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ZOOQUARIA

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ISSUE 87

RETURN OF THE NATIVES

A SPECIAL ISSUE ON EUROPE'S OWN WILDLIFE

Meet the neighbours

A NEW EXHIBIT CONTRASTS INVASIVE WITH RETURNING NATIVE SPECIES

Puffins' plight

THE THREATS FACED BY THE SEABIRDS OF NORTHERN EUROPE

HERRING	*Clupea harengus*
SPRAT	*Sprattus sprattus*
MACKEREL	*Scomber scomber*
WHITING	*Merlangius merlangus*
TREVALLY	*Pseudocaranx dentex*
SANDEEL	*Ammodytes marinus*
POUTING	*Gadus luscus*
PACIFIC SAURY	*Cololabi Saira*
CAPELIN	*Mallotus villosus*
ROACH	*Rutilus rutilus*
TROUT	*Oncorhynchus mykiss*
PANGASIUS	*Pangasius Pangasius*
TILAPIA	*Oreochromis Niloticus*
SIGNAL CRAYFISH	*Pacifastacus leniusculus*
SHRIMP	*Crangon crangon*
KRILL	*Euphausia superba*
KRILL	*Euphausia pacifica*
ARTEMIA	*Artemia Salina*
MYSIS	*Mysis relicta*
PEELER CRAB	*Portinus pelagicus*
HERMIT CRAB	*Pagurus bernhardus*
EDIBLE CRAB	*Cancer pagurus*
SHORE CRAB	*Carcinus naenas*
CLAM	*Paphia undulate*
MUSSELL	*Mytilus edulis*
COCKLES	*Erastoderma edule*
RAZOR	*Ensis ensis*
DAY OLD CHICKS	*Gallu gallus domesticus*
HORSE	*Equus*
RABBIT	*Cuniculus*
MICE	*Mus, Muris*
RATS	*Rattus*
OCTOPUS	*Octopus vulgaris*
SQUID	*Loligo Opalescens*
BLOODWORM	*Chironomus sp*
CYCLOPS	*Cyclops cyclops*
POLYCHAETES	*Perinereis aibuhitensis*
LUGWORMS	*Arenicola defodiens*
SALMON	*Salmo salar*
RED PLANKTON	*Calanus Finmarchicus*
BREAM	*Abramis brama*
LAMPREY	*Lampetra fluvitallas*

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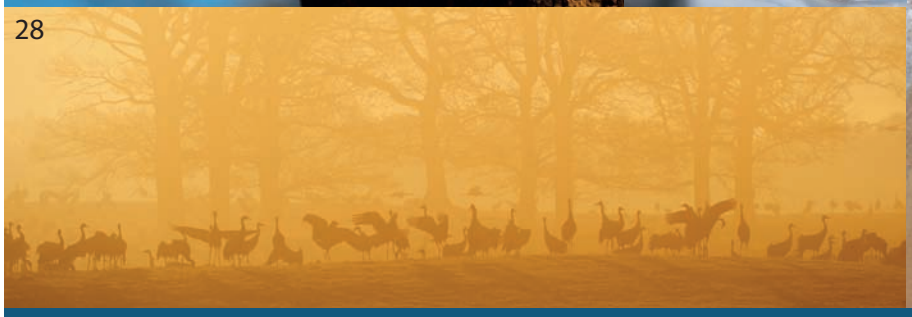

This special European species issue of Zooquaria *is guest-edited by Dr Angela Glatston, Conservation Coordinator with Rotterdam Zoo and GSMP Convener for red pandas. Angela is a highly valued long-term contributor to EAZA conservation programmes, and the Association and the editors are honoured that she agreed to both set the direction of the issue, and provide articles outlining this important and sometimes overlooked aspect of EAZA's work.*

Zooquaria

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FROM THE DIRECTOR'S CHAIR

So, here it is. My final Director's page. I thought about what to write to reflect the past six years of my tenure as Executive Director, the ups and the downs, the great things that happened and the not so great things. Ultimately I have decided to write about the ups. We can all think of the areas of contention, the plans that didn't work in the end. But I believe that we need to remind ourselves just how far we have come as an encouragement to go even further. The following does not just reflect my work, but the team at the EAZA Office over the years, the work of the committees, the Executive Committee, the Council and so many members who acted as true members – contributing enthusiastically to the association with positive contributions and precious time, not just paying a fee and expecting someone else to do the real work. I have looked back through various documents to jog my memory, and certainly there are many more events and pieces of work that could have been highlighted, but here are just a few. Somewhat in the style of Billy Joel singing '*We didn't start the fire*' (though we did start a few), here we go.

It began in 2008 when I was presented with a pile of notes from the Kristiansand 2007 strategic planning meeting in my first week as Director and asked to prepare a strategy for my first Council meeting at the annual conference in Antwerp. In exactly six weeks time. The strategy was completed and first draft discussed at Council. The 2009-2012 EAZA Strategy would be formally approved soon after, giving us a plan to work towards.

By the next council meeting in Spring 2009 we had begun developing position statements, had restructured the EAZA Executive Office, and laid out far more clear budgets for the financial security of the association. The first draft of the Fundraising Strategy was also presented and approved in 2009. By the annual conference, that year in Copenhagen, a comfortable surplus had been made financially to begin the rebuilding of the reserves of EAZA, which had been declining in recent years. Voluntary donations would also be asked of the membership to help create an EAZA Development Fund to help implement the new strategic plan. A fee increase was proposed to allow EAZA to develop representation in the EU arena at Brussels and Strasbourg, positively accepted by the membership. In conjunction a new Lobbying strategy was approved. EAZA also now had, for the first time, a dedicated communications manager and a new website was launched. Simon Stuart of the IUCN SSC was a speaker and for the first time as a community we heard in great detail about the overarching conservation crisis in Southeast Asia. Thus began the planning between EAZA and SSC of what would become the joint Southeast Asia campaign. We were sad to see Bert de Boer step down as the Chairman of EAZA, reflected in the standing ovation he received at plenary for his work. But we were delighted he was followed by Simon Tonge to continue the good foundations laid by Bert's tenure.

Spring 2010 brought with it the first voluntary re-accreditation by Hagenbeck's in Hamburg, who volunteered to fly the flag for this process. The Sanctions document was approved, bringing in more clear responsibilities for what was acceptable and not acceptable conduct for members, in conjunction with the revised Ethics Policy, and what the consequences would be of non-compliance. A tough discussion, but an important one. By the Verona annual conference we were able to report significant surplus on the annual accounts to speed up the rebuilding of the reserves. We also signed a Memorandum of Understanding with Fondation Segré, who funded the initial development of the EAZA Academy, an idea discussed for years but that had not yet come to fruition. Within a few months we were able to hire a young woman called Myfanwy Griffith to lead the development of the Academy as it took off in great style. The EAZA Conservation Education Strategy was approved in the same year. We also started working with Grayling, professional consultants in Brussels to help us navigate the EU.

By spring 2011 the EAZA Academy was up and running and would go on to develop rapidly throughout the year and beyond. The Socio-Economic Impact Assessment, funded by the voluntary Development Fund, was completed and demonstrated the enormous conservation and social contributions made by EAZA members in Europe and globally. The EAZA Communications Strategy was formally approved and, perhaps the most important development this year, full and cyclical accreditation of all members was approved by Council. It would also be approved by a full electronic vote of the membership later in the year. We hired our first full time 'EAZA Accreditation Officer' soon after. The annual conference in Montpellier once again saw the return of a strong financial performance in the annual accounts. We heard about the first progress in the EAZA Accreditation Programme, the EAZA/IUCN SSC Southeast Asia Campaign was launched and we updated our important MoU with EAZWV. The Council also unanimously approved the EAZA Euthanasia Policy.

The spring 2012 Directors meeting was a special one as it was devoted to planning the new strategy for EAZA. This time around, instead of being a council process, we opened up the facilitated strategic planning meeting to the full membership to participate and two days of productive meetings followed. By the Innsbruck annual conference we had an approved strategy for 2013-2016 (with a foreword by

the Director General of the IUCN) and once again a clear direction for progress. This strategy then took precedence over all other strategies bar the special development of a dedicated EAZA Plant strategy. Council this year also approved guidelines for the conduct of zoos in relation to invasive species that had been developed in conjunction with the Invasive Species Specialist Group of the IUCN, once again demonstrating the growing collaboration between the IUCN SSC and EAZA. After a monumental effort by many people, the EAZA Population Management Manual was approved. The new *Journal of Zoo and Aquarium Research*, EAZA's own scientific journal, was launched, a professional editor appointed and it was soon accepting submissions.

In early 2013, EAZA signed an MoU with AZA to develop closer ties over a number of issues and new staff members were hired to work for us in Brussels as was our first ever full-time population biologist to help support our coordinators throughout the membership. We continued in the development of encouraging collaboration and support between institutions, TAGs and the Specialist Groups of the IUCN, our 'Building Bridges' project.

By 2014 we had voted to change our financial year and, thanks to the generosity of Claudio Segré and the continued support of the Fondation Segré, were able to expand it further, adding a dedicated Israeli Academy in 2013 and a new Animal Welfare Training Officer in 2014. The new EAZA Conservation Database will be launched in 2014 at the annual conference in Budapest, as will the new website. Expanding our partnerships further we were delighted to sign a joint MoU with the European Association of Science Centres (ECSITE) and Botanic Gardens Conservation International (BGCI). In September the office of the Chair of the SSC, Dr Simon Stuart, appointed a partnership officer, to strengthen the linkages between zoos, aquariums and Specialist Groups, arising out of the positive relationship built over the years with EAZA.

So In September 2014 where do we stand? Our association has a well structured executive office with skilled, expert, enthusiastic staff. We have never been in a stronger, more healthy, financial position. We have a strong conservation reputation with the IUCN that simply did not exist before. The Academy goes from strength to strength. We have our own research journal. Population management has been strengthened by the appointment of a population biologist, as has our representation in Brussels with the appointment of an EU Policy Manager. We have cyclical accreditation. We have clear policies and procedures and we have a clear strategic plan. Our partnerships are strong and there are many exciting developments on the horizon. There will be some challenging policy discussions in the future, but surely an association that has accomplished all the above in the last six years can handle those discussions with bravery and an eye on the progressive and ethical way forward.

I would like to end by thanking wholeheartedly all the staff at the office that I have worked with over the years. They have been wonderful and their work has been tremendous – I will miss working with them very much. I would like to thank the progressive members of the zoo and aquarium community both in EAZA and globally who have provided support and many enjoyable discussions over the years. I would also like to thank the various EAZA board members who I have worked with closely to progress the association, especially during times of difficult discussion. My thanks also go to Bert de Boer, my 'first' Chairman, whose support was invaluable in that initial year, and to my 'last' Chairman, Simon Tonge. Over the five years that we have worked together as Chairman and Director I have frequently been in awe at the way Simon has handled the most challenging discussions, where tempers could be frayed, and all with a deep honesty and determination to do the right thing for the greater good. I have learnt so much from him that I will take forward into my future career and I also, happily, take his friendship forged over the years.

Thank you all for an amazing past six years and I am sure you join me in wishing Myfanwy our best wishes and confidence as she steps into her new role as Executive Director.

Dr Lesley Dickie
Executive Director, EAZA

NEWS

NEW FACES

EXECUTIVE DIRECTOR

After six eventful years at the helm of EAZA, Dr Lesley Dickie is leaving the Association. Lesley's dedication and energy in the role of 'herding cats', as Chairman Simon Tonge put it, helped develop 'the capacity of the EAZA office to deliver… in ways, and at a speed, that we had not imagined possible.' Lesley hands over the Executive Directorship of the Association, now in its strongest financial and organisational position ever, to Myfanwy Griffith (above), formerly EAZA Academy Manager on 1 October. Myfanwy (pronounced Miff-an-we!) has developed the EAZA Academy from its inception three years ago to a world-class professional education facility for zoos and aquariums. She previously worked as a lecturer in animal behaviour and management, and as a keeper and presenter at EAZA member Chester Zoo.

EU POLICY MANAGER

Sophie Dorémus, EAZA's first EU Policy Manager, left the Association in July after nearly a year in the position. Sophie was instrumental in developing the role, and achieved much during her time with us, including the development of EAZA's European Parliamentary election manifesto, funding proposals and strong connections with some of the most important legislators in the field of the environment, conservation, and animal welfare. Sophie hands over the reins to Daniel Nuijten, a Dutch national who has lived and worked in Brussels for several years. Daniel has extensive experience in the field of international development and youth engagement, having held positions with the development consortium CONCORD, and the European Youth Forum. Daniel will help EAZA continue to build its profile and contacts with the European Parliament and Commission, helping the Association to be included and consulted by legislators. Daniel will also serve as liaison to the Legislation Committee.

EXECUTIVE COORDINATOR, COLLECTION COORDINATION AND CONSERVATION

EAZA has appointed a new Executive Coordinator to replace Christina Henke, who left the office during the summer. Her name is Katharina Herrmann (above,

right) and she is originally from Berlin, Germany where she worked at the zoo as a temporary keeper during holidays. She completed her studies at Van Hall University of applied Science in The Netherlands with a Master's degree in Zoo Conservation Biology from Plymouth University (UK). During her studies Katharina did internships in different zoos (Harderwijk, Munster and Taronga), field work in Uganda and an internship at the species management department of our colleagues in ZAA (Zoo and Aquarium Association, Australia). She has recently finalised her thesis project at San Diego Animal Park in the United States. Katharina will be the TAG liaison for a variety of mammal TAGs including (among others) primates and carnivores.

OFFICE MANAGER

After eight years at the EAZA office, Fleur Kist will also be leaving the Association at the end of September. Fleur has been a key member of the team, taking on many roles and tasks during her time with us, and ensuring the smooth running of the office and its reach to the 41 countries in which we are present. Lillian Stammeshaus will take over the role on 22 September 2014. Lillian will be familiar to many members as the office manager during Fleur's maternity leave in 2011, and her experience in the role will allow the office to continue to run smoothly and responsively.

