

In our hands:

The British and UKOT species that Large Charitable Zoos & Aquariums are holding back from extinction (AICHI target 12)

We are:

Clifton & West of England Zoological Society (Bristol Zoo, Wild Places) est. 1835

Durrell Wildlife Conservation Trust (Jersey Zoo) est. 1963

East Midland Zoological Society (Twycross Zoo) est. 1963

Marwell Wildlife (Marwell Zoo) est. 1972

North of England Zoological Society (Chester Zoo) est. 1931

Royal Zoological Society of Scotland (Edinburgh Zoo, Highland Wildlife Park) est. 1913

The Deep est. 2002

Wild Planet Trust (Paignton Zoo, Living Coasts, Newquay Zoo) est. 1923

Zoological Society of London (ZSL London Zoo, ZSL Whipsnade Zoo) est. 1826





1. Wildcat 2. Great sundew 3. Mountain chicken 4. Red-billed cough 5. Large heath butterfly 6. Bermuda skink
 7. Corncrake 8. Strapwort 9. Sand lizard 10. Llangollen whitebeam 11. White-clawed crayfish 12. Agile frog
 13. Field cricket 14. Greater Bermuda snail 15. Pine hoverfly 16. Hazel dormouse 17. Maiden pink
 18. Chagos brain coral 19. European eel

Executive Summary:

There are at least **76 species** native to the UK, Crown Dependencies, and British Overseas Territories which **Large Charitable Zoos & Aquariums** are restoring. Of these:

There are **20 animal species in the UK & Crown Dependencies which would face significant declines or extinction on a global, national, or local scale without the action of our Zoos.**

There are a further **9 animal species in the British Overseas Territories** which would face significant declines or extinction without the action of our Zoos. These species are all listed as threatened on the IUCN Red List.

There are **at least 19 UK animal species** where the expertise of our Zoological Institutions is being used to assist with species recovery.

Our Institutions are also **assisting with the recovery of at least 28 plant species.**

We also have **12 nature reserves and protected areas** in our care, which are home to many species of conservation concern.

Our institutions are **highly collaborative**. We use the **world-class expertise** that we gain from working with species on the brink, to deliver conservation through **long-term partnerships** with other environmental charities and government agencies. **Large Charitable Zoos & Aquariums also contribute to the restoration of species in many other ways: to the conservation of international species, to policy, to scientific research and education.** Some examples are given here and many other examples of this are given in the sister paper: Societal Value of Britain's Large Charitable Zoos & Aquariums: The Case for Support, May 2020.

In May 2020, during the global COVID-19 Pandemic, the case for the societal value of Britain's Large Charitable Zoos & Aquariums was made in a paper to DEFRA¹.

Britain's Large, Charitable Zoos and Aquariums are conservation powerhouses and are assisting with the recovery of many threatened species.

This paper examines, in more detail, the British and UK Overseas Territories species that the Large Charitable Zoos & Aquariums are holding back from extinction, on a global, national, or local scale and the wild spaces that we are protecting. The action detailed here delivers specifically on CBD AICHI target 12 *"By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained"*. Within the UK, progress has been made towards this target but at an insufficient rate².

One of the key roles that Zoos and Aquariums perform, is managing populations of threatened species in captivity (ex-situ) for return to the wild. There is a recognition within the DEFRA 25 Year Environment Plan³ that providing opportunities for the recovery and reintroduction of native species is critical. Reintroduction (and more generally translocation) is recognised as a key recovery tool in the recent IPBES report⁴ and by the Scottish Government through The Scottish Code for Conservation Translocations⁵. **The process of returning species to the wild may seem straight forward, but it is not.** Many returns of species to the wild fail⁶. Those that succeed have generally involved long-term collaborative, multidisciplinary efforts involving specialised knowledge: from animal care to ecological monitoring, from social science to genetics, from veterinary risk assessment to population modelling. The Zoo community have been instrumental in establishing this knowledgebase and in developing international standards⁷. We have already played a pivotal part in the restoration of iconic species such as the beaver, pine marten, and white stork to the British countryside. From this work with species on the brink of extinction, we have also been able to develop world-class expertise to assist with a much broader suite of conservation and environmental projects involving the protection & recovery of species in the wild, habitat restoration, removal of invasive species, environmental campaigning, science and education¹.

Through their work on UK wildlife, our Zoos and Aquariums are also playing key roles in other aspects of the DEFRA 25 Year Environment Plan through their contributions to eradicating invasive alien species, to developing green infrastructure in urban areas, and to helping children and young people from all backgrounds to engage with nature and improve the environment. Some examples of this are given in the section on cross-cutting work at the end of this paper.

¹ Societal Value of Britain's Large Charitable Zoos & Aquariums: The Case for Support, May 2020 made by Bristol Zoological Society, Chester Zoo, The Deep, Durrell, Marwell Wildlife, The Royal Zoological Society of Scotland, Twycross Zoo, Wild Planet Trust, ZSL and BIAZA

² CBD Sixth National Report - United Kingdom of Great Britain and Northern Ireland (English version) January 2019

³ A Green Future: Our 25 Year Plan to Improve the Environment

<https://www.gov.uk/government/publications/25-year-environment-plan>

⁴ IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

<https://ipbes.net/global-assessment>

⁵ <https://www.nature.scot/scottish-code-conservation-translocations>

⁶ Johnson et al 2019, Conservation translocations and post-release monitoring: Identifying trends (...), BIOLOGICAL CONSERVATION Volume 238, 108239

<https://www.sciencedirect.com/science/article/abs/pii/S0006320719308754?via%3Dihub>

⁷ <https://www.iucn.org/content/saving-species-translocation-new-iucn-guidelines>

Species in our hands

There are **20 animal species in the UK & Crown Dependencies which would face significant declines or extinction on a global, national, or local scale without the action of our Zoos (Table 1).**

Table 1: The 20 species in the UK & Crown Dependencies which would face significant declines or extinction on a global, national, or local scale without our action:

Species name	Scale	Organisation	UK BAP Priority	Other status info	IUCN Red List category	Phase of restoration 1=Early 2=Ongoing 3=Monitoring post delivery
Corncrake	England	ZSL	YES		LC	3
Pied flycatchers	Dartmoor National Park	WPT	NO	RED (UK BTO)	LC	2
Red-billed chough	Jersey (and Kent)	Durrell	NA	Threatened on Jersey	LC	2
White stork	England	Durrell	NO	Extinct former native to British Isles	LC	1
European eel	Thames catchment	ZSL	YES		CR	2
Smelt	Thames catchment	ZSL	YES		LC	2
Sturgeon	England	ZSL	YES		CR	1
Field cricket	England	ZSL	YES		LC	3
Large heath butterfly	Lancashire	CZ	YES		VU	2
Native oyster	England	ZSL	YES		Not Assessed	2
Pine hoverfly	Scotland	RZSS	YES		Not Assessed	2
Pond mud snail	Scotland	RZSS	YES		NT	2
Wart-biter bush-cricket	England	ZSL	YES		LC	2
White-clawed crayfish	England	BZ (WPT)	YES		EN	2
Eurasian Beaver	Scotland (UK)	RZSS	NO	Extinct former native now with EPS status	LC	3
Hazel dormouse	Wales/ England	CZ (WPT, ZSL)	YES		LC	2
Pine marten	Wales	CZ (ZSL)	YES		LC	3
Wildcat	Scotland (UK)	RZSS (CZ, Durrell)	YES		LC	2
Agile frog	Jersey	Durrell	NA	Threatened on Jersey, only population of species in Britain	LC	2
Sand lizard	England	MW (ZSL)	YES		LC	2

Further details of the action for each species can be found in the Appendix 1; BZ=Bristol Zoo, CZ=Chester Zoo, Durrell =Jersey Zoo, MW= Marwell Wildlife, TZ= Twycross Zoo, RZSS= Royal Zoological Society of Scotland, WPT= Wild Planet Trust, ZSL= Zoological Society of London

This includes species as diverse as the wildcat, the agile frog, sand lizard, wart-biter bush-cricket, and white-clawed crayfish (further details of each species can be found in Appendix 1).

In some cases we are also restoring species which have been completely lost from the wild on the British Isles, such as the beaver, the first mammal species to be officially returned to the UK after ten years of work from The Royal Zoological Society of Scotland (RZSS) and Scottish Wildlife Trust in conjunction with government agencies. Projects are also being launched on white stork and sturgeon (**Table 1**).

The UK Overseas Territories are home to many globally threatened species and island endemics⁸. About 90 endemic species (i.e. those which occur nowhere else) occur in mainland Britain, compared with 3300 known so far in the UKOTs. Therefore, UKOTS have around 94% of known endemic species for which the UK is responsible under international conventions.

Table 2: 9 species in the British Overseas Territories which would face significant declines or extinction without our action:

Species name	Location	Organisation ¹	Red List category	Phase of restoration category 1=Early 2=Ongoing 3=Delivered
Gough bunting	Tristan da Cunha (Gough)	RZSS	CR	2
Gough moorhen	Tristan da Cunha (Gough)	RZSS	VU	2
Henderson rail	Pitcairn (Henderson Island)	RZSS	VU	3
Spiky yellow woodlouse	St Helena, Ascension and Tristan da Cunha	ZSL	CR	1
Mountain chicken (frog)	Montserrat	Durrell (ZSL, CZ)	CR	2
Chagos brain coral	BIOT	ZSL	EN	2
Greater Bermuda snail	Bermuda	CZ (ZSL)	CR	2
Lesser Bermuda snail	Bermuda	CZ (ZSL)	CR	2
Bermuda skink	Bermuda	CZ	CR	2

Further details of the action for each species can be found in Appendix 1; BZ= Bristol Zoo, CZ= Chester Zoo, Durrell= Jersey Zoo, MW= Marwell Wildlife, TZ= Twycross Zoo, RZSS= Royal Zoological Society of Scotland, WPT= Wild Planet Trust, ZSL= Zoological Society of London

There are **9 animal species in the British Overseas Territories** which would, or would have, faced significant declines or extinction without the action of our Zoos (**Table 2**). These species are all listed as threatened on the IUCN Red List. Durrell Wildlife Conservation Trust, ZSL, and Chester Zoo have worked together on a programme to recover the Critically Endangered mountain chicken frog which was eradicated from Montserrat and catastrophically declined on Dominica due to outbreaks of Chytridiomycosis. The species is now established back on Montserrat in an innovative experimental enclosure in its forest habitat as a pre-cursor to wild reintroduction (See Appendix 1 for more details). Projects on Greater and Lesser Bermuda snails and the Bermuda Skink (Chester Zoo) are also breeding critically endangered endemics on the brink of extinction. In some cases, captive holding operations have been set up by Zoo veterinarians (Royal Zoological Society of Scotland)

⁸ Churchyard et al 2016, The biodiversity of the United Kingdom's Overseas Territories: a stock take of species occurrence and assessment of key knowledge gaps *Biodivers Conserv* 25:1677–1694

temporarily on UKOT islands during rodent eradication projects. This is done to ensure survival of endemics which would otherwise be vulnerable to rodenticides e.g. in the case of the Henderson rail, Gough Moorhen and Gough Bunting.

Using our world class expertise to assist with species recovery

The captive management and recovery of many species both from the British Isles and around the world has built an extensive base of scientific and conservation management expertise within our organisations.

Table 3: The 19 additional UK animal species for which our expertise is being used to assist with species recovery					
Species name	Country name	Organisation	UK BAP Priority	Other status info	IUCN Red List category
Capercaillie	Scotland	RZSS	YES		LC
Girl bunting	England	ZSL	YES		LC
Hen harrier	England	ZSL	NO	UK BTO "RED"	LC
Red kite	England	ZSL	NO	NT-EU	NT
White-tailed sea eagle	England	ZSL	NO	UK BTO "RED"	LC
Flapper skate	Scotland	RZSS	YES		CR
Barberry carpet moth	England	CZ	YES		Not Assessed
Chequered skipper	England	ZSL	YES		LC
Fisher's estuarine moth	England	ZSL	NO	Protected	Not Assessed
Short-haired bumblebee	England	ZSL	YES		LC
Canna mouse	Isle of Canna Scotland	RZSS	No		LC
Grey seal	London	ZSL	NO	Protected	LC
Harbour seal	London	ZSL	YES		LC
Hedgehog	Urban locations England	ZSL, CZ	YES		LC
Water vole	UK	ZSL	YES		LC
Common European adder	England	ZSL	YES		LC
Natterjack toad	England	ZSL	YES		LC
Pool frog	England	ZSL	YES		LC
Smooth snake	England	ZSL	YES		LC

Further details of the action for each species can be found in Appendix 1; BZ= Bristol Zoo, CZ= Chester Zoo, Durrell= Jersey Zoo, MW= Marwell Wildlife, TZ= Twycross Zoo, RZSS= Royal Zoological Society of Scotland, WPT= Wild Planet Trust, ZSL= Zoological Society of London

