ZSL Institute of Zoology

Annual Review 2024/25

Contents

Cover image: In response to a 90% population decline caused by the spread of the chytrid fungus, the agent responsible for the fatal disease chytridiomycosis, 53 Darwin's frog *(Rhinoderma darwinii)* were transported from Parque Tantauco, Southern Chile, to ZSL London Zoo to create a captive assurance population. Photo: Ben Tapley

Executive summary

In 2024/25 the ZSL Institute of Zoology (IOZ), the research division of the Zoological Society of London (ZSL), produced 157 peer-reviewed scientific papers and seven major reports. Our research and impact efforts addressed our five Conservation Challenges:

- Research on the **Biology and Recovery of Threatened Populations** included outputs focusing on the factors that underlie hatching failure and low reproductive success rates in threatened bird species. Our impact included research-based recovery programmes for numerous species, including Mexican pupfish, Vietnam pheasant, Hainan gibbon and Guam kingfisher (sihek).
- IOZ work on **Climate Change Risks and Ecosystem-Level Mitigation and Adaptation Strategies** included research on the effect of rapid ocean warming on habitat use in Critically Endangered angelsharks. Our impact included the proposal for an integrated policy framework to address climate change and biodiversity loss.
- Research on **Coexistence Between People and Wildlife** included studies focusing on the impact of armed conflicts on biodiversity loss and environmental degradation. Our conservation impact included continued protection for cheetahs across seven landscapes in 18 countries.
- Our work on **Global Biodiversity Monitoring and Forecasting** produced publications on monitoring methodologies, including for wetland habitats and mangrove restoration projects. Our impacts included the publication of the *Living Planet Report 2024*, which revealed a continued global decline in wildlife populations, with regional losses including a 95% decline in Latin America and 76% in Africa.
- Research on **Wildlife Health and One Health in a Changing World** ranged from an investigation into the effects of pollution and environmental change on infectious disease mortality in cetaceans to the first description of vertical transmission in field-caught mosquitoes as a mechanism for the establishment of Usutu virus in the UK. Our impacts included the rescue of Endangered Darwin's frog from Parque Tantauco, Chile, in response to a 90% population decline cause by chytridiomycosis.

Teaching and training activities in 2024/25 were directed at a postgraduate community of 75 PhD students, including 16 new students, and 89 Masters students across seven courses run with the Royal Veterinary College (RVC) and University College London (UCL). In total, we trained 827 conservation practitioners in 2024/25, including 269 trainees from low- and middle-income countries.

Public engagement in 2024/25 included nine free public lecture evenings in our Science and Conservation Events series, and six episodes of the WildScience Podcast. Our public engagement with science activities continued to focus on underserved audiences, including nine groups with lived experience of forced migration. We hosted two STEM Learning Placement weeks designed for young people underrepresented in science to help develop their science skills, and our international outreach programme Soapbox Science involved 37 events in 13 countries with 444 speakers and an audience of >37,000 people. IOZ research appeared in 969 news articles, with a total reach of 641,167,605 people.

Total income for the year was £8.82 million of which £2.16 million was from Research England and the rest from research grants (£5.43 million) and income from overheads, student fees, publications, meetings and endowments (£1.23 million combined). The Research England grant was thus 24.5% of our total income. We also received a contribution of £857,000 from ZSL for our net support costs.

1. Introduction

The global biodiversity crisis continues to accelerate, with widespread and interconnected challenges threatening the natural systems upon which all life depends. Against this backdrop, the ZSL Institute of Zoology (IOZ) plays a vital role in delivering the evidence base needed to inform effective conservation policy and practice. As the research division of the Zoological Society of London (ZSL), IOZ brings world-leading expertise to the most pressing issues in conservation science, from recovering threatened species to understanding the impacts of climate change and safeguarding the health of wildlife and ecosystems.

In 2024/25, IOZ maintained its position at the forefront of global conservation research, publishing 157 peer-reviewed scientific papers in both fundamental and applied science. Our work had tangible, global impacts, from the urgent rescue operation to safeguard Darwin's frogs from chytridiomycosis in Chile, to the publication of the *Living Planet Report 2024*, which generated over 10,000 media mentions worldwide, significantly increasing political and public pressure for biodiversity conservation.

During the year, IOZ research benefitted from a major investment in infrastructure, with our high-performance computing facility now advancing AI and data science approaches to conservation science. By harnessing this capability, IOZ is developing sophisticated models to process camera trap images, acoustic data, remote sensing imagery, and ecological literature, transforming how we assess species populations, monitor habitats, and predict biodiversity responses to environmental change.

Strategically, 2024/25 was a year of review and future planning, with the development of a new IOZ Business Plan (2025/26–2027/28), building on our previous Business Plan (2022/23–2024/25). The new plan is embedded within ZSL's strategy *Restoring Nature: A Blueprint for Nature Recovery*, launched in 2025, which in turn was guided by our previous plan. This co-evolution of research and organisational direction will create new opportunities for science to advance ZSL's vision to create a world where wildlife thrives.

Collaboration with our key academic partners, UCL and RVC, remains central to our success. In July 2025 we signed a new Memorandum of Understanding with UCL, reinforcing our shared commitment to high-impact research and postgraduate education.

Our people remain our greatest asset and we were proud to see IOZ staff members recognised for their exceptional contributions this year. Nathalie Pettorelli was awarded an OBE for services to conservation and outreach, while Rob Deaville received a British Empire Medal for his contributions to marine species conservation. IOZ's scientific leadership was further demonstrated with the appointment of Rosie Woodroffe to the Natural England Science Advisory Committee and Andrew Cunningham's appointments to [1] the Wildlife Health Working Group of the Convention on Migratory Species, [2] the UKHAS Vector Borne Disease Surveillance Group, [3] the cross-UK government Expert Working Groups on West Nile Virus and Usutu Virus, and, along with Becki Lawson, to [4] the UK Health Security Agency's West Nile Virus Incident Management Team.

This Annual Review is structured around IOZ's four delivery pathways: Research, Impact, Training, and Engagement. Within this framework, we report on our work in relation to our five Conservation Challenges: *Biology and Recovery of Threatened Populations*, *Climate Change Risks and Ecosystem-Level Mitigation and Adaptation Strategies, Coexistence Between People and Wildlife*, *Global Biodiversity Monitoring and Forecasting*, and *Wildlife Health and One Health in a Changing World*. The review also includes an overview of our financial performance, an update on our ongoing work in Equality, Diversity and Inclusion (EDI) and environmental sustainability, and our Headline Indicators.

We are grateful for the continued support of our Independent Scientific Advisory Board (ISAB), whose guidance continues to ensure that IOZ's work remains scientifically rigorous, strategically aligned, and globally impactful.

2. Generating world-leading research

The Institute of Zoology (IOZ) creates knowledge through research to directly address global challenges in conservation science and practice, and to drive evidence-based conservation. An example of IOZ's research activities during the 2024/25 academic year is described below for each of our five Conservation Challenges.

Between 1 September 2024 and 31 August 2025, IOZ staff and students published 157 peer-reviewed research papers. Twenty-four datasets were published during the year, and eight software packages were produced. An additional nine publications, including major reports, edited books and book chapters were published (Appendix A). The global influence of IOZ research over the last 10 years, assessed through our institutional h-index, is currently ranked third out of ten international organisations delivering on-the-ground conservation (Appendix B).

Our research benefits from the expertise of staff across ZSL, with whom our research is often jointly conducted to maximise conservation impact. In 2024/25, 19 out of 157 papers published by IOZ included a ZSL co-author.

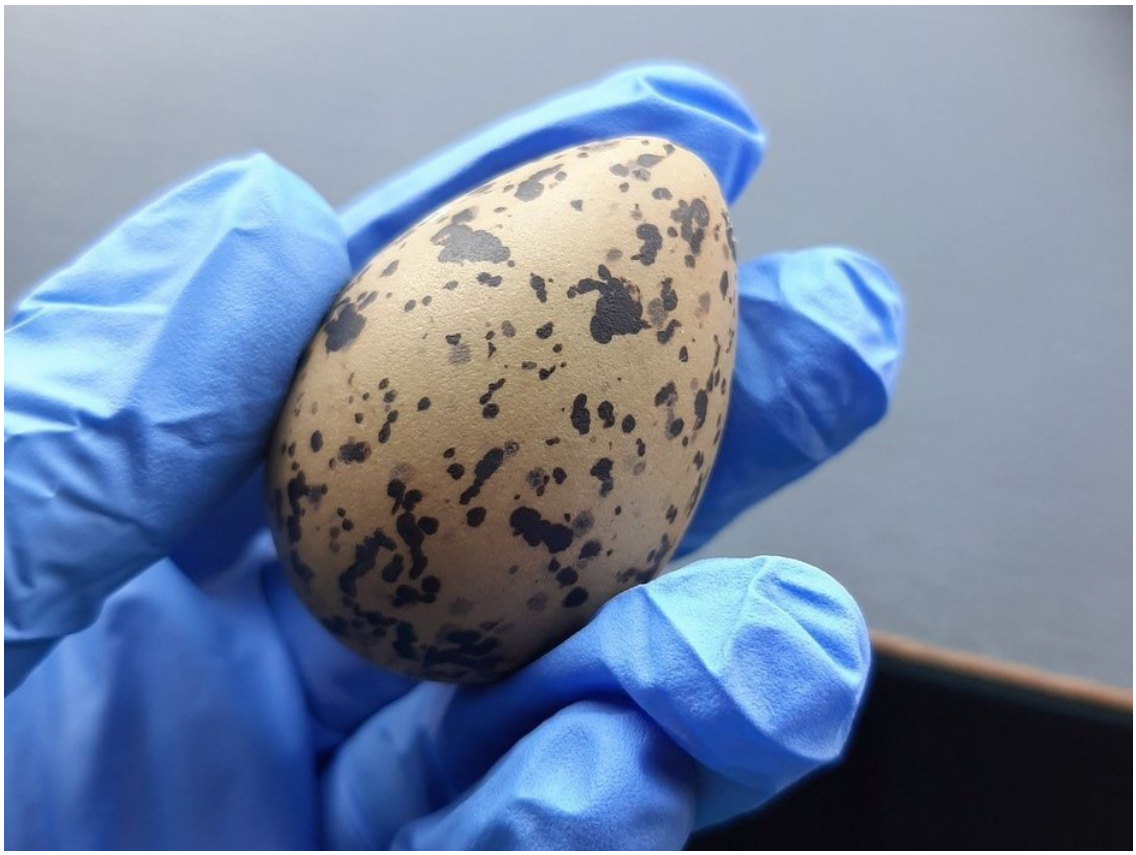
Biology and Recovery of Threatened Populations

IOZ staff and students continued to research the genetic, demographic and socio-ecological processes that underpin the conservation of small populations, and to advise on structured decision-making in line with new developments in recovery science.