Budapest Conference welcomes delegates and speakers

The EAZA Annual Conference, being hosted by Budapest Zoo, starts September 23rd and runs until September 27th. As well as the TAG and Committee meetings, which will help define the direction of the Association's conservation, education and research programmes, the Conference will also be the first to feature a meeting of two new committees agreed by the attendees at May's Directors Days in Doué La Fontaine: the Communications Committee and the National Associations Committee. Plenaries will feature speakers including Anna Omedes, Director of the Barcelona Museum of Natural Sciences and a key figure in Ecsite, as well as experts in communications, conservation, veterinary science, and addresses by Dr. Miklós Persányi, Director of Budapest Zoo, the Mayor of Budapest, EAZA Chair Simon Tonge, and Executive Director Lesley Dickie.

MEMORANDUM OF UNDERSTANDING

ON 10 SEPTEMBER 10, EAZA signed a Memorandum of Understanding with two sister organisations that will help identify areas of common interest and cooperation.

Ecsite, the network of European Science Centres, includes some of the best known museums – including natural history museums – on the continent, and their members are highly active in research, education and biodiversity work. Ecsite member collections also ensure a wealth of historical reference materials, and their experience of science communication will help set the context for our joint work.

Botanical Gardens Conservation International is the membership organisation for the world's botanical gardens. BGCI have unparalleled experience in the fields of botanical conservation, research and education and will be instrumental in helping the partnership build a complete approach to ecosystems and their protection. The Memorandum, which covers collaboration on biodiversity campaigning and communication, will mean that for the first time, the leading members of all three types of institution in Europe will be speaking with a united voice and providing a comprehensive approach to preserving biodiversity across the continent. The Memorandum also points the way to even greater support for IUCN's One Plan approach, bringing in scientists from across the disciplines to assist with systems-level planning.

INTRODUCING THE IMPROVED EAZA CONSERVATION DATABASE

ARE YOU CURIOUS about the type of support given to the conservation of certain European species by EAZA members? Do you know what conservation activities EAZA colleagues in France or the Czech Republic are supporting? Would your institution like to support a project focused on species X or Y but you are looking for some inspiration? The new and improved online EAZA Conservation Database (www.eazaconservation.org) aims to provide the membership with a further improved information tool. Currently more than 1,000 projects are available to browse through and, over time, the database will create an overview on conservation contributions that gives a more complete reflection of the breadth and extensive conservation work handled by our membership.

Of course, the success of this new online EAZA Conservation Database is dependent upon the input of our members. Within each EAZA member institute, conservation contacts have received an account and will be approached to add information online, with support from EAZA.

All EAZA member institution employees can request access to the database for browsing. You will find the database is easy to use with new features and options being added all the time.

The EAZA Conservation Database eagerly awaits your visit at www.eazaconservation.org.

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BIRTHS AND HATCHINGS

CAPERCAILLIE SUCCESS

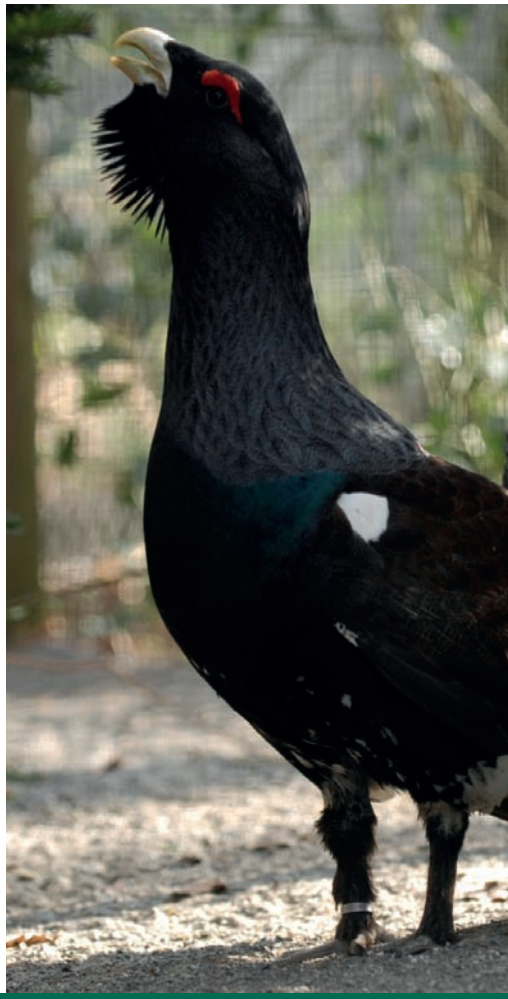
BERNE ANIMAL PARK DÄHLHÖLZLI, in Switzerland, has kept that fantastic grouse, the capercaillie (*Tetrao urogallus major*), since 1971. Initially, the park took in injured birds from the wild, as well as purchasing birds from private keepers. The first chick hatched at the park in the 1970s died after 10 days, and those that followed did not live much longer. By the 1980s, the breeding success had started to improve, and since 2000 Berne raised 63 chicks. The most recent were in June this year, when a clutch of nine eggs hatched. Three chicks did not survive, but the remaining three cocks and three hens are in good health and developing well.

The incubation process is as follows: clutches of eggs are put into the incubator (T = 37.8°C) and the eggs are automatically turned twice a day. After hatching, and once they are dry, the chicks are brought into a brooding-box made of plywood with a grating floor covered with filter paper. A 250W infrared lamp about 40cm above the floor ensures a suitable temperature, and a damp cloth under the lamp provides sufficient humidity.

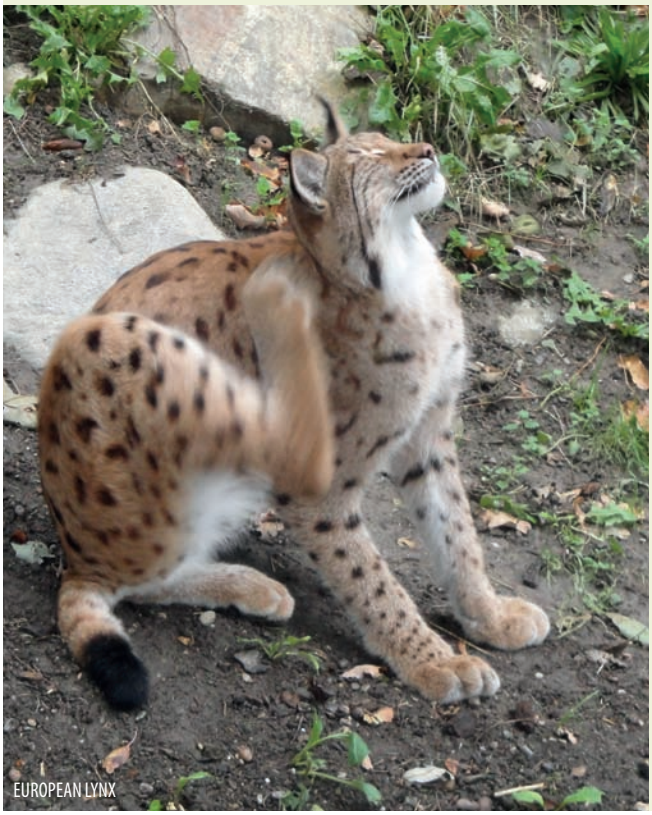
The birds are kept in three aviaries of 8m depth and 2.5m in height; the middle aviary is 10m wide, where two hens live. To the left and right live two cocks, each in a 5m-wide aviary. The aviaries are connected by holes of 17cm diameter – too small for the cocks – so the hens may decide which cock they want to visit during courtship. The floor substrate is sand; the planting consists of pine, spruce and elm in which the birds can sit.

For the first two weeks the chicks receive four feeds a day, which is reduced to three per day in the third week. Antibiotics are also provided via the water supply during the first month. For the first few days, the chicks are kept on absorbent paper, with regular changes; over the course of the next few days, birch branches, moss and fruit bushes are introduced into the enclosure, and in the fourth week, the birds are transferred to an outdoor enclosure on sand with constant heating from a lamp. From day 30, the lamp is only on during bad weather and at night.

Capercaillies are currently being held in 18 EAZA institutions. They are sensitive to stress, and transport by air freight is therefore a great risk. Experience shows that capercaillie are best transported by car, preferably by the new holder.



CAT TALES



EUROPEAN LYNX

LE PARC DES FÉLINS, located 50km east of Paris, was established in a woodland estate of 71 hectares (175 acres) to display to the public and breed many species of felines in huge natural enclosures. With 150 specimens from 26 species out of the 36 or 37 described in the wild (including 15 EEPs and 4 ESBs), the park is an important centre for breeding with 24 species having bred over the past 15 years.

Le Parc des Félins has had particular success over the last two years with the northern subspecies of European lynx (*Lynx lynx lynx*) and the European wildcat (*Felis silvestris silvestris*). A litter of two male and one female lynx was born in May 2013, with the loss of one of the male cubs, apparently due to a fight with its brother. This behaviour has been recognised in the literature on the species, and fights to the death between male litter-mates are well known in the wild, despite recorded attempts by the mother to separate cubs. Both surviving cubs are in good health and growing well, having been transferred to Rome Zoo as part of the ESB.

A litter of 5 European wildcats (four male, one female) was born in April 2014, which is an abnormally large litter. After attempts to find facilities to take two of the males were unsuccessful, the Parc made the difficult decision to euthanise the animals, as large litters can cause problems and jeopardise the welfare and survival of young wildcats. The litter of two males and one female are thriving and growing well.

Straightforward husbandry and ease of breeding combined with a natural adaptation to the climate mean that both species do very well in European zoos. However, like many species kept in human care, the major problem to overcome is finding new homes for offspring. Long lifespans of sometimes more than 20 years and low demand in zoo collection plans limit the possibilities of transfer and the Parc prevented breeding for some years by separating the male and female wildcats and using temporary contraceptive implants on the lynxes. Culling is occasionally employed and with great caution, and is usually carried out when young litter sizes are large (above two or three kittens or cubs) and therefore potentially problematic. Le Parc des Félins encourages more institutions to make room for these wonderful species in their collection plans, and is happy to make the young wildcats available to interested curators this winter.

WOLVERINE: THE EUROPEAN SUPERHERO

BORÅS ZOO IN SWEDEN was delighted to welcome a litter of three wolverine pups (*Gulo gulo gulo*) at the beginning of 2013 and this year has brought even more success. This is a major turnaround in the fortunes for breeding at the Zoo, after 26 years without any result. Reconstruction of the enclosure to increase its size and provide access to a hillside, changes in husbandry, tests to separate the pair close to likely birth dates, the arrival of new animals, and steady development of enrichment were all tried, but nothing seemed to be able to reverse the negative trend. Disturbances or suspected complications around the time of mating were investigated and also minimised, but years went by without any success.

In 2006 a couple of wolverine litters were found in two different Sami villages, where mothers had been killed during legal hunting. From these litters one male (Tjokko) and one female (Pessina) were placed at Borås Zoo after an application from the Swedish Association of Zoos and Aquaria.

The youngsters were introduced, but again nothing happened. In fact the healthy young wolverines were more interested in playing with each other than in mating when they came of age. After discussion with the species coordinator Leif Blomqvist, an exchange of males between Nordens Ark and Borås Zoo was suggested. In early May 2012 the transfer was completed and new pairs were formed. Although the usually quite noisy mating was never heard (or seen) this transfer was an immediate success. After the delayed implantation typical of this species, the first litter (two males and one female) was born in February 2013. During rearing the male stayed with the female and pups without any reported problem.

That could have been the end of that, as the plan was to have only one litter from this pair, but this year brought success, too. Another two pups were born on Valentine's Day 2014 – naturally the young male and female were named Valle and Tina. It might also be added that this was not the end of the tale: Nordens Ark also succeeded with Tjokko and another three pups were born there at the same time. Our male was recently returned and we hope that his positive experience at Nordens Ark will take effect when he is reintroduced to his old partner!

The global population of wolverines is of Least Concern according to IUCN Red List, although in Sweden the animal is locally regarded on the national Red List as Vulnerable, due to illegal hunting in the past as well as today. A breeding programme for the wolverine was established in 1994 and today it contains 51.15 animals in 40 institutions.

Walking the walk

EAZA AND THE ROLE WE CAN PLAY IN EUROPEAN CONSERVATION

Angela Glatston, Rotterdam Zoo, The Netherlands

Part of EAZA's mission, as we know, is to facilitate co-operation within the European zoo and aquarium community with the aim of contributing to the conservation of global biodiversity. We all consider nature conservation to be an important aspect of our work but all too often we, EAZA members, interpret this to refer to exotic endangered species rather than our own indigenous fauna. This means that, although many EAZA members are indeed involved in the conservation of local species, they do not seem to communicate or promote these activities in the same way or to the same extent as they do for exotic species. For example, very few European projects are listed in our Conservation Database, published in *Zooquaria* or discussed during our annual meeting.

To help members reconsider this state of affairs, this issue of *Zooquaria* is dedicated to European species conservation within EAZA, and with this introduction, I hope to persuade you to regard your European conservation activities as being on a par with those you support outside of Europe and to encourage you to report on them to your colleagues.

So why is European conservation important? There are four ways of answering that question.

1. Europe has conservation problems

The IUCN recently carried out a national analysis of data for the European Red List. They assessed the status of around 6,000 European species (mammals, reptiles, amphibians, freshwater fishes, butterflies, dragonflies and selected groups of beetles, molluscs, and vascular plants) and their data show alarming declines in Europe's biodiversity. It will require increased conservation efforts throughout Europe if the EU 2020 Biodiversity Strategy is to be achieved.

The highest proportion of threatened species can be found around the Mediterranean. This is not surprising as that region is a recognised global hotspot for biodiversity and home to a large number and variety of species. Spain, Portugal and Greece host the highest proportion of species that are threatened with extinction at the European level. More than 20% of the species assessed in Spain, 15% in Portugal and 14% in Greece fall into this category.

While effective conservation action in the Mediterranean is needed urgently, other European nations are not exempt; all countries need to take adequate measures to reverse the current population declines if we are to prevent species from going extinct. Considerable conservation investment is needed to achieve this and to ensure long-term improvement in the status of European species. Zoos could and should play a central role in raising public awareness of the problem and stimulating appropriate action.