Table 4: The 28 UK plant species which we are restoring

Species name	Scientific name	Country name	Organisation name	UK BAP Priority	BSBI Vascular Plant Red List for England	IUCN Red List category
Annual knawel	<i>Scleranthus annuus</i>	England	CZ	YES	EN	Not assessed
Ash	<i>Fraxinus excelsior</i>	UK	CZ	NO		NT
Black poplar	<i>Populus nigra</i>	England	CZ	NO		DD
Bog asphodel	<i>Narthecium ossifragum</i>	England	CZ	NO	LC	Not assessed
Bog rosemary	<i>Andromeda polifolia</i>	England	CZ	NO	NT	LC
Common gromwell	<i>Lithospermum officinale</i>	England	CZ	NO	LC	Not assessed
Dune wormwood	<i>Artemesia campestris ssp. maritima</i>	England	CZ	YES		Not assessed
Dyer's greenweed	<i>Genista tinctoria</i>	England	CZ	NO	VU	Not assessed
Floating clubrush	<i>Eleogiton fluitans</i>	England	CZ	NO	LC	LC
Floating water plantain	<i>Luronium natans</i>	UK	CZ	YES	NT	LC
Globeflower	<i>Trollius europaeus</i>	England	CZ	NO	LC	Not assessed
Grass-wrack pondweed	<i>Potamogeton compressus</i>	UK	CZ	YES	EN	DD
Great sundew	<i>Potamogeton compressus</i>	England	CZ	NO	EN	NT
Green-winged orchid	<i>Anacamptis morio</i>	England	CZ	NO	VU	NT
Heath cudweed	<i>Omalotheca sylvatica</i>	England	CZ	NO		Not assessed
Lesser skullcap	<i>Scutellaria minor</i>	England	CZ	NO	LC	Not assessed
Llangollen whitebeam	<i>Sorbus cuneifolia</i>	Wales	CZ	NO	EN	EN
Maiden pink	<i>Dianthus deltoides</i>	England	CZ	NO	VU	Not assessed
Marsh valerian	<i>Valeriana dioica</i>	England	CZ	NO	NT	LC
Melancholy thistle	<i>Cirsium heterophyllum</i>	England	CZ	NO	NT	Not assessed
Mountain everlasting	<i>Antennaria dioica</i>	England	CZ	NO	VU	LC
Oblig-leaved sundew	<i>Drosera intermedia</i>	England	CZ	NO	VU	NT
Petty whin	<i>Genista anglica</i>	England	CZ	NO	VU	EN
Seagrass	<i>various</i>	England	WPT			
Shepherd's cress	<i>Teesdalia nudicaulis</i>	England	CZ	NO	NT	Not assessed
Small cudweed	<i>Logfia minima</i>	England	CZ	NO		Not assessed
Strapwort	<i>Corrigiola litoralis</i>	England	WPT	YES	EN	LC
White-beaked sedge	<i>Rhynchospora alba</i>	England	CZ	NO	NT	LC

Further details of the action for each species can be found in Appendix 1; CZ=Chester Zoo, WPT= Wild Planet Trust

We use this to contribute to species recovery, be this through disease risk analysis and health surveillance, genetic analysis, ecological monitoring and live animal tracking, citizen science and more⁹. There are **at least an additional 19 UK animal species** where the expertise of our Zoological Institutions is being used to actively assist with species recovery in this way (**Table 3**).

Recovering plants and habitats

Whilst Zoos' focus may traditionally be thought of as being centred on the care of animals, the recovery methods used for plant and animal species share many parallels and, in fact, our Zoological Institutions are **assisting with the recovery of at least 28 plant species** in the UK. Chester Zoo is working in partnership with the North West Rare Plant Initiative and the Lancashire Wildlife Trust to reintroduce dozens of locally extinct wetland plants. Chester Zoo has also been at the centre of efforts to save endemic species such as the Llangollen Whitebeam (less than 300 wild specimens remaining) and restoring the black poplar, a nationally rare tree in Cheshire. The Wild Planet Trust is working in partnership with local organisations to assess and monitor the health and development of seagrass beds in Torbay and, through propagation and reintroduction, of Strapwort a waterside plant only found naturally at one site in the UK.

Table 5: The 12 UK & UKOT reserves in our care				
Reserve name	Extent of Area	Country name	Organisation	Designations
Twycross Zoo Nature Reserve	1.6 ha	England	TZ	
Dunstable and Whipsnade Downs SSSI	73 ha	England	ZSL	SSSI
Eelmoor Marsh SSSI	79 ha	England	MW	SSSI and SINC
Marwell Woods Nature Reserve	60 ha	England	MW	SINC
Chester Zoo Nature Reserve	6 ha	England	CZ	SINC
Primley woods and park	12 ha	England	WPT	
Clennon Gorge and Grassland	24 ha	England	WPT	
Slapton Ley	214 ha	England	WPT	SSSI and NNR
Hollywood Towers Estate	55 ha	England	BZ	SINC
Avon Gorge, Bristol	155.4 ha	England	BZ	SSSI
Highland Wildlife Park	105 ha	Scotland	RZSS	(within a NP)
British Indian Ocean Territory Marine PA	640,000 km ² , including 66,000 km ² of shallow coral reef, more than 80 seamounts, and 55 islands.	BIOT	ZSL	MPA

Further details of the action for each site can be found in Appendix 1; BZ= Bristol Zoo, CZ= Chester Zoo, Durrell = Jersey Zoo, MW= Marwell Wildlife, TZ= Twycross Zoo, WPT= Wild Planet Trust, ZSL= Zoological Society of London, RZSS= Edinburgh Zoo & Highland Wildlife Park

⁹ Some examples of specialist units contributing to UK & UKOT biodiversity restoration: <https://www.rzss.org.uk/conservation/research/rzss-wildgenes/> ; <https://www.zsl.org/science/wildlife-health/disease-risk-analysis-and-health-surveillance> ;

Many zoos are leading on habitat restoration in their local areas and there are **11 UK & UKOT reserves in our care (Table 5)**. Marwell Wildlife restores and manages tracts of heathland, calcareous grassland and seminatural woodland in Hampshire, including Eelmoor Marsh Site of Special Scientific Interest which has become a refuge for over 400 species of conservation concern following successful interventions.