Case-study: Understanding the drivers of reproductive failure in threatened birds

Hatching failure in threatened birds is prevalent and caused by two mechanisms: fertilisation failure and embryo mortality. IOZ-led research used ten years of data comprising 4,371 eggs laid by hihi (*Notiomystis cincta)* to investigate the relative importance of infertility and embryo death as drivers of hatching failure and explored population-level factors associated with them (Morland et al. 2024). In the most comprehensive estimates of infertility rates in a wild bird population to date, fertilisation failure was found to account for 17% of hatching failure and is more prevalent in years where the population is smaller and more male biased. Nevertheless, the vast majority of hatching failures (83%) were caused by embryo mortality. Male embryos are more likely to die during early development than females, but no overall effect of sex on the successful development of embryos was found. Offspring fathered by within-pair males have significantly higher inbreeding levels than extra-pair offspring; however, the results show no effect of inbreeding nor extra-pair paternity on embryo mortality. Accurately distinguishing between infertility and embryo mortality in this study provides unique insight into the underlying causes of reproductive failure over a long-term scale and reveals the complex risks of small population sizes to the reproduction of threatened species.

A related IOZ study suggests that the findings for hihi are not unusual among birds. Using advanced fertility diagnostics on unhatched eggs from 30 avian captive-breeding programs (Marshall et al. 2025), IOZ scientists found that fertilisation failure is rare across all species, and the main driver of early reproductive failure is early embryo mortality. It was also found that traditional macroscopic examination of undeveloped eggs led to inflated estimates of fertilisation failure rates in breeding programmes (due to the difficulty of detecting embryos). On a positive note, there was no evidence that fertilisation failure rates are higher in threatened than non-threatened captive birds, suggesting that with careful management, hatching outcomes may be improved in threatened captive populations.



IOZ research contributes to our understanding of reproductive failure in the Critically Endangered Kakī, or black stilt, a wading bird endemic to New Zealand. Photo: Ashleigh Marshall

Understanding the underlying causes of low reproductive success rates in ex-situ populations of threatened species is also essential so that management programmes can optimise species' recovery potential. New IOZ research explored the influence of parental age, inbreeding and method of incubation on egg viability and hatching success in the ex-situ population of the Extinct in the Wild sihek (*Todiramphus cinnamominus*) (Mitchell et al. 2025). Sihek were found to have extremely low egg viability rates (~48% ± 2.15%, *N* = 304/635) and total egg-hatching success rates (~30% ± 1.82%, SE 190/635) compared to other ex-situ and wild bird species. Increased paternal age and parental inbreeding coefficient were found to be key drivers of decreased egg viability, and increased maternal age and use of artificial incubation were contributors to decreased egg-hatching success. These results are pertinent given current recovery planning for sihek, which may require increased offspring production for wild releases.

Further research highlights in Biology and Recovery of Threatened Populations

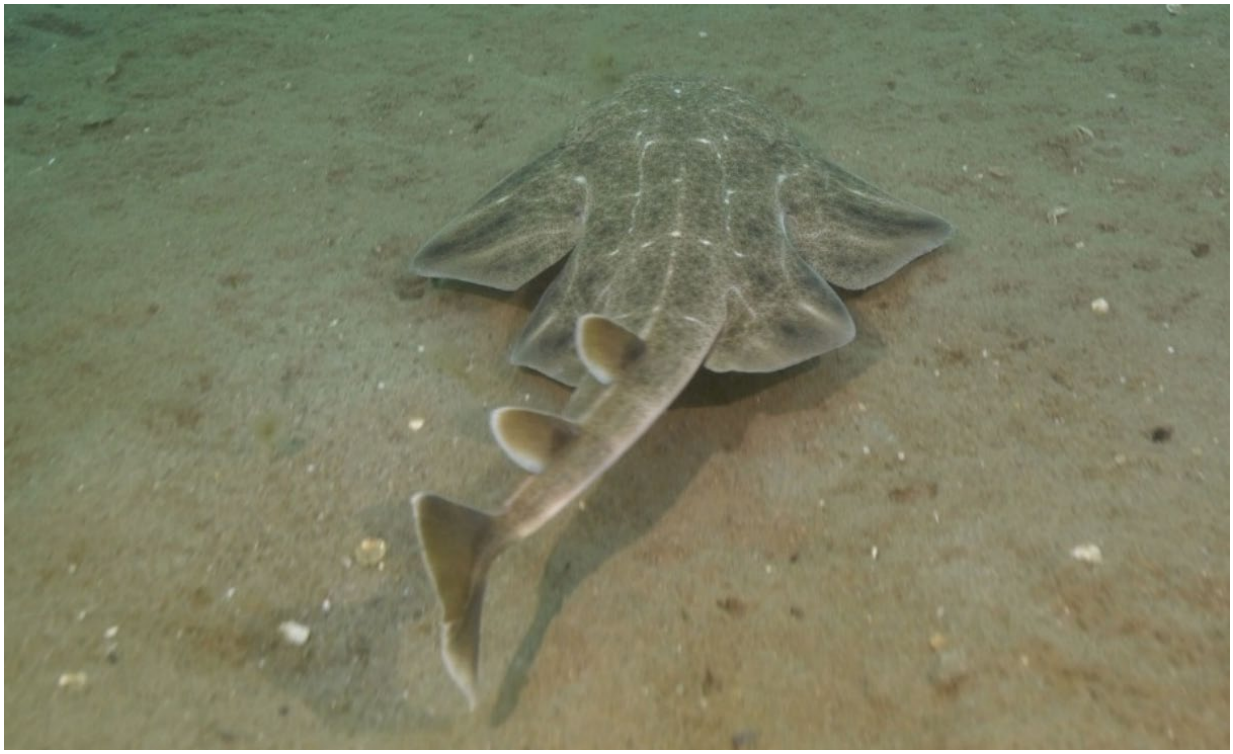
Additional research on the biology and recovery of threatened populations published in 2024/25 includes papers reporting on migration patterns, habitat use and genetic origins of sea *trout (Salmo trutta)* in Norfolk chalk streams (Piper et al. 2024); the status of Critically Endangered Northwest African cheetah *(Acinonyx jubatus hecki)* across the Sudano-Sahel (Shams et al. 2025) and the morphometric characterization of Holocene skeletal remains to expand the ecological baseline for understanding gibbon extinction dynamics (Turvey et al. 2025).

Climate Change Risks and Ecosystem-Level Mitigation and Adaptation Strategies

Over the past year IOZ researchers have continued to explore species and ecosystem vulnerability to climate change, building the evidence base required to assess the effectiveness of approaches that mitigate the impacts of climate change on biodiversity.

Case study: Shark responses to environmental stress

Climate change poses one of the greatest threats to marine ecosystems worldwide, altering physical, chemical, and biological processes at unprecedented rates. Many shark species rely on coral reefs as important habitat, and play a number of significant ecological roles in these ecosystems. However, the impact of environmental stress on site-attached reef shark behaviour is not well understood. A recent study combined eight years of acoustic tracking data (2013–2020) from grey reef sharks (*Carcharhinus amblyrhynchos*) resident in the coral reefs of the Chagos Archipelago with a satellite-based index of coral reef environmental stress exposure (Williamson et al. 2024). On average, increased stress on the reefs significantly reduced grey reef shark residency, leading to more diffuse space use and increased time away from shallow forereefs. Importantly, this impact has a lagged effect for up to 16 months. This may have important physiological and conservation consequences for reef sharks, as well as broader implications for reef ecosystem functioning. As climate change is predicted to increase environmental stress on coral reef ecosystems, understanding how site-attached predators respond to stress will be crucial for forecasting the functional significance of altering predator behaviour and the potential impacts on conservation for both reef sharks and the coral reefs themselves.



Juvenile angelshark in Wales. Photo: Jake Davies

A second study found that rapid ocean warming drives sexually divergent habitat use in a Critically Endangered angelshark (*Squatina squatina)* (Mead et al. 2025). Between 2018 and 2023, 112 adult *S. squatina* were tracked using acoustic telemetry in La Graciosa Marine Reserve in the Canary Islands. Female sharks were found to be particularly sensitive to temperature, with a possible upper thermal threshold close to 22.5°C. Peak sea surface temperature in the study area increased from 22.99°C to

23.81°C, and the number of days above 22.5°C nearly tripled. Absence of females during the 2022 breeding season coincided with widespread thermal anomalies across the Northeast Atlantic Ocean. Given the warming projected for this region, thermal thresholds may increasingly be exceeded, and key areas may become inhospitable for female *S. squatina*. Angelsharks remain one of the world's most threatened sharks, ranked as the fifth most Evolutionarily Distinct and Globally Endangered (EDGE) species. Their loss would represent not just a local extinction, but the disappearance of a unique lineage of life. These findings highlight the urgency of identifying species-specific environmental tolerances so that conservation management remains ecologically relevant in a rapidly warming ocean.

Further research highlights in Climate Change Risks and Ecosystem-Level Mitigation and Adaptation Strategies

Additional research on climate change risks and ecosystem-level mitigation and adaptation strategies in 2024/25 includes papers showing how land use configuration modifies the vulnerability of gallery forests in a savannah ecosystem (Schulte to Bühne et al. 2025); the impacts of an omnivorous ungulate on plant communities and soil organic carbon with implications for rewilding (Lovell et al. 2025) and quantifying the relative importance of agricultural land use as a predictor of catchment nitrogen and phosphorus concentrations in rivers in England (Crowson et al. 2024).

Coexistence Between People and Wildlife

IOZ staff and students continue to develop transdisciplinary research that focuses on the human dimensions of wildlife conservation.