2. Goodwill for EAZA

Taking a more prominent role in European conservation will also serve to further promote EAZA with EU institutions, European-based conservation organisations and, last but not least, the public. Our efforts in this area will become much clearer to all these parties and our successes will be far more tangible. At Rotterdam Zoo, we believe that local conservation is of much greater interest to our visitors than similar projects on the other side of the world and we are making a greater effort to make our visitors more aware of local issues. Local projects have the added advantage of demonstrating to the public that conservation is not merely the preserve of large, rich organisations but something where they, as individuals, can also make a meaningful contribution.

BARBARY MACAQUE

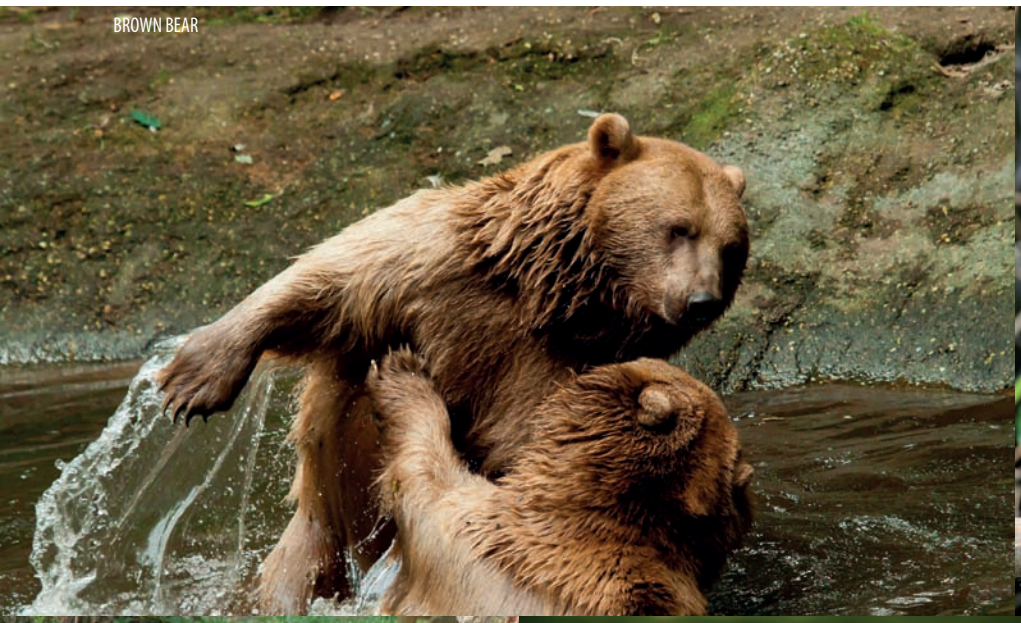
LESSER KESTREL

A further benefit is the way we are perceived in those countries outside Europe where we are also active; it surely is much better to teach others through example rather than instruction: ie we need to 'walk the walk' not just 'talk the talk'.

3. More inclusivity for our members

Many of our colleagues who work in smaller institutions only have limited possibilities for donating cash to projects, let alone for setting up their own projects abroad and then monitoring their progress. Projects in Europe are much more accessible for them, and zoos can very easily become involved in local projects through breeding and release activities and/or education programmes. The interest of these zoos in local conservation was clearly demonstrated in the European Carnivore Campaign in which regional participation moved away from the 'traditional', large, supporting zoos in western Europe to other institutions. At that time, members representing smaller institutions expressed considerable satisfaction at the fact that there was a 'local' campaign.

KESTREL: FRANK VASSEN; WOLF: GERARD VAN DRUNEN; MINK: TIIT MARAN


BROWN BEAR


IMPERIAL EAGLE


IBERIAN WOLF


EUROPEAN MINK

4. We are Europeans

We are all European and so it is our responsibility to ensure that our own home is kept in order. If we so choose, EAZA members could have a major impact on conservation both locally and within Europe in general. We not only have members in those biological hotspots of the Mediterranean but we also have visitors who holiday in that region so there's plenty of opportunity to make a difference. Furthermore, in Europe we have the good fortune that conservation is not generally a question of money. The structures of government are in place and the budget is accessible to support conservation within Europe; the problem is the will to take action. Zoos are well placed to encourage conservation action from the authorities through communication and lobbying. This means we can be active at home and still be financially capable of being active abroad with other projects.

HOW TO PROCEED

European conservation should not be an EAZA initiative in the first instance; it is probably much better for individual zoos or regional zoo organisations to take the lead. Each zoo has its own opportunities for action and we should easily be able to find potential partner organisations as there are any number of local and regional conservation NGOs who would welcome the chance to partner with their local zoos if only for our fundraising and communication potential. As a community we should encourage each other's local conservation initiatives. This can easily be achieved by making some simple changes to our existing structures. Here are some ideas:

1. Inform your colleagues of your European conservation work by writing articles for *Zooquaria*, giving presentations at our annual meeting and/or at the conservation forum. We need to make more effort to showcase our existing European conservation efforts in this way.
2. We could ensure that we list our European efforts on the Conservation Database.
3. Local conservation can easily be linked to the issue of sustainability. EAZA should do more to encourage sustainable business practices amongst the membership and we can all sign up to the Pole to Pole Campaign and Pull the Plug.
4. Don't forget your zoo site and grounds can and do provide valuable habitat for native species (particularly relevant for city zoos). We could do more to study and publicise this fact.
5. We can encourage, educate and facilitate visitors to participate in our local conservation projects. A good example is the young conservation volunteers in Woodland Park Zoo, Seattle, who help zoo staff with breeding programmes for local species. Citizen science is a buzz phrase in the USA and perhaps we should also cash in on this model.

Personally I would like to see a significant percentage of our EAZA Conservation Campaigns either devoted to European issues or, at the very least, have a European component. In the long term, this approach may naturally lead into a partnership between EAZA and one or more of the larger NGOs with a European remit thereby fully integrating EAZA into European conservation as should be the case.

Directive directions

AN EXAMINATION OF THE CONSERVATION LEGISLATIVE FRAMEWORK AT EUROPEAN LEVEL

Sophie Dorémus, EAZA EU policy manager

Conservation of the environment is an important mission that the European Union has set itself. It is therefore a crucial factor in the development of policy and legislation to that end. Many pieces of legislation have been progressively introduced, and two key directives adopted in relation to wildlife and nature conservation.

The Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive) created a scheme of protection for all wild bird species naturally occurring in the Union, identifying 194 species and sub-species particularly threatened. It was adopted unanimously by the Member States in 1979 as a response to increasing concern about the declines in Europe's wild bird populations resulting from pollution, loss of habitats and unsustainable use. It was also recognition that wild birds, many of which are migratory, are a shared heritage of the Member States and that their effective conservation requires international cooperation.

According to that Directive, Member States are required to designate Special Protection Areas (SPAs) for particularly threatened species and all migratory bird species. Activities that directly threaten birds are also banned, such as their deliberate killing or capture, or the destruction of their nests and taking of their eggs. Finally, a number of rules that limit the number of bird species that can be hunted and the periods during which this can happen were introduced.

At the same time, the Council of Europe (the leading human rights organisation in Europe) adopted a Convention on the conservation of European wildlife and natural habitats (the Bern convention) which aims at ensuring conservation of wild flora and fauna species and their habitats in Europe.

The parties at the Bern Convention must take a series of actions such as promoting national policies for the conservation of wild flora and fauna, considering the conservation of wild flora and fauna in their planning and development policies, promoting

EGYPTIAN VULTURE

education and disseminating general information on the need to conserve species and habitats. A regular monitoring of the implementation of the Convention is ensured through various tools such as reports and a case-file system.

In 1992, the European Union adopted the Habitats Directive (Directive 92/43/EEC) on the conservation of natural habitats and of wild fauna and flora. Amended in 1997, its main aim is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements.

It ensures the conservation of a wide range of rare, threatened or endemic species, including around 450 animals and 500 plants, and provides for a ban on the downgrading of breeding and resting places for certain strictly protected animal species.

These two Directives are the backbone of the protection of animal and plant species of European importance and the habitats which support them, and are built around two pillars: a strict system of species protection, and an ecological network of protected areas, called Natura 2000. The latter was established under the 1992 Habitats Directive and aims to ensure the long-term survival of Europe's most valuable and threatened species and habitats. To this end, it features Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs) designated under the Birds Directive.

As regards *ex situ* conservation, the European Union adopted in 1999 the Directive 1999/22/EC on the keeping of wild animals in zoos (Zoos Directive). With the aim of reinforcing the conservation role of zoos, the Directive requests Member States to deliver licences to zoos provided they fulfil certain obligations such as:

- participating in research whose results benefit the preservation of species and/or exchange of information on the conservation of species,
- educating and raising public awareness on the conservation of biodiversity, keeping animals in a manner that meets their biological needs and ensures the preservation of different species,
- preventing certain animals from escaping and preventing intrusion of outside pests, and
- keeping up-to-date records of the animals kept in the establishment appropriate to the species record.

Further relevant legislation includes Directive 92/43/EEC (Water Framework Directive), under which Member States are required to protect and improve their inland and coastal waters, and Directive 2008/56/EC (Marine Strategy Framework Directive) to achieve good environmental status in their marine environment by 2020.

The EU's environmental legislation is complemented by a variety of other non-binding policy instruments such as strategies, programmes and action plans. By these means, the EU also aims to fulfil its international commitments under the UN Convention on Biological Diversity.

It is up to the Member States to apply the environmental legislation and to the European Commission and national judges to make sure that it is respected. If not, a series of legal actions is at their disposal.

Stefan Leiner

HEAD OF THE NATURE UNIT, EUROPEAN COMMISSION

You have a very wide remit that includes everything from zoos to protection of Europe's wildest areas. How can these diverse elements become a cohesive strategy for the natural future of Europe?
The most important task of my unit is to support the full implementation of the EU nature legislation (the so-called Habitats and Birds Directives) so that the objective of halting and reversing the loss of biodiversity and the degradation of ecosystem services in the EU by 2020 is being achieved. The EU biodiversity strategy, which also includes, for example, work on invasive alien species and global action, is our overarching framework of action. The Zoos Directive is part of, and plays an important role in support of, this strategy.

How central to the EU's strategies are zoos and aquariums, and how do you see their future?
Combined with their role in public education, zoos and aquariums are critical centres for *ex situ* conservation and research programmes as they have a very important role to play in overall biodiversity strategies, both in the EU and more globally. The EU Zoos Directive aims to promote this role in the conservation of biodiversity and, in this context, there has been EU funding support for conservation projects involving zoos, mainly within the framework of the EU LIFE programme. However, it is for each Member State of the EU to put in place the necessary systems, including financial resources to ensure that zoos and aquariums fulfil their role.

Zoos and aquariums are under increased scrutiny from legislators and the public due to recent management euthanasia cases. Do you worry that negative reactions may hinder your work to preserve biodiversity?
The primary goal of the Zoos Directive is to promote the role of zoos and aquariums in the conservation of biodiversity. However, to achieve this, there is a requirement in the Directive to ensure appropriate accommodation of the animals. European citizens are sensitive to animal suffering, which explains why there is intense social and political pressure for progress on animal welfare issues within the EU. Where actions such as euthanasia may be required, this should be carried out in ways that have full regard to these sensitivities. As the public are major supporters of many zoos and aquariums it goes without saying that there is a constant need to educate and communicate with them in relation to conservation management strategies, especially those that may involve control of animal populations.

***In situ* conservation in Europe is highly challenging due to the continent's crowdedness and the economic imperative. How do you convince governments struggling with economic pressure to come to the aid of nature?**
Despite the fact that we live in one of the most crowded parts of this planet there is still a great deal of nature to enjoy and conserve in Europe. Our primary focus in the EU is on conservation of nature in the wild, especially in ensuring the effective management of the Natura 2000 areas of high biodiversity value. There is also increased action for nature in the wider countryside, reflected in land- and water-use policies throughout the EU and our objective to establish a thriving 'Green Infrastructure'. The financial crisis has certainly not made it easier in recent years to secure resources for nature but there is also growing understanding that a healthy economy needs to be underpinned by healthy nature, which delivers many essential services for people.

We have recently seen the new guidance document for the implementation of the Zoos Directive. Can you tell us more about how the document was formulated?
The Commission guidelines respond to a need to promote good practice in the implementation of the Zoos Directive across the EU. The Commission has been assisted by experts in preparing this work but most importantly it has also sought to engage Member States and key stakeholder groups, including EAZA, in the exercise from the outset. We have also provided the different stakeholders with an opportunity to participate in a dedicated workshop where the draft guidelines were discussed as well as to provide written input to the process. Stakeholders have quite different and sometimes strongly held views on this subject and the Commission has had regard to each of these views, while ultimately focusing on the objective of providing guidance on the provisions of the directive. A key aim of the exercise has also been to promote good practice in different Member States, including examples from different zoos that are in the EAZA family.

How do you imagine zoos and aquariums will look in 20 years? And how do you imagine the future of Europe's wild spaces?
I hope that the contribution of zoos to conservation programmes in Europe and more globally will be strengthened. I also hope that the extraordinary potential of zoos and aquariums in raising awareness and education about nature is fully realised. Many European zoos have still to complete the evolutionary transition from the ancient 'passive' image they often portrayed to become truly dynamic education and research centres of excellence. This will need to be combined with effective action for nature in the wild, both within Natura 2000 protected areas and more generally in the wider landscape, based on a greater respect for nature and recognition of our interdependence with other species that share this planet with us.

The value of European species

A CLOSER FOCUS ON BREEDING PROGRAMMES FOR EUROPEAN SPECIES CAN HAVE MANY BENEFITS

William van Lint, Assistant Manager, Collection Coordination and Conservation, EAZA

Around 30 (8%) of our breeding programmes focus on European species, or at least species with a partial distribution in Europe. These include programmes for charismatic species such as European bison, brown bear and bearded vulture but also programmes for less well-known species such as wolverine, lesser kestrel and short-snouted seahorse. Some of these species are threatened on a global or European level while others are not, but these species have great educational value and function as ambassadors.

