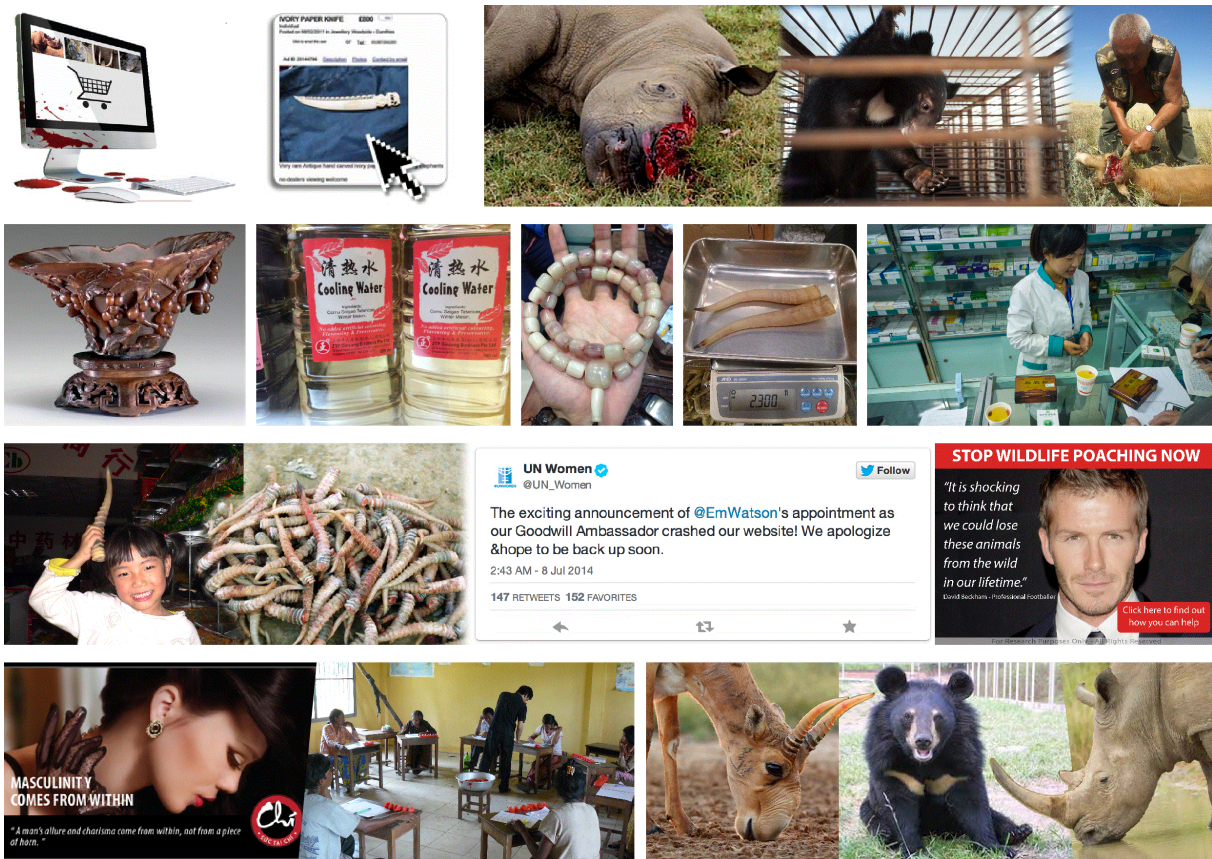


Table of Contents

1. EXECUTIVE SUMMARY	3
2. UPDATES ON PROGRAMME PROGRESS - FRAMEWORKS	4
2.1 MONITORING THE ONLINE TRADE IN WILDLIFE PRODUCTS (METHODS FOR CHARACTERISING ONLINE TRADE) – FRAMEWORK 1	4
2.2 DESIGNING, IMPLEMENTING, AND EVALUATING COMPLEX INTERVENTIONS IN THE ILLEGAL WILDLIFE TRADE (METHODS FOR INTERVENING EFFECTIVELY) – FRAMEWORK 2	5
2.3 METHODS FOR GAINING A PREDICTIVE UNDERSTANDING (PREDICTING MARKET DYNAMICS) – FRAMEWORK 3	7
3. UPDATES ON PROGRAMME PROGRESS - CASE STUDIES	9
3.1 DISENTANGLING THE INTERACTING LEGAL AND ILLEGAL MARKETS FOR BEAR BILE IN CHINA.....	9
3.2 INFLUENCING SALES OF SAIGA PRODUCTS IN SINGAPORE.....	12
3.3 EXPLORING THE EFFECTIVE USE OF CELEBRITIES IN WILDLIFE DEMAND REDUCTION: CHANGING PERCEPTIONS OF PANGOLINS IN VIETNAM.....	14
3.4 JAGUAR TRADE IN LATIN AMERICA.	16
3.5 MONITORING THE ILLEGAL KILLING OF ELEPHANTS: A CASE STUDY OF UNCERTAINTY IN CONSERVATION MONITORING.	17
3.6 TACKLING SMALL-SCALE ILLEGAL HAKE FISHING IN CHILE.	19
4. PROGRAMME ENGAGEMENT - WORK PACKAGE 3	20
4.1 VISITING RESEARCHERS.....	21
4.2 WORKSHOPS	21
4.3. KEY OUTREACH PUBLICATIONS.....	22
4.4. ONLINE PRESENCE	25
5. OUR CORE COLLABORATORS:	26
6. PUBLICATIONS AND OTHER OUTPUTS FROM THE PROGRAMME	26
6.1 PEER REVIEWED PAPERS.....	26
6.2 BOOKS/BOOK CHAPTERS	29
6.3 OTHER PROGRAMME OUTPUTS (CUMULATIVE)	29
6.4 MEDIA COVERAGE	30
6.5 TALKS AND PRESENTATIONS.....	31

1. Executive Summary

In Year 4, we have been moving towards the next phase of the programme; our team's salaries are no longer being supported from the programme's funds, and our governance and reporting structures are evolving into more light-touch forms. Several students are completing their work, and we have been thinking towards the future for the programme. In this report we provide a summary of our work in Year 4 as well as reflecting on progress made by the programme.

Selected highlights:

- The researchers in the Programme have been initiating new collaborations together, including paper-writing together on controversial topical issues, writing grant proposals together, and helping each other with their research, with strong mentorship between senior and junior team members.
- The team published 22 peer-reviewed papers, with 3 accepted and 10 in review, including in high profile journals, and including several on COVID-19 and wildlife trade.
- The team responded highly effectively to the COVID-19 pandemic, providing analysis and expert insight which was widely read. This included an early, and influential, position paper from the whole Programme team.
- Team members contributing as expert technical advisors to governments and international conventions (particularly M. 't Sas Rolfes to South Africa as a member of a Ministerial High-Level Panel on trade policy issues relating to five iconic species).
- All the programme's DPhil students are moving towards completion, and Hunter Doughty passed her viva on her intervention targeting saiga horn in Singapore, from baseline through design, implementation, and evaluation.
- The post-doctoral researchers on the programme have all been promoted so that they are all now at Grade 8.
- Publication of a new book on pangolins and their conservation 'Pangolins: Science, Society and Conservation', which is the first all-inclusive resource on the biology, behaviour and conservation of pangolins. (Edited by Dan Challender, with contributions from Alegria Olmedo and Diogo Veríssimo).
- Secured funding (in February 2020) for a new project focusing on improving global policymaking around wildlife trade 'Towards effective global wildlife trade policy'. Specifically, the project focuses on (1) linking theory to practice in CITES, and (2) convening polarised stakeholders to guide policy directions for high-value traded species. Being led by E.J. Milner-Gulland, Dan Challender, and Mike 't Sas-Rolfes.

Low points:

- We have not yet secured funding for long-term sustainability of the core programme.

Focus for year 5:

- Sustainability planning for the evolution of the programme, including submission of grant proposals.
- Publish research papers (including some high-profile ones in the pipeline).
- Complete several of the case studies and supporting team members into the next stages of their careers.
- Hold the in-person workshop for the Interdisciplinary Conservation Network.
- Continue cross-fertilisation with the GCRF TRADE Hub, run out of UNEP-WCMC, (see Section 2.4.1) and other partners (e.g., governments) to explore further synergies, evidence and research needs, and develop future projects focused on informing and improving wildlife trade policy decisions, including but not limited to CITES.
- Continue delivery of end user-relevant policy briefs, tools and guidance. Leverage research outputs so that they inform decision- and policymaking, and impact, at local to international levels across our case studies and systems of focus, as applicable.

2. Updates on Programme Progress - Frameworks

2.1 Monitoring the online trade in wildlife products (Methods for characterising online trade) – Framework 1

Led by Joss Wright. Team members involved: David Roberts, Julio Hernandez Castro, Diogo Verissimo, Amy Hinsley, Dan Challender, Alegria Olmedo, Melissa Arias, Yuhuan Li, E.J. Milner-Gulland.

This framework advances our understanding of the online trade in wildlife and supports this element for several of the case studies. Through the course of the Programme, the external interest in this element of the programme has continued to grow. Despite this, funding has been challenging to acquire, and currently there is still no core funding for this part of the project (the core funding in the original budget was only for years 1-2).

Year 4 Deliverables

- Data collection using Twitter and the Global Database of Events, Language, and Tone (GDELT) to continuously gather social media and long-form traditional news articles published globally on wildlife keywords
- Paper on online saiga trade in the Russian language, including systematic review protocol, by D. Roberts (OMP-IWT visiting researcher) and E.J. Milner-Gulland (paper now in press at *Oryx*)
- Joss Wright and Diogo Verissimo have analysed global sentiment towards wildlife species using the GDELT dataset: <https://arxiv.org/abs/2007.11506> (Pre-print)

Year 4 Key outputs

We continue with our ongoing data collection effort that uses both Twitter and the Global Database of Events, Language, and Tone (GDELT) to gather constantly-updated social media and long-form traditional news articles published globally on a related range of wildlife keywords, sourced from the other components of the programme.

Melissa Arias and Yuhuan Li carried out a discourse analysis concerning the jaguar trade from Bolivia based on systematic online news searches in Chinese, English and Spanish languages. This was supervised by Amy Hinsley and E.J. Milner-Gulland. Manuscript on the point of submission, MPhil thesis submitted.

Melissa Arias participated in an online jaguar trade workshop in Lima, Peru in May 2019, organized by WCS, and contributed to a manuscript (in prep) on the range-wide online trade in jaguar body parts.

Dan Challender (with Anita Wan [Sun-Yat Sen University] and Mai Trinh [Save Vietnam's Wildlife]) conducted pilot searches of online trade in pangolins and their derivatives and products. However, having previously fed in seed terms to similar research being conducted by GITOC and CASM (Sussex), in order to avoid duplication of effort, the intention now is to collaborate with GITOC and CASM on this research in 2021.

Commentary on risks

As anticipated in the risk register, access to online data sources has raised many difficulties. We have somewhat improved our potential to access WeChat – a major known Chinese trading source – although this remains largely unavailable in bulk due to the nature of the platform. We have made some small-scale improvements in our ability to access Facebook data, but this remains a significant barrier.

Overall progress assessment

Work on this element of the programme was originally planned to finish at the end of year 2. However, work is still ongoing to fulfil our objectives and build on the synergies created with other elements and case studies within the programme.