Case study: The impact of armed conflicts on biodiversity and land degradation

Research into how armed conflicts affect ecosystems has historically been limited, but advances in satellite technology, open-source intelligence, and local community engagement have improved monitoring in conflict zones. Armed conflicts can both harm and unintentionally protect biodiversity, depending on the context. For example, in Angola, decades of war displaced millions of people, leaving some areas of the country relatively free of human impacts, allowing certain wildlife to persist. However, conflict often weakens governance, enabling illegal hunting, logging, and land degradation. The widespread availability of weapons further accelerates wildlife loss for trade and subsistence. Despite these impacts, international conservation frameworks have largely ignored the link between biodiversity and armed conflict. IOZ researchers have called for policy makers to integrate conflict considerations into global conservation policy (Wier et al. 2024), for example, by updating National Biodiversity Strategy and Action Plans (NBSAPs) to reflect the risks and opportunities arising during and after conflict. This could include plans for biodiversity restoration as a tool for peacebuilding and monitoring conflict-related environmental damage using existing data sources, such like the ACLED Conflict Index. Currently, there is little interest in adding conflict-related indicators to the over 100 used for tracking targets under the Global Biodiversity Framework (GBF). However, doing so could improve countries' abilities to meet biodiversity commitments and build resilience. International conventions such as the Ramsar Convention on Wetlands could also play a key role by pooling expertise and mobilising funding for conservation in fragile areas. Conservation work in conflict zones is often underfunded due to perceived risks. Yet, with a strong understanding of local contexts and a commitment to local leadership, community-based projects can succeed and even contribute to peace.

IOZ research this year also focused on how armed conflicts contribute to environmental degradation, emphasizing the importance of identifying affected areas to inform effective recovery strategies, despite the inherent challenges posed by insecure environments. A case study in Tigray, Ethiopia, was used to illustrate how open-source satellite data can support the identification of woody vegetation loss during

armed conflicts where ground-based assessments are difficult or impossible (Schulte to Bühne et al. 2024). Areas of potential woody vegetation loss were found to extend across 930 km^2 and appear to be concentrated mostly along major roads; however, vegetation recovery has continued during the war across a significantly larger area (approximately 2600 km^2). These findings suggest that the deforestation is conflict-driven, caused by increases in demand for fuel wood and highlight the potential for open access satellite data to inform post-war restoration efforts by helping identify degraded areas at regional scales.

Large mammals are disproportionately impacted by armed conflict, yet information on population status is lacking because the survey effort required poses risks to human safety. The globally important W-Arly-Pendjari (WAP) ecosystem is increasingly affected by conflict and supports one of the four known remaining populations of the Critically Endangered Northwest African cheetah (*Acinonyx jubatus hecki*). Research published this year used camera traps in a novel dual placement design over three biennial surveys to generate reliable and repeatable estimates for cheetah in Pendjari National Park and its surrounding hunting zones (Drouilly et al. 2025). The results suggest that the park is likely to be a core area for cheetah in this ecosystem and may be an important source population for the W-Arly-Pendjari Complex; however, the cheetah population is worryingly small. Violent extremism and insecurity are widespread across the remaining distribution of *A. j. hecki* and our approach can provide vital data to prioritise and assess conservation interventions.

Deployment of a camera trap in W-Arly-Pendjari and a cheetah captured on a high vantage point. Taken from Figure 1. in Drouilly et al. (2025).

Further research highlights in Coexistence Between People and Wildlife

Additional outputs on coexistence between people and wildlife published in 2024/25 includes research on the socioeconomic and environmental niche of protected areas, revealing global conservation gaps and opportunities (Mouillot et al. 2024); a study exploring participatory approaches to improving recreational fisheries management in a remote island system (Collins et al. 2025) and an an extensive re-evaluation of evidence and analyses of the Randomised Badger Culling Trial II (Mills et al. 2024).

Global Biodiversity Monitoring and Forecasting

Understanding the state of biodiversity - past, present, and future - is critical to developing effective conservation interventions and meaningful policy recommendations. Our research spans terrestrial and aquatic systems, using diverse, cutting-edge scientific approaches to investigate the status, trends, and drivers of biodiversity change. In 2024/25, IOZ research included outputs focussing on

monitoring habitats and ecosystems for conservation interventions. Here we describe three new studies that provide the evidence base for conservation decision-making.

Case study: Habitat monitoring for conservation interventions

Wetland habitats, which provide vital ecosystem services and are crucially important for global biodiversity, are some of the most heavily degraded habitats on the planet. Satellite remote sensing of wetland condition at a national, regional, or even global scale opens up the opportunity for conservation-priority analysis that would be prohibitively expensive and not practically feasible to determine with field studies alone. IOZ research published this year proposes an open-source, low-cost methodology for combining a time-series trend analysis of selected habitat condition indices and a ranking approach to evaluate habitat condition and suitability to support conservation decision-making (Tough et al. 2025). Relative long-term degradation of Madagascar's wetlands was quantified to help direct decision-making for reintroduction of the Critically Endangered Madagascar pochard (*Aythya innotata*). This time- and cost-saving method is transferrable to other habitats with their own set of condition assessment indices to aid multiple conservation objective planning.

The assessment of habitat condition also plays a critical role in the restoration of degraded habitats. Restoration is a key component of global and national efforts to reduce biodiversity loss and adapt to climate change, but our ability to track progress toward restoration targets is limited by the lack of consistent and standardised data on objectives, interventions, and outcomes. To address this, an international collaboration of conservation practitioners and scientists has developed the Mangrove Restoration Tracker Tool (MRTT) to track outcomes from mangrove restoration projects (Gatt et al. 2024). The MRTT records information across the lifetime of a project, capturing data describing the site background and pre-restoration baseline and the restoration interventions and costs, as well as post-restoration monitoring that incorporates both socioeconomic and ecological factors. The MRTT allows decision makers, practitioners, and site managers to access information that is essential in making informed, evidence-based decisions on restoration interventions to maximise impact and success.

The Mangrove Restoration Tracker Tool provides the evidence-base to inform decisions on restoration interventions to maximise impact and success. Photo: Clare Duncan

With respect to the ongoing development of habitat monitoring technologies, machine learning has the potential to revolutionise passive acoustic monitoring for ecological assessments. However, high annotation and computing costs limit its adoption in conservation research. Generalizable pretrained networks can overcome these costs, but high-quality pretraining requires vast annotated libraries, which currently limits their development to data-rich bird taxa. In collaboration with Google DeepMind, IOZ research identified the optimum pretraining strategy for data-deficient domains, using tropical reefs as a representative case study (Williams et al. 2025). The research involved assembling ReefSet, an annotated library of 57 000 reef sounds taken across 16 datasets. Multiple pretraining experiments were performed, with the results showing that pretraining on a library of bird audio 50 times the size of ReefSet provides notably superior generalizability on held-out reef datasets. However, our key findings show that cross-domain mixing, where bird, reef and unrelated audio are combined during pretraining, provides superior transfer learning performance. SurfPerch, our optimum pretrained network, provides a strong foundation for automated analysis of tropical reef and related passive acoustic monitoring data with minimal annotation and computing costs.

Further research highlights in Global Biodiversity Monitoring and Forecasting

Additional outputs on global biodiversity monitoring and forecasting published in 2024/25 includes papers that integrate multiple evidence streams to understand insect biodiversity change (Cook et al. 2025); a review of the utility of the Living Planet Index as a policy tool and for measuring nature recovery (McRae et al. 2025) and a database that provides a framework for the first global meta-analytic overview of the response of insects to a range of major anthropogenic drivers (Millard et al. 2025).

Wildlife and One Health in a Changing World

IOZ research continues to advance our fundamental and applied understanding of the ecological and social mechanisms, processes, and patterns that underlie the dynamics of infectious and non-infectious diseases affecting living organisms and the ecosystems they inhabit. This work includes investigating the determinants of zoonotic disease spillover from wildlife, investigating disease threats to amphibian conservation, and disease surveillance to support recovery of British wildlife, for example through our work on Garden Wildlife Health, the Cetacean Strandings Investigation Programme and Disease Risk Analysis and Health Surveillance.

Case study: The impact of pollution and environmental change on infectious disease mortality and nutritional health in cetaceans

The concurrent pressures of climate change and chemical pollution, often studied in isolation, have been linked to increases in infectious disease that threaten biodiversity. Understanding their interconnected nature is vital, as the impacts of climate-mediated environmental changes can be exacerbated by chemical pollution and vice versa. New IOZ research used data from 836 UK-stranded short-beaked common dolphins (*Delphinus delphis*) necropsied between 1990 and 2020 found that PCB concentrations and sea surface temperatures are associated with an increased risk of infectious disease mortality (Williams et al. 2025). Specifically, a 1 mg/kg lipid increase in PCB concentration correlated with a 1.6% increase in disease mortality risk, while a 1 °C rise in sea surface temperature corresponded to a 14% increase. The research derived a novel PCB threshold concentration (22 mg/kg lipid), defined as the level where PCB blubber concentrations are significantly associated with infectious disease mortality risk. International efforts to reduce carbon emissions have mostly failed, and despite regulatory efforts, PCBs remain a significant threat. These results demonstrate the urgent need for conservation strategies that address both risk factors simultaneously to protect marine biodiversity.

In a second study, nine morphometric body condition indices were applied to long-term datasets for short-beaked common dolphins from Ireland and the UK (Albrecht et al. 2024). By comparing animals from 2017 to 2019 to animals from 1990 to 2006, the results show a decline in the nutritional health of common dolphins in the Celtic Seas ecoregion, with an increase in cases of animals dying due to starvation. Ventral blubber thickness (VBT) was identified as the most important index to predict nutritional status, defined at necropsy, followed by the scaled mass index (SMI). Both significant temporal and seasonal patterns in VBT were identified, with poorer body conditions observed during the autumn and better body conditions observed during the spring, as well as an overall decline detected in VBT during the study period. Further research is needed to understand the underlying causes for the observed decline, including shifts in prey availability and/or quality, to inform targeted conservation management strategies.