PROGRAMME RATIONALE

The educational value of species can be an important reason for EAZA member zoos to initiate a breeding programme. These species can function as ambassador species for the habitat or ecosystem and pass on a conservation message to the 140 million public visiting EAZA member zoos annually. These captive populations can be used to inform the public about threats (fragmentation, habitat loss, hunting, poisoning, disturbance, etc), European Red Lists and, in for example the case of great carnivores, about the human-predator conflicts and potential solutions so they are aware what is going on in their 'back yard'. Earlier EAZA conservation campaigns for amphibians and European carnivores greatly supported these efforts.

For other species we as a zoo community have to do our homework given the lack of attention, urgency or knowledge in the past, to make sure we have a valuable back-up population. So, for species such as lynx, European brown bear or Egyptian vulture the creation of breeding programmes has greatly contributed in dividing different subspecies, hybrids and unknowns to make sure we only breed with (prioritised) pure (sub) species and phase out the hybrids and species with an unknown background.

Research on the captive population has also proven to be of great value; husbandry experiences with felids and especially European lynx have been of great value for the establishment of a captive population for Iberian lynx, while waldrapp ibises born in captivity have been used to fine-tune release techniques.

In the case of species such as European bison, bearded and European black vultures there was a clear request for individuals that could be and still can be released to start new populations or strengthen existing remnants of populations. The existence of breeding programmes has greatly contributed in producing healthy and genetically valuable animals. The growth of some of the populations shows that our contributions are paying off. It should also be clear that we, in most cases, are only one piece of the puzzle as these successes are realized as part of overall action plans and contributed by many more partners.

DEVELOPMENT OVER TIME

If you take a closer look at the EEP and ESB programmes for European species it is interesting to see the developments. Some of the programmes such as for European bison, European otter, bearded vulture, European black vulture and waldrapp ibis, were established back in the 1980s, when the first EEP programmes were initiated. All had a high conservation need at that time and as such most of these programmes have contributed to release projects.

These programmes were accompanied by programmes in the 1990s for, amongst others, Dalmatian pelican, black stork, white-tailed sea eagle, brown bear, Iberian wolf, wolverine and European mink. These were species with a conservation need at that time, but which mainly functioned as flagship species to communicate and promote the concepts of undisturbed wetlands, intact (original) forest systems and the importance of the Natura2000 concept (the ecological network within Europe).

The need for a breeding programme for the European mink has a slightly different background as this species in the wild was and is still out-competed by escaped American mink, clearly flagging the risk of invasive species. The European mink is Critically Endangered and more action is needed to safeguard the future of this species. Captive-bred minks have been introduced onto the Baltic islands of Hiumaa and Saremaa in an attempt to reestablish them in Estonia in suitable habitat free of American mink. This project has been funded by EAZA members and the Darwin Initiative as well as by an EU Life grant.

At the beginning of the 21st century programmes were established for European lynx, Egyptian vulture, griffon vulture, grey seal and forest reindeer. If you take a closer look at the rationale behind proposing a studbook for European lynx for example (2002), you can see that at that time almost 50% of the captive population was of unknown origin, and that although the species was not threatened it was locally threatened in some areas, which is an important justification for an ESB. Today, more than 10 years later, the population of the prioritised subspecies is growing, and although there are difficulties in tracing background of certain individuals and due to taxonomic discussion within the felid world, the population of lynxes with an unknown background is decreasing.

More recently, programmes for sharks, seahorses, lesser kestrel and marbled polecat have been established, reflecting the actual conservation needs of our oceans and rural areas.

Overall, most of the official programmes for European species focus on the larger species. Elsewhere in this issue you can read about the many EAZA members who are also involved in programmes for locally threatened, smaller species. This is in line with one of the conclusions in the IUCN Red List for European mammals (2007) which stated that mammals in Europe require greater action to improve their status, and that while many species already receive some conservation attention, others do not.

Given our responsibility for Europe, EAZA members have to continue focusing on the European species in need of help, to safeguard our heritage!

CLOCKWISE FROM TOP LEFT: SHORT-SNOUTED SEAHORSE © LAURA CASTELLANO; WHITE-TAILED SEA EAGLE © LINDA MARTIN; LESSER KESTREL © FRANK VASSEN; EUROPEAN OTTER; DALMATIAN PELICAN © SEBASTIAN BUGARIU; MUSK OX © FRANK RØNSHOLT; GREY SEAL

Wisent additions

SUPPORT FOR EUROPEAN BISON REINTRODUCTION INTO ROMANIA IS THE LATEST CHAPTER IN AN OLD CONSERVATION STORY

Douglas Richardson, European Bison EEP Coordinator, Head of Living Collections, RZSS, Highland Wildlife Park (Kingussie)

On June 24 2014, six female European bison that were born in Fota Wildlife Park, Howletts Wild Animal Park, Port Lympne Wild Animal Park and Highland Wildlife Park, full EAZA members all, were released from their acclimatisation enclosure into the forest of the Vanatori Neamt Nature Park in Romania. The nature park already had a small number of bison and the point of the additional females from the British Isles was to augment the numerical and genetic potential of their herd. In another part of the Romanian Carpathian Mountains, a larger group of bison arrived, including animals from EAZA member institutions Kolmården Zoo (see box), Parco Natura Viva, Reserve d'Animaux Sauvages and Bern Zoo, and non-member EEP participants Springe and Hirschfeld. Both of these high profile bison reintroductions into Romania are part of a continuum of support that the serious zoo community has provided for this species starting in the early 20th century.

When I started in zoos in the 1970s, the story of the saving of the European bison was part of the captive conservation trinity, along with Przewalski's horse and Arabian oryx, which one recited in any discussion that required a defence of the conservation role of zoos. All are classic examples of species that had become extinct in the wild and would have disappeared entirely were it not for the managed captive populations. The bison, or wisent, was the first non-domestic animal to be the subject of a studbook, the European Bison Pedigree Book which was first published in 1932. In recent years, what has become apparent is that many coming into our community are unaware of the classic conservation story of the bison, and there had been a gradual reduction in interest in the species. In part, this may have been down to the belief that the species has been saved and that there is no longer the need for a large, intensively managed, captive population.

According to the last edition of the pedigree book, the global population of European bison is about 5,000: 3,100 in the wild, 300 living as semi-free herds and a captive population of about 1,600, of which about 350 make up the EEP population. Two thirds of the wild population, about 2,200, are found in 12 sites in Poland and neighbouring Belarus.

A wild population of over 3,000 would seem to give the species a level of protection against extinction in the wild that they have not had for at least a few hundred years, but they still face a variety of potentially significant threats and we cannot

afford to become complacent. The largest and oldest wild populations are those on either side of the international border that splits the Bialowieza Forest and a disease was first discovered there in the 1980s that causes inflammation and infection of the penis; to date the cause is still unknown. Some reintroduced herds have become extinct or markedly reduced by poaching in the moderately recent past during periods of political disruption, and we need to be aware of the current political unrest in Ukraine, which had a wild and semi-free population totalling 250 as of the end of 2012; there were 664 wild bison in Ukraine in 1994. The global population stems from a mere 12 founders and the majority of the reintroduced herds can only be traced back to seven of them. Wild-living pure-bred bison in the Caucasus are at risk of genetic contamination from expanding wild herds of American x European bison hybrids.

I am not trying to paint an overly negative picture of European bison conservation issues, or to detract from the tangible contributions that are being made by EAZA member collections in partnership with other conservation NGOs and regional wildlife authorities. What I am trying to underline is that an intensively managed captive population of European bison is as important now as it has ever been and although we have much work to do to get the programme functioning at the desired level, the EEP is the main mechanism we have that can ensure both a healthy safety-net population, and act as an important source of known origin animals for reintroduction into new sites or to support existing small wild herds.

WELCOME RELEASE

Mats Höggren, the Zoological Director of Kolmården Wildlife Park in Sweden, describes the background to the Carpathian bison release.

On 17 May 2014 it finally happened: three European bison from Kolmården Wildlife Park, along with another 14 bison from across several European zoos, set hoof on Romanian soil. The southern Carpathians was once the last stronghold of the European bison in Romania, and after some 200 years of absence, this major reintroduction event is anticipated to mark the beginning of a long-term and holistic approach towards applied conservation biology in modern Europe.

About six months prior to the reintroduction, Kolmården received a request to contribute with animals from Rewilding Europe (www.rewildingeurope.com). After consulting with EEP coordinator Douglas Richardson, even though neither a genetic and demographic management plan, nor a population and habitat viability analysis (PHVA), were yet in place, Kolmården and the EEP eventually agreed to supply the animals. As the target for the south Carpathian bison population is a herd of 500 heads by 2025, this goal is merely a matter of population size rather than a strict maximal retention of the founder genomes – a fact that could and should be debated. However, considering the overall favourable conditions and weighing up the pros and cons, Kolmården decided to be part of this quite remarkable species- and landscape-restoration initiative.

A comprehensive transport protocol covering the entire operation was created and distributed by Rewilding Europe´s project coordinator, and took into account the fairly complicated logistics, as well as animal welfare and veterinary requirements. Two state-of-the-art trucks with trailer units carried out the transportation from western Europe. Kolmården´s bison (one male, two female) travelled with a group from Avesta Bison Park, with each animal in a separate compartment.

Initially, the bison were released in a restricted enclosure of 15ha, and subsequently let into an adjoining 'rewilding zone' of 160ha. In September 2014 they are finally being released into the wild. From then on they will be left alone but monitored as an integrated mega-herbivore component of their Carpathian ecosystem.

The actual release site is in a mixed landscape of forested hills and open meadows in the Tarcu Mountains Natura 2000 reserve. At this end of the Carpathians, the mission is to create one of Europe's largest wilderness areas, covering over 10,000 km2 of protected land. The region comprises unique biodiversity values with a great potential for ecotourism and related economic benefits for local communities, landowners and official stakeholders. Species reintroductions are a costly and multifaceted endeavour, and involve various practical challenges. Rewilding Europe and its partner WWF-Romania are sponsored by the Dutch and Swedish Postcode Lotteries and the Liberty Wildlife Fund, while transport costs for Kolmården´s animals were covered by the SAZA Conservation Fund.

This bison reintroduction is just a start. Local people have already been trained to act as bison rangers and the first official bison guides. From the very beginning, even in the rewilding zones, the bison serve as an important regional tourism attraction, to help enhance local livelihood. A Bison Visitor Centre will be established, from which several nature-related activities will be organised. Bison safaris are already being marketed by UK-based operators and Kolmården Conservation Foundation plans to play an active part in the near future.

Rewilding Europe and WWF-Romania have been working closely with the local community and entrepreneurs, forestry services, hunting and tourism organisations at local, regional and national levels. Further steps include assistance in developing business plans based on biodiversity values, such as wildlife-watching tourism, and efforts to halt poaching and poisoning, which might make possible the return of the griffon vulture to the region. Rewilding Europe is working to establish in total at least three new populations of some 100 individuals each, in other suitable areas across continental Europe. Part of Rewilding Europe's strategy is to establish more efficient coordination between supply and demand for European bison by setting up the European Wildlife Bank. The future seems promising.

Outside the programme

EAZA is well known for its EEP and ESB breeding programmes, and as highlighted on page 14 a fair share of our EEPs and ESBs are for European species. However, several EAZA members take responsibility for the species in 'their own back yard' and are involved in different types of activities for them.
These species are mostly endangered or threatened on regional or national level. The projects themselves vary from providing animals bred in EAZA member collections for release (eg ferruginous duck, chough), hatch-starting eggs taken from the wild and release of the successfully raised juveniles back to the wild (eg water spider, amphibians), and projects that require more long-term commitment (eg corncrake, European hamster, Iberian lynx). It is important that these projects are in close cooperation with local stakeholders and conservation partners, and that they provide the right platform for education, especially for local visitors, to raise awareness and involve local communities in the conservation message.
In the coming pages we highlight a few of these projects to show the diversity in projects in which EAZA members take responsibility for and show commitment to the conservation of native fauna.

CHOUGH CHICKS BEING HAND FED;
INSET: CHOUGHS AT LIBERTY RETURN TO THE AVIARY

RED-BILLED CHOUGH

Red-billed choughs (*Pyrrhocorax pyrrhocorax*) are once again flying high in the skies of Jersey, Channel Islands, thanks to a re-introduction project managed by Durrell Wildlife Conservation Trust.

Choughs had once been considered a common sight across the Channel Islands, but were deemed locally extinct by the 1930s. Changes in coastal land-use was without doubt the driving force behind the choughs' demise.

Durrell began a captive breeding programme in 2010 in collaboration with Paradise Park, Cornwall, to produce birds for release. For various reasons there has been no successful parent-rearing at the park to date. This year, however, staff took eggs for artificial incubation and successfully hand-reared four chicks. The chicks were moved a week before fledging to a purpose-built release aviary on Jersey's north coast. Here they could socialise with six adult choughs living in the wild since their release in spring this year.

Using a soft-release technique the adults gradually became accustomed to life in the wild. They have been target-trained to respond to a whistle for supplementary feed and land on weighing scales enabling post-release general health checks.

Durrell's chicks have now been joined by six parent-reared chicks from Paradise Park. Once they have undergone their training and pre-release health checks they will begin their soft-release journey. By the end of the year Jersey will hopefully have a wild chough population of 16 individuals. There are more releases

planned over the next few years with the aim of a sustainable breeding population by 2020.

The chough is the flagship species for the Birds On The Edge project, a joint initiative between Durrell, the National Trust for Jersey, and the States of Jersey Department for the Environment which aims to safeguard threatened bird species by restoring areas of Jersey's coastal and farmland habitats. For further information go to www.birdsontheedge.org and www.durrell.org/conservation.

CORNCRAKE

Corncrakes spend the winter in central Africa and migrate to Britain and Europe for the summer to breed, *writes Laura Gardner, ZSL*. They are extremely secretive, inhabiting areas of long grass and hay meadows. The males sing to attract mates with a loud, repetitive, rasping call, often continuing throughout the night.

However, the introduction of mechanised grass-cutting led to the wholesale destruction of corncrake nests and chicks. Throughout the last century, this revolution in grass-cutting effectively restricted populations of corncrakes to pockets on the Western Isles of Scotland.