The online work component has continued to attract a significant level of interest and resulted in a number of interesting collaborations both within the online wildlife trade consortium and with others. Both our inclusion as external invited experts for the Global Coalition to End Wildlife Trafficking Online, and the subsequent research collaborations with the Wildbook project at the University of Illinois in Chicago, have provided routes to future work and impact.

This framework's progress has now produced several datasets and associated analytical tools that feed into other components of the programme, as well as resolving some key practical and ethical issues with investigating the online component. Despite the minimal current funding, we can anticipate this work will continue as the programme evolves.

Ongoing Plans

- A continuing focus on seeking and applying for ongoing funding, with a view to longer-term sustainability of this work.
- Continued development of collaborative opportunities, including those fostered with the IFAW's Global Wildlife Cybercrime Action Plan.
- Maintaining the existing data collection of Twitter and news-source data, via GDELT, relating to conservation keywords.
- Writing up of existing data sources and research.
- Additional tools and guidance for end users.

2.2 Designing, implementing, and evaluating complex interventions in the illegal wildlife trade (Methods for intervening effectively) – Framework 2

Led by Diogo Veríssimo. Team members involved: Hunter Doughty, Alegria Olmedo, Dan Challender, E.J. Milner-Gulland, Kathryn Oliver (advisory committee), Rodrigo Oyanedel, Tim Kuiper, Amy Hinsley.

This framework supports virtually all the case studies by providing expertise in behavioural change and impact evaluation. It also enables us to provide guidance to the wider wildlife trade community through expert input to external projects. The requests for expert input have increased dramatically, and our relationship with SDZG has provided core staff funding.

Year 4 Deliverables

- Publication of the saiga horn intervention approach in a peer-reviewed journal; and successful doctoral defense of the entire saiga horn intervention project
- Publications on pangolin use from Vietnam, with a focus on the use of Celebrities to influence consumer behaviour
- Publication of a Special Issue of the academic journal "People and Nature", entitled Consuming wildlife – managing demand for products in the wildlife trade". This volume brought together 10 papers from across Asia and Africa, highlighting the current state of the art in both applied and theoretical research focused on understanding consumers across a range of wildlife products from pets, and medicinal products to wildmeat. This is the first time that an academic journal has run a special issue on this topic.

Year 4 Key Outputs

For outputs related to the Programme's case studies, please see the reports for each case study. Additional expert advice and support was given to various external collaborators by Diogo Verissimo:

- Support provided to project led by the Alliance for Religion and Conservation, using religion to influence the extraction of wildlife products. Data collection conducted.
- Consumer research surveys were carried out in six provinces across Vietnam, to better understand the preferences of bear bile consumers and understand how farmed and synthetic bear bile could interact with wild products. Data collection impacted by COVID-19.
- A baseline survey was implemented in Kinshasa, Democratic Republic of Congo, as the first stage of the impact evaluation of a large-scale demand reduction intervention focused on bushmeat. This survey had to be carried out via interactive voice response system, after face-to face surveys were made impossible due to the COVID-19 pandemic.
- Collaboration with Northeastern Forestry University in China on the use of consumer research methods to understand consumers of shark fin soup and of manta ray gills in China. As part of this work consumer research surveys were carried out online and in-person in key provinces.
- A three-day workshop was held to design a demand reduction intervention aimed at future owners of wild caught birds and mammals in Trinidad and Tobago. This intervention is being supported by US Fish and Wildlife Service and led by the University of Michigan.
- Training was provided to staff of the Twiga Walinzi project in Kenya, a partnership of SDZG and several Conservancies on social science methods to be applied on qualitative impact evaluation of interventions focused on the reduction of giraffe meat consumption in the region.

Additionally, Dan Challender and Diogo Verissimo are analysing data from ZSL research on the prevalence of consumption of pangolin products in China as part of a paper on data needs to inform behaviour change interventions. Diogo Verissimo is currently analysing consumer research data on bear bile use in Vietnam, shark fin soup and manta ray gills in China. These datasets will form the basis of several research papers.

Overall progress assessment

Work carried out under this framework has faced limitations due to the COVID-19 pandemic, both in terms of fieldwork and regarding constraints faced by researchers at Oxford partner institutions. Several projects have faced long delays, particularly those implementing behaviour change interventions. Despite this, this last year saw a large number of publications, which have played an important role in strengthening our understanding of consumer decision making across a number of products, countries and species.

Commentary on risks

The COVID-19 pandemic had impacts on the timeframe of the projects that were impossible to predict and may continue for much of 2021. While much has been achieved through online channels in some cases, particularly for behaviour change interventions, it is impossible to move all projects online or predict how long offline implementation will be delayed for.

Plans for Year 5

A substantial focus will be on reporting and publications. There are substantial bodies of consumer research, namely on songbirds in Indonesia, sharks in China, bear bile in Vietnam and pangolins in Vietnam and China, which require reporting and dissemination. This will require a substantial coordinated effort with different partners, particularly those that may not prioritise publishing.

Implementation of interventions in Cambodia, alongside testing of intervention concepts in Vietnam and China, is ongoing.

2.3 Methods for gaining a predictive understanding (Predicting market dynamics) – Framework 3

Led by Mike 't Sas-Rolfes. Other team members involved: Dan Challender, Melissa Arias, Tim Kuiper, Tilda Dunn, Diogo Veríssimo, Rodrigo Oyanedel, Amy Hinsley.

This framework connects the programme with the supply side of IWT to support effective policy decision-making through three main strands:

1. Drawing empirical evidence from the programme's case studies to develop predictive understanding of the likely potential impacts of a range of interventions, in the light of external conditions, using various approaches including scenario planning.
2. Applying theoretical understanding and participatory approaches to highlight uncertainties and clarify the basis for conflicting viewpoints on policy options, by analysing the interactions between legal, illegal, synthetic, wild and captive-bred wildlife products, both in theory and practice, for a range of wildlife products.
3. Utilising horizon scanning as a technique for systematically identifying emerging challenges and opportunities that are not yet widely recognised as important, but which have a high probability of societal impact.

Year 4 Deliverables

- Final publication of papers on illegal wildlife trade and horizon scanning in major conservation journals (see publications).
- Publications on the topics of pangolin farming, consumer preferences between wild and farmed wildlife products, possible impacts of synthetic products, and whether wildlife trade bans are an appropriate response to COVID-19.
- Secured substantial funding for a new project focusing on improving global policymaking around wildlife trade 'Towards effective global wildlife trade policy'. Specifically, the project focuses on (1) developing a predictive understanding of trade measures in CITES by linking theory to practice, and (2) convening polarised stakeholders to guide policy directions for high-value traded species. Team members: E.J. Milner-Gulland, Dan Challender, and Mike 't Sas-Rolfes.

Year 4 Key outputs

The final version of the IWT review paper for the *Annual Reviews in Environment and Resources* journal on wildlife trade by Michael 't Sas-Rolfes, Amy Hinsley, Dan Challender, Diogo Veríssimo and EJMG was published in late 2019 and has already been widely cited (25 times) during 2020.

The global horizon scan final version was published in *Conservation Letters* in April 2020 and is starting to be cited.

Evaluations of the feasibility and potential impact of pangolin farming, with Dan Challender and Mike 't Sas-Rolfes as co-authors, published in *Global Ecology and Conservation* and as a book chapter in *Pangolins: Science, Society and Conservation*.

The perspective piece by Amy Hinsley and Mike 't Sas-Rolfes on the consumer preferences between wild and farmed products was published in the *People and Nature* special edition on demand.

The team wrote three peer-reviewed articles on the relationship between COVID-19 and wildlife trade, and a piece in *The Conversation*, all of which included several co-authors from the programme. One of the peer-reviewed papers is published in *World Development*. A further publication which presents a framework for qualitative evaluation of wildlife trade policies post-COVID linked to the SDGs is in second review at *Frontiers in Ecology and Evolution* (led by Hollie Booth – with Dan Challender, Melissa Arias, Tim Kuiper, and Rodrigo Oyanedel et al.). And the third publication, on the risks of banning the wildlife trade, has just been accepted at *Current Biology*.

Mike 't Sas-Rolfes collaborated with economist Fred Chen to publish an article on the theoretical impacts of introducing synthetic products to a market, published in *Ecological Economics*.

Matilda Dunn and Diogo Veríssimo, jointly with colleagues from SDZG, led a literature review and expert consultation exercise characterising the scope and scale of the trade in giraffe parts following the listing of Giraffe on CITES Appendix II. This was published in the journal *Conservation Science and Practice*.

Overall progress assessment

Progress on the lion bone trade policy issue continued to be stalled as Michael 't Sas-Rolfes was appointed to a High-Level Panel in South Africa to reach decisions on the issue using different (political) criteria. However, the imperative to complete this work may be renewed in 2021 as Mike and EJMG will take part in a participatory modelling project on tiger farming.

Michael 't Sas-Rolfes and Dan Challender continued their engagement with CITES, through inputs to working groups and other CITES processes. The new project '[Towards effective global wildlife trade policy](#)' has begun in earnest. The first output will be a paper which presents a comprehensive conceptual model of international wildlife trade, which will be used to evaluate the extent to which social-ecological factors have been considered in decisions to amend the CITES Appendices in the last decade. Subsequently, an evidence-based theory of change will be developed to identify the conditions under which amendments to the CITES Appendices would be likely to contribute to improving the status of species.

Our newer case studies - on the use of evidence in jaguar trade policy-making; on compliance with fishing regulations in Chile; and on use of monitoring data for elephant protection in Zimbabwe - continued to progress well and provide groundwork for policy impact (refer to details in the case studies section).

Commentary on risks

The risks outlined in the proposal centred around lack of stakeholder engagement in the contentious issues which arise in such participatory approaches. This has not been a problem as team members have been able to successfully manage relationships with stakeholders of different (often opposing) viewpoints.

An unanticipated risk has been the impact on COVID-19 on the ability to travel and conduct in-person workshops. This has had two negative impacts on the work: 1) it has slowed certain aspects down; and 2) it disables certain types of participatory approaches on contentious issues for which in-person contact is far preferable. These risks will persist into Year 5 and must be accommodated and managed.

Plans for Year 5

Under the new global wildlife trade policy project, the plan is to complete the first two outputs as soon as possible so that they can be widely disseminated, especially to governments. It is hoped that this research can be leveraged to instigate and inform reforms to CITES decision-

making on trade measures for species at the next CITES CoP (CoP19, currently scheduled for early 2022).

Plans for the case studies are outlined in the relevant sections. However, of note is the plan to undertake analysis of the bioeconomics of pangolin farming. It is also hoped that some groundwork can be laid for an engagement on rhino horn trade policy options and further inputs on the issue of big cat farming and trade in body parts.

There is lots of scope to continue and scale up cross-fertilisation and collaboration with the GCRF TRADE Hub (run out of UNEP-WCMC) and other partners (e.g., governments) through this framework to explore further synergies, evidence and research needs, and develop future projects focused on informing and improving wildlife trade policy decisions, in particular, focused on CITES. For example, we have a project in train within the TRADE Hub to develop an exemplar Non-Detriment Finding on the Tokay gecko for the Indonesian government, in collaboration with WCS-Indonesia. Dan Challender will work on this project, which will intersect very well with our new global wildlife trade policy project (providing a case study of how to take both social and ecological elements into account when making decisions under CITES). Dan is also working with the TRADE hub team at UNEP-WCMC to look at the intersection between CITES and the IUCN Red List, and our work on the effects of COVID on consumer perspectives on the wild meat trade is also under the TRADE Hub umbrella.