The value of using long-term stranding data to monitor cetacean population was further demonstrated in a study using a 30-year dataset from the Scottish Marine Animal Stranding Scheme (Lennon et al. 2025). Species were clustered into broad ecological groups - baleen whales, short-beaked common dolphins, deep divers, harbour porpoises and pelagic dolphins - for spatiotemporal analysis of stranding patterns. All groups showed increases in annual stranding rates, with common dolphins and baleen whales exhibiting exponential increases, suggesting these species may be facing heightened pressures. Distinct seasonal and spatial trends were also detected. Identifying these trends helps focus surveillance and mitigation efforts, underscoring the importance of this approach for monitoring vulnerable species.

Stranded common dolphin. Photo: BDMLR

Further research highlights in Wildlife Health and One Health

Additional research on wildlife health and one health in a changing world in 2024/25 includes papers describing a mechanism for the establishment of Usutu virus in a temperate country involving vertical transmission in field-caught mosquitoes (Schilling et al. 2025); Mpox as a case study for a One Health approach to infectious disease prevention (Hayman et al. 2025) and research demonstrating the usefulness of eDNA for the monitoring of disease status of consignments of traded amphibians (Trafford et al. 2024).

Long-term Programmes providing insights into wildlife ecology and conservation in a changing world

Natural and anthropogenic change in wildlife populations and ecosystems can take place over long periods, and interventions aimed at reducing detrimental impacts also take time to be effective. To advance conservation, access to long-term information is thus key. IOZ has supported Long-term Programmes for many decades and now manages a significant number of long-term datasets, representing over 400 years of research since Special Funding arrangements for IOZ began 30 years ago. Most IOZ senior staff run at least one Long-term Programme that has generated over 20 years of data, research tools, and/or knowledge. Over the past year we have continued to develop and maintain bespoke databases for Long-term Programmes, including chacma baboons, cheetah, New Zealand passerines and tropical seabirds, and have explored the potential for using our new high-performance computing facility for secure storage of large datasets and computationally intensive analytics.

Biobank

The Biobank comprises internationally important collections of samples that are derived from our Long-term Programmes, including samples from our projects focusing on wildlife health in the UK, as well as ZSL's zoo-derived veterinary collections. ZSL investment in the Biobank in 2024/25 enabled the recruitment of a Biobank Technician. Almost 1,500 dry collection specimens have been catalogued and made available for research; 11,376 frozen tissue specimens from veterinary post-mortem have been accessioned and 9,000 frozen specimens from IOZ projects and legacy collections have been catalogued. Research this year focused on developing an AI image recognition tool to identify snake species, DNA recovery from wildlife for wildlife crime forensic science, and the development of a DNA test for hippo ivory. The establishment of a ZSL-wide Biosamples Working Group now brings together cross-ZSL representatives to work on Biobank priorities and processes.

The work of the Biobank would not be possible without our large team of Biobank volunteers and we thank them for their continued dedication and support.

Biobank staff and volunteers

3. Accelerating the translation and use of research to maximise conservation impact

Institute of Zoology (IOZ) research underpins conservation practice and policy, and we work with our network of partners to reduce the deleterious impacts of human activities on wildlife at national, regional and global scales. Our activities are supported by staff in ZSL's Conservation and Policy directorate and two Conservation Zoos, as well as ZSL's press office and engagement teams, who provide pathways through which our science is shared with the wider conservation community. A selection of IOZ's impact-related activities during the 2024/25 academic year are described below for each of our five Conservation Challenges.

In 2024/25, IOZ conducted conservation-relevant work in 59 countries and collaborated with 387 institutions in the UK and overseas. Over 280 species were the focus of IOZ conservation science.

Collaboration with ZSL colleagues plays an important role in IOZ's research and impact activities: of 174 IOZ projects running in 2024/25, 37 (21%) were conducted in partnership with ZSL's Conservation and Policy directorate, 21 projects (12%) with ZSL's Conservation Zoos and 6 projects (3%) with both.

Biology and Recovery of Threatened Populations

Species recovery programmes

Our scientists continue to support species recovery programmes both domestically and abroad. [1] We wrapped up our multi-year work on red squirrel (*Sciurus vulgaris*) recovery planning in England with a report now pending from the Natural England publications team. Our detailed analysis explores options for recovering red squirrels in a landscape largely dominated by grey squirrels (*Sciurus carolinensis*). [2] We supported The Knepp Wildland Foundation and their partners to assess the wildlife health risks associated with planned reintroductions of black-veined white butterflies (*Aporia crataegi*) from Europe. This is one of multiple disease risk assessments undertaken over the last year. [3] In Scotland, we worked with Argyll and the Isles Coast and Countryside Trust to evaluate whether a red-billed chough (*Pyrrhocorax pyrrhocorax*) reinforcement would recover a declining remnant population on Islay and Colonsay. [4] Further afield, we continue to play a central role in the conservation of hihi (*Notiomystis cincta*). This year marks significant milestones for hihi, with the reintroduced population we manage on Tiritiri Matangi island celebrating its 30th anniversary and another reintroduced population in Aotearoa New Zealand's capital city Wellington (Zealandia Te Māra A Tāne) celebrating its 20th anniversary. Another translocation was undertaken with an additional 40 juvenile hihi released at our newest population at Shakespear Open Sanctuary – a site that receives upwards of 650,000 visitors a year who now have a good chance to see this most stunning of birds. [5] Remaining in Aotearoa New Zealand, we completed work with the Aotearoa New Zealand government's Department of Conservation to map possible release sites for the conservation translocation of the kapitia skink (*Oligosoma salmo*). [6] We have also revisited our previous work with tara iti (New Zealand Fairy Tern, *Sternula nereis davisae*) to update population projections with new monitoring data to inform adaptive management.

IUCN SSC Extinct in the Wild Action Partnership

Our work supporting the wild recovery of species that have become restricted to ex situ care in zoos, aquaria and botanic gardens globally — species listed on the IUCN Red List as Extinct in the Wild – has grown from strength to strength. Our earlier initiative, spearheaded in partnership with Re:Wild, the IUCN Conservation Translocation Specialist Group and Botanic Gardens Conservation International, has now been embraced by the IUCN's Species Survival Commission as one of only two Action Partnerships. Working together with the IUCN SSC provides an exciting opportunity to deliver for Extinct in the Wild

species with support from a global collective of conservation specialists. IOZ staff co-chair this new Action Partnership. In 2024/25 IOZ researchers continued to work closely with partners on monitoring the released sihek (Guam kingfisher, *Todiramphus cinnamominus*) on Palmyra Atoll. A decision to release sihek was based on our previous risk assessment work. All released birds (nine in total) have survived their first complete year in the wild – a remarkable achievement for a species which has been maintained ex situ for nearly 40 years. We hope to release the next cohort of nine birds in 2026. Our work on Extinct in the Wild species epitomises conservation in action and highlights how ZSL can combine its cutting-edge science with field conservation and the ex situ care of animals.

Extinct in the wild sihek released on Palmyra Atoll. Photo: Martin Kastner TNC-ZSL

Advancing conservation impact in China

Our conservation impacts in China have encompassed a range of key activities, from species-based planning to establishing new international partnerships and guiding policy. Our Long-term Programme on Chinese giant salamander (*Andrias* sp), has coordinated the publication of a new national conservation action plan for all Critically Endangered giant salamander species, now recognised through IOZ's research as 7–9 species, some of which remain undescribed. Our Long-term Programme for the Hainan gibbon *(Nomascus hainanus)*, the world's rarest primate, has supported a proposed IUCN Motion to prioritise gibbon conservation efforts. We were invited by Defra to provide a response to a call for evidence in the UK government's 2024 China Audit on the importance of China and the role it plays in international conservation, the impact of changing UK-China relationships on the conservation sector, and how to improve and increase UK governmental capability and engagement with China on conservation. Following this invited policy engagement, we coordinated a briefing meeting for the new UK Ambassador to China on Chinese environmental issues at both the national scale (including Chinese species and ecosystem conservation priorities) and the international scale (including international wildlife trade), with subsequent development of a Foreign, Commonwealth & Development Office (FCDO) proposal for a UK-China Nature Partnership to safeguard the country's biodiversity through UK collaboration and support.

Climate Change Risks and Ecosystem-Level Mitigation and Adaptation Strategies

Synergies between biodiversity and climate policy frameworks

The world is confronting simultaneous crises of climate change and biodiversity loss, yet despite their interconnected nature, global responses remain fragmented. While both the United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CBD) acknowledge this link, coordinated policy action has been insufficient. IOZ researchers proposed a joint work programme between the UNFCCC and CBD as the most effective way forward. In October 2024, IOZ researcher Nathalie Pettorelli co-led the draft and circulation of an open letter, signed by over 190 scientists from over 40 countries, calling for a joint program between the CBD and UNFCCC, and in May 2025, led on a submission to the CBD on biodiversity and climate change, signed by 191 scientists, social scientists, policy makers and practitioners from 57 countries. The submission made the case for the creation of a joint work programme between the Rio Conventions as a way to provide a sustained, institutionalised structure to advance cooperation and align the implementation of agreements across these UN conventions. The joint work programme would improve cost-effectiveness through reduced duplication and streamlined reporting, build stronger policy alignment and improved outcomes for both climate and nature, provide the basis for inclusive science-policy processes grounded in transdisciplinary knowledge, and enable whole-of-society engagement in national planning, investment, and strategy. Progress would be assessed by the establishment of shared indicators, harmonised frameworks, and successful integration of climate and biodiversity goals across the Rio Conventions. IOZ research was previously presented at UNFCCC COP26 and COP27 and was cited in the UK Parliament's COP29 2024 UNCCC research briefing. IOZ also co-leads the BIOCAM4 project, a consortium project. A key focus of BIOCAM4 is to develop methods for mapping Nature-based Climate Actions (NBCAs) worldwide. A second focus is to assess local NCBA opportunities and challenges in two biodiversity hotspot regions, East Africa and Central America, where vulnerable groups and communities are among the most affected by climate impacts, least responsible for it, and have reduced adaptive capacity due to social and economic fragility.