In 2001, a joint project involving Natural England, the RSPB, the Zoological Society of London (ZSL) and later Pensthorpe Conservation Trust (PCT) was initiated to re-establish a population of corncrakes in England using the reintroduction of captive-bred birds.

The project sees corncrake chicks being bred at ZSL Whipsnade Zoo and Pensthorpe reintroduced to a protected area at the Nene Washes, 60 miles away. The dedicated bird teams at ZSL and PCT manage the breeding and genetic health of the captive population and use their husbandry knowledge and expertise to handrear strong and healthy chicks for release.

The first releases of captive bred birds took place in 2002. The numbers released has steadily increased during the years and these birds are known to have successfully migrated to Africa and returned to breed. The offspring of released birds are now also breeding at the Nene. The aim of the project is to establish a self-sustaining population of corncrakes in Eastern England with a target of 30 calling males. If the reintroduction at the Nene Washes is successful, future reintroductions at other sites may be used to facilitate the re-colonisation of the corncrake across suitable habitat in the UK.


CORNCRAKE NEST

EUROPEAN MUDMINNOW

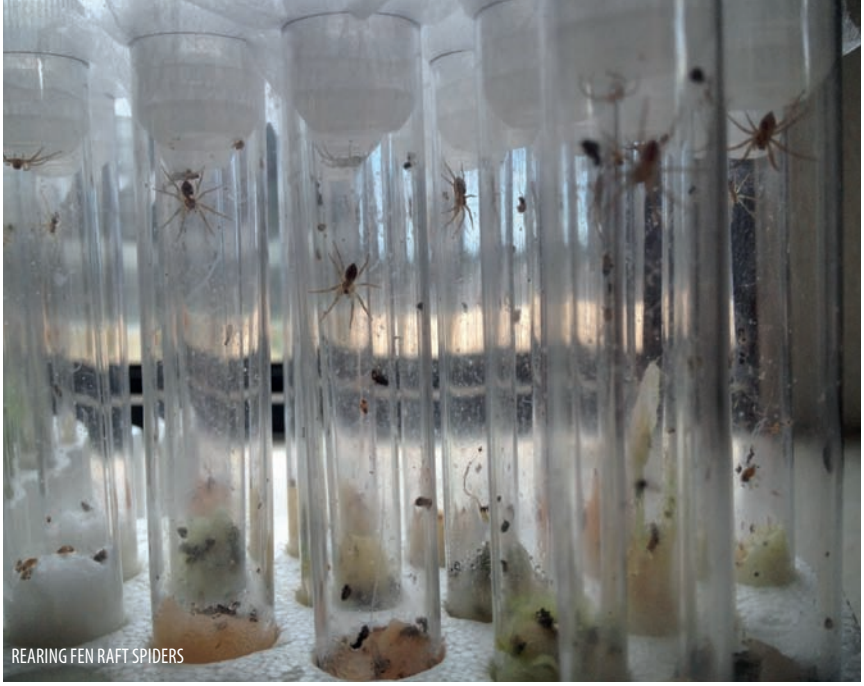
The European mudminnow (*Umbra krameri*) occurs in the lowlands of the Danube drainage, from Vienna to the Black Sea, and in the lower reaches of the Dniester drainage. Due to its ability to breathe atmospheric air, it can deal with low oxygen levels and can adapt to very harsh conditions. Thanks to this adaptability, the small, brownish fish was the first species that became popular as aquarium fish in Austria in the early 20th century.

Following massive river regulation, *U. krameri*, slowly and almost unnoticed, disappeared from its natural habitats and when ichthyologists eventually started to pay attention it seemed it may be too late: for more than 20 years *U. krameri* was thought to be extinct in Austria. Then, in 1992, Josef Wanzenböck from the University of Vienna rediscovered a small, but viable population. Today, the area where the population was found – the Danube floodplain in the east of Vienna – is part of the Danube National Park and the surviving population enjoys special protection and is considered to be stable.

However, this population represents the only relevant one in Austria – a risky situation for a vulnerable species. In 2012, Vienna Zoo and the Danube National Park decided to develop a back-up plan and started a joint conservation project. The zoo received 50 individuals from the national park to establish an *ex situ* breeding population, and in the backstage areas the zoo managed to raise 150 individuals over the past two years. Even more importantly, the zoo was able to confront its visitors with an inconspicuous, native species that – though once popular and quite common – was almost lost for good.


EUROPEAN MUDMINNOW

TOP: JAMIE GRAHAM ZSL; BARBARA NICCA


REARING FEN RAFT SPIDERS

FEN RAFT SPIDER

As part of the UK Biodiversity Action Plan (BAP) for the fen raft spider (*Dolomedes plantarius*) it was recommended that the number of sites sustaining the spider in the UK be increased from three to 12 by 2020 (UK BAP, 2005). Captive breeding, rearing and translocation from the existing sites have been the key actions over the past three years. Rearing of the spider is down to the combined efforts of 11 invertebrate collections across the UK. Under Natural England guidance, the Disease Risk Analysis and Health Surveillance team was asked to formulate a disease risk-management protocol for the ZSL London Zoo fen raft spider quarantine unit (FeRSQ). It is expected that quarantine protocols will be developed for all 11 rearing collections.

More than 12 months ago, 186 fen raft spiders were taken from a bio-secure unit at Chester Zoo to the RSPB's mid-Yare reserve to help establish a new wild population of fen raft spiders. In all 2,437 spiders were released and the team kept everything crossed to see what the outcome would be.

Fast forward a year and the team was delighted to see a pregnant female at the same release site; spiders were not expected to breed until 2014 so this was a particularly welcome discovery. This good news was mirrored at the original release site, a Suffolk Wildlife Trust nature reserve, where more than 90 nursery webs were observed.

Again this year, Chester Zoo took part in the fen raft spider translocation programme. For the first three months of the spiders' lives they are hand-reared in individual test tubes. This reduces cannibalism between siblings as well as any threat from predators, ultimately allowing more spiders to be released back into the wild. We have had fantastic results this year with 98% of the spiderlings released in October.

The future of this project is looking bright at the moment, with three new populations being established in just four years. With this success in mind it is hoped that the project will go from strength to strength and reach its target of releasing 12 populations by 2020.

FERRUGINOUS DUCK

Many zoos keep ferruginous ducks (*Aythya nyroca*) but, unfortunately, without special care or attention. Nevertheless, the species is Critically Endangered in Germany, so the Ministry of Environment of Lower Saxony involved the species in the programme 'Ark Lower Saxony' to try reestablishing a population of ferruginous ducks at the lake 'Steinhuder Meer'.

The project is run by BirdLife Lower Saxony and the Ecological Station Steinhuder Meer, and various zoological institutions in Germany provide them with offspring for releasing. Cooperation with the zoos is coordinated by the Wildlife Rescue and Conservation Centre Sachsenhagen (WRCC).

Before the first releases in 2012 WRCC also carried out a genetical screening of the ferruginous duck population in the cooperating zoos to avoid the release of hybrids. No signs of hybridisation could be detected. Scientists are monitoring the ducks at the release site and to gain further information about the migration of the birds all ducks are marked with colour-rings and rings from the Institute of Avian Research (Vogelwarte Helgoland). By summer 2014, 174 ducks had been released.

For further information, contact Dr Florian Brandes, Wildlife Rescue and Conservation Centre, at florian.brandes@wildtierstation.de or visit www.wildtierstation.de.

EUROPEAN HAMSTER

The European hamster was once widely spread across Europe and into Asia. Its range extends from Belgium and Alsace in the west, to Romania in the south and through to Russia and beyond to the east. It is typically found in low-lying farmland with soft loam soils. However, with changes in agriculture, its numbers have declined across most of its range. The hamster has become locally extinct and its population at the western end of its range is severely


FERRUGINOUS DUCK RELEASE

F. BRANDES


EUROPEAN HAMSTER

reduced and fragmented with only small enclaves surviving in eastern France, southeast Holland, central and eastern Belgium and several German Federal States. However, according to the IUCN Red List it is still classified as Least Concern because the species remains abundant in some areas in the eastern part of its range.

Nevertheless, the EU has legislated to prevent the extinction of this species in member states and has used these powers to take action against states which fail to protect the species adequately. For example, in 2011 the European Court of Justice ruled that France had failed to protect the hamster and that if it did not adjust its agricultural and urbanisation policies sufficiently to protect the species, the government would be subject to very large fines.

In order to avoid similar legal issues, the Dutch government funded Rotterdam Zoo together with other partners to establish a breeding and reintroduction programme to save the species within its borders. This programme was founded in 1999 when the last 14 animals still surviving in the wild were caught and brought to two captive breeding centres. These founders were related to each other so, to increase genetic diversity in the founder base, new hamsters from Belgium and Germany were introduced into the breeding programme. Most recently two males from Zülpich (North Rhine-Westphalia, Germany) were successfully added to the Dutch breeding program.

The first captive born hamsters, together with their transponders, were released in 2002. The release sites in south Limburg were located on farms which had agreed to adopt hamster-friendly agricultural practices.


IBERIAN LYNX

Since the start of the programme, Rotterdam Zoo has bred more than 700 hamsters of which around 600 have been returned to the wild in six different locations. This is just the start; it has become clear that the hamster populations in Belgium and Westphalia, Germany need support if they are to survive. This means that the hamster programme will be expanding to include these areas. In the future, Rotterdam Zoo and our hamster-breeding partner Gaia Zoo will be breeding hamsters which will later be sent to locations outside of the Netherlands. We are also looking to develop this into a Life+ programme in the future.

IBERIAN LYNX

This programme started in 2002 when the Iberian lynx was in a critical state with no more than 100 animals left worldwide in two populations in Andalusia.

Zoobotánico Jerez was involved in the programme's implementation from the beginning, coordinating it for some years. The first cubs taken from the wild to be founders of the programme were raised at Jerez Zoo and soon a network of exclusive breeding centres was created, including two in Andalusia, one in Extremadura and one in Portugal.

The programme operates within the frame of the National Strategy for the Conservation of Iberian lynx and in close cooperation with the Life+ Iberlince project for the conservation of the remnant populations and for the reintroduction of the Iberian lynx in its former range.

The first litter in captivity was born in 2005 in El Acebuche centre in Doñana national Park. Since then the population has increased steadily and currently includes 136 individuals within the four breeding centres and Jerez Zoo as an associated centre.

In December 2010, two females were released in Andalusia, leaving their large adaptation pens for the wild in February 2011. After some improvements in the training of the captive-born litters it is no longer necessary to use this system and now all lynxes are released directly in the wild with a high survival rate. In total 71 lynxes have been released from the conservation breeding programme into the wild.

The situation of the species has improved quite a lot in recent years with more than 300 animals now living in the wild in six populations.

Saving the greater Capricorn beetle

A BREEDING PROGRAMME COULD BE THE SOLUTION FOR A SPECTACULAR SWEDISH BEETLE

Jimmy Helgesson, Zookeeper, and Christer Larsson, Project Leader, Nordens Ark

With its big, pitch-black body and long slender antennae the greater Capricorn beetle (*Cerambyx cerdo*) is a spectacular insect. Listed as Critically Endangered in Sweden and on the brink of extinction, this species is in need of attention. Over a three-year period Nordens Ark has managed to develop a method for reproducing the species in captivity which will be used in a future reintroduction.

SPECIES BACKGROUND

Cerambyx cerdo is predominantly a European species and threatened in most parts of the continent. The species is listed in both the habitats directive of the European Union (Annex II and IV) and in the IUCN Red List of threatened species for 2009. In Sweden *C. cerdo* is protected by law and classified as Critically Endangered on the Swedish Red List. Once, the species was found in five provinces in the southernmost part of the Swedish mainland, but now there is only one remaining population, in the nature reserve of Halltorp on the island of Öland.

The habitat of this beetle has decreased enormously in Sweden during the last 200 years. Larval development takes place in sun-exposed living old oaks that are weakened or damaged, and are standing in grazed areas, but thousands of old oaks have been cut down, mainly during the 19th century. These woodlands are no longer grazed and have turned into forests while others have been cut and replaced with plantations. The Swedish Action Plan for protection of the species proposes, among other things, development of a breeding programme in controlled lab conditions. To achieve this, Nordens Ark and the County Administration of Kalmar have started a very unique breeding trial to learn how to produce fertile offspring.

REARING TECHNIQUES

Since the species population is very fragile in Sweden, breeding material had to be collected in Poland, outside the town of Rogalin. The area is a vast flooded grassland with several hundred-year old oaks, where *C.cerdo* thrives.

With permits from Polish authorities for collecting 15 pairs once a year, for three years, the beetles are brought back to Nordens Ark, where each pair is kept in boxes containing two pieces of fresh oakwood with the bark still on. The mating occurs at dusk and during the night, and after copulation the female is very active looking for suitable bark cracks to lay her eggs. This procedure occurs multiple times, every night, until the beetles die. The eggs are easy to find as they are about the size and shape of a sesame seed, and after about one week they hatch into larvae. A newly hatched individual weighs about 0.004 grams and has to be handled very delicately. Each larva is placed in its own petri dish containing food substrate. For some insect species it's essential to have the host plant present for the larva to start eating. The *C.cerdo* larvae are therefore given a mixture of oak shavings, powder for breeding drosophila and water, a recipe that has been developed and refined during the project.

In the wild, larva development lasts for about four years in southern Sweden, but is probably faster in the Polish population. However, the project found that most larvae turn into pupae during late summer of their second year when given a more nutritious diet.

After less than a month the pupa skin breaks and a golden white beetle emerges. But this is not the final step; the project believes that the beetles hatch in autumn and then stay deep inside the oak wood during winter waiting for the next summer. So, after hibernating as a hatched beetle, the adult life begins and the circle is completed. This method is now being tested with good results. The aim of the project is to use the method in a large-scale breeding and reintroduction programme to ensure the long-term survival of the greater Capricorn beetle in Sweden.