3. Updates on Programme Progress - Case studies

3.1 Disentangling the interacting legal and illegal markets for bear bile in China.

Led by Amy Hinsley. Team members: E.J. Milner-Gulland, David Roberts.

This case study is jointly carried out with IUCN and the Chinese National Forestry and Grassland Administration. Additional collaborators are Tien Ming Lee (Sun Yat Sen university) and an IUCN core steering group (Mike Hoffman, Dave Garshelis, EJMG, Liz Bennett, Brendan Moyle, Dave Roberts). The focus is on understanding the trade in bear bile, not behavioural change. It combines work on physical markets, consumer motivations and mapping of the online trade,

Year 4 Milestones and Deliverables

- Meeting with IUCN and NFGA collaborators in Beijing to discuss results and final outputs
- Oxford-led papers sent for independent external review
- Online meeting with project partners to finalise timeline for submission
- Oxford-led papers completed and ready to submit to a journal following NFGA checks.

Year 4 Key outputs

- In November 2019, there was a 3-day project meeting in Beijing to bring together researchers from Oxford and Sun Yat Sen University with key IUCN and NFGA collaborators to discuss final outputs for the project.
- In November 2020 there was an online meeting of NFGA, Sun Yat Sen University, IUCN and Oxford to finalise outputs for submission, and discuss a final timeline for the WCC report.
- Final Oxford-led papers were ready for submission in December 2020. The first paper on the results of a choice experiment about preferences for bear bile types was

submitted in January 2021 (see Fig. 5 for key results), following checks by Chinese partners.

- The second paper (on the prevalence and characteristics of bear bile use among the Chinese public) will be submitted by the end of January 2021.
- In December 2020 a small grant was secured from Defra to repeat the bear bile surveys in two provinces, to examine any changes to bear bile consumption since the start of the COVID-19 pandemic.

Overall progress assessment

Although all data collection was completed in Year 2, the process of writing up project reports and papers was delayed by the COVID-19 pandemic, which made work for our Chinese collaborators impossible for several months in early 2020 and slowed progress towards final deliverables. However, as the IUCN World Conservation Congress scheduled for May 2020 was also cancelled and will now take place in late 2021, we are still on track to report our findings at the meeting.

Commentary on risks

In Year 4, the relationship with NFGA suffered some setbacks as new NFGA staff members became involved in late Year 3 and challenged many of our findings. We called an additional meeting in Beijing in November 2019 to try to build trust and improve the relationship, and this led to final outputs and findings being agreed upon. As in Year 3, there were some issues with the availability of research assistants employed to carry out certain tasks within the project (most notably the online surveys) and this, coupled with the global pandemic, led to some delays.

Plans for Year 5

Year 5 will involve finalising the analysis and reporting for the project, publishing the work in an academic journal, and delivering the final project findings at the 2021 World Conservation Congress.

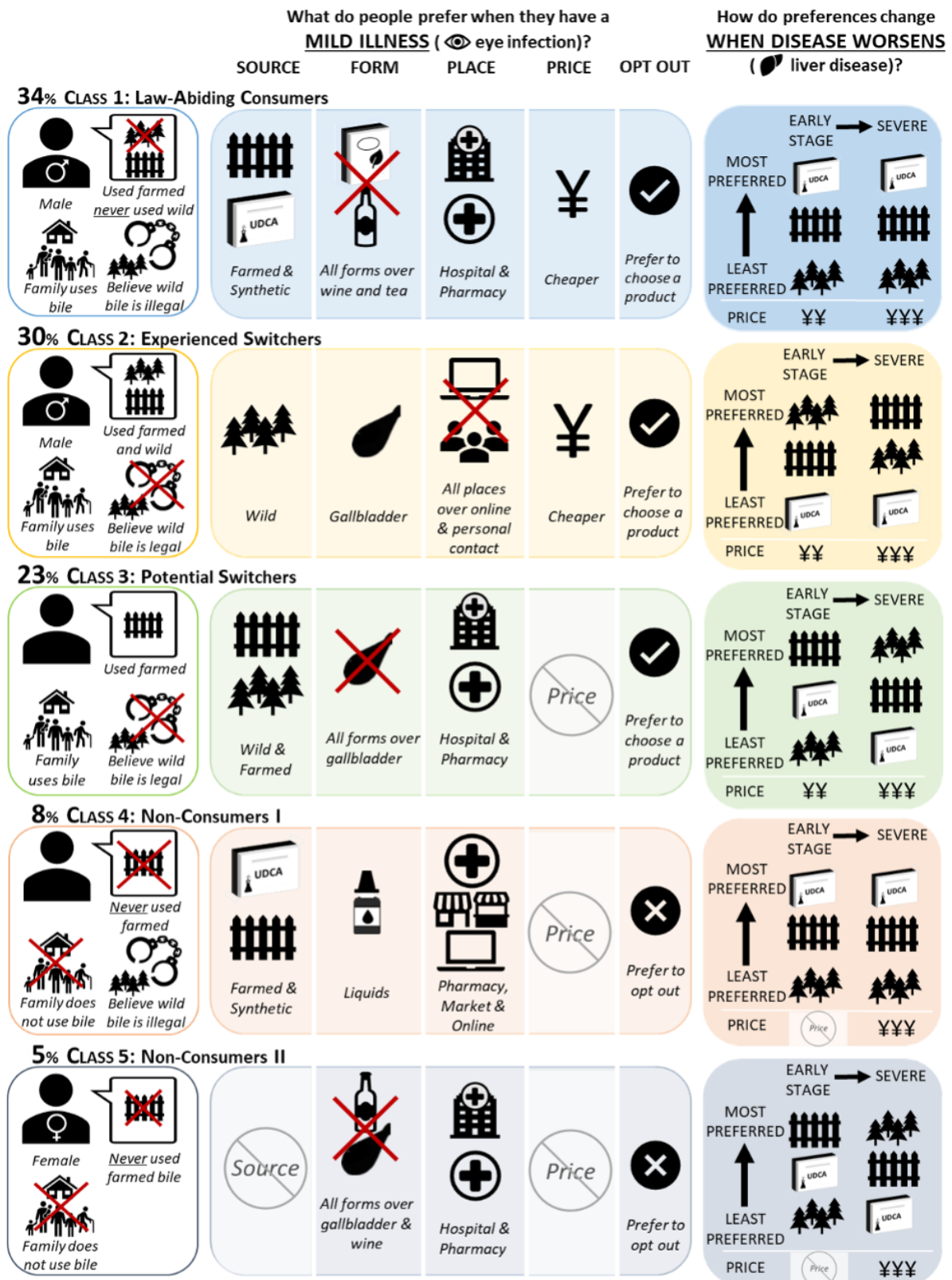


Figure 1. Summary of our Latent Class Model results identified using a discrete choice experiment on bear bile consumer preferences, showing characteristics of class members and their preferences for bear bile products

3.2 Influencing sales of saiga products in Singapore.

Led by Hunter Doughty. Team members: E.J. Milner-Gulland, Kathryn Oliver, Joss Wright, Diogo Veríssimo.

This case study implemented a behavioural change intervention from start to finish, using the approaches in Framework 2. Hunter was supervised by EJMG, Kathryn Oliver (formerly at the Department of Social Policy and Intervention, now at LSHTM) and Diogo Veríssimo. The project was in collaboration with Roman Carrasco (National University of Singapore) and Janice Lee (Nanyang University of Singapore). In Year 3 Joss Wright also joined the team to support online elements of the project.

Year 4 Deliverables

- Doctoral thesis submitted and successfully defended
- Results of the case study published and disseminated

Year 4 Key outputs

All components of the intervention from start to finish were written up as a doctoral thesis which was submitted and successfully defended by Hunter. Following on from the baseline work which was published in Year 3, the intervention design stage, the final intervention approach and implementation stage, and the evaluation stage, were written up as three manuscripts and submitted for publication.

The intervention approach and implementation manuscript was published in *Conservation Science and Practice*, and garnered high interest among our networks and beyond. The paper explained the approach of using repeated message exposure and social reinforcement through targeted online advertisements promoting news articles, to influence saiga horn consumers. The manuscript included detailed steps and things to consider, such as cost-effectiveness, so that others would be able to replicate this type of work. Accompanying the publication, Hunter and Joss wrote a University blog which was reposted on Phys.org. Hunter was also invited to speak in a professional lecture series hosted by a Thai non-profit, as well as in an 'emerging issues' series hosted by Society for Conservation Biology - for which she was their youngest speaker.

The intervention design paper is currently in re-review at *People and Nature* following minor revisions. This manuscript details the process of using both empirical evidence and human behaviour theory to carry out critical intervention development steps, such as selecting a target audience and identifying and understanding the many complex influences that affect a target audience and target behaviour.

The evaluation paper will imminently be submitted for re-review at PLOS One following minor revisions. This manuscript describes the unique multi-pronged approach that was used to assess intervention impact on the target audience. The manuscript is a rare example of using multiple in-person methods (consumer surveys and traditional Chinese medicine shopkeeper surveys) to evaluate the impact of an online intervention on offline behaviour.

Overall progress assessment

The full intervention process from baseline through evaluation is now complete, two manuscripts have been published, and the final two manuscripts will likely be in-press soon (Figure 6). Through this research we have successfully shown that utilising a rigorous standardised framework from public health to carry out a behavioural intervention on a wildlife product is feasible. The innovative and trans-disciplinary approaches that were employed throughout the project, particularly for the intervention itself, exemplified novel applications of behavioural science insights to the field of illegal wildlife trade. The project completion also saw the most extensive consumer research to date on a saiga horn consumer population, as

well as results showing that the intervention itself had significant effects on some target audience members.

Commentary on risks

All fieldwork has now been carried out, and as such there are no fieldwork-related risks remaining. Any future risks would be limited to unforeseen circumstances in the final stages of publication, which we would aim to mitigate should these occur.

Plans for Year 5

Hunter aims to see the final manuscripts reach publication and will work to widely disseminate these pieces. Hunter, Diogo, and EJ also aim to submit a publication on a saiga horn cooling water project carried out by a Singaporean undergraduate in Year 1 and 2.



Figure 2. Saiga horn intervention collage. Saiga horn products for sale in traditional Chinese medicine shops in Singapore (top row – horn shavings, whole horns; bottom left – boiled and chilled horn shaving broth); snapshots of two Facebook adverts and a news article that were part of the intervention materials; the baseline research team with Hunter Doughty.

3.3 Exploring the effective use of celebrities in wildlife demand reduction: changing perceptions of pangolins in Vietnam.

Led by Dan Challender and Alegria Olmedo. Team members: E.J. Milner-Gulland, Diogo Veríssimo, Joss Wright

This case study is part-funded by National Geographic and is in collaboration with Save Vietnam's Wildlife. Although it is mostly focussed on understanding and influencing consumers (FW2), it also includes elements of online trade monitoring (FW1), as well as some elements of understanding the relationship between farming and trade (FW3), and is linked in with a number of other pangolin-related elements through Dan Challender's continuing external position with the IUCN pangolin specialist group. This case study commenced in April 2018 (Y2 of the programme). The project itself is in its third and final year (milestones are given in respect to months of the project).