The case for Integrated Nature-Climate Action

Nature-based Solutions (NbS) have gained traction across the Rio Conventions as a tool to address climate change while offering co-benefits for both nature and humanity. However, NbS have also been criticised for facilitating greenwashing, promoting market-centric approaches, and failing to confront the root causes of environmental degradation. Critics warn that an overreliance on NbS can distract from more transformative actions, such as rapid decarbonisation and fundamental economic reforms. In a new policy-focused output, IOZ researchers propose the concept of Integrated Nature-Climate Action (INCA) as a broader, more systemic framework. INCA goes beyond NbS to address climate change, biodiversity loss, and desertification while supporting livelihoods, reducing inequities, and upholding the rights of Indigenous Peoples and Local Communities. Examples of effective INCAs include eliminating harmful subsidies, securing land rights, and promoting circular economic models. INCA's inclusive approach has the potential to mobilise a wider range of actors and unlock greater financial support for climate and biodiversity efforts. Although tracking the outcomes of INCA could be complex, existing UN mechanisms may offer guidance for maintaining accountability and ensuring credibility. To prevent the shortcomings seen in NbS, INCA will require a clear definition, robust standards, and strong oversight from both stakeholders and rightsholders. From a policy perspective, transitioning from NbS to INCA presents a timely opportunity to enhance coordination across the Rio Conventions and catalyse systemic change. By adopting INCA, the global community can move toward a regenerative economic system that serves both people and the planet.

Coexistence Between People and Wildlife

Supporting bovine tuberculosis elimination in England

IOZ scientists are playing a key role in national efforts to eliminate bovine tuberculosis (bTB), a cattle disease which has huge impacts on the UK's cattle farmers. On the ground, IOZ's Cornwall Badger Project was recently expanded to include a new initiative, led by the National Farmers' Union in collaboration with IOZ, to assess the effectiveness and scalability of badger vaccination in the fight against bTB. The initiative, co-developed with local farmers, aims to explore the extent to which different approaches to badger vaccination can reduce bTB risk to cattle. Supported by £1.4 million of Defra funding, the project builds on an earlier small-scale pilot which showed promising results—reducing bTB-positive badgers from 16% to 0% over four years, while building farmers' enthusiasm for the approach. The new project includes training farmers and landholders to administer the vaccines themselves, expanding access to this non-lethal control method. In 2024, a record 4,110 badgers were vaccinated—up 24% from the previous year—as part of a nationwide effort to phase out the badger cull and shift towards sustainable disease management. This growing emphasis on vaccination aligns with the government's broader commitment to ending culling and developing long-term, non-lethal solutions to eliminate bovine bTB. At this policy level, Rosie Woodroffe sits on the Steering Group tasked by the government with updating its bTB elimination strategy.

Badger undergoing vaccination. Photo: ZSL

Corridors, communities and capacity for cheetah conservation

In the past year, the Cheetah Conservation Initiative led by IOZ delivered conservation actions towards an improved cheetah conservation status in each of our seven transboundary landscapes through [1] improved capacity for cheetah monitoring and protection (Greater Limpopo Transfrontier Conservation Area, Horn of Africa and Serengeti-Tsavo landscapes); [2] ecological surveys conducted and reports submitted to governments to strengthen protection of key landscapes (Liuwa-Mussuma and Horn of Africa landscapes); [3] improved understanding of cheetah responses to human impacts (Serengeti-Tsavo); [4] updated long-term strategic plans in place for coordinated carnivore conservation across large landscapes (North, West and Central Africa, including the Algeria and WAP landscapes, and Kavango Zambezi (KAZA) landscape); [5] improved awareness of cheetah conservation amongst different stakeholder groups (WAP

and Liuwa-Mussuma landscapes); [6] strengthened monitoring for cheetahs (WAP, Serengeti-Tsavo and Horn of Africa landscapes); and [7] improved collaboration and coordination across international boundaries in key cheetah habitats (Serengeti-Tsavo and Liuwa-Mussuma landscapes). To strengthen landscape connectivity, CCI led corridor analyses and implemented corridor management plans in multiple countries and engaged communities in land-use planning. Support for legal and institutional developments secured transboundary conservation areas, notably between Angola and Zambia, and contributed to global conservation policy through IUCN motions and CMS (Convention on Migratory Species) consultations. Further progress has been made in our community-based coexistence initiatives, supporting conflict mitigation programmes, environmental education, sustainable agriculture, and carnivore-focused curricula across Zimbabwe, Zambia, Benin, Angola, and Kenya. Capacity-building efforts included the training of National Cheetah Coordinators (NCCs) and government staff across 12 authorities, delivery of technical skills courses, and support for national conservation action plan implementation. The CCI supported advanced academic training through scholarships for PhD, MSc, and BSc students in several African countries, fostering future regional leadership in cheetah conservation. Together, these achievements demonstrate a comprehensive, multi-scale approach to cheetah conservation across Africa, integrating fieldwork, community engagement, capacity building, policy advocacy and scientific research.

IOZ delivered conservation actions towards an improved cheetah conservation status in each of seven transboundary landscapes. Photo: Sarah Durant

Global Biodiversity Monitoring and Forecasting

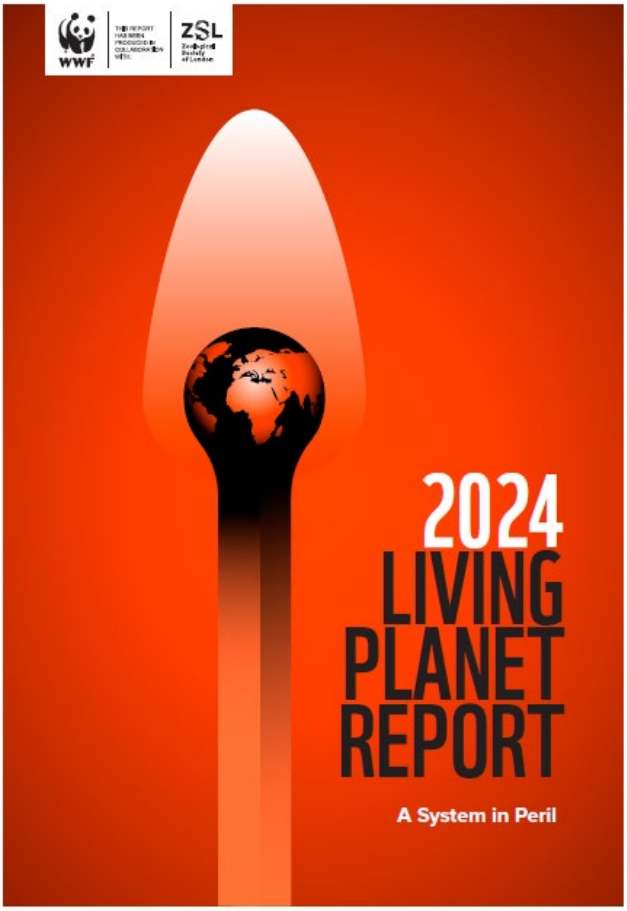
Assessing Species Extinction Risks with the IUCN Red List

Over the past year, our work has strengthened IOZ's impact on the IUCN Red List by advancing representation for underrepresented taxa, expanding national Red List capacity, and enhancing global accessibility of conservation data. With support from the Rufford Foundation, IOZ completed the final nine cephalopod assessments, now published on the IUCN Red List, and progressed swallowtail butterfly assessments through new approaches using sRedList tools. The National Red List (NRL) Database achieved major milestones, launching its new uploader function in September 2024 and piloting data uploads for

reptiles in South Africa (with SANBI, the South African National Biodiversity Institute, and the NRL Working Group), bryophytes in the UK (with JNCC, the Joint Nature Conservation Committee), and birds in Metropolitan France (with OFB, the Office Français de la Biodiversité). These pilots are helping provide a more accessible and integrated global platform, with additional partners including Spain, Andorra, and Iceland now engaged.

IOZ researchers contributed technical input to IUCN workshops on leveraging emerging technologies for Red List assessments, helping to shape future SIS 3.0 developments and interoperability planning with the GBIF, the Global Biodiversity Information Facility. Our communication and policy outputs continue to be strong including a dedicated side-event at the IUCN Regional Conservation Forum (ICENCA, the Interregional Committee for Europe, North and Central Asia, 2024) and preparations for a thematic session on the future of the Red List at the IUCN World Conservation Congress (October 2025).

Assessing population declines with the Living Planet Index



IOZ researchers have continued to strengthen the global evidence base for biodiversity trends through the Living Planet Index (LPI) and the Living Planet Database. We led the analysis and data curation underpinning the Living Planet Report 2024, launched globally by WWF on 10 October 2024 and in the UK Parliament on 16 October 2024. The 2024 edition revealed a continued global decline in wildlife populations, with regional losses such as a 95% decline in Latin America and 76% in Africa. It incorporated 3,015 new population time series for 265 species, bringing the dataset to its largest extent yet, with 34,836 population trends representing 5,495 vertebrate species. Its release generated over 10,000 global media mentions and significantly amplified political and public pressure for action, reinforcing ZSL's role as a science leader influencing policy and mobilising conservation commitments worldwide.

The LPI also continues to play a central role in tracking progress towards the Kunming–Montreal Global Biodiversity Framework and other international targets. IOZ staff continued their active engagement with the Convention on Biological Diversity's (CBD's) Ad Hoc Technical Expert Group and the Biodiversity Indicators Partnership to ensure the LPI and related indicators are accurately represented within post-2020 monitoring frameworks. Beyond global reporting, IOZ advanced national and regional collaborations in Canada, Indonesia, and across the Asia–Pacific region, and supported development of the Canada Species Index and other national biodiversity indicators (e.g. Australia's Threatened Species Index). Work is ongoing to improve African representation, and to expand analytical capacity through collaborations on predictive modelling of biodiversity change under climate and land-use pressures.