ZSL's coordination of the Great British Oceans campaign to conserve the seas of the UK Overseas Territories led to a total of 3,598,000km² coming under legal protection. ZSL now coordinates a multi-year partnership involving 60 marine scientists focussed on high priority species such as sharks and turtles, as well as studying coral reef regeneration and resilience to change. This research feeds directly into the management and preservation of the BIOT marine, which is one of the last great ocean wilderness areas. It should also be noted that much of our international work has a habitat as well as a species focus, since it is rarely possible to recover a species without a holistic approach.

Examples of cross-cutting contributions to British and UKOT conservation

The Deep have contributed to **IUCN Red List assessment** of over 500 aquatic species. This critical work identifies the status of each species and informs conservation decision making at a global scale. This data is then published on the IUCN Red List of Threatened Species¹⁰. Other Zoos host IUCN specialist groups relevant to UK taxa (e.g. Butterflies, Galliformes, & Eels), these groups are responsible for red-listing and strategic coordination of conservation effort for the relevant taxa on a global scale.

The #OneLess campaign led by ZSL to **reduce plastic pollution** in the ocean by targeting single-use plastic bottles, has now reached more than 18 million people. #OneLess Pioneer Network members have installed 335 drinking fountains across the UK, effectively removing 4.3 million single-use plastic water bottles from circulation, along with six million other disposable plastic items such as straws and sachets. ZSL has driven installation of 29 publicly available water fountains in London to date, which have dispensed water equivalent to 736,087 bottles of water. This model has been adopted by public and private sector bodies and major events organisers in the UK and is now being replicated in other cities worldwide.

Britain's large Zoos are collaborating extensively with each other and with academic institutions to develop valuable data banks as a resource for future research. For example, the **biobanking** project which, in conjunction with the UK Zoo community (led via RZSS through BIAZA & the EAZA biobank, in collaboration with ZSL, Chester Zoo and others), aims to provide a biobanking resource for academic research and conservation. This biobank will assist the UK biosciences community in improving the implementation of the Nagoya Protocol on Access to Genetic Resources under the Convention on Biological Biodiversity (CBD) Aichi target 16.

Bristol Zoological Society are a leading partner on the RAPID LIFE EU funded project entitled, "*Holistic management of **Invasive Alien Species (IAS)** in freshwater aquatic, riparian and coastal ecosystems*". This project delivers a package of measures to reduce the impact and spread of IAS in freshwater aquatic, riparian and coastal environments across England.

Chester Zoo's Wildlife Connections campaign **encourages people to take action to help local wildlife** and create habitat corridors through urban and suburban areas. The Zoo created a network of safe spaces for wildlife across its region by working with community groups to improve green spaces for nature. They trained 150 'Wildlife Champions' giving them skills and knowledge to lead their

¹⁰ <https://www.iucnredlist.org/>

communities to take action for UK wildlife, delivered 'Masterclasses' focussing on a particular topic or species, and introduced 'Wild Networking' to bring together community groups and conservation organisations. They also created a number of 'Wildlife Communities' in deprived areas of Chester and engaged with their local authority to encourage wildlife in local parks. As part of the project they have hosted four Wildlife Connections Festivals on the Zoo nature reserve which were attended by over 10,000 people. The project has engaged over 100 schools in repeat engagement projects reaching over 5,500 pupils and has created a host of online resources.

ZSL runs a Garden Wildlife Health project: a combined **citizen science** and research programme in which people report sick or dead wildlife and contribute samples with the objective to monitor trends and investigate emerging threats to garden wildlife health.

All our organisations are highly active in educating our visitors and the general public about native species conservation¹.

Our Zoos' are also extremely active in the realms of international species & habitats focused conservation, capacity building, research, training, science, campaigning, and behaviour change. Further details can be found in the sister paper to this paper: Societal Value of Britain's Large Charitable Zoos & Aquariums: The Case for Support, May 2020.

Appendix 1: A dictionary of the species and sites listed in Tables 1-5 with brief details about the action taken and the likely outcome if our conservation support to the species were to be withdrawn (S-withdrawn):

A

Agile frog, *Rana dalmatina*, Amphibian, Jersey, Durrell, Head-starting at Jersey Zoo, releases, population monitoring, research, programme strategy. S-withdrawn: Recovery of species on Jersey would stall with likely population declines.

Annual knawel, *Scleranthus annuus*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England, S-withdrawn: Local extinction.

Ash, *Fraxinus excelsior*, Plant, UK, Chester Zoo, Provides supervision for a PhD project based at the University of Salford to determine management strategies to control ash dieback disease through molecular and environmental interactions. Project collaborators include DEFRA, The Woodland Trust, Natural England, Scottish Natural Heritage. S-withdrawn: Ash dieback disease will continue to devastate ash populations in the UK.

Avon Gorge, Bristol, UK, Bristol Zoological Society, Delivers a programme of silky wave moth and habitat surveys annually, which helps to inform both the National Trust and Bristol City Council on the appropriate winter habitat management works for the site. This is a long-term project that BZS has been running and it is an important part of the Avon Gorge management because this is the only site in England where the silky wave is found. For the past 20 years, BZS has employed an Avon Gorge Biodiversity Education Officer who runs a programme of public events to inspire people and to give them a better understanding of this unique green space that lies within 5 miles of a city centre. SSSI, The survey programme has been funded by BZS for the past 10 years. S-withdrawn: There is no funding available for this work and therefore the project would have to stop and there would be no future management plan for the conservation of the silky wave. BZS also funds the biodiversity officer who is the key person responsible to run the conservation education programme for the Avon Gorge. If this job was lost then a key communication element would end.

B

Barberry carpet moth, *Pareulype berberata*, Invertebrate, England, Chester Zoo, Propagation of food plant (barberry) and supply to conservation partners for planting along habitat corridors for the moth.

Bermuda skink, *Plestiodon longirostris*, Reptile, Bermuda, Chester Zoo, Conservation breeding, research on biology and ecology, identification of remaining sites. S-withdrawn: Extinction likely in the wild. Captive insurance populations would not exist.

Black poplar, *Populus nigra*, Plant, England, Chester Zoo, One of the most declining trees in the UK. Working with rECOrd to monitor all remaining trees in Cheshire. Genetic testing to identify different clones, Propagation from identified clones of both sexes, providing new trees for replanting in Cheshire to increase the currently aging population of about 370 trees, S-withdrawn: Further decline of population in north-west England.