Year 4 Deliverables

- Publication and dissemination of scoping review on the use of celebrities in environmental campaigns (Fig. 7). and of the study on prevalence of pangolin consumption in Ho Chi Minh City, Vietnam.
- Knowledge Exchange visit by our collaborators to design a pangolin consumption intervention.
- Completion of focus groups with target audience of wild meat consumers in Vietnam.

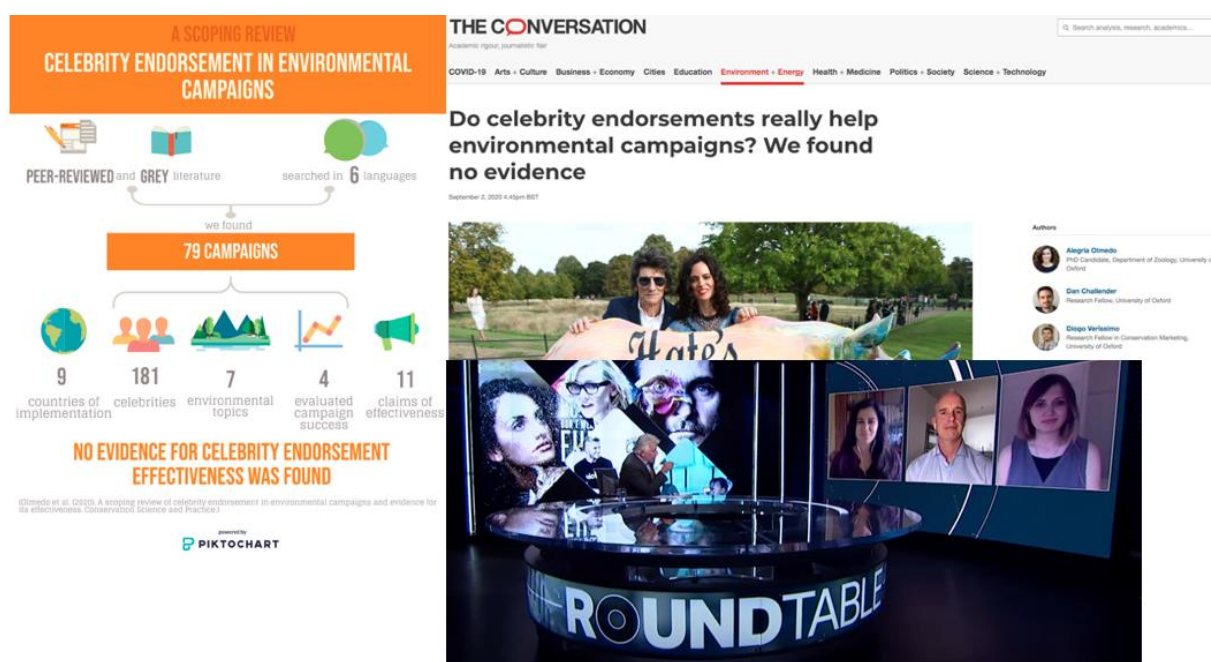


Figure 3. Dissemination of the scoping review on celebrity endorsement included publication and visual abstract, an article in The Conversation, and participation of the lead author in a TRT (Turkish television channel) Roundtable debate.

Year 4 Key outputs

The first three studies conducted for this case study have been completed and two have been accepted for publication. The first study is a scoping review conducted in six languages of the use of celebrity endorsement in environmental campaigns, this has been published in *Conservation Science and Practice*. The second study, on the prevalence of consumption of three pangolin products in Ho Chi Minh City, Vietnam using a sensitive questioning technique has been accepted for publication in *Oryx*. The third, an audience segmentation study to further understand our consumer group, is in second review at the journal *People and Nature*.

The final data collection for this case study, focus groups conducted with members of our target audience, which will inform the design of a behavioural intervention, was completed in the final quarter of 2020.

The pangolin farming project component has proceeded with an initial paper published in *Global Ecology and Conservation* in July 2019, evaluating the feasibility and conservation impact of pangolin farming using a supply-side framework published in the literature. A book chapter on pangolin farming has also been published (in the recently published book "Pangolins: Science, Society and Conservation"). This chapter considers the theory of wildlife harvesting, legal supply and illegal trade, and evaluates pangolin farming based on current evidence. COVID-19 has prevented any in-person visits to commercial captive breeding facilities for pangolins in China (planned for 2020). The project team has adapted the approach and are collaborating with colleagues from South China Normal University and Sun-Yat Sen University to collect and collate data remotely to inform bioeconomic models. The intention is to publish these results in 2021.

The online pangolin trade component has proceeded with the use of a systematic approach to pilot searches for pangolin products available to buy online in English, Chinese and Vietnamese. However, having previously fed in seed terms to similar research being conducted by GITOC and CASM (Sussex), in order to avoid duplication of effort, the intention now is to collaborate with GITOC and CASM on this research in 2022.

Overall progress assessment

Substantial progress is being made on each project component. As highlighted above, the majority of the research and analysis has been completed for the consumer research in Vietnam and the project team is now moving to test a celebrity-based behavioural intervention. The pangolin farming component has progressed well - but with an adapted timeline related to COVID-19. As above, we have adapted the online trade component in order to collaborate and avoid duplication with other research groups.

Commentary on risks

Due to the COVID-19 pandemic, in-person fieldwork in Vietnam was not possible during 2020 and will remain so in 2021. While this delayed data collection briefly, further complications were mitigated by collaborating with a local agency, Cimigo, who could carry out the focus groups being closely advised by Alegria Olmedo and Save Vietnam's Wildlife's Research Coordinator, Huong Dao. Vietnam continues to operate normally and unhindered by the pandemic, so we hope the final testing of the intervention can take place in early 2021 with continued collaboration with Save Vietnam's Wildlife and Cimigo. COVID-19 prevented the project team from visiting commercial captive breeding facilities for pangolins in China. As such the approach to this research has been adapted in order to collect this data remotely with collaborators in China.

Plans for Year 5

- Behavioural intervention testing will be conducted to inform the final design of an intervention to reduce consumption of wild meat in Ho Chi Minh City, Vietnam.
- Finalise revisions of the third study on audience segmentation for publication in *People and Nature*.
- Alegria Olmedo to write-up and submit PhD thesis on this case study.
- Data collation and collection will be completed on the pangolin farming component, bioeconomic models developed, and the research written up for publication.
- The project team will collaborate with GITOC and CASM on a comprehensive assessment of online trade in pangolin products. The intention is to publish this research in 2021.

3.4 Jaguar trade in Latin America.

Led by Melissa Arias. Team members: E.J. Milner-Gulland, Amy Hinsley, Yuhua Li.

This case study is Melissa's PhD project, funded by an Ecuadorian government scholarship. Melissa has also successfully raised funds from WCS, Rufford Foundation, Wildlife Conservation Network, San Diego Zoo, Society for Conservation Biology, Society of American Mammalogists and St. Cross College. She has built a strong relationship with WCS-Mesoamerica and with SDZG, and local organizations in Mesoamerica and Bolivia. The project started at the beginning of year 2 of the programme, and is focussed on understanding scale and drivers of jaguar trade (Fig. 8), as well as the uncertainties in the evidence surrounding jaguar trade in Latin America (particularly Guatemala, Belize and Bolivia).

Year 4 Deliverables

- Published the manuscript entitled "Characteristics of, and uncertainties about, illegal jaguar trade in Belize and Guatemala" in the journal Biological Conservation.
- Submitted the manuscript entitled "Prevalence and characteristics of jaguar trade in north-western Bolivia" to the journal Conservation Science and Practice, also available as a pre-print on SocArXiv.
- Submitted the manuscript entitled "Complex interactions between commercial and non-commercial drivers of illegal trade for a threatened felid" to the journal Animal Conservation, also available as a pre-print on SocArXiv.
- Uploaded the Tools and Guidance document entitled "Implementing the Ballot Box Method to reduce social desirability bias when researching sensitive behaviours in conservation" to the pre-print server SocArXiv.
- MPhil thesis on discourses surrounding the jaguar trade in the Chinese, English and Spanish online media completed and submitted.

Year 4 Key outputs

Melissa published and submitted several manuscripts during year 4 in well-known conservation journals. These are also chapters of her thesis, which is nearing completion. The last chapter and academic paper is still in progress. Yuhua finished her MPhil.

Overall progress assessment

This case study has progressed significantly over the past year, with the analysis, write up and publication of the two fieldwork data collection seasons completed. The submission of Melissa's thesis is planned for Trinity term 2021, with no major risks. Yuhua Li has also completed her research on an analysis of the online trade in jaguars and of the online discourse surrounding jaguar trade issues in Bolivia in the Chinese, Spanish and English languages.

Commentary on risks

No significant risks to progress.

Plans for Year 5

- Finishing the write up of the last chapter of Melissa's thesis, on the use of evidence in the illegal jaguar trade and beyond. Submission and defense of the thesis.
- Papers all published in conservation journals from both Melissa and Yuhua's work.
- Melissa is conducting a range-wide study on the illegal jaguar trade, commissioned by the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES). In year 5, she will complete this study, with the support of OMS-IWT team members. The study will be presented to range States at the next CITES' Conference of the Parties (COP19) later in 2021. Its recommendations will be used by range States to design and implement evidence-informed actions to address jaguar trade.

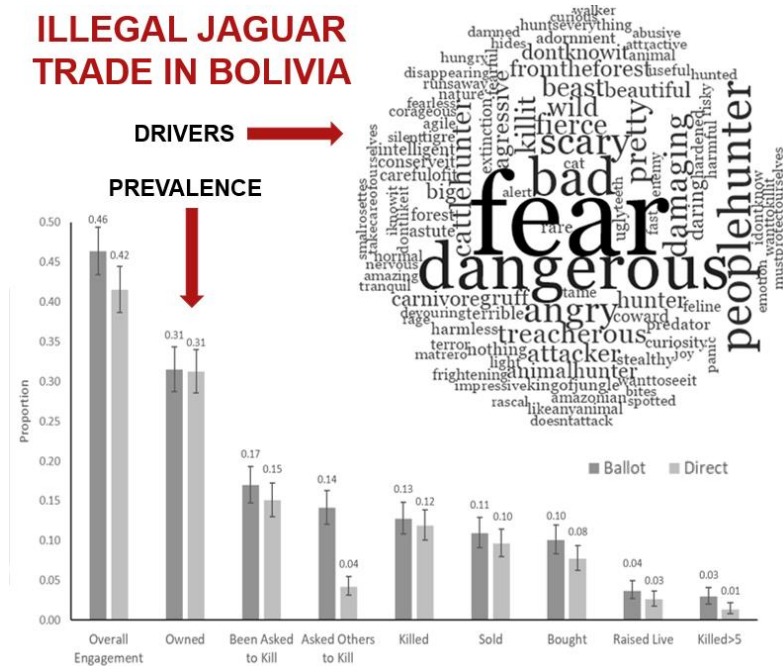


Figure 4. This case study identified the key drivers of illegal jaguar killing and trading in north-western Bolivia, including the negative perceptions towards the species, and assessed the prevalence of multiple behaviours associated with illegal jaguar trade.