Venomous, yet exposed

THE FIGHT IS ON TO SAVE THE RARE AND ELUSIVE HUNGARIAN MEADOW VIPER

Endre Sós, Zoo Health Management, Budapest Zoo and Bálint Halpern, MME BirdLife Hungary

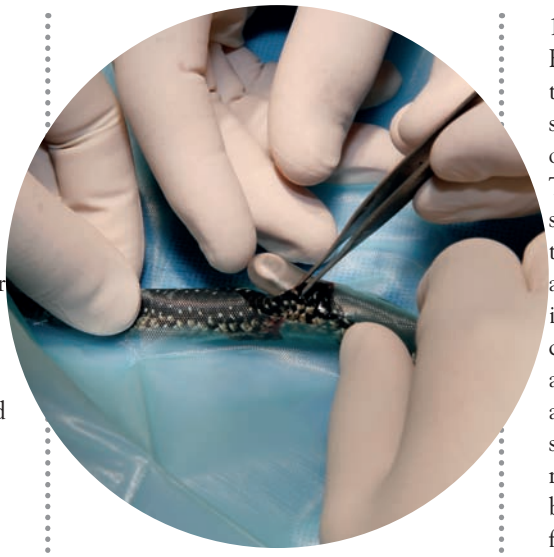
Current taxonomy differentiates 25 Eurasian viper species and many more subspecies in the Viperinae subfamily. The two venomous snake species of Hungary both belong to this group, which are the patchily distributed European adder (*Vipera berus*) and the strictly protected, Endangered Hungarian meadow viper (HMV, *Vipera ursinii rakosiensis*).

By the end of the 20th century the HMV was almost extinct and is still considered to be the most endangered Hungarian vertebrate (recent population estimates judge the size of the wild population to be between 500 and 1,000 individuals). Its critical state has also been recognised internationally, as it is included in the Bern Convention Appendix II, it is listed in the CITES Annex I. and the IUCN has categorised the species as 'threatened'.

The remaining populations occur on diverse grasslands in two national parks (10 populations in the Kiskunság and two in the Hanság). Moreover, there has been the good news of the species' rediscovery in Transylvania, where it was thought to be extinct.

The declining trend had been clearly recognised by conservationists: 'old' viper collectors have been telling stories from the 1970s when they used to be able to find 50 vipers in one day on some sites where systematic search by the researchers only managed to find one viper in 50 days by the end of the 1990s. The main reason for this rapid decline was continuous habitat loss, caused by a change in agricultural management from the 1950s.

In 2001 Budapest Zoo organised and hosted a Population and Habitat Viability Assessment, led by the IUCN Conservation Breeding Specialist Group. The event was conducted by the late Dr Ulysses S Seal and Dr Phil Miller, and the gathering of well-known international experts convinced the Hungarian stakeholders and authorities that the time had come for coordinated action.



As a result and in order to stop the rapid loss of the species, MME BirdLife Hungary together with national parks and Budapest Zoo started a complex conservation project which was co-funded by the European Commission's LIFE and subsequent LIFE+ funds. The actions concentrated on four major areas:

1. captive breeding and reintroduction at a later stage (creation and operation of the Hungarian Meadow Viper Conservation Centre, HMVCC)
2. habitat reconstruction
3. monitoring of the species and its habitats at the remaining populations, located in the Kiskunság and Hanság National Parks
4. public awareness campaign.

Budapest Zoo joined these efforts from the very beginning to contribute the operation of the HMVCC (providing captive-bred crickets for the vipers) and the veterinarian management of it. The former means a weekly consumption of 3-4,000 crickets (*Acheta domesticus*, *Gryllus bimaculatus*) from April until September.

For conservation breeding purposes 10 individuals were caught in the wild in 2004, and a further six specimens were collected in 2006/2007. These 'founders' were collected from six different populations due to genetic reasons. Up until this year almost 1,700 individuals have bred in the HMVCC, and since 2008, when the first captive-raised individuals started breeding, the number of offspring has increased significantly. The mortality rate of the young snakes was close to 10% when the programme started and the animals overwintered inside at individual terraria. This rate is close to 20% now, but the vipers are kept in a more natural way at the protected outside terraria, spending their first winter amongst natural circumstances so that they become much better candidates for the releases which started in March 2010 (30 adult snakes into a reconstructed habitat in Kiskunság National Park).

All releases must be followed up to gain further knowledge about the fate of the individuals and the success of our work. In order to develop a remote tracking method, pre-programmed VHF radio-tags with a detection range of 200-300m, developed by the Research Institute of Wildlife Ecology, University of Veterinary Medicine Vienna (FIWI), were implanted surgically into the coelomic cavity of 21 vipers. These tags also operate as temperature loggers, recording data every five minutes for a year-long operation period. Further specimens at the HMVCC were implanted only with temperature loggers. These technical devices delivered extremely important information about the life history and especially the dispersal and survival of the released individuals.

Finally, the public awareness campaign is also crucial for the survival of this species. There are live exhibits in Budapest and Schönbrunn and Szeged Zoo will display the species soon. Moreover, information points in all Hungarian zoos have been erected.

As a conclusion we can clearly say that the conservation effort is on the right track, but it is still too soon to conclude that we have saved the Hungarian meadow viper!

Clawing it back

A TEAM EFFORT IS ATTEMPTING TO SAVE THE NATIVE WHITE-CLAWED CRAYFISH FROM THE THREAT OF INVASIVE SPECIES

Jen Nightingale, UK Conservation Manager, Bristol Zoo Gardens

The white-clawed crayfish (*Austropotamobius pallipes*) is one of Britain's largest freshwater invertebrates and our only indigenous crayfish species. In 2010, the IUCN upgraded its status from Vulnerable to Endangered; the white-clawed crayfish is Endangered not only in the UK but throughout its range in mainland Europe. In England, white-clawed crayfish have experienced the most extensive decline since the 1970s, primarily due to the introduction of non-indigenous crayfish species, which were introduced into UK farms for the restaurant industry. Of particular concern is the threat of the American signal crayfish (*Pacifastacus leniusculus*) which can carry crayfish plague. This disease can eradicate entire white-clawed crayfish populations within a few weeks. Signal crayfish are a larger, more aggressive crayfish species and can out-compete white-clawed crayfish and damage both the morphology and ecology of river systems.

FORMING A PARTNERSHIP

The South West Crayfish Partnership (SWCP) was formed in 2008, with the Avon Wildlife Trust, Bristol Zoo, Buglife and the Environment Agency forming the steering committee. It is reliant upon external funders including Natural England, BBC Wildlife Fund, the Environment Agency, Biffa Award, Bristol Water, the Heritage Lottery Fund, The Mohammed Bin Zayed Species Conservation Fund and the Centre for Environment, Fisheries and Aquaculture Science. The SWCP implements landscape scale, strategic conservation for white-clawed crayfish by establishing ark 'refuge' sites, in an attempt to safeguard the future of this species. Extensive desk-top mapping and field surveys identified and assessed all remaining white-clawed crayfish populations within the southwest. The ark site selection is very rigorous, factoring in elements such as the effect on existing species, plus habitat and water quality suitability and long-term site security. Over the past five years, 15 ark sites have been established with over 5,000 crayfish moved from nine highly threatened wild white-clawed crayfish populations. It is estimated that the ark sites have increased *in situ* populations within Southern England by approximately 50%.

'NEW FACILITY

As part of the SWCP's strategy a white-clawed crayfish captive breeding and rearing facility was established at Bristol Zoo Gardens. The captive-born juveniles are used as bio-secure, plague-free brood stock, for research, outreach, ark-site release and supplementation of wild *in situ* stocks. Bristol Zoo's hatchery achieves a 75% survival rate on average and over 2,000 crayfish have been reared. Closed-cycle breeding is also achieved, adult females being mated within captivity rather than being brought into the zoo already berried (egg-laden) and Bristol Zoo now has second generation juveniles. In the spring of 2013, in partnership with the Hampshire and Isle of Wight Wildlife Trust, 12 berried white-clawed females were brought in to Bristol Zoo, from the last remaining population in Hampshire, in an attempt to boost the wild stock. It is estimated that the Hampshire population is down to approximately 2,000 animals and the entire population is only present in one river catchment. Over 400 youngsters hatched at Bristol Zoo last summer and 200 were released into an unpopulated stretch of river, upstream from the resident population, in spring 2014, with the aim of eventually linking the existing wild population with the captive-born supplementation.

A further 16 berried females from the River Itchen were brought into Bristol Zoo this year, all the eggs hatched, and the juveniles are being reared on for release in subsequent years. The release site will be closely monitored over several years and its genetic integrity researched.

WHITE-CLAWED CRAYFISH

Running alongside the ark site and captive breeding elements is the South West Crayfish Partnership's communication strategy, which reaches local, national and international audiences via publications, outreach events, newspaper, television, radio and social media. The white-clawed crayfish display, established within the Bristol Zoo aquarium, links to the off-show breeding facility via multimedia displays. A key target focus group is the angling community, highlighting the importance of the Environment Agency's 'Crayfish Code'; that it is illegal to trap, move, or use as bait, any species of crayfish without a licence. Establishing a flagship fishery at a local, popular fishing club near Bristol was pivotal to the success of the campaign. A restaurant campaign encourages sustainable sourcing of crayfish and schoolchildren are educated through Bristol Zoo's conservation sessions and through the development of a crayfish roadshow. All communication elements tie in closely with the Department for Environment, Food and Rural Affairs' (DEFRA) 'Check Clean and Dry' and 'Be Plant Wise' initiatives, attempting to reduce the spread of invasive species.

The South West Crayfish Partnership is the largest strategic partnership project for white-clawed crayfish conservation.

Further information can be found at http://www.bcsf.org.uk/bcsf/crayfish-in-crisis-project.

8th European Zoo Nutrition Conference
Royal Burgers' Zoo in Arnhem, 22-25 January 2015

Register and send in your abstracts now for the 8th European Zoo Nutrition Conference hosted by Royal Burgers' Zoo in Arnhem The Netherlands! The conference is jointly organised by the EAZA Nutrition Group and VHL University of Applied Sciences together with our host.

EAZA Academy workshop

22 January 0900-1730: *Aspects of Zoo Nutrition: Primates and Herbivorous Reptiles.*

This practical workshop preceding the conference will focus on providing an overview of essential information and skills related to nutritional management of the subject species. There will also be a possibility to get acquainted with the new Fauna™ nutrition software.

Conference programme

The central theme of the conference is *Feeding zoo animals for health, welfare and conservation*. As usual we welcome contributions on any zoo animal nutrition related topic. Specific topics will be on fish nutrition, primate nutrition and bird nutrition.

Oral presentations: 10 or 20 minutes and 5 minutes questions/discussion

Posters presentations

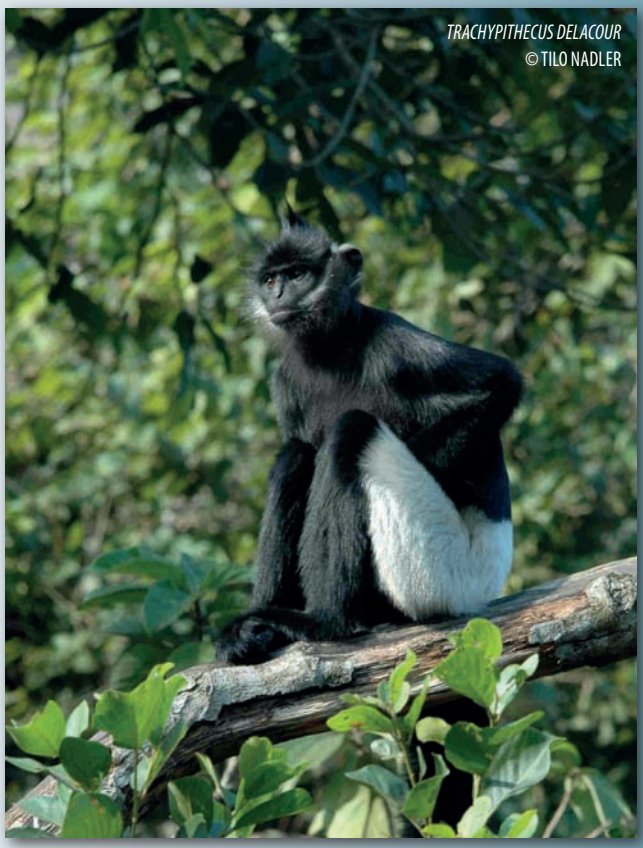
Q/A-sessions: participants can send their questions and cases to the organizing committee in advance in PowerPoint format. Photos can contribute to a lively discussion.

Demonstrations (zoo visit): During the zoo visit nutrition related topics will be demonstrated such as: body condition scoring, measuring UV-B, quality of food items etc.

Submission deadlines*

Oral presentations/poster abstracts: 15 October 2014
Questions for Q/A-sessions: 2 January 2015

* Email to mclauss@vetclinics.uzh.ch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Accommodation

We have made conference reservations in three hotels in Arnhem with rooms in a 69-119 euro price range:

BEST WESTERN PLUS Hotel Haarhuis
Stationsplein 1, 6811 KG Arnhem,
www.hotelhaarhuis.nl.

Van der Valk Hotel Arnhem
Amsterdamseweg 505, 6816 VK Arnhem,
www.hotelarnhem.nl.

Holiday Inn Express
Nieuwe Oeverstraat 50, 6811 JB Arnhem,
www.hiex.nl.

Please visit www.eaza.net/activities/Pages/Nutrition.aspx for more information about the conference

Registration fees	Until 31 Oct. 2014	From 1 Nov. 2014
Full Conference	€ 250	€ 300
Daily Conference	€ 90	€ 110
EAZA Academy Workshop	EAZA Member € 100 Non EAZA Member € 125	

Strange birds and returning carnivores

INVASIVE AND ENDEMIC SPECIES ARE NEIGHBOURS IN A NEW DUTCH PROJECT AIMED AT SHOWING VISITORS HOW HUMANS AFFECT ANIMAL DISTRIBUTION

Tjerk ter Meulen Curator, and Hanneke de Boer, Education and Communication, Gaia Zoo

Up until 2013, GaiaZOO housed Iberian wolves and Bochara deer in the taiga part of the zoo. Their enclosures needed refreshing, however, and the design team came up with a complete rethink, themed around human influence on the distribution of animal species and nature, in which grey wolves and invasive species would be neighbours. Although two EEP species had be removed for the project, we felt that the educational theme of this new area was very important for our visitors. In January 2014, GaiaZOO started the building project, which covered more than 6,000m2, and six months later the complete new area was opened for the first time. It was the largest building project since the zoo opened in 2005, and visitors can now enjoy 25 new species and five amazing new enclosures.