Bog asphodel, *Narthecium ossifragum*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Bog rosemary, *Andromeda polifolia*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

British Indian Ocean Territory Marine PA, 640,000 km², including 66,000 km² of shallow coral reef, more than 80 seamounts, and 55 islands., UKOT, Zoological Society of London, ZSL coordinated NGO campaigning to get this reserve established in 2010 and has conducted considerable research there to inform management and protection. We are currently managing a four-year, multi-organisation, multi-million-dollar programme of marine science there aimed at continuing the flow of information and recommendations. The programme has effectively de-ratted at least one island, enabling seabirds to breed without rat predation on eggs. We are also working to reduce ocean plastic pollution there with local beach cleans and outreach, The whole MPA is a strict no-take reserve (except 3km round Diego Garcia) and contains 10 Important Bird Areas covering 15% of the land area. Most of Diego Garcia is managed under the provisions of RAMSAR. S-withdrawn: Decline in quality and effectiveness of reserve management. Loss of data from reference site for comparison with more exploited sites across the Indian Ocean.

C

Canna mouse, *Apodemus sylvaticus*, Mammal, Isle of Canna Scotland, Royal Zoological Society of Scotland, Lead for the captive care of the Canna mouse during the rat eradication project led by the NTS in 2008. The Canna mouse is a population of distinctive, large field mice (*Apodemus sylvaticus*), Severe decline of mouse during bait drop without ex-situ intervention. S-withdrawn: Project completed successfully.

Common European adder, *Vipera berus*, Reptile, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. S-withdrawn: Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Common gromwell, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Capercaillie, *Tetrao urogallus*, Bird, Scotland, Royal Zoological Society of Scotland, RZSS contracted in 2019/20 to assist CNPA with genetic monitoring. RZSS also working on ex-situ husbandry to build a better knowledge base to support future releases, S-withdrawn: Loss of Knowledge.

Chagos brain coral, *Ctenella chagius*, Invertebrate, BIOT, Zoological Society of London, ZSL is coordinating a four-year, multi-organisation, multi-million-dollar programme of marine science in BIOT to inform reserve management and protection. We are also working to reduce ocean plastic pollution there with local beach cleans and outreach, (ultimately the whole BIOT species assembly, but the brain coral is a focal point). S-withdrawn: Decline in reserve management effectiveness. Loss of knowledge on status of the Chagos brain coral, which was severely impacted by first the 1998 and then the 2015-16 warming events and has only been seen in small areas since.

Chequered skipper, *Carterocephalus palaemon*, Invertebrate, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Chester Zoo Nature Reserve, 6-ha, UK, Chester Zoo, Chester Zoo owns and manages this land and has created a 3-ha wildflower meadow from a previous monoculture field of perennial ryegrass through scraping and seeding with locally provenanced wildflower seed. The meadow is the 91st Coronation meadow under the scheme launched by Prince Charles to restore wildflower meadows with locally sourced seed and use these to provide seed sources for other restorations in the local area. The reserve also includes restored and created wetlands in the form of ponds and reedbeds. Harvest mice have been reintroduced to the area. Part of the reserve is a designated Site of Importance for Nature Conservation (SINC) and forms part of a habitat corridor along the Shropshire Union canal between Chester and Ellesmere Port. Habitat restoration at the reserve was funded by WREN and the Zoo uses it extensively for wildlife education and engagement with school and community groups. SINC. S-withdrawn: The site would become neglected and its biodiversity value would reduce. The benefits to the local community and to local schools would be lost.

Cirl bunting, *Emberiza cirlus*, Bird, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. S-withdrawn: Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Clennon Gorge and Grassland, 24 ha, UK, Wild Planet Trust, Clennon Gorge and Grassland is owned and managed by the Wild Planet Trust. The area comprises a gorge and ephemeral stream within the urban Torbay area providing a habitat for a number of native species. It also includes a chalk grassland which is maintained and managed for chalk loving species. S-withdrawn: The site would likely be turned to development as there is increasing build in this area. The benefits to the local community would be lost.

Corncrake, *Crex crex*, Bird, England, Zoological Society of London, Over 1,000 birds bred at Whipsnade released in Nene Washes in the past. Current involvement continues via advice on disease risk and health surveillance (DRAHS). S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

D

Dune wormwood, *Artemisia campestris ssp. maritima*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Dunstable and Whipsnade Downs SSSI, 73 ha, UK, Zoological Society of London, This lies within Whipsnade Zoo's grounds, some of it is the White Lion area, and ZSL manage it in consultation with Natural England. ZSL lead on the Management Plan; ZSL write it and Defra edit/approve. S-withdrawn: If ZSL vacated the site, an agency with less concern for wildlife conservation might become the owner/manager with consequent decline in species diversity on it.

Dyer's greenweed, *Genista tinctoria*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

E

Eelmoor Marsh SSSI, 79 ha, UK, Marwell Wildlife, Marwell manages Eelmoor Marsh on behalf of landowner QinetiQ as part of a long-term conservation partnership. Grazing management using Przewalski's horses and highland cattle was established in 1995, which together with mechanical restoration has seen remarkable improvements to habitats, botanical diversity, and populations of notable species. SSSI and SINC. S-withdrawn: Removal of grazing management and neglect of the site will lead to deterioration in currently favourable status of habitats and populations of notable species. The loss of 25 years of accumulated site knowledge and successful managerial continuity would be difficult to replace.

European eel, *Anguilla anguilla*, Fish, England, Zoological Society of London. ZSL have so far opened up 231 km of river in the Thames catchment area to eel migration via installation of eel passes, and are monitoring elver numbers in the region. ZSL are also very active in international policy and legislation for this species, including liaison with the fishing industry. ZSL chair the IUCN SSC Anguillid eel specialist group and host the Thames Eel Management Plan. S-withdrawn: Loss of knowledge about eel return to and use of rivers in the Thames catchment. Possible adverse impact on eel status over time both in the Thames system and generally due to loss of input into relevant international legislation and policy.

Eurasian beaver, *Castor fiber*, Mammal, Scotland, Royal Zoological Society of Scotland, Over the last ten years RZSS has led the return of this species to Scotland (& the UK) in conjunction with the Scottish Wildlife Trust, through the implementation of the Scottish Beaver Trial. The species is now successfully established, however

RZSS are heavily involved in providing health and population management advice across the UK. S-withdrawn: Loss of expertise to assist with future management.

F

Flapper skate, *Dipturus batis* (intermedia), Fish, Scotland, Royal Zoological Society of Scotland, RZSS is assisting the University of St Andrews and SNH with the implantation of tracking devices into this critically endangered species, so that population monitoring can happen more effectively, and high standards of animal welfare are maintained. S-withdrawn: Less effective monitoring (with respect to data gathering and animal welfare).