3.5 Monitoring the illegal killing of elephants: a case study of uncertainty in conservation monitoring.

Led by Tim Kuiper. Team members: E.J. Milner-Gulland

This case study is Tim's PhD project, funded by a Commonwealth scholarship, in collaboration with ZimParks and Chinhoyi University of Technology, Zimbabwe. It is most aligned with our work on Framework 3 (understanding and predicting trade dynamics). Although the case study is focussed on the supply side, we include it in the programme because of its strong resonance with other elements of the programme around the ivory trade, and in particular the dataset that Tim is investigating is used by CITES to inform decision-making about the ivory trade. The project started at the beginning of year 2 of the programme.

Year 4 Deliverables

- Tim had two of his PhD chapters published in international conservation journals
- Tim presented results from his quantitative chapters to a Statistical Ecology research group in the Department of statistics at the University of Cape Town
- Tim successfully submitted his PhD in December 2020. His viva will be in February 2021
- EJMG and Tim successfully applied for a postdoctoral grant fellowship to translate Tim's PhD findings into policy recommendations in Zimbabwe.

Year 4 Key outputs

Tim conducted interviews with higher level staff at the MIKE programme (Monitoring the Illegal Killing of Elephants) to supplement local Zimbabwean interviews and to feed into his final PhD chapter on the factors affecting the extent to which park managers use ranger-collected data to inform their management decisions.

In 2020, Tim's manuscript on ranger's perspectives on patrol-based data collection was published in the journal *People and Nature*, as well as a manuscript on participatory models of spatial patterns in elephant poaching in the journal *Biological Conservation* (see publications).

Tim also made progress on an exciting aspect of his PhD work which used mathematical simulations to critically assess the potential of ranger-collected data to track changes in elephant poaching and thus inform management strategies (Fig. 9).

In October 2020, EJMG and Tim Kuiper were successfully awarded an Oxford Policy Engagement Fellowship (OPEN) to translate these PhD results into policy recommendations, alongside partners at the Zimbabwean Parks and Wildlife Management Authority. See “Plans for Year 5” below.

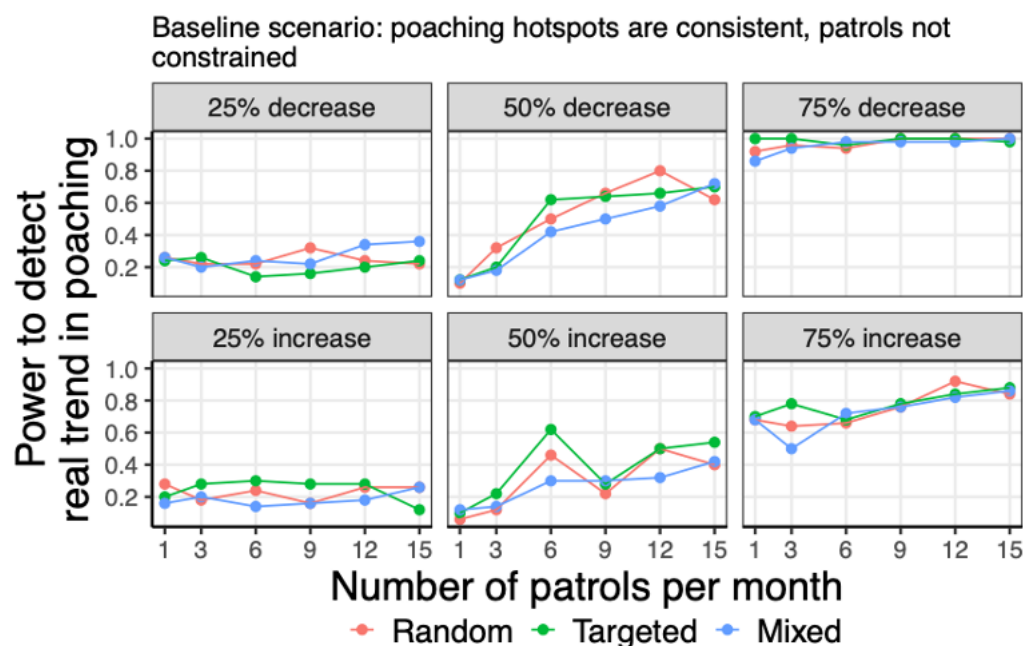


Figure 5. The effect of patrol effort on the power of ranger-collected data to detect temporal trends in elephant poaching of different magnitudes (25%, 50%, 75% increase/decrease), based on mathematical simulation models developed in one of Tim’s PhD chapters. Trends were simulated to occur over a 2-year period from a baseline poaching rate of 90 elephants p.a. (3% of the population at the case study site). A key insight from this chapter was the importance of clearly defining the goals of monitoring before one can assess the power of ranger-based monitoring to meet these goals.

Overall progress assessment

The research element of this case study is now complete, and translation into policy recommendation is excitingly underway.

Commentary on risks

To date, major risks have been avoided, with the successful renewal of the research permit for this project, as well as continued access to data and close collaboration with colleagues within the Zimbabwe Parks and Wildlife Management Authority.

Plans for Year 5

Conduct the 4-month postdoctoral work for the OPEN fellowship, developing briefing notes and other knowledge exchange outputs to influence senior management within the Zimbabwean Parks and Wildlife Management Authority. This endeavour will focus on maximising the use and relevance of ranger-collected data for protected area management and anti-poaching in Zimbabwe, based on the findings of Tim’s PhD work. Other target audiences will be the CITES MIKE programme, as well as local Zimbabwean NGOs involved in funding ranger operations.

3.6 Tackling Small-Scale Illegal Hake Fishing in Chile.

Led by Rodrigo Oyanedel. Team members involved: E.J. Milner-Gulland.

This case study is Rodrigo's PhD project, funded by the Chilean Government's CONICYT scholarship. This case study is also partially funded by the Marine Stewardship Council's Scholarship Research Program. The project is in collaboration with the Universidad Católica de Chile (project co-supervisor Stefan Gelcich), and Rodrigo has strong links to diverse government agencies from previous work in the area. The project started at the beginning of year 3 of the programme and is focussed on understanding and addressing the prevalent illegalities of the hake fishery.

Year 4 Deliverables

- Conducted fieldwork trip to Chile, all data for third and fourth chapters collected.
- Data from fieldwork analysed.
- Submission of three papers for publication (two published).

Key outputs, Year 4

The team has made critical progress in looking at how markets affect unsustainable fishing practices, in particular underreporting (which is illegal), with two projects. The first one (completed): "A framework for assessing and intervening markets driving unsustainable wildlife use" aims to assist in the identification of interventions that can help reduce unsustainable practices from a market standpoint. The second, "A Dual Wildlife Trading Model", provides a generic dynamic simulation model to assess the economic factors that affect intermediaries' decision to trade legal or illegal wildlife products. These projects deliver not only relevant recommendations for improving the sustainability of the common-hake fishery but also general methodological approaches to understanding illegality and the role of markets in natural resource use more broadly.

Rodrigo, EJMG and Stefan Gelcich have published two papers related to Rodrigo's thesis. First, "Motivations for (non-)compliance with conservation rules by small-scale resource users" was published in *Conservation Letters*. Then, "A synthesis of (non-)compliance theories with applications to small-scale fisheries research and practice" was published in *Fish and Fisheries*. Moreover, Rodrigo's third chapter (A framework for assessing and intervening markets driving unsustainable wildlife use) was submitted to *Science of the Total Environment*.

Overall progress assessment

This case study aims to better understand what drives illegal wildlife use, as well as possible interventions to reduce it. The case study provides (a) empirical estimates of the magnitude and (b) fishers motivations to engage in illegal fishing in Chile, (c) possible approaches to reduce illegality from criminology theories, (d) a framework for assessing and intervening in markets driving unsustainable wildlife use, and (e) a simulation model to assess wildlife trading dynamics. By combining these approaches, this case study is shedding light on how to design interventions and policies to reduce illegal wildlife use.

Commentary on risks

To date, most risks related to unwillingness of fishers and traders to participate have been avoided, through the use of specialized survey methods and simulation models. There were issues with fieldwork related to COVID-19, but the consequent move to telephone/skype interviews was successful.

Plans for Year 5

- Finish the Dual Wildlife Trading Model (Fig. 10), and be able to analyse, through simulations, which interventions are more effective at reducing unsustainability in the common hake fishery.

- Based on findings from this work, design a fieldwork campaign to assess which interventions are more feasible considering the local context, which design attributes are more desirable and what would be the willingness of fishers to accept these interventions.
- Apply this model to other wildlife trade contexts, in collaboration with other members of the OMP-IWT team.

A framework for assessing and intervening unsustainable natural resource markets

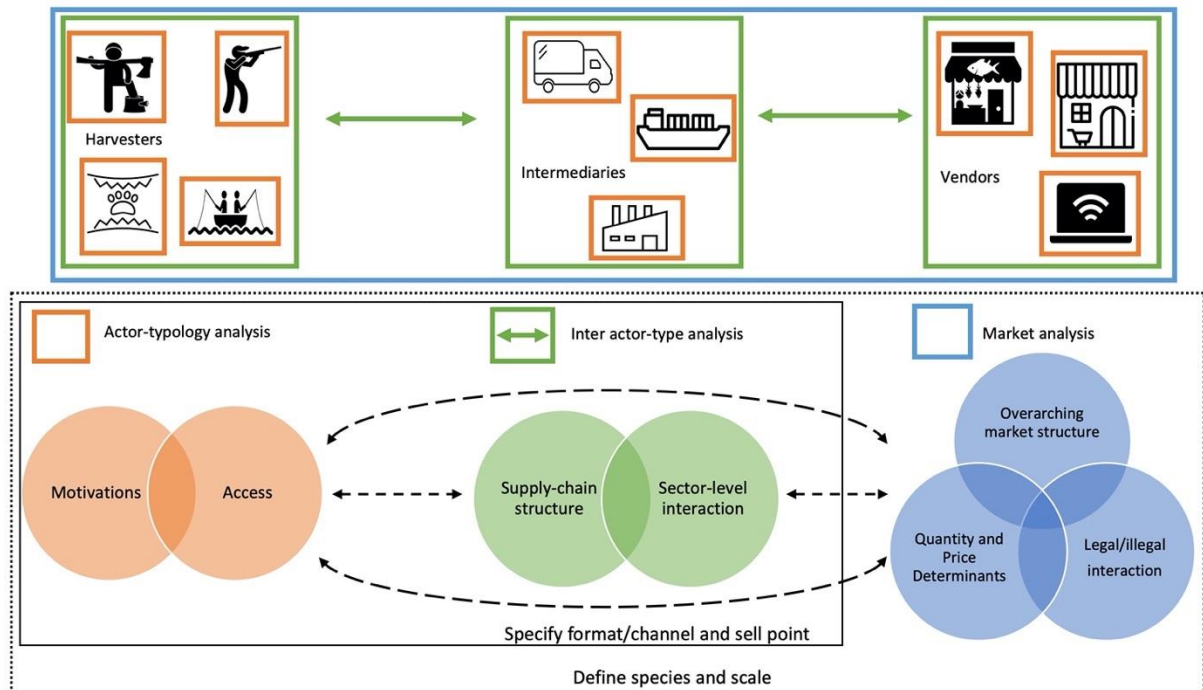


Figure 6. A framework for assessing and intervening in markets driving unsustainable wildlife use. This formalises a framework that integrates different research fields and makes use of data obtained using mixed methods can help researchers to improve understanding of the role of markets in driving unsustainable and illegal wildlife use, inform policy and shape interventions towards long-term solutions.