AVIARIES AND VALLEY

GaiaZOO believes in sustainability and recycling, so all the fences from the previous enclosures were carefully removed before the new project began, with the mesh wire and wood being reused for the new fences. Over 20 trees were cut down but used as landscape elements or climbing structures for the animals. Four existing stables and prominent visitor shelters were kept.

A huge walk-through aviary – 9m by 18m by 40m – was built, with eight 12m high steel pylons carrying an immense stainless steel net, which uses 122km of wire. Known as the Strange Birds Aviary, it houses 13 different invasive bird and turtle species, including ring-necked parakeet, monk parakeet, mandarin duck, sacred ibis and red-eared slider. For two invasive carnivores, the raccoon and the striped skunk from North America, a separate enclosure was built. Visitors can experience the natural behaviours of these animals, seeing them climbing or sleeping high up in the trees, pottering around while turning stones or scratching the ground and swimming in the water basin.

Alongside the Strange Birds Aviary and the raccoon enclosure, a spacious Wolf Valley was landscaped. Six wolves now roam the 2,200m2 valley, which consists of shrubs, sandstone, a grassy area, various trees and water. Visitors can walk around the valley, while an underground tunnel leads them through the enclosure, providing a striking opportunity to see the wolves walking around them. Emerging from the tunnel on the other side of Wolf Valley, visitors walk through an aviary for three indigenous Dutch bird species: raven, Eurasian eagle owl and black stork. This aviary is built around a church tower, from which visitors have an exciting view of the birds.

The fifth enclosure is a small, secret aviary called Parakeet Paradise, made of European oak in the typical Limburg timber-framed construction style. The sides and roof are lined with fine steel mesh wire. In Parakeet Paradise, six different Australian bird species (including grass parakeets, zebra finches and diamond doves) fly around the visitors, twittering and chirping all day long. The intimate character of this small aviary was especially chosen for children, so that they can experience

WOLF VALLEY

RING-NECKED PARAKEET

these beloved pet birds in a more natural setting.

STRANGE BIRDS

In Europe there are thousands of species that actually come from other countries or continents. They are known as 'invasive species' – we also call them 'strange birds'. Humans took them from their natural surroundings and brought them to other parts of the world – either deliberately or by accident. Many small animals, bacteria or plant seeds unintentionally travel with us in our clothes or on animals' paws, while other species have been deliberately introduced for exhibition, hunting, fur farming or as pets. Every so often these exotic animals escape from captivity, or are deliberately set free, and their presence can have negative consequences on the native species in their new country. They can make indigenous species ill, compete with them for resources or even become a plague. Just to give a few examples; ring-necked parakeets are starting to become a burden for fruit farmers and for people in large cities, while North American red-eared sliders are competing for resources with the endangered European pond turtle in several European countries. Meanwhile, the opportunistic raccoon feeds on the nestlings and eggs of rare birds. GaiaZOO takes it as its duty to inform visitors about everybody's personal role in the problems with invasive species, and to open their eyes to the consequences of invasive species in our own backyard.

To help spread these messages, a mascot called Willie Wasbeer (Ricky Raccoon) has been created. Via signage, and character actors, he informs visitors about invasive species and the role we as humans have in this problem.

RETURNING CARNIVORES

Grey wolves once roamed all over Europe, but as we humans were afraid of those large carnivores, we eradicated them from our surroundings. In the Netherlands the last grey wolf was shot in the mid-19th century. The same happened in other parts of western Europe, but at the end of the 20th century wolves started to reappear in some parts of their original range. In 1996, Polish wolves crossed the German border and, by 2012, at least 12 packs roamed the country, moving further westwards every year. In 2014, the first lonely wolf in 150 years wandered through the Netherlands for two days. It will only be a matter of time before wolves will settle in our country again.

Every citizen should get used to the idea of living close to wolves again, which might be difficult after such a long period of absence, but the respectful way in which GaiaZOO houses grey wolves helps to teach visitors that we can live in harmony with this social large carnivore without having to be afraid of them. As long as we respect them and leave them alone, fairy tales like Little Red Riding Hood need not scare us any more.

The grey wolf is not the only animal to be persecuted by humans. The meat-eating eagle owl and raven were on the edge of extinction in the Netherlands because farmers loathed them for they thought that the birds ate their young livestock. They poisoned them, leaving none behind. Thanks to the efforts of conservationists, ravens were reintroduced to our country in the 1970s and now over 100 pairs live here, enlarging their range. The number of eagle owls in the Netherlands has similarly risen thanks to efforts of nature lovers.

HUMAN INFLUENCE

The new area of GaiaZOO shows visitors the various ways in which we influence nature. On the one hand we bring new species into our own backyard, often without realising the possible (negative) impacts. On the other, we do everything we can to help threatened species return to their original habitats. In both the walkthrough aviaries and Wolf Valley, visitors are immersed in birds of all kinds and able to come close to the animals. This way they feel more connected to them and are astonished by their beauty. This is a good opportunity to provide information about everybody's responsibility in the distribution of these animals and the way our lives contribute to this, both positive and negative.

Back to the wild

REWILDING EUROPE BELIEVES THERE IS A CHANCE TO RECONNECT WILD NATURE WITH MODERN SOCIETY, AND THAT ZOOS COULD BE IMPORTANT PARTNERS IN SUPPORTING THIS PROCESS

Wouter Helmer, Rewilding Director, and Staffan Widstrand, Director of Marketing and Communications, Rewilding Europe, Nijmegen, The Netherlands

Europe is changing, and changing very fast. Young people are moving to the cities and coastal areas and, each year, almost a million hectares of low-productive farmland is being abandoned. This is a tragedy in many ways, but it does at least give nature a chance to start coming back.

Sadly, however, that doesn't always happen and natural landscapes in Europe are too often like theatres without the actors. Rewilding Europe believes there is a chance here to reconnect wild nature with modern society, for the benefit of man and nature alike. Wildlife is absolutely key to that philosophy, and we believe that zoos could be important partners in supporting the necessary wildlife comeback.

REWILDING EUROPE

For the first time in centuries, large parts of our continent are experiencing shrinking human populations and, as a result, a decreasing human impact on nature. What in many ways can be seen as a socio-economic disaster can also be regarded as a unique opportunity to bring back spectacular nature and at the same time build new rural business and economic development around those 'wild values'. Reconnecting modern society with a wilder nature is the core activity of Rewilding Europe, founded in 2011 as a new initiative to grasp this opportunity.

One of the main goals of Rewilding Europe is to identify and develop rewilding in 10 large areas, each of at least 100,000ha, spread across Europe, where natural processes are more allowed to shape the landscapes, where people earn a fair living from the wild and where rewilding is highly appreciated and supported by local communities. Such a process needs time and Rewilding Europe has given itself 10 years to take the first steps in building these real life showcases as examples for rewilding in similar habitats elsewhere.

To reach this goal, Rewilding Europe not only puts its energy into encouraging the return of natural processes, but also in communicating to a wide audience about the wild wonders of Europe and establishing rewilding enterprises to create the business case for nature's comeback. It's a new strategy that could also help European governments reach their goals within Natura 2000, Europe's ambitious protected area network, but for which much funding is still lacking.

'Rewilding' is much more about the process (making Europe wilder) than about end results. It is very much about 'learning by doing', as there is no single 'wild' area left in Europe that can serve as a full reference. Even the wildest parts of our continent are missing key natural processes, wildlife species or wildlife in natural numbers. Due to the continuing changes of our social environment, the climate and nature itself, the reference for Rewilding Europe is therefore in the future, rather than in the past. Rewilding Europe uses the latest scientific insights on natural processes to give nature back its own tools. If we act – for example by bringing back keystone species – it's in order to act less in the future and give nature the chance to do its own job.

THE CRUCIAL ROLE OF WILDLIFE

Having natural processes back in the lead does not just mean the recovery of free flowing rivers or undisturbed forest growth. It also means the return of key ecological processes in which wildlife is involved.

Biodiversity in Europe is highly dependent upon processes connected to wildlife. Tens of thousands of plant and animal species find their habitat in the open and half-open landscapes that originate from the impact of natural grazing by large herbivores. The way herbivores use the landscape or choose to avoid certain places is to a large extent influenced by large carnivores like wolf, bear and lynx. In the case of beetles, we know that at least 750 species forage on carcasses, as do many other insects, birds and small mammals. So a single attack of a wolf on a red deer starts a story involving more than thousand species! Vultures wouldn't have existed in Europe without this process. Tortoises and many butterflies wouldn't have survived and developed into a multitude of species over millions of years, without huge areas heavily influenced by large numbers of herbivores on this continent.

However, it is not only for their ecological role that Rewilding Europe puts so much emphasis on wildlife. We are very much aware of the fact that for many people the support for nature and conservation starts with a close identification with one of those living actors in nature, preferably a large mammal or bird species. In addition the rewilding economy is to a high level connected to wildlife and the chance of watching it. So if we talk about reconnecting people with wild nature, wildlife plays a crucial role.

Using this role in a constructive way means much more than just releasing animals. This is particularly true of large carnivores, but is also the case when we talk about the natural role of wild living horses and bovines; psychology and communications

STEFANO UNTHERTHINER & GRZEGORZ LENIEWSKI / WILD WONDERS OF EUROPE; STAFFAN WIDSTRAND/REWILDING EUROPE


WOLF


FARMING WITH DONKEY

are perhaps even more important disciplines than ecology. Zoos can help us with all three.

HISTORICAL OPPORTUNITY

Europe's natural landscapes lack much of their natural variety and quantity. In fact our huge numbers of domestic livestock resemble the real mammal production potential of the European landscape. We have forgotten about the wild red deer, fallow deer, roe deer, aurochs, wild horse, chamois, water buffalo, ibex, bison, wolf, bear, lynx and wildcat that once roamed these landscapes. We had them exterminated (wild horse and aurochs), domesticated (horse, cattle, water buffalo, goat, dog, cat) and decimated (all of them) to avoid them competing with our businesses. Because we have been doing this in Europe for so long, we have also lost the true picture of Europe's natural landscape and its original, native inhabitants.

However, times are changing. Food production is now being concentrated within the best soils. People are leaving the marginal rural landscapes in large numbers and urbanisation is widespread. With more people in cities, no longer struggling to produce food on every square metre, the relation between nature and people is slowly relaxing. With millions of hectares already abandoned, there is new space to give this more relaxed relationship an exciting future. Actually, the wildlife comeback we face these days, with wolves recolonising Western Europe, plus exploding numbers of beavers, white-tailed eagles, cranes, deer and many other charismatic species, is a clear manifestation of this changing relation.

However, wildlife numbers are still extremely low, even up to 100 times lower than their natural densities. This means that the wildlife comeback could be improved and increased by a conscious rewilding policy. Using the growing interest in wildlife, substantiated by scientific arguments concerning its ecological importance, Rewilding Europe is working with land managers, forest managers, hunting organisations and local communities to create 'no-take-zones', to restore natural processes and bring back missing species, creating an enabling environment for a new, more nature-based, rural economy.

EAZA AND REWILDING

In order to restore the natural role of wildlife, the numbers of animals have to be stimulated as well as public acceptance of those higher numbers. Zoos could play an important role in both cases.

As we talk about hundreds of thousands hectares of core rewilding areas and millions of hectares in the surrounding bufferzones, large numbers of wildlife are needed to rebuild viable populations of the key species in different parts of Europe. For some species, like red deer and beaver, or wolf and bear, the main solution will come by stopping poaching and poisoning in the field, and changing forestry and hunting management. As many of these animals are kept in zoos, active communication about their role in nature will help to improve the public acceptance of more natural numbers of these species.

Other species, like chamois, ibex, European lynx, kulan, European water buffalo, European bison or vultures are extinct over large parts of their original natural ranges. EAZA members could help here with careful and well-managed breeding programmes and adaptation of animals to the natural habitats in which they are to be released. Connecting zoo visitors not only to the animals, but also to the areas in which they are to be released, could stimulate the local economy of those areas, as visitors might decide to explore these areas themselves. A strong communication with zoo audiences will also help to raise funds, both for the breeding programmes as well as the successful releases of the animals into the wild. The complementary infrastructure and skills of EAZA members and of Rewilding Europe, around the practice of reintroductions as well as communications, could be seen as a perfect match.

Call of the wild

IN ORDER FOR EUROPE'S LARGE CARNIVORES – THE 'BIG FIVE' – TO HAVE A CHANCE OF SURVIVAL, WE NEED TO INCREASE PUBLIC AWARENESS OF THE ISSUES OF COEXISTENCE

David Williams-Mitchell, Communications and Membership Manager, EAZA

Europeans have been reshaping the landscape to suit their needs for over a thousand years, during which time human populations have grown enormously, as has our knowledge of techniques to intensify agriculture and modify the environment. Inevitably, we humans have regarded our own interest as paramount, and have viewed some of our natural neighbours as little more than an impediment to progress. The most problematic of these animals, particularly for livestock farmers, are large carnivores, of which five species exist naturally in Europe: the brown bear (*Ursus arctos*), the wolf (*Canis lupus*), the wolverine (*Gulo gulo*), the Eurasian lynx (*Lynx lynx*) and the Iberian Lynx (*Lynx pardinus*). However, as awareness grows across Europe of the importance of biodiversity, and the role that these species can play in both ecotourism and ecosystem management, conservationists and legislators have been working to overcome the conflict between predators and humans and ensure a place for carnivores on our crowded continent.

'There are no universal models for managing and mitigating the conflict between humans and carnivores,' says Dr Luigi Boitani, Chair of IUCN's Large Carnivore Initiative in Europe (LCIE), which has been working on the conservation of these species since the mid 1990s. 'Every situation is different, and determining the local context is key to finding a good compromise that allows people and animals to find a balance.'