Field cricket, *Gryllus campestris*, Invertebrate, England, Zoological Society of London, Conservation breeding and reintroduction leading to successful re-establishment of this species at sites in southern England. S-withdrawn: Loss of monitoring of re-established populations and relevant knowledge.

Fisher's estuarine moth, *Gortyna borelii*, Invertebrate, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. S-withdrawn: Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Floating clubrush, *Eleogiton fluitans*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Floating water plantain, *Luronium natans*, Plant, UK, Chester Zoo, Propagation and reintroduction.

G

Globeflower, *Trollius europaeus*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Gough bunting, *Rowettia goughensis*, Bird, Tristan da Cunha (Gough), Royal Zoological Society of Scotland, Veterinary lead for the Gough island mouse eradication (scheduled 2020 but aborted due to Covid-19, now 2021). On island veterinary lead during bait drop to eradicate mice. To protect the bunting, they will be taken in captivity for the period of the operation. Disease risk assessments. S-withdrawn: Severe decline, extinction.

Gough moorhen, *Gallinula comeri*, Bird, Tristan da Cunha (Gough), Royal Zoological Society of Scotland Veterinary lead for the Gough island mouse eradication (scheduled 2020 but aborted due to Covid-19, now 2021). On island veterinary lead during bait drop to eradicate mice. To protect the moorhen, they will be taken in captivity for the period of the operation. Disease risk assessments. S-withdrawn: Severe decline, extinction.

Grass-wrack pondweed, *Potamogeton compressus*, Plant, UK, Chester Zoo, Propagation and reintroduction

Greater Bermuda snail, *Poecilozonites bermudensis*, Invertebrate, Bermuda, Chester Zoo (With ZSL). Leading conservation breeding and reintroduction efforts. S-withdrawn: This reintroduction is at a crucial stage. If halted there is a chance that the species would decline to extinction due to lack of management and there would be no captive population from which to replenish.

Great sundew, *Potamogeton compressus*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. Recent reintroduction into restored peatland sites in Cheshire. S-withdrawn: Local extinction.

Green-winged orchid, *Anacamptis morio*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Grey seal, *Halichoerus grypus*, Mammal, England, Zoological Society of London. Monitoring programme in the Thames estuary, including a citizen science component to generate local support. Policy advice to relevant infrastructure management agencies. S-withdrawn: Loss of knowledge on seal status and breeding. Decline in public interest in and support for seals in the Thames. Loss of conservation inputs to policy decisions by infrastructure agencies.

H

Harbour seal, *Phoca vitulina*, Mammal, England, Zoological Society of London. Monitoring programme in the Thames estuary, including a citizen science component to generate local support. Policy advice to relevant infrastructure management agencies. S-withdrawn: Loss of knowledge on seal status and breeding. Decline in public interest in and support for seals in the Thames. Loss of conservation inputs to policy decisions by infrastructure agencies.

Hazel dormouse, *Muscardinus avellanarius*, Mammal, Wales/ England, Chester Zoo, Wild Planet Trust, ZSL, CZ- Population monitoring at local site in north Wales. WPT- Some breeding of stock for release, use of vet expertise for quarantine and health checks before release, ZSL- is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: CZ- Loss of monitoring would remove the ability to determine impacts of management on population which risks actions that contribute to a decline in this important population of the species. WPT/ZSL- Decline in quality of Health risk Management.

Heath cudweed, *Omalotheca sylvatica*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Hedgehog, *Erinaceus europaeus*, Mammal, England, Zoological Society of London and Chester Zoo (leading separate projects) ZSL- Monitoring and protection of local Regent's Park hedgehog population. Wider London monitoring programme using camera traps in people's gardens. CZ- Local citizen science project to determine population status, use of gardens and effectiveness of conservation interventions. S-withdrawn: ZSL- Loss of knowledge on status of London hedgehog populations, CZ- Absence of knowledge on hedgehog ecology and population status along an urban-rural gradient in north west England.

Hen harrier, *Circus cyaneus*, Bird, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Highland Wildlife Park, 105 ha, Scotland, Royal Zoological Society of Scotland, RZSS manages the Highland Wildlife Park which is situated in the Cairngorms National Park. The park is home to over 500 wild species and RZSS is in the final stages of establishing a Conservation Action Plan for the Biodiversity and Ecosystems of the Highland Wildlife Park 2020-25. S-withdrawn: loss of momentum on BAP implementation.

Hollywood Towers Estate, 55 ha, UK, Bristol Zoological Society, BZS owns and manages the Hollywood Towers Estate on the edge of Bristol. This site has several key habitats including ancient woodland, wetlands, meadow edges and hedgerows along with a Grade 2 listed mansion and associated buildings. BZS has a woodland management strategy in place to restore the ancient woodland from a sycamore plantation and is delivering a large-scale wetland restoration project to improve and increase the aquatic habitats for the resident great crested newts and the 14 bat species that utilise this site. This is an important wildlife corridor that links other greenbelts in the area and has several protected and rare species on site. The habitat restoration is part of a long-term native species strategy to ensure that we maximise and conserve the native biodiversity.

L

Large heath butterfly, *Coenonympha tullia*, Invertebrate, England, Chester Zoo, Project with Lancashire Wildlife Trust to reintroduce populations in restored peatlands of Lancashire where they have been extinct for over 100 years. Head starting at Chester Zoo from small number of gravid females taken from healthy

population in wild. Next generation of chrysalis/adults placed in suitable habitat in sites where they are absent. S-withdrawn: Local extinction would continue.

Lesser Bermuda snail, *Poecilozonites circumfirmatus*, Invertebrate, Bermuda, Chester Zoo (With ZSL) Leading conservation breeding and reintroduction efforts. S-withdrawn: This reintroduction is at a crucial stage. If halted there is a chance that the species would decline to extinction due to lack of management and there would be no captive population from which to replenish.

Lesser skullcap, *Scutellaria minor*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Llangollen whitebeam, *Sorbus cuneifolia*, Plant, Wales, Chester Zoo, Propagating the Llangollen whitebeam seeds collected in 2014 as part of the Millennium Seed Bank UK National Tree Seed Project (UKNTSP). This species is the first UK tree for which seeds have been released through the UKNTSP for a conservation project. This project aims to propagate new trees at Chester Zoo, and make them available to botanical collections and local gardens. Surveying the population on the Eglwyseg to clarify the conservation status of the endemic, endangered species using drone mounted aerial photography to survey inaccessible cliffs. Restoring the species to Castell Dinas Bran where the first tree recognised as a distinct species was found in the 1950s. S-withdrawn: With less than 300 wild specimens, mostly old, this species is at risk of becoming functionally extinct in time.