4. Programme engagement - Work Package 3

Work Package 3 is a major component of the programme and involves acting as a hub for sharing of research, information and best practice between stakeholder groups working to manage the illegal wildlife trade. This requires a large amount of engagement activity, tailored to a range of target groups. In Year 4 we were somewhat constrained by lack of capacity for this Work Package (due to Nafeesa Esmail and Laure Cugniere's contracts finishing). However, we have still been able to produce substantial outputs.

The core funding for our outreach and dissemination activities came to an end in November 2019. Therefore, we are now focussing on maintenance of the website and social media channel, as well as project-specific engagement activities. We are building coordination costs into our funding proposals, and as and when large-scale funding is acquired, we will be able to ramp up activities again.

This component of the work is now led by Carlyn Samuel, who manages our online presence, and will support our main Year 5 outreach activity: the Interdisciplinary Conservation Network workshop for early career researchers and practitioners. We also hope to publish some more tools and guidance briefs as the teams' projects come to maturity.

4.1 Visiting Researchers

Our [Visiting Fellows programme](#) enables our collaborators and other colleagues to spend time working with the Programme. **Reshu Bashyal** followed up her first short fellowship in March 2019 with a virtual fellowship in October 2020 to work with Amy Hinsley and Diogo Veríssimo on a project looking at the distribution of *Dracula* orchids

Yen Truong and **Nhu Nguyen** from Save Vietnam's Wildlife visited Oxford in November 2019 (with a grant from Oxford's Knowledge Exchange fund). They collaborated with the Case Study 5 team to explore the results of the consumer research conducted in Ho Chi Minh City to inform development of an intervention to change consumer behaviour of consumers of pangolin meat. Diogo Veríssimo delivered social science training to Yen and Nhu.

Shaleen Attre (recent postgraduate at University of Kent; Indian Snakes) worked from January to September 2020 as a Research Assistant with Amy Hinsley on various online trade components, specifically to study and gather data on the online trade of orchid (Orchidaceae) containing Ayurvedic products. Her write-up will take place in Year 5.

4.2 Workshops

Diogo Veríssimo and Laure Cugnière continued with the writing of the results of the Year 3 workshops in which researchers and end-users discussed the opportunities and barriers to collaborative working in the IWT space. An initial draft is expected in the first quarter of 2021.

Our main outreach activity in Year 4, continuing into Year 5, is the **Interdisciplinary Conservation Network (ICN) 2020-21**. The workshop is the third instalment of the OMP-IWT's major events, which aim to bring together wildlife trade researchers from multiple disciplines. It is a wildlife trade focused two-part workshop with an online and in-person component. The online component was introduced in the light of COVID-19, replacing our original plan for an in-person only event in summer 2020.

The [Interdisciplinary Conservation Network](#) event format is one which has been implemented highly successfully over several years by the Interdisciplinary Centre for Conservation Science. The aim of the Interdisciplinary Conservation Network (ICN) workshops is to provide Early Career Researchers with an opportunity to develop collaborative research with other ECRs from around the world, while learning key skills for the development of their careers. By using a bottom-up approach to planning and design, ICN workshops allow a team of ECRs to take charge of their own event. This helps them to build new networks and produce an output that is relevant to their own research. At the same time, the participation of a few selected senior researchers ensures a high-quality capacity-building and mentorship element to the workshops.

ICN 2020-21 aims to create a platform for early career researchers (primarily with a focus on wildlife trade) to develop and lead their own collaborative research projects, gain useful research and career skills, and network with other early career researchers. ICN 2020-21 has also served a unique and valuable function during the COVID-19 pandemic by providing a space for participants to meet and collaborate with colleagues internationally despite travel restrictions – which helps maintain social connectivity between otherwise isolated participants and allows participants to continue their overall career development despite a general dearth in current opportunities.

ICN 2020-21 is organised by OMP-IWT and ICCS, in partnership with the **Wildlife Conservation Research Unit (WildCRU)** and the **Oxford Brookes University Wildlife Trade Research Group**. The aim of the collaborative organisational structure is to bring early career researchers from a range of different groups together. Previous OMP-IWT events have been hosted in collaboration with a range of academic and NGO partners, and previous ICNs have

been in partnership with several universities around the world. For this ICN, however, we felt that it would be a good idea to showcase the strong and diverse range of IWT research being carried out within Oxford itself, and to bring Oxford's own IWT research teams closer together. Hence, we decided to reach out to our colleagues at WildCru and Oxford Brookes to co-host this event.

ICN 2020-21 includes a series of virtual collaborative meetings from September 2020 through July 2021, followed by a 3-day in-person event (now being rescheduled for late summer 2021) in Oxford, United Kingdom. There are three research themes: two are specific to wildlife trade (focused on *the linkages between human-felid conflict and wildlife trade*, and *online trade in wildlife products*) and one theme discusses moral and ethical issues that apply to conservation more broadly. During the virtual meetings, participants for each theme are working together to develop a collaborative piece of research with a tangible output. For example, a framework for how researchers can study online wildlife trade, which aims to be published in a peer-reviewed paper. During the in-person event, participants will partake in tailored skill- and career-building sessions, as well as relevant plenary talks and networking sessions.

The three themes are on-track to produce three high-impact peer-reviewed publications. Additionally, the virtual meetings are being attended by 38 predominately international participants, and the in-person event will involve 24 participants from our virtual participant pool. The composition of the participants is: Early-career researchers from Africa (4), Asia (4), Europe (mostly non-UK citizens; 16), North America (3), Oceania (1), and South and Central America (4). Mentors: 6.

Key planned ICN outputs:

- A series of online and in-person workshops attended by 38 participants.
- A total of nine hours of career and skills-building workshops attended by 24 participants.
- At least three high-impact peer-review publications.

Key ICN outcomes:

- Fostering collaborative global networks that will serve participants throughout their careers in conservation science and practice.
- Developing skills, experiences, and knowledge helping participants become independent researchers, including by leading their own research projects with limited guidance from senior academics.
- Contribute novel research, particularly valuable for wildlife trade research, enhancing participants' academic profiles.

Key ICN impacts:

- Fostering international networks of skilled researchers able to provide evidence to address global conservation challenges, particularly regarding wildlife trade.

4.3. Key outreach publications

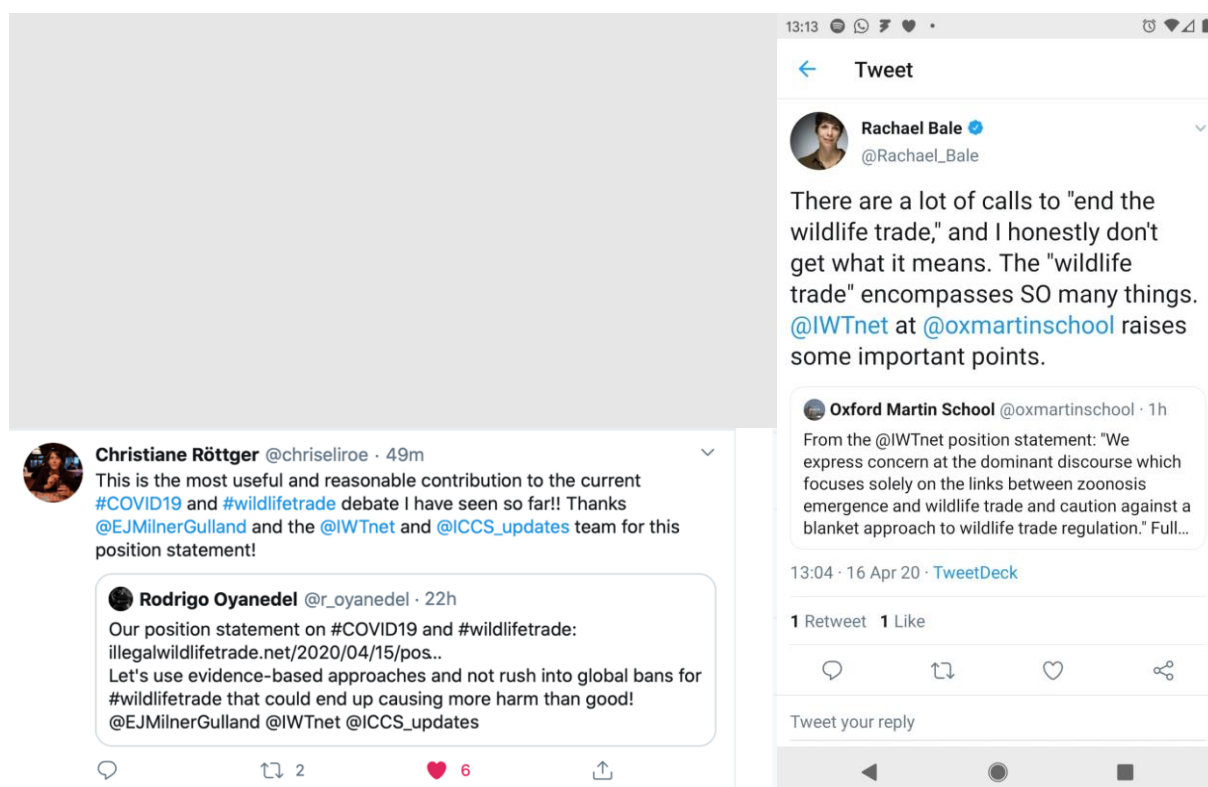
In 2020, we produced the following publications aimed at disseminating our work to a wide audience of end-users:

- Oxford Martin Programme on Wildlife Trade and the Interdisciplinary Centre for Conservation Science (2020). "Position Statement: Managing Wildlife Trade in the Context of Covid-19 and Future Zoonotic Pandemics." doi:10.31219/osf.io/r5w46. **Position statement** jointly prepared by members of the OMS IWT team and ICCS, with particular contributions from: EJ Milner-Gulland, Hollie Booth, Lauren Coad and Stephanie Brittain.
- Arias, Melissa, Amy Hinsley, and E.J. Milner-Gulland. 2020. "Implementing the Ballot Box Method to Reduce Social Desirability Bias When Researching Sensitive

Behaviours in Conservation." SocArXiv. December 8 2020. doi:10.31235/osf.io/t3evh. A methodological **Tools and Guidance** document, providing the first detailed explanation of how to implement the Ballot Box method for asking sensitive questions within a real-world field conservation setting.

The Position Statement was produced in order to provide some clarity and evidence-based thinking around the debate on COVID and the wildlife trade. It was downloaded 99 times and formed the foundation for our peer-reviewed papers about COVID-10. It was very well received on social media (see sample tweets, including from the Director of the CITES Secretariat Ivonne Higuero, Programme Officer at the Convention on Migratory Species Christiane Roettger, Executive Editor of the National Geographic Animals Desk Rachel Bale):





Our team also contributed to the drafting of, and signed, an open letter to the World Health Organisation and UNEP explaining the potential negative consequences of calls to ban the wildlife trade for public health reasons. The Director-General of UNEP responded positively:

Executive Office



Reference: UNE-2020-01073

Dear Mr. Sturgeon,

Thank you for your open letter to the World Health Organization (WHO) and United Nations Environment Programme (UNEP) dated 25 April 2020, in which you share a white paper. I am extremely heartened to see such widespread support for a systemic and thoughtful response to the current global pandemic and your emerging shared vision to address its long-term impacts. Through you, I wish to also thank all colleagues and organizations involved in this process. The challenge before us requires a collective lift and I am grateful for your ideas and partnership.