Conservation effort to save Southern Darwin's frog

Researchers at IOZ were the first to show that chytridiomycosis and ranavirosis are responsible for global amphibian declines, and have been working ever since to respond to this crisis. In collaboration with Chilean and international partners, IOZ staff and experts from ZSL's conservation zoos led a species rescue mission to establish a captive assurance population of the Southern Darwin's frog (*Rhinoderma darwinii*), an Endangered amphibian endemic to Chile and Argentina. In response to a 90% population decline caused by the spread of the chytrid fungus, the agent responsible for the fatal disease chytridiomycosis, 53 frogs were transported from Parque Tantauco, Southern Chile, to ZSL London Zoo. Long-term epidemiological and population monitoring led by IOZ researchers enabled the detection of population declines and the decision to carry out this emergency rescue. During a five-day expedition in October 2023, 55 frogs were located and placed in a temporary bio-secure facility for health screening. Of these, 53 frogs, including several males carrying developing tadpoles in their vocal sacs, a unique reproductive trait of the species, were chytrid-free and cleared for transport. Upon arrival, London Zoo's amphibian experts ensured all frogs were healthy and quickly acclimatised to their new environment, some even vocalising shortly after arrival. To date, 33 froglets that arrived as tadpoles in the vocal sacs of males have been born at ZSL, and successful breeding has also been recorded on a few occasions. Classified by ZSL as an EDGE (Evolutionarily Distinct and Globally Endangered) species, the Southern Darwin's frog is a high conservation priority. This rescue initiative not only safeguards a critical component of Chile's biodiversity but also provides a research opportunity to better understand and mitigate the impacts of chytrid fungus. The long-term goal is to breed the frogs in captivity and support future reintroduction efforts in Chile, while enhancing scientific knowledge of the species and designing evidence-based strategies to control the disease threatening its survival. The expedition to rescue *R. darwinii* was featured in the film A Leap of Hope.

IOZ researcher Andrés Valenzuela chairs the governance committee of the Binational Conservation Strategy for Darwin's frogs. In collaboration with our local partner, the Ranita de Darwin NGO, we are implementing priority research and conservation actions under this initiative. These include a frog-friendly land conservation programme, the approval of a legally recognised national species action plan in Chile, and in situ mitigation measures against chytridiomycosis.

The team collecting Darwin's frogs for transport from Parque Tantauco in southern Chile to London Zoo. Photo: ZSL

4. Building capacity through teaching and training

The integration of Institute of Zoology (IOZ) with ZSL creates a unique environment for teaching and training that allows staff and students to work alongside wildlife conservation professionals, as well as providing access to ZSL's two conservation zoos. This creates experiences and opportunities for students that go beyond their immediate academic disciplines. ZSL colleagues contribute practitioner perspectives to IOZ's teaching and training, including through the delivery of lectures and modules to our MSc courses, supervision of MSc student projects, and co-supervision of PhD students.

PhD Students

In 2024/25 IOZ hosted 75 PhD students, including 16 new students. The majority of new students are working on projects that cut across two or more of our five Conservation Challenges, highlighting the interdisciplinary nature of IOZ research. These 16 projects include:

- Enhancing seagrass growth and resilience for restoration purposes with microbial manipulations
- Impacts of changing sociocultural terrain on human-nature relations and hunting sustainability in the Indigenous Peoples of Arunachal Pradesh, India
- The socio-ecological importance of elasmobranchs to coastal communities in a changing climate
- Does urbanisation and urban heat impact parasite burden and disease risk from the invasive grey squirrel in the UK?
- What climate change variables are affecting reptile population decline?
- The Pelican Brief: Using environmental archives to establish ecological baselines for UK wetland biodiversity restoration
- Understanding the lagged impacts of climate and land-use on global biodiversity
- The role of egg harvesting in the recent decline and long-term viability of a tropical seabird
- Holobionts-on-a-Chip focused on amphibian chytrid fungal infection

IOZ is not a degree-awarding institution so our PhD students are co-registered with university partners. The 16 new students in 2024/25 were co-registered at seven universities, namely Imperial College London, University of Kent, Queen Mary University of London, University of Bangor, University of Reading, University College London, and University of Liverpool.

2024/25 was the first year of the last cohort of students from the five NERC Doctoral Training Partnerships (DTPs) that IOZ is partnered with: the ARIES DTP (led by University of East Anglia), the London NERC DTP (led by UCL), the SSCP DTP (led by Imperial College London), the SCENARIO DTP (led by University of Reading), and the Oxford DTP in Environmental Research (led by University of Oxford). Six new students came through the London NERC DTP, one through SSCP, and two through SCENARIO. We also welcomed one student through the ACCE DTP (led by University of Liverpool). IOZ is also a partner on two Centres for Doctoral Training (CDTs); the QMEE CDT (led by Imperial College London) and the SuMMeR CDT (led by University of Plymouth) through which we welcomed one student this year.

This year we also successfully partnered on four new NERC Doctoral Landscape Awards (DLAs), the successors to the DTPs. We are full partners on the TREES DLA (led by UCL) and CROCUS DLA (led by University of Reading), and associate partners on the GW4+ DLA (led by University of Bristol) and ILESLA DLA (led by University of Oxford). We have also joined a NERC Doctoral Focal Award (DFA), the successors to the CDTs, as a core partner. This is AI_INTERVENE (led by University of Reading) which focuses on the use of artificial intelligence for biodiversity monitoring, forecasting and management. The first students from all of these doctoral programmes will join us in autumn 2025/26.

Cost recovery for our PhD students is based on fee-sharing arrangements with our university partners. In 2024/25, full partnership arrangements accounted for 59% (44/75) of PhD students. We typically recover 50% of the student fees, which contributes towards the cost of supporting these students.

Overall, 11 IOZ PhD students submitted theses during the academic year, with 100% completing within four years of starting their PhD.

MSc Students

Masters courses with University College London (UCL)
Our partnership with UCL Masters courses now extends to five courses, continuing to provide core teaching on methods and practice in conservation science for the well-established MSc in Biodiversity and Global change and MRes in Biodiversity, Evolution and Conservation, as well as some input on advanced computational methods for the newer, highly innovative MSc courses Ecology and Data Science, Ecology and Urban Engineering, and Ecology, Climate Change and Health. A high proportion of the 71 students on these courses completed research projects with IOZ, making an important contribution to our research. Recruitment to these courses declined slightly overall this year (see table below), but remained at sustainable levels.

Masters courses with the Royal Veterinary College (RVC)
Our MSc in Wild Animal Biology (WAB) is run in partnership with RVC but primarily delivered by IOZ and other ZSL staff, providing scientifically rigorous, practically oriented training at the nexus of animal conservation, management and health. It increased recruitment slightly this year, and there are signs that ongoing efforts to boost the profile and marketing of the courses may be having a positive effect, with a further strengthening of applications this year. This includes a return of applicants for WAB's sister course with additional clinical content, MSc Wild Animal Health, which has not recruited any students for the last two years. We continue working to support this positive trend.

Interventions in Wild Animal Health Field Course

In February we delivered our tenth Interventions in Wild Animal Health (IWAH) field course, at the Wildlife Research and Training Institute in Naivasha, Kenya, hosting 27 participants from 13 countries. Our 2025 cohort included 16 MVetSci students from the University of Edinburgh, and vets from Hungary, India, Malaysia, Nigeria, Uganda and Kenya. Eight participants had received funding to attend the course from various donors. The IWAH course is run under the Wildlife Health Bridge, a collaboration between seven international institutions: ZSL, the University of Edinburgh, the Wildlife Institute of India, the Royal Veterinary College, the University of Melbourne, Toronto Zoo, and our most recent partners the Wildlife Research and Training Institute (Kenya). The 2025 course also received assistance in its planning and delivery from the Kenya Wildlife Service. The IWAH course has been running since 2016 and has had a total of 253 participants from 35 countries.

Residencies

The ZSL/RVC partnership is the only place in Europe that hosts European College of Zoological Medicine residency programmes in both Wildlife Population Health (WPH) and Zoo Health Management (ZHM). The former is hosted by IOZ, the latter by ZSL's Wildlife Health Services. These programmes are validated by the European Board of Veterinary Specialisation and build on ZSL's international reputation as a world-leader in veterinary zoological practice and education, augmenting global capacity to promote wild animal welfare and conservation. While IOZ's WPH programme has been re-certified by the ECZM until 2029, lack

of funds to support a stipend mean that we have been unable to recruit a current WPH resident.

Student Numbers

Course	Partner University	2020/21	2021/22	2022/23	2023/24	2024/25
PhD students	Various	83	86	80	75	75
MSc Wild Animal Health	RVC	10	9	4	0	0
MSc Wild Animal Biology	RVC	18	17	15	14	16
MSci Wild Animal Biology	RVC	12	9	10	7	1
MRes Biodiversity Evolution and Conservation	UCL	16	18	17	14	11
MSc Biodiversity and Global Change	UCL	Started 2021/22	12	17	25	19
MSc Ecology and Data Science	UCL		Started 2022/23	18	27	32
MSc Ecology and Urban Engineering	UCL				Started 2024/25	4
MSc Ecology, Climate Change and Health	UCL				Started 2024/25	6
Interventions in Wild Animal Health Field Course	RVC, Edinburgh, Melbourne, Wildlife Institute of India	18	37	21	24	27
TOTAL		157	188	182	186	191

Practitioner Training

IOZ's Long-term Programmes play an important role in our practitioner training activities. For example, IOZ's Tsaobis Baboon Project provides capacity-building through two internship schemes that foster young Namibian conservation scientists. The first is the Work Integrated Learning (WIL) Programme run by our in-country partner the Gobabeb Namib Research Institute together with the Namibian University of Science and Technology. In 2024/25, we sponsored two 6-month undergraduate WIL interns, who undertook projects on allelopathy in !nara melons and on seed dispersal by desert rodents, respectively. The second scheme is our Tsaobis Baboon Project Internship Programme (TBPIP), which supports university graduates to live, train, and work with our field team. The TBPIP interns learn how to carry out research on wild animals, including behavioural and ecological data collection, the collection of field samples, and data management. The interns also gain experience of working in an international research team and develop a network of contacts across multiple collaborating organisations.

In September 2024, IOZ staff co-organised the Best Practice of National Red Listing workshop, held in Bruges, Belgium. The event focused on strengthening regional capacity for applying IUCN Red List criteria at the national level, particularly across Europe, North and Central Asia. Training covered the IUCN Red List methodology and its application at national scale, with peer-to-peer exchange encouraged through case studies and practical insights shared by national speakers. The workshop also marked the launch of new IUCN guidelines for developing a National Red List programme, outlining a ten-step approach for countries initiating their own assessments. Finally, the event showcased tools to support national focal points, including updates to the National Red List website and database hosted by IOZ.