M

Maiden pink, *Dianthus deltoides*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Marsh valerian, *Valeriana dioica*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Marwell Woods Nature Reserve, 60 ha, UK, Marwell Wildlife, MW owns and manages this tract of semi-natural ancient woodland and calcareous grassland. Much of the area was formerly degraded because of neglect, historical planting of conifers over ancient woodland and the use of fertiliser and herbicides for hay production. Further restoration is ongoing, but the area is now a good example of multifunctional, sustainable land use which has been enhanced for local biodiversity while yielding hay and woodland products.

Melancholy thistle, *Cirsium heterophyllum*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Mountain chicken, *Leptodactylus fallax*, Amphibian, Montserrat, Durrell (with ZSL, Chester Zoo) Lead programme strategy, captive breeding and reintroductions, public outreach, training government staff, research. Durrell staff at field site. S-withdrawn: Species only exists in Montserrat in field-based experimental enclosure. Therefore, ceasing conservation results in species going extinct on Montserrat with no animals available for future releases, either in Montserrat or Dominica.

Mountain everlasting, *Antennaria dioica*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

N

Native oyster, *Ostrea edulis*, Invert, England, Zoological Society of London, Re-establishment of native oyster colonies in one UK location so far with funding just obtained for three more including Scotland and Wales.

Work is being done in collaboration with the fishing industry. 36,500 individuals (spat) 'released' to date. S-withdrawn: Re-establishment programme at these sites would stop.

Natterjack toad, *Epidalea calamita*, Amphibian, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. S-withdrawn: Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

O

Obling-leaved sundew, *Drosera intermedia*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

P

Petty whin, *Genista anglica*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Pied flycatchers, *Ficedula hypoleuca*, Bird, England, Wild Planet Trust, Including the provision and monitoring of nest boxes within designated areas of Dartmoor National Park. S-withdrawn: Continued decline in local numbers.

Pine hoverfly, *Blera fallax*, Invertebrate, Scotland, Royal Zoological Society of Scotland, Leading Ex-situ breeding effort for this species on behalf of the Pine Hoverfly Steering Group. S-withdrawn: Pine hoverfly have not been seen in the wild for over 7 years, it is likely that without ex-situ intervention this species will go extinct in the UK.

Pine marten, *Martes martes*, Mammal, Wales, Chester Zoo & ZSL, Chester Zoo is working in partnership with the Vincent Wildlife Trust to restore pine marten populations in mid/north Wales by providing funding and technical support for translocation procedures, helping to build release enclosures and partly funding a PhD into the social dimensions of the project which include building local community support and using the species to encourage tourism. S-withdrawn: Reinforcement measures have finished for the time being and the species is slowly becoming established but cessation of the project at this stage could prevent the population from growing and lead to antagonism and lack of support from local people which is crucial for its success.

Pool frog, *Pelophylax lessonae*, Amphibian, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Pond mud Snail, *Omphiscola glabra*, Invertebrate, Scotland, Royal Zoological Society of Scotland, RZSS is leading on the captive breeding effort for this species in Scotland, conducting the first ever release of the species to the Pentland Red Moss in 2018 in partnership with Buglife. RZSS now holds the only captive breeding population in Scotland at Edinburgh Zoo. S-withdrawn: Continued population decline and possible localised extinction. Species only known from a handful of sites.

Primley woods and park, 12 ha, UK, Wild Planet Trust, Wild Planet Trust owns and manages Primley woods and park. This was previously land used for grazing and the management has concentrated heavily on the removal of enriched grasses and a return to native meadow species. Student research has been undertaken on the management techniques. As this was previously parkland attached to a private residence there are a number of unusual tree species within the grounds (e.g. luccombe oak and western redwood). The park is made available as public open space and is used for Forest Schools, Bio Blitzes etc. It is also managed as a hay meadow.

R

Red-billed chough, *Pyrhcorax pyrrhcorax*, Bird, Jersey, Durrell, Lead programme strategy, captive breeding and reintroductions, public outreach, post-release monitoring, wild population management, research. Durrell staff at field site. Durrell is also providing advice on the captive breeding programme at Paradise Park and giving strategic and technical support to the Kent chough reintroduction project. S-withdrawn: Re-establishment of species on Jersey would stall due to no further releases, no wild population management, no monitoring. Reintroduced population of 50 birds on Jersey likely to decline. Kent reintroduction project won't be able to benefit from 10 years of experience in Jersey and will have reduced chance of success.

Red kite, *Milvus milvus*, Bird, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

S

Sand lizard, *Lacerta agilis*, Reptile, England, Marwell Wildlife (Major), ZSL (Minor) Marwell- Captive breeding, reintroduction and research leading to successful re-establishment of sand lizards at 27 locations across the South of England over 3 decades. ZSL- ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Loss of largest captive breeding and rehabilitation centre for rescued sand lizards, and offspring for reintroduction.

Seagrass, various species, Plant, England, Wild Planet Trust, Leading partners within the TorBay area, assisted in the development of TorBay Marine Conservation Zone, Coordinating monitoring using dive volunteers (social engagement). Leading on local changes to implementation of new developments such as Eco-moorings, S-withdrawn: Reduction of capacity of local group to operate. Removal of volunteer structure for dive monitoring, reduction in quality of seagrass beds around the TorBay area as there would be less restriction on use by marine operators (leisure users and small businesses e.g. mussel fisheries etc).

Shepherd's Cress, *Teesdalia nudicaulis*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Short-haired bumblebee, *Bombus subterraneus*, Invertebrate, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions, S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Slapton Ley, 214 ha , UK, Wild Planet Trust, Wild Planet Trust owns Slapton Ley, the largest natural freshwater lake in the southwest of England. Wild Planet Trust work in partnership with the Field Studies Council (FSC) to develop and implement a management plan for the Ley and the surrounding woodland, and also the development of the site for teaching under the auspices of the FSC. The management of this site includes the restoration of wetland and bog areas surrounding the Ley itself. Partnerships have been established with surrounding landowners (agricultural land) to control the use of pesticides and fertilizers ensuring that the Ley is protected and the community engagement / value for the site is locally high. Wild Planet Trust are key members of the Slapton Ley Line which deals, among other things, with the presence of the road across the shingle ridge at the mouth of the Ley. The Ley was originally purchased in 1925 by Herbert Whitley, the founder of Paignton Zoo and the originator of the Trust. The purchase was made to protect the land and establish the reserve for public education, the same tenet he used for the establishment of Paignton Zoo. SSSI and NNR. S-withdrawn: Sale of a National Nature Reserve. The site runs the risk of becoming degraded and without the partnerships with surrounding landowners, increased agricultural run-off would damage the wetland habitats. The presence of the road could also prevent the natural movement of the shingle ridge leading to the loss of this site entirely without effective management

Small Cudweed, *Logfia minima*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

Smelt, *Osmerus eperlanus*, Fish, England, Zoological Society of London, Monitoring programme in the Thames estuary, including a citizen science component to generate local support. Programme to improve water quality in the Thames catchment via citizen science 'outfall safaris' which report polluted outfalls and have so far leveraged perhaps £100 million in remedial action from the relevant agencies. S-withdrawn: Loss of knowledge on smelt. Decline in public interest in and support for Thames conservation generally. Loss of improvements programme for water quality from outfall safari work.