4.4. Online presence

Our programme website **www.illegalwildlifetrade.net** has attracted 50,220 visitors since it was launched. On average, users spend a little less than 2 minutes on the website and visit about 2 pages. Most of our users are new visitors (88%). See below some analytics about our users since the last yearly report:

Our users' starting points appear to be predominantly our Trading Ideas articles. Following the usage flow, users then tend to then seek further information about our team and other research (Fig.11).



Figure 7. Website users' starting points (1st Nov-18th Jan 2021).

We are continuously growing an active twitter profile, @IWTnet with a total of 2,840 followers with 1,940 tweets posted.

As of January 2021, 30% of our audience was based in the United Kingdom while 15% is from the United States of America. Followers are also based in Australia, South Africa, India, Canada, Indonesia and many other countries (Figure 12). 68% of our followers identify as men while 32% of our organic audience identify as male.

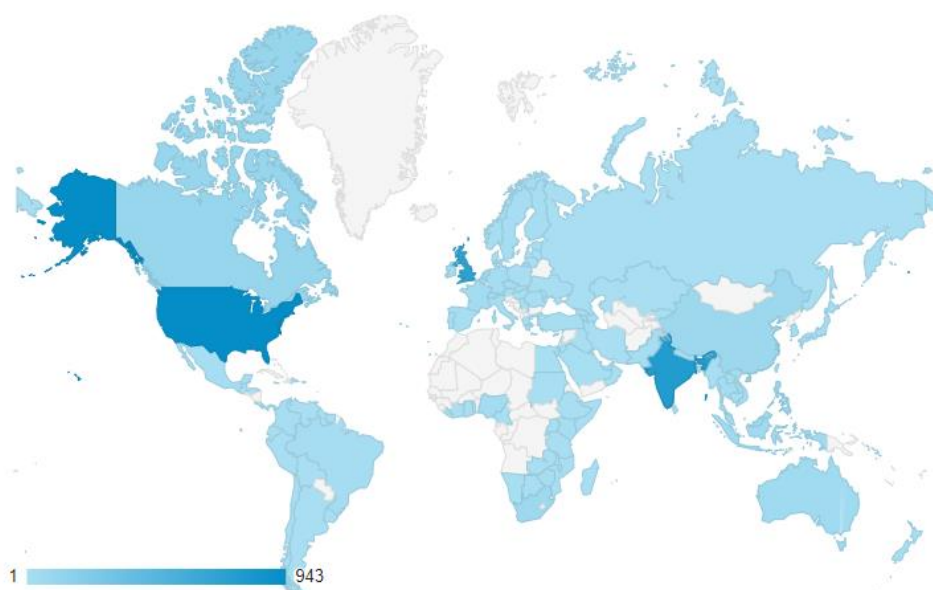


Figure 8. Audience location October 2020 -Jan 18th, 2021 for our Programme's website.

5. Our Core Collaborators:

These organisations worked particularly closely with us this year and have contributed towards various activities in our work programme through co-funding and their own time. We thank them all!

- Fauna and Flora International (Lizzie Duthie)
- Free the Bears (Thona Lim, Matt Hunt)
- IUCN Bear Specialist Group (Dave Garshelis)
- Massey University (Brendan Moyle)
- Nanyang Technical University, Singapore (Janice Lee)
- National University of Singapore (Roman Carrasco)
- Saiga Conservation Alliance (Katya Rashitova)
- Save Vietnam's Wildlife (Thai Van Ngyuen, Huong Dao)
- National Forestry and Grasslands Administration, China (Ruan Xiangdong)
- China Association of Traditional Chinese Medicine (Qiu Yingjie)
- Sun Yat Sen university (Tien Ming Lee, Anita Wan, Sifan Hu)
- University of the Witwatersrand (Vivienne Williams)
- Wildlife Conservation Society: Indonesia (Nuruliawati, Yunita Setyorini), Mesoamerica (John Polisar, Lee McLoughlin, Adrian Reuter, Jeremy Radachowsky, Kurt Ducheze)
- Zimbabwe Parks and Wildlife Management Wildlife Authority (Rose Mandisodza, Nobesuthu Ngwenya, and Blessing Kavhu)
- Zoological Society of London (Paul de Ornellas, Carly Waterman)
- Pontificia Universidad Católica de Chile (Professor Stefan Gelcich)
- Colección Boliviana de Fauna (Isabel Moya)
- Asociación Boliviana para la Investigación y Conservación de Ecosistemas Andino-Amazonicos (Nuno Negroes)
- South China Normal University (Wu Shi Bao)
- London School of Hygiene and Tropical Medicine (Kathryn Oliver)

Particular thanks go to the Oxford Martin School team and our Internal and External Advisory Committees for all your support and advice.

6. Publications and Other Outputs from the Programme

6.1 Peer reviewed papers

These are publications by the OMP-IWT team since October 2019 (including core team members and Visiting Researchers who worked on these papers during their visits). OMP-IWT team members are in bold. Please see previous reports for papers published in other years.

Published

1. Koh, L.P., Li, Y. & Lee, J.S.H. [The value of China's ban on wildlife trade and consumption](https://doi.org/10.1038/s41893-020-00677-0). *Nat Sustain* 4, 2–4 (2021). <https://doi.org/10.1038/s41893-020-00677-0>
2. **Challender, DWS., 't Sas-Rolfes, M.** et al. (2019) [Evaluating the feasibility of pangolin farming and its potential conservation impact](#), *Global Ecology and Conservation*, Volume 20.
3. **Hinsley, A., Milner-Gulland, E.J., Cooney, R., Lee, T.M..** [Building sustainability into the Belt and Road Initiative's Traditional Chinese Medicine trade](https://doi.org/10.1038/s41893-019-0460-6). *Nat Sustain* 3, 96–100 (2020). <https://doi.org/10.1038/s41893-019-0460-6>

4. **Esmail, N.**, Wintle, B., **'t Sas-Rolfes, M.**, Athanas, A., Beale, C., Bending, Z., Dai, R., Fabinyi, M., Gluszek, S., Haenlein, C., Harrington, L., **Hinsley, A.**, Kariuki, K., Lam, J., Markus, M., **Paudel, K.**, Shukhova, S., Sutherland, W., **Verissimo, D.**, Wang, Y., Waugh, J., Wetton, J., Workman, C., Wright, J., **Milner-Gulland, E.J.** [Emerging illegal wildlife trade issues: A global horizon scan](#). *Conservation Letters*. 2020; 13:e12715. <https://doi.org/10.1111/conl.12715>
5. **Oyanedel, R.**, Gelcich, S., **Milner-Gulland, E.J.** (2020) [Motivations for \(non-\) compliance with conservation rules by small-scale resource users](#). *Conservation Letters*.
6. **Kuiper, T.**, Kavhu, B., Ngwenya, N., Mandisodza-Chikerema, R., **Milner-Gulland, E.J.**, (2020) [Rangers and modellers collaborate to build and evaluate spatial models of African elephant poaching](#), *Biological Conservation*, Volume 243
7. **Verissimo, Diogo**, Pienkowski, Thomas, **Arias, Melissa**, **Cugnière Laure**, **Doughty, Hunter**, Hazenbosch, Mirjam, de Lange, Emiel, Moskeland, Annalyse, Grace, Molly. (2020) [Ethical Publishing in Biodiversity Conservation Science](#) Volume: 18, Issue Number: 3 220-225
8. **Oyanedel, R.**, Gelcich, S., **Milner-Gulland, E.J.** (2020) [A synthesis of \(non-\)compliance theories with applications to small-scale fisheries research and practice](#). *Fish and Fisheries*; 21: 1120– 1134.
9. **Hinsley, A.**, **'t Sas-Rolfes, M.** (2020) [Wild assumptions? Questioning simplistic narratives about consumer preferences for wildlife products](#). *People and Nature*. 2: 972– 979
10. Thomas-Walters, L, **A Hinsley**, D Bergin, G Burgess, **H Doughty**, ... **D Verissimo**,... (2020) [Horizon Scan of the Belt and Road Initiative](#), *Trends in Ecology & Evolution*, Volume 35, Issue 7, 583-593.
11. **Olmedo, A.**, **Milner-Gulland, E.J.**, **Challender, D.**, **Cugnière, L.**, Dao, H., Nguyen, L., Nuno, A., Potier, E., Ribadeneira, M., Thomas-Walters, Laura; **Wan, Anita**; Wang, Yifu; **Verissimo, Diogo**. (2020) [A scoping review of celebrity endorsement in environmental campaigns and evidence for its effectiveness](#). *Conservation Science and Practice*. ; 2:e261.
12. **Roberts, D.L.** and **Hinsley, A.** (2020) [The seven forms of challenges in the wildlife trade](#) *Tropical Conservation Science*. v13
13. **Doughty, H.**, **Wright, J.**, **Verissimo, D.**, Lee, JSH, **Oliver, K.**, **Milner-Gulland, E.J.** (2020) [Strategic advertising of online news articles as an intervention to influence wildlife product consumers](#). *Conservation Science and Practice*. ; 2:e272.
14. **Arias, M.**, **Hinsley, A.**, **Milner-Gulland, E.J.** (2020) [Characteristics of, and uncertainties about, illegal jaguar trade in Belize and Guatemala](#). *Biological Conservation*, Volume 250
15. T Lee, **DL Roberts** 2020 [Moving Beyond Simple Descriptive Statistics in the Analysis of Online Wildlife Trade: An Example From Clustering and Ordination](#) *Tropical Conservation Science* Volume: 13
16. **Kuiper, T.**, Massé, F, Ngwenya, NA, Kavhu, B, Mandisodza-Chikerema, RL, **Milner-Gulland, E.J.** 2020 [Ranger perceptions of, and engagement with, monitoring of elephant poaching](#). *People Nat.* ; 00: 1– 14
17. D Roe, A Dickman, R Kock, **EJ Milner-Gulland**, E Rihoy, **M 't Sas-Rolfes** 2020 [Beyond banning wildlife trade: COVID-19, conservation and development](#), *World Development*, Volume 136
18. **Verissimo, D.**, **'t Sas-Rolfes, M.** and Glikman, J.A. (2020), [Influencing consumer demand is vital for tackling the illegal wildlife trade](#). *People Nat*, 2: 872-876.
19. Frederick Chen, **Michael 't Sas-Rolfes**, 2020 [Theoretical analysis of a simple permit system for selling synthetic wildlife goods](#). *Ecological Economics*, Volume 180.
20. H Cheung, **H Doughty**, **A Hinsley**, E Hsu, **TM Lee**, **EJ Milner-Gulland**, H Possingham, D Biggs 2020. [Understanding Traditional Chinese Medicine to strengthen conservation outcomes](#). *People and Nature*.