The 2025 EDGE Conservation Tools Course was held in Kanchanaburi, Thailand, for four weeks from February to March 2025. We trained early-career conservationists from India, Nepal, Vietnam, Maldives, the Philippines and Indonesia, in [1] project planning and management, [2] Conservation Standards and theories of change, [3] basic statistics for analysing ecological data, [4] ecological and social methods, and [5] GIS. This training is designed to enable the trainees to lead their first conservation projects to improve knowledge and interventions for threatened species. The training is led by ZSL's EDGE programme with IOZ staff and students as part of the delivery team.

IOZ's capacity-building for the monitoring of amphibians in protected areas of Chile and Argentina focused on a collaboration with Parque Nacional Vicente Pérez Rosales to develop a monitoring plan for this public protected area in Chile. As part of this work, we co-organised a week-long capacity-building workshop on amphibian monitoring. This workshop, attended by 12 rangers from Chile and Argentina, fostered strong collaboration and led to the discovery of an abundant population of Darwin's frogs.

In total, during 2024/25, 827 conservation practitioners participated in IOZ training, including 327 overseas participants, and 269 trainees from low- and middle-income countries.

Early-career conservationists on the 2025 EDGE Conservation Tools Course in Kanchanaburi, Thailand. Photo: ZSL

5. Inspiring audiences to care about and better understand wildlife and its conservation

A key part of our work involves communicating science to a range of audiences, and we are in a unique position to engage with over two million visitors to ZSL's Zoos annually. Our programming creates opportunities for Institute of Zoology (IOZ) staff and students to discuss research with public audiences and provides pathways to impact through policy and practitioner engagement. The full cost of ZSL's communications and Learned Society activities, including our public lecture series, symposia, public engagement and outreach, is met by income from ZSL's portfolio of scientific journals.

Science and Conservation Events

Our free public lecture series showcases innovative and groundbreaking work from across ZSL, drawing on our collaborations with partners throughout the world of conservation science, and exhibiting how we embed science throughout the organisation. The 2024/25 series included nine in-person events, two of which were held in a hybrid format, and all of which are posted on the ZSL Science and Conservation YouTube channel, increasing accessibility to a global audience. The events covered topics including 'Economies for a sustainable future', 'The evolution of enrichment' and 'Earth system tipping points and their implications for conservation'. To date, 42 Science and Conservation Events have been uploaded to the YouTube channel, which accrued 16.2k views in the reporting year (73% increase on the previous year). A large proportion of these views (~10k) correlate to YouTube Shorts, <1-minute clips to showcase our work drawing on our scientific events programme, the ZSL Wild Science podcast, and new IOZ research. Over 45% of viewers find our channel through their YouTube Shorts feed, and 3,230 people now subscribe to the channel.

Wild Science Podcast

Six new episodes of the Wild Science Podcast were released during the year, and the podcast was downloaded over 12.5k times from platforms including Spotify and Apple in more than 70 countries. Topics ranged from 'The rubber story and the road to sustainability' and 'Feeding the Zoo' to 'Shark tales of North Wales'. To date there have been over 68,000 downloads across all episodes, which feature interviews both online, in-person and in the field.

International Symposia

International Symposia enable science and conservation professionals to share cutting-edge research and best practice, and create valuable networking opportunities. In June we held the Seascape Symposium II; a two-day conference with an additional one-day workshop focusing on the science, policy and conservation practice needed to reconnect coastal habitats to meet global nature restoration targets. The event reached more than 180 attendees and lasting outputs including conference proceedings and full event recordings to increase reach and legacy.

Public Engagement with Science

This year we invested in the fabrication of a pop-up 'Living Library' which enables members of the public

to ‘borrow’ a researcher for an in-depth conversation about their work. We have also implemented walking tours as a new engagement activity to bring people closer to nature and to share our work. We continue to host strategically important networks in order to develop our collaborations and expand outreach and drive greater impact, including the Royal Society of Biology Outreach Network Meeting and Refugee Education. We hosted two UCL Science Communication Masters students, enabling them to gain experience and skills in public engagement. To build on our culture of public engagement and best practice, we held a celebration event to recognise and value participation for contributions to public engagement. We also introduced an IOZ student award for promoting EDI through public engagement.

IOZ staff and students work with Senior Learning Officers to embed science in ZSL’s formal educational programmes and teaching resources, including ZSL’s Education Access Scheme, which offers schools and colleges in Camden, Westminster and L1 to L7 postcodes (Luton/Bedfordshire) unlimited term-time access to ZSL London and ZSL Whipsnade Zoos. Online engagement provides virtual opportunities for learners to engage with our researchers, including Scientist in Your Classroom sessions, held during Biology Week and Science Week, reaching 1,256 students during the year.

Soapbox Science

Our international public outreach platform Soapbox Science showcases the work of women and non-binary scientists by placing them on soapboxes in public spaces in a fun, informal setting. Each event offers scientists a chance to break free of conventional communication methods, such as lectures, and aims to inspire young scientists of the future while challenging limiting stereotypes about what a scientist looks like. During the year, 37 Soapbox Science events were held in 13 countries including 444 speakers and reaching an audience of over 37,000 people. Women are significantly under-represented in science: only 33% of scientists globally are women – and only 26% in the UK. In addition, many reports still fail to consider non-binary people when monitoring diversity in STEM. Through its work spotlighting women and non-binary researchers, Soapbox Science is working to tackle this imbalance by inspiring future scientists. 2025 also saw Soapbox Science’s first event in Asia, in Purwokerto, Central Java, Indonesia. This was a big milestone for Soapbox Science as the project now has event teams on six continents.

Soapbox Science Purwokerto, Indonesia, showcasing women and non-binary researchers in STEM. Photo: ZSL

Refugia

Our public engagement with science is increasingly focused on traditionally underserved audiences, enabling us to gain insights and reflect on how people relate to and understand the ways in which science can benefit wildlife, people and the environment. The Refugia project, originally funded by NERC, continues to provide opportunities for IOZ researchers to co-create public engagement activities with asylum seekers and refugees. In November, project outputs were exhibited in the UK Pavilion at COP29 in Azerbaijan (the 29th UN Climate Change conference). We now have expanded the programme to work with nine groups, including Care4Calais and Fences and Frontiers, both charities supporting families and adults. During the past year, over 195 participants engaged with Refugia, alongside 27 students and staff. In November, Refugia was presented with the Falling Walls Foundation awards for Science Engagement. The award recognises impactful, innovative approaches that remove barriers to engagement with climate change and adaptation.

Placement Schemes

In August we hosted seven STEM Learning Placement students for a week of workshops designed to develop their science skills. The students were from families with lived experience of forced migration, who are underrepresented in science and likely to have had disruptions to their education. The students reported a 79% increase in likelihood of studying and pursuing a job involving wildlife, and 100% of participants said the programme improved their ability to talk about science in English. A second week of STEM Learning Placements saw 15 students from traditionally underserved backgrounds, such as low-income households or the first in their families to apply to university, join our staff and students for series of workshops to develop their science skills. In collaboration with the Primate Society of Great Britain, we also hosted and supported a 3-day field skills workshop for students who would otherwise not be able to gain that experience as a result of, for example, caring responsibilities or other personal circumstances.

IOZ hosted STEM Learning Placement students for a week of science workshops. Photo: Lucy Brown

Recruiting Citizen Scientists

IOZ has a strong track record of enlisting help from citizen scientists. The participation of citizen scientists enables projects to run in the long-term that would otherwise be logistically and financially unfeasible, while simultaneously engaging and inspiring the wider public with our research and impact activities. One IOZ programme working with citizen scientists is the Garden Wildlife Health (GWH) project. Since 1 September 2024, the Garden Wildlife Health project received c. 4,000 Disease Incident Reports from members of the public, which resulted in carcasses from c. 200 reports being submitted for post-mortem examination. Over the year, 119 citizen scientists also participated in IOZ London HogWatch surveys, of which 36 volunteered their garden or allotment to be surveyed; 185 volunteers also submitted information to the London HogWatch Historical Wildlife survey. In addition, London HogWatch hosted data on three citizen science platforms: Instant Wild, Mammal Web and Zooniverse. The Zooniverse project, in partnership with Friends of Richmond Park, gained 168,601 image classifications by 1,460 citizen scientists.

Press and Media

Since 1 September 2024, IOZ research appeared in 969 news articles, with a total reach of 641,167,605 (with an equivalent advertising value of £11,392,552). Highlights include the *Living Planet Report 2024*, which was featured in over 200 outlets including BBC, The Guardian, New York Times, Financial Times and Reuters; widespread coverage of the badger vaccination trial delivered in partnership with the National Farmers' Union, including in The Guardian and Farmers Weekly, and international coverage of the laying of the first sihek eggs in the wild since their return to the wild, including an article in The New Scientist on the most inspirational conservation success stories of 2024.

6. Equality, Diversity and Inclusion

Equality, Diversity, and Inclusion remained a core focus at the Institute of Zoology throughout 2024/25, as we concluded our current EDI Action Plan (2022/25) and began shaping the next iteration (2025/28).

Guided by departmental feedback, organisational reflection, and reporting to the Independent Science Advisory Board, we focused on embedding long-term structures to support equity, diversity, and an inclusive research culture. To strengthen our evidence base, we gathered insights through targeted surveys, including an evaluation of the new Performance Advisory Committees by Research Fellows and Senior Research Fellows. The purpose of Performance Advisory Committees is to guide research staff along a positive trajectory of accomplishment with advice and support from multiple colleagues, which provides a wider set of perspectives than a traditional Performance Review with a single line manager. On the basis of feedback, we have now introduced PACs for research staff at any career stage who would like one. Our dedicated staff and student survey on PhD supervision also provided clear, actionable improvements—both within supervision practices, wider support frameworks and training.

Mental health and wellbeing remained a top priority. We addressed recurring questions around mental health resources and increased visibility of our Science Mental Health First Aiders. We also launched a ZSL Science Guide to Work-Life Balance, bringing together practical strategies and lived experience from across the Science Directorate. These efforts were complemented by the rollout of our Science EDI Communications Action Plan and 11 EDI newsletters promoting over 120 external events, webinars, and resources.