Smooth snake, *Coronella austriaca*, Reptile, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Strapwort, *Corrigiola litoralis*, Plant, England, Wild Planet Trust, Propagation and reintroduction of strapwort to sites within the South West, S-withdrawn: loss of this species from the UK.

Sturgeon, *Acipenser sturio*, Fish, England, Zoological Society of London, ZSL has just co-founded the UK Sturgeon Restoration Alliance, which aims to restore the native sturgeon to our rivers. We are currently generating evidence of historic use, prioritising river systems, identifying threats, and planning the road to recovery. S-withdrawn: Possible collapse or weakening of the UK Sturgeon Restoration Alliance.

T

Twycross Zoo Nature Reserve, 1.6 ha, UK, Twycross Zoo, Opened in May 2012 this nature reserve restored an inland wetland habitat which had mostly disappeared from the Midlands due to agricultural and landscape management. The habitats of the 19 ponds form a natural chain with plant communities ranging from reedbeds to marshes to open water, providing vital habitat to over 400 species, including at least 20 BAP species. Twycross Zoo owns and manages the area, which is free to enter for visitors, as well as carries out habitat surveys. S-withdrawn: Decline in nationally and internationally protected species.

W

Water vole, *Arvicola amphibius*, Mammal, UK, Zoological Society of London, Royal Zoological Society of Scotland, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. RZSS has helped with disease screening for a number of reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Wildcat, *Felis silvestris*, Mammal, Scotland, Royal Zoological Society of Scotland, RZSS is leading on the major six-year EULIFE funded project to release captive-bred wildcats in Scotland, captive breeding, in-situ monitoring, reintroduction, genetic research & management, policy and conservation planning. S-withdrawn: Likely extinction of the species in the UK according to IUCN review published in 2019.

Wart-biter bush-cricket, *Decticus verrucivorus*, Invertebrate, England, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. We have also been involved in breeding these crickets for reintroduction. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

White-beaked Sedge, *Rhynchospora alba*, Plant, England, Chester Zoo, Funding and providing technical and practical support for the North West Rare Plants Initiative (NWRPI) which aims to re-establish populations of locally extinct plant species into suitable locations in the North West of England. S-withdrawn: Local extinction.

White-clawed crayfish, *Austropotamobius pallipes*, Invertebrate, England, Bristol Zoological Society (With Wild Planet Trust), One of the key lead partners of the South West Crayfish Partnership delivering on captive breeding and reintroductions, public outreach, post-release monitoring, wild population surveys; research, plus signal crayfish control pilot study. S-withdrawn: BZS are responsible for 3 crayfish hatcheries. The species is likely to decline in the south west and some populations will become extinct. If the hatcheries end, we will lose a significant amount of bio-secure captive-bred crayfish from 3 different counties and 4 different river catchments, which would significantly compromise the reintroduction programme.

White stork, *Ciconia ciconia*, Bird, Jersey, Durrell. Coordinate partnership project; strategic planning; post-release monitoring, population monitoring, public outreach, research. Durrell staff at field site, S-withdrawn: Programme effectiveness would diminish. Likely that re-establishment of species in UK would stall and possibly fail.

White-tailed sea eagle, *Haliaeetus albicilla*, Bird, UK, Zoological Society of London, ZSL is contracted by Natural England to contribute DRAHS to various UK reintroductions. S-withdrawn: Decline in quality of disease risk management and health surveillance for the ongoing reintroduction programme. Possible negative effects on reintroduction, and/or loss of knowledge in this arena.

Photo Credits (page 2):

Reference	Species	Source
1	Wildcat	https://www.rzss.org.uk/wildcats
2	Great sundew	https://www.chesterzoo.org/news/meat-eating-plants/
3	Mountain chicken	https://www.durrell.org/wildlife/product/mountain-chicken-appeal/
4	Red-billed chough	http://wildlife.durrell.org/blog/returning-the-redbilled-chough-to-jersey/
5	Large Heath Butterfly	https://www.chesterzoo.org/what-we-do/our-projects/large-heath-project/
6	Bermuda skink	https://www.chesterzoo.org/news/the-secrets-of-the-bermuda-skink/
7	Corncrake	https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/corncrake/conservation/
8	Strapwort	http://www.wvct.org.uk/conservation-research/south-west-uk/slapton/strapwort
9	Sand lizard	https://www.marwell.org.uk/conservation/action/species-listing/sand-lizard
10	Llangollen whitebeam	https://www.chesterzoo.org/what-we-do/our-projects/conservation-and-interpretation-of-llangollen-whitebeam/
11	White-clawed crayfish	https://bristolzoo.org.uk/save-wildlife/conservation-and-research/white-clawed-crayfish-project
12	Agile frog	http://wildlife.durrell.org/animals/amphibians/agile-frog/
13	Field cricket	https://www.rspb.org.uk/our-work/conservation/projects/field-cricket-reintroduction/#
14	Greater Bermuda snail	https://www.chesterzoo.org/news/thousands-of-rare-snails-return-to-the-wild/
15	Pine hoverfly	https://www.rzss.org.uk/conservation/our-projects/project-search/field-work/pine-hoverfly-restoration/
16	Hazel dormouse	https://www.chesterzoo.org/what-we-do/our-projects/hazel-dormouse-ecological-research/
17	Maiden pink	North-west rare plants https://twitter.com/nwrpi/status/1005867176379772928/photo/1
18	Chagos brain coral	https://www.zsl.org/blogs/the-chagos-brain-coral-survives [Anne Sheppard]
19	European Eel	https://www.zsl.org/conservation/regions/uk-europe/eel-conservation