21. 't Sas-Rolfes, M., Challender, DWS., Hinsley, A., Veríssimo, D., Milner-Gulland, E.J. (2019) Illegal Wildlife Trade: [Patterns, Processes and Governance](#). *Annual Review of Environment and Resources*. *Annual Reviews*
22. Ullmann, T., Veríssimo, D., Challender, D.W.S. (2019) [Evaluating the application of scale frequency to estimate the size of pangolin scale seizures](#), *Global Ecology and Conservation*, Volume 20,
23. Khwaja, H. ..., Challender, DWS. (2019) [Pangolins in global camera trap data: Implications for ecological monitoring](#), *Global Ecology and Conservation*, Volume 20

Accepted

1. **A Olmedo, D Verissimo, EJ Milner-Gulland, A Hinsley, H Dao, DWS Challender.** Uncovering Prevalence of Pangolin Consumption in Ho Chi Minh City, Vietnam. *Oryx*
2. **H Doughty, K Oliver, D Veríssimo, JSH Lee, EJ Milner-Gulland.** Using theory and evidence to design behaviour change interventions for reducing unsustainable wildlife consumption. *Conservation Science and Practice*
3. **Roberts, D., Mun, K., Milner-Gulland, E.J.** A systematic survey of online trade: trade in saiga antelope horn on Russian-speaking websites. *Oryx*
4. Booth, H., Clark, M., **Milner-Gulland, E.J., Amponsah-Mensah, K.,** Antunes, A.P., Brittain, S., Castilho, L., Campos-Silva, V., Constantino, P.A.L., **Li, Y.,** Mandoloma, L., Nneji, L.M., Iponga, D.M., McNamara, J., Rakotonarivo, S., Shi, J., Tagne, C.T.K., van Velden, J., Williams, D.R. Investigating the risks of removing wild meat from global food systems. *Current Biology*

In review

1. **H Doughty, EJ Milner-Gulland, JSH Lee, K Oliver, LR Carrasco, D Veríssimo.** Evaluating a Large-Scale Online Behaviour Change Intervention on Wildlife Product Consumers in Singapore
2. Bullough, L.A., Drury, R., **Hinsley, A.** Orchid obscurity: uncovering domestic markets for wild orchids in Vietnam.
3. **Paudel, K., Hinsley, A., Verissimo, D., Rowcliffe, J.M., Milner-Gulland, E.J.** Evaluating the reliability of media reports for gathering information about wildlife trade seizures. *People and Nature*
4. **Arias, M., Hinsley, A.,** Nogales-Ascarrunz, P., Negroes, N., Glikman, J., **Milner-Gulland, E.J.** Prevalence and characteristics of jaguar trade in north-western Bolivia. *Conservation Science and Practice*
5. **Arias, M., Hinsley, A.,** Nogales-Ascarrunz, P., Carvajal-Bacarreza, P.J., Negroes, N., Glikman, J., **Milner-Gulland, E.J.** Complex interactions between commercial and non-commercial drivers of illegal trade for a threatened felid. *Animal Conservation*
6. **Olmedo, A., Verissimo, D., Challender, D., Dao, H., Milner-Gulland, E.J.** Who eats wild meat? Profiling consumers in Ho Chi Minh City, Vietnam. *People and Nature*
7. Booth, H., **Arias, M.,** Brittain, S., **Challender, D.,** Khanyari, M., **Kuiper, T., Li, Y., Olmedo, A., Oyanedel, R.,** Pienkowski, T., **Milner-Gulland, E.J.** Saving lives, protecting livelihoods and safeguarding nature: risk-based wildlife trade policy for sustainable development outcomes post-COVID. *Frontiers in Ecology and the Environment*
8. **Oyanedel, R.,** Gelcich, S., **Milner-Gulland, E.J.** A framework for assessing and intervening in markets driving unsustainable natural resource use. *Nature Sustainability*
9. **Challender, D.,** Brockington, D., **Hinsley, A.,** Hoffmann, M., Kolby, J., Masse, F., Natusch, D., Oldfield, T., Outhwaite, W., 't Sas Rolfes, M., **Milner-Gulland, E.J.** Mischaracterising wildlife trade and its impacts may mislead policy processes. *Conservation Letters*
10. **Hinsley, A., Wan, A.,** Garshelis, D., Hoffmann, M., Hu, S., **Lee, T.M.,** Meginnis, K., Moyle, B., Qiu, Y., Ruan, X., **Milner-Gulland, E.J.** Understanding how wildlife consumers choose between wild, farmed and synthetic products: consumer

preferences in complex Traditional Chinese Medicine markets for bear bile in China.
Biological Conservation

6.2 Books/book chapters

1. **Challender, DWS.**, Nash, H., Waterman, C. (2019). Pangolins: Science, Society and Conservation. Academic Press.
2. **Challender, DWS.**, Shepherd, CR., Heinrich, S., Katsis, L. (2019). International trade and trafficking in pangolins, 1900-2018. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
3. **Challender, DWS.**, O'Criodain, C. (2019). Addressing trade threats to pangolins in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
4. Cooney, R., **Challender, DWS.** (2019). Engaging local communities in responses to illegal trade in pangolins: who, why and how? In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
5. **Sas-Rolfes, M., Challender, DWS.** (2019). Evaluating the impact of pangolin farming on conservation. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
6. Morin, D., **Challender, DWS.**, Ichu, IG., Ingram, DI., Nash, HC., Panaino, W., Panjang, E., Sun, NCM., Willcox, D. Developing robust monitoring methodologies for pangolin conservation. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
7. Pietersen DW., **Challender, DWS.** (2019). Research needs for pangolins. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
8. **Challender, DWS.**, Hoffmann, R., Hoffmann, M. (2019). Conservation strategies and priority actions for pangolins. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
9. **Challender, DWS.**, Nash, H.C., Waterman, C., Hoffmann, R. (2019). Taking pangolin conservation to scale. In: Challender, DWS., Nash, H., Waterman, C. (Eds.) (2019). Pangolins: Science, Society and Conservation. Academic Press.
10. C. Dean and **A. Hinsley** in [Campaigning to bring about change](#)
11. **Kuiper, T.** (2019). Book review: [Wildlife Crime: From Theory to Practice](#) edited by William D. Moreto (2018) 306 pp., Temple University Press, Philadelphia, USA. ISBN 978-1-4399-1472-4 (pbk), USD 37.95. Oryx, 53(4), 788-788

6.3 Other programme outputs (cumulative)

Multilingual website: www.illegalwildlifetrade.net

Online newsletter and knowledge exchange platform:

[Trading Ideas](#) [mailing list with 866 subscribers. Note, 243 subscribers were removed due to new GDPR restrictions in 2018]

1. 04/28/2017 - [Trading Ideas: Issue 1](#)
2. 09/05/2017 - [Trading Ideas: Issue 2](#)
3. 12/23/2017 - [Trading Ideas: Issue 3](#)
4. 04/04/2018 - [Trading Ideas: Issue 4](#)
5. 07/30/2018 - [Trading Ideas: Issue 5](#)
6. 11/22/2018 - [Trading Ideas: Issue 6](#)
7. 04/12/2019 - [Trading Ideas: Issue 7](#)
8. 10/08/2019 - [Trading Ideas - Issue 8](#)

Twitter profile: [@IWTnet](#) [2,800+ followers]

YouTube video playlist:

https://www.youtube.com/playlist?list=PL2cdem_UgJc62RwCmoaf-UWytIkiGahbU

Flickr photo collection:

<https://www.flickr.com/photos/145004991@N08/collections/72157675118016818/>

6.4 Media coverage

(Selected outputs in Year 4 - some authored by team members, some featuring our work)

1. February, 2020: [The global wildlife trade and the coronavirus](#) Challenger, DWS. Canadian Broadcasting Corp.
2. February 27, 2020: [China's Ban on Wildlife Trade a Big Step, but Has Loopholes. Conservationists Say](#) New York Times
3. March 2020: *Pangolins and Coronavirus (The Andy Harper Show)* Challenger, DWS. BBC radio Bristol
4. April 8, 2020: [Coronavirus: why a blanket ban on wildlife trade would not be the right response](#) Dan Challenger, Amy Hinsley, Diogo Veríssimo, Michael 't Sas-Rolfes, The Conversation
5. April 18, 2020: [Covid-19 – a blessing for pangolins?](#) The Guardian, UK
6. April 4, 2020: [Coronavirus: WHO developing guidance on wet markets](#). A Hinsley & D Challenger. BBC
7. April 22, 2020: [A global pandemic casts humanity's relationship to nature in stark relief](#), The Globe and mail, Canada
8. April 29, 2020 Amy Hinsley interviewed for [‘Another Wuhan in the making’?: Undercover in a Thailand market selling live animals](#) Channel 4 news, UK
9. March 26, 2020: [Coronavirus: Pangolins found to carry related strains](#), BBC
10. May 25, 2020: [Statistical models and ranger insights help identify patterns in elephant poaching](#) T Kuiper and Milner-Gulland. The Conversation
11. May 26, 2020: [What does more environmental damage: eating meat from the wild or a factory farm?](#) The Guardian, UK
12. May 31, 2020: [Why Eat Wild Meat?](#) The Food Programme, BBC
13. June, 2020: [Diogo Veríssimo talking about the Illegal Wildlife Trade](#) on LBC radio, UK
14. June, 2020: [Diogo Veríssimo on Naturen slår tillbaka](#) Sveriges Radio AB (National Swedish Radio) Konflikt
15. July 6, 2020: [After the coronavirus, China moves to kick its exotic meat habit](#). A Hinsley. NBC news
16. July 7, 2020: [Poaching is sending the shy, elusive pangolin to its doom](#) Challenger, DWS, National Geographic
17. September 2020: [Five reasons people buy illegal wildlife products – and how to stop them](#) L. Thomas-Walters, A. Hinsley, D. Verissimo. The Conversation
18. September 25, 2020: [Harnessing online tools to save a species](#) Hunter Doughty, Joss Wright, Oxford University Science Blog; reposted on Phys.org
19. November 2020 [Oxford Sparks 'Big Questions' Podcast](#) A Olmedo
20. [Do celebrity endorsements really help environmental campaigns? We found no evidence](#). A Olmedo, DWS Challenger, D Verissimo. The Conversation

6.5 Talks and presentations

These showcased or referenced work carried out under OMP-IWT:

E.J. Milner-Gulland

1. *June 2020*: Panellist at All-Party Parliamentary Group on International Conservation event on COVID-19 and the wildlife trade.
2. *October 2020*: Department of Biological Sciences, Virginia Tech University (Nov 2020).
3. *October 2020*: Department of Natural Resources and the Environment, Cornell university.
4. *December 2020*: Presentation on COVID and the wildlife trade: Bristol Zoological Society annual keynote talk
5. *January 2021*: Presentation to the Anthropocene group of Google Ltd (showcasing H. Doughty's work).

Amy Hinsley

1. *June 2020*: Talk: 'Understanding consumers of wildlife' Departmental Conservation Seminar, Xishuangbanna Botanical Garden
2. *July 2020*: Talk: 'Orchid trade and CITES', Florida International University
3. *September 2020*: CCI Conservation Seminar: How do we prevent further pandemics?
[Cambridge Conservation Seminar Panel: CCI Conservation Seminar](#)

Hunter Doughty

1. *November 2020*: Society for Conservation Biology - "Using strategic advertising of online news articles to influence wildlife trade consumers"
2. *November 2020*: Golden Triangle Asian Elephant Foundation - "[Using strategic advertising of online news articles to influence wildlife trade consumers](#)"

Melissa Arias

1. *November 2020*: Illegal Jaguar Trade in Latin America. Panelist and the Month of the Jaguar Webinar series organized by Panthera and Rubyxco.

Alegria Olmedo

1. *September 2020*: [Celebrity Activism: Does it make a difference?](#) TRT World broadcast