Support for students and early-career researchers continued through tailored initiatives. We developed formal guidelines for institutional support in fellowship applications and paired 10 individuals through our Mentor Programme. For students specifically, we expanded development opportunities by providing financial support for 12 PhD students who live outside London to attend internal conferences. We also introduced three new EDI Student Awards to recognise contributions to co-designed research, public engagement, and workplace inclusion, and issued Certificates of Achievement for student EDI committee representatives. PhD student voices were further elevated through the Weekly What's Happening (WWH) series, which highlighted their research and impact (WWH events are 20-min online meetings attended by colleagues across ZSL in which different teams talk about their work). In April, we organised a writing retreat at The Old Rectory, Suffolk, which was attended by 15 PhD students.

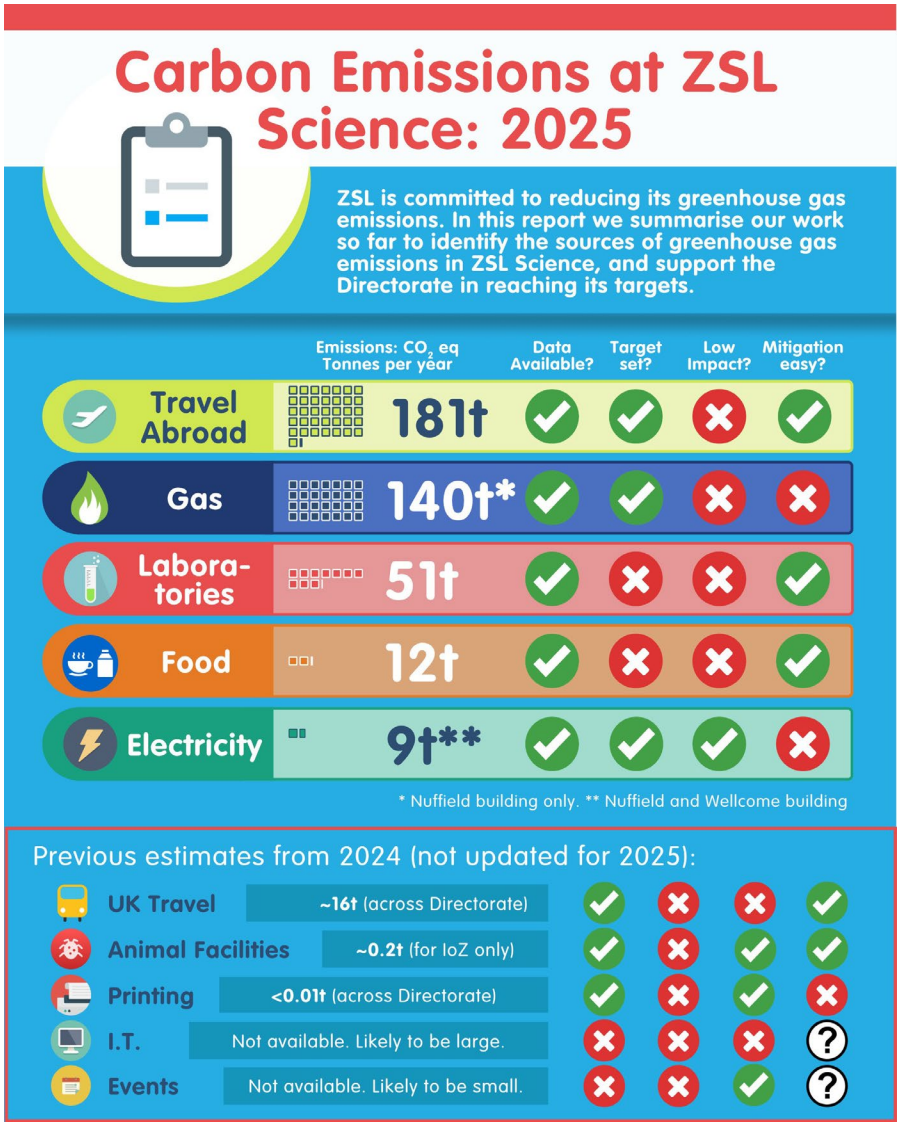
We also took steps to build resilience and equity into our research culture more broadly. The launch of the Climate Resilience Network created space for staff and students to explore environmental stressors and co-develop resilience strategies. We introduced guidance on inclusive authorship to promote equity in research outputs and continued our work on decolonising science. This involved delivering six internal learning sessions, and contributing externally through partnerships with the RVC and STEM Learning Placement programmes, in collaboration with ZSL's Conservation & Policy directorate.

Collaboration across ZSL remained a strong thread throughout the year, as well as external relationship building. We supported the development of ZSL's new EDI Strategy 2025/26 and hosted a meeting of the Royal Society of Biology's Diversity and Inclusion Working Group, which featured a presentation from The Clear Company. We also contributed to the wider sector by participating in the National Day for Staff Networks Conference and co-hosting a networking event with WWF-UK, focused on shared challenges and opportunities in conservation EDI.

Looking ahead, the structures, and relationships we've developed this year will directly shape the next phase of our EDI strategy—ensuring our direction remains grounded in our community's experiences and responsive to the evolving challenges of inclusive science.

7. Environmental Sustainability

In July 2025 the Institute of Zoology's Carbon Management Committee, comprising academic staff and students, published its second Carbon Management Report. The report brought together all available data on greenhouse gas emissions associated with IOZ's work over the last year. We also developed a travel policy which provides transparent criteria to help staff and students reduce travel-related carbon emissions. We have now expanded this work, recognising the importance of addressing environmental impacts beyond greenhouse gas emissions. To guide this effort, we have developed a Sustainability Action Plan. The Action Plan is aligned with the UKRI Environmental Sustainability Concordat, ensuring that IOZ follows best practices in sustainability in the academic sector. The IOZ Sustainability Action Plan is also aligned with the wider ZSL Strategy, which embeds environmental sustainability as a key component of ensuring organisational resilience. The IOZ plan will therefore serve as a test case for developing and trialling approaches and methodologies before they are adopted in other departments across ZSL. To support this, the Action Plan ensures close alignment with related work across ZSL, including the ZSL Decarbonisation Plan Working Group. The implementation of this Action Plan will be led by the IOZ Sustainability Committee, which evolved from the Carbon Management Committee with a wider remit.



Graphical summary from the ZSL Science Carbon Management 2025 Report.

8. Major grants awarded

The Institute of Zoology (IOZ) receives core-funding through Research England Special Funding with additional support from ZSL. In 2024/25, IOZ employed 27 core research staff, who raise additional grant funding to support their research and impact, including the employment of a further 41 research staff. IOZ's 27 core staff also supervised 75 PhD students, taught MSc students and practitioners, and participated in science communication and public engagement activities. IOZ grant funding comes primarily from overseas organisations (non-EU) and the UK government, followed by UK charities, UK research councils, European funding, and UK commercial funding.

Grants awarded in 2024/25

A major grant of £3,746,875 was awarded as part of a five-year multi-million-dollar programme funded by the Howard G. Buffet Foundation. This grant support IOZ's ongoing work to ensure a long-term future for cheetah in 18 countries and across large landscapes, ranging from the deserts of Algeria to the savannahs and woodlands of east and southern Africa. Over the next phase of the programme, we will continue our restoration work in the Luangwa valley, Zambia, and continue to restore and maintain corridors between current and future cheetah populations within our landscapes. In parallel, we will support national and international policies that safeguard connectivity. We will also continue to foster coexistence between cheetah and people in and beyond the landscapes where we work, increasing our focus on innovative finance models that can generate sustainable benefits for communities living alongside cheetah. We also plan to continue our leadership program supporting cheetah conservation scholarships, to build a networked cohort of African cheetah experts who can advocate for cheetah conservation within their respective countries and communities.

The IOZ also received two grants from Defra to support our work on badger vaccination as a potentially effective, sustainable, and acceptable tool to reduce bovine tuberculosis risks to UK cattle. The first of these totalled £473,623 as part of a £1.4 million grant to the National Farmers' Union, upskilling the farming industry to deliver badger vaccination and exploring the effectiveness of different vaccination approaches on land previously subjected to badger culling. The second involved an award of £249,999 to support three years of the Cornwall Badger Project's work to explore badger vaccination effects on land on which badgers have never been culled.

IOZ's Long-term Programme on Disease Risk Analysis and Health Surveillance was awarded £232,890 by Natural England to conduct essential disease risk analyses and health monitoring for conservation translocations and reintroductions. This ongoing work ensures that appropriate disease risk assessments are carried out for animals released each year and that their health is continuously monitored. The partnership utilises the combined expertise and experience of IOZ and Natural England to ensure that species recovery work is carried out to a high standard. The funding this year also aims to better understand how terrestrial species are exposed to and impacted by harmful chemicals such as pesticides, heavy metals, and persistent toxins. This two-part project focuses on the Eurasian beaver *(Castor fiber)* and the red kite *(Milvus milvus),* using post-mortem and clinical health examinations to build tissue archives that support investigations into contaminant levels and their adverse effects.

Red kites undergoing clinical health examinations as part of ongoing Disease Risk Analysis and Health Surveillance research. Photo: ZSL

In the past year, the IOZ's London HogWatch project has raised over £230,000 in grant funding. The British Hedgehog Preservation Society (BHPS) is London HogWatch's core funder and has awarded over £77,000 to the project. In addition, Natural England provided £83,800 for the third year of the National Hedgehog Monitoring Programme. This is a pioneering pilot project, led by BHPS and the People's Trust for Endangered Species, which will for the first time enable robust estimates and trends of hedgehog populations nationally. London HogWatch was also awarded over £13,000 by the City of London's Green Spaces fund. This project is assessing the population trends and connectivity of London's largest hedgehog population (Hampstead Heath), as well as conducting significant public engagement. In parallel, London HogWatch has continued to work with ZSL's Monitoring and Technology Team, based in the Conservation and Policy directorate, on their partnership with Network Rail. This year London HogWatch received £40,000 to help Network Rail create monitoring protocols to robustly measure biodiversity impact and trends over time. Finally, London HogWatch is collaborating with ZSL's Horticulture Team and The Royal Parks in a hedgehog translocation project for Regent's Park.

Appendix A. Institute of Zoology Publications

(1 September 2024 to 31 August 2025)

Journal articles

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