Indeed, Dr Boitani notes that one of the largest challenges faced by LCIE is the tendency of people to look for a one-size-fits-all solution, especially the old human fallback of searching for modern technologies to help. Successful solutions in particular areas range from the oldest of all predator deterrents – the guard dog – to modern electric fencing. In most cases, however, LCIE conservationists have found that a combination of measures designed to mirror the local circumstances can bring a measure of harmony to the relationship. Money helps too, in the form of compensation for farmers – the earliest such scheme dates back to Italy in the 1970s – however, compensation merely provides restitution, and cannot help shape the attitudes needed that will allow large predators to live more or less free in Europe. For that to happen, awareness of the challenges and their size needs to grow not just among those whose livelihoods depend on good management of large carnivores, but also among the public.

RAISING AWARENESS

'That's where EAZA institutions can really make a difference,' says Dr. Boitani. 'Carnivore populations in Europe are generally quite genetically diverse, so there's no real pressure to provide animals from breeding programmes to supplement the wild populations. Where EAZA can help is in providing the educational context that will help Europeans understand better the tensions, and sometimes conflicts, that exist between people and large carnivores.'

As Europe continues its march toward urbanisation, people are losing their connection to animals such as the lynx and wolverine. 'Introducing people to some of the techniques used to maintain an equilibrium is important, even if it can be difficult for people to accept the need for, for example, culling of bears and other charismatic animals,' says Dr. Boitani.

INTEGRATED APPROACH

LCIE notes that there are two main options available for European conservation efforts: to concentrate large numbers of carnivores in small and highly protected ecosystems, or to try to integrate smaller populations as far as possible into a wider and more populated (from a human point of view) area that covers much of the continent. LCIE is not alone in these considerations: this June, the European Commission officially established a platform on Coexistence between People and Large Carnivores, and the LCIE has recently signed a Memorandum of Understanding with Rewilding Europe to assist on the integration of the big five into areas they are reclaiming for conservation. The Government of the Netherlands has been working on a strategy to allow the accommodation of a population of wild wolves in the country, and there have been some discussions about the possibility of reintroducing wolves to Scotland. As the Initiative's John Linnell notes in his blog (http://lcie.nina.no/Blog/TabId/4630/ArtMID/6987/ArticleID/58/Dutch-prepare-for-wolf-comeback-.aspx), approaching the problem of human/predator conflict before the species has even become established is precisely the kind of forward thinking that is needed to make a viable space available to large carnivores.

There have been, and will continue to be, successes in the field and with the support of EAZA institutions. As noted elsewhere in this issue, the Iberian lynx, while remaining Critically Endangered, now has a strong chance for recovery, provided that prey species become more widespread. Brown bears roam across Northern and South-eastern Europe, and wolverine numbers are on the increase in the two main population centres. Dr Boitani, recently returned to Italy after the SSC meeting in Tallinn, also notes with glee that two jackals were recently spotted in Estonia, right at the very edge of their traditional range. EAZA's 2008 campaign focused on carnivores in Europe, and awareness of wolves, lynx and bears in particular is relatively high on the continent, even if understanding of tension and its causes lags somewhat behind.

The relationship between humans and large carnivores is unlikely to become easy, however much effort is put into working with farmers and increasing awareness among other members of society. Nonetheless, as John Linnell notes: 'For almost the entirety of human history we have been at a state of war with these species. We are now trying to find a way to coexist with them, although nobody knows how this coexistence is going to look in the end. Who could resist being a part of such a process?'

BROWN BEAR

WOLVERINE

Puffins under pressure

A COMBINATION OF FISHING AND GLOBAL WARMING IS PLAYING HAVOC WITH POPULATIONS OF NORTHERN HEMISPHERE SEABIRDS SUCH AS PUFFINS

Flemming Nielsen, Curator, Copenhagen Zoo

During the construction of Copenhagen Zoo's Arctic Ring exhibit in 2011, it was decided to create a bird-cliff with representative seabird species, including auks. Murres and razorbills were sourced by the Zoo from captive bred populations or rehabilitation centres, but the puffins were a different matter. The species is bred in very low numbers in bird centres, so to introduce new genetic lines, and ensure a healthy future for the species at the Zoo, Copenhagen chose to bring in eggs collected from the wild to hatch and rear artificially. The Faroe Islands autonomous region remains part of the Kingdom of Denmark so this was the region chosen to seek permits for the collection of eggs.

It was then that the crisis emerged. During the preparation and trip to collect the eggs, we became aware of the fact that the whole region's seabird population is under heavy pressure which threatens a collapse on a scale not seen since the time of the passenger pigeon. We learned that out of the presumed 500,000 pairs, not a single puffin chick had fledged in the last previous seven years and, during the egg-collection itself, we found eggs in only 10% of the burrows. Most of the breeding pairs arrive at the colonies in poor condition, and even if they manage to lay one egg they very often abandon the attempt after a few weeks' incubation. If the eggs do hatch the adults leave the chick to starve after a few days. They simply can't supply themselves as well their chick with sufficient food for all to survive.

THE THEORY

The Atlantic tuna has decreased dramatically thanks to overfishing and, as a result, the main predator of mackerel has gone. As sea temperatures have increased by 2° due to global warming the mackerel has expanded its distribution into Faroe waters, where they predate upon small fish like sandeels, capelin and sprats – food that is important for puffins. In addition, these small fish species feed on phytoplankton and the amount of plankton has dropped dramatically since 1997, reaching an all-time low in 2011.

As a result, the apex predator in the North Atlantic is under intense pressure. Other factors caused by global warming are fluctuations in the acidity and salinity of the ocean, which are wreaking havoc with fish and plankton populations and causing them to move outside of the range where they can be caught by puffins and other seabirds. An increase in the number and intensity of storms has also been suggested as a reason for the disruption of breeding patterns, and the subsequent collapse of seabird numbers.

A GLOOMY FUTURE

This situation repeats itself right acroos the range of the Alcids in the Atlantic region, while all other species of seabirds seem to face similar problems. Fieldwork done in Norway on the Island of Røst from the late 1970s until 2011 shows a clear decline of 7% per year in the puffin population, which has been shown to have decreased from 1.5 million 35 years ago to 392,000 pairs in 2011. When the last of the old breeding birds start to die off in 15 years' time and no new generations are available for recruitment, the time of the big impressive bird-cliffs will be over, never to return.

For further information, please visit Marine Research Institute, Iceland (http://www.hafro.is), or 'Havstovan' Faroe Marine Research Institute (http://www.hav.fo).

Under fire

A NEWLY DISCOVERED FUNGUS IS SEVERELY THREATENING FIRE SALAMANDER POPULATIONS

Annemarieke Spitzen – van der Sluijs, senior project manager, Reptile, Amphibian and Fish Conservation, The Netherlands; An Martel and Frank Pasmans, professors at the Department of Pathology, Bacteriology and Avian Diseases, Faculty of Veterinary Medicine, Ghent University, Belgium

Amphibians are true representatives of the current global biodiversity crisis and, although a variety of factors are involved in amphibian decline worldwide, fungal chytridiomycosis has been identified as one of the major infectious drivers involved. It has resulted in the extirpation of more than 40% of amphibian species in areas in Central America, as well as widespread losses across Europe, Australia, and North America. Chytridiomycosis is currently believed to be caused by a single species of fungus, *Batrachochytrium dendrobatidis*, until recently the only chytridiomycete taxon known to parasitise vertebrate hosts. However, *B. dendrobatidis* and other factors known to cause amphibian decline fail to explain several recent amphibian population losses. A dramatic and enigmatic mortality event, which has brought its species to the edge of extinction, was recently reported among fire salamanders (*Salamandra salamandra*) in The Netherlands. Since 2010, the species has declined, with only 4% of the population remaining in 2013. This rapid decline coincided with the finding of five dead animals in the field.

The recent launch of an *ex situ* conservation programme for 39 of the remaining fire salamanders was compromised by the unexplained death of 49% of the captive animals between November and December 2012. Attempts to identify known amphibian infectious agents, including *B. dendrobatidis*, yielded negative results. Instead, we found, isolated, and characterised a second, highly pathogenic chytrid fungus that occupies a different niche compared with *B. dendrobatidis*.

This second chytrid fungus was named *Batrachochytrium salamandrivorans*. 'Salamandrivorans' means: 'salamander-devouring', which refers to the extensive skin destruction and rapid mortality observed in infected salamanders. This chytrid causes erosive skin disease and rapid mortality in experimentally infected fire salamanders and was present in skin lesions of salamanders found dead during the decline event. Infected fire salamanders mostly die within 14 days after a short episode of anorexia, apathy, and ataxia. The pathology consistently comprises multifocal superficial erosions and deep ulcerations in the skin all over the body. The animals can be infected by direct contact or by infected tissue. *B. salamandrivorans* has a lower optimum temperature range than *B. dendrobatidis* making it a potentially large threat for temperate climatic regions: *B. salamandrivorans* grows at temperatures as low as 5°C, with optimal growth between 10°C and 15°C and death at 25 °C or higher, a markedly lower thermal preference compared with *B. dendrobatidis*.

DECLINE OF THE FIRE SALAMANDER

In the Netherlands, fire salamanders live at the very edge of their distribution and are confined to the old growth stages of deciduous forests on hillsides. Currently, the species is only known from two native populations and another small, introduced, non-native population, all three in the extreme south of the Netherlands. It was estimated that the whole population comprised several hundred individuals. Up until recently, despite the fragmented distribution, there was no reason to assume something would go wrong. From 2008 onwards, however, repeat findings of dead adults were recorded for the first time and, from 2010 onwards, there was an extremely sharp decline in the number of sightings of living salamanders. To date 25 dead salamanders have been found, and during the overall monitoring period (1997 – 2012) the total population decreased by 96%.

Much remains unclear on this emerging pathogenic organism. Its origin, mode of dispersal and its host range are unknown, and there is great urgency in finding this out. Clearly, the Netherlands is not an isolated country, and the recent findings (December 2013 and May 2014) of *B. salamandrivorans* in two sites in Belgium emphasise this. The fungus may be spreading through Europe, heavily impacting on fire salamanders,. Reasoning by analogy, *B. dendrobatidis* is known to be able to spread over land with high speed, up to even 282 km/year, and human-aided multiple introductions may cascade this spread and lead to an catastrophic disease front.

We currently have about 30 adult fire salamanders and 100 juveniles in captivity across three zoos. A breeding programme in the Netherlands has not yet been started, as the unclear future situation prevents the establishment of a clear timeframe in which the animals may be returned to their natural habitat, but close monitoring contiues.

For more on this project, visit www.SOSvuursalamander.nl and https://www.facebook.com/SoSvuursalamander.

JELGER HERDER

Progress so far

AS YOU'LL HAVE READ IN THIS ISSUE, A LOT NEEDS TO BE DONE FOR EUROPEAN CONSERVATION… BUT A GOOD START HAS BEEN MADE

Angela Glatston, Rotterdam Zoo, The Netherlands, and William van Lint, Assistant Manager, Collection Coordination and Conservation, EAZA

As we mentioned in the introduction to this special issue of *Zooquaria*, many EAZA members are already deeply supportive of local conservation. The problem is that we rarely discuss or publicise this aspect of our work. By keeping it under wraps we are doing ourselves a serious disservice, not only in regards to our image with our visitors but also with our critics. So let's change this and celebrate what we are doing for own native wildlife and, by doing so, encourage more and more of our colleagues to join us in this important work.

The existing interest which many EAZA members have for European conservation was clearly demonstrated during the European Carnivore Campaign 2008-2010 which was supported by more than 150 zoos from around 30 countries. In addition to the traditional support base for such campaigns, the European Carnivore Campaign stimulated interest from different zoos, particularly those in France and Switzerland as well as those located in eastern and southern Europe and Scandinavia, countries that are home to the species covered by the campaign. Similarly, the 2012 Conservation Forum in Vienna also received many contributions discussing work with local European species.

At the extreme there are a few collections which provide shining examples of commitment to European conservation and clearly demonstrate what EAZA members can achieve when they focus on local species. A particularly good example is Nordens Ark which has a national responsibility for the rearing and reintroduction of native species. In fact, since the year 2000, around 300 mammals and birds and 10,000 amphibians born and hatched at Nordens Ark have been released across Europe. These include Eurasian otters in the Netherlands, European wildcats in Germany, Eurasian lynx in Poland and over 150 peregrine falcons in Sweden.

INTERPRETATION AT MULHOUSE ZOO

Captive breeding and reintroduction is not confined to this institution; many other zoos are also involved in this kind of activity as shown in the photo story, with species as diverse as corncrakes (ZSL Whipsnade Zoo), fire-bellied toads (Copenhagen Zoo), European meadow viper (Salzburg Zoo), Sardinian brook salamander (Bioparco Rome), Ural owl (Vienna zoo) and large heath butterfly (Chester Zoo). This is not to forget the successes regarding white storks: many zoos have successfully contributed to the recovery of the population by releasing young, while Planckendael zoo is even more involved, conducting research on the birds' migratory behaviour.

However, there are a number of other ways in which European zoos support local wildlife. This can be through functioning as rescue and rehabilitation centres, a role particularly embraced by our colleagues in Eastern Europe. Our support in research and survey work is also important; the Harderwijk Dolphinarium is conducting research on the harbour porpoise while the Zoological Society of Scotland is evaluating the feasibility of reintroducing beavers to Scotland after an absence of 400 years. Zagreb Zoo is part of a team learning about the biology of the olm, St Petersburg Zoo is involved in the study of the Ladoga ringed seal, Salzburg Zoo is supporting *in situ* work on the European pond turtle and Aquazoo Dusseldorf is involved in surveying for amphibians in the city's ponds.

Invasive alien species are another threat to the survival of European species. Beauval Zoo is taking the lead on eliminating the bullfrog from the Sologne area of France while Zagreb is conducting research on the reproductive potential of the red-eared slider, another persistent invasive species.

Education is an integral part of our role in the conservation of native species. Zoos holding European species in their collections naturally educate their public as part of their normal educational panels or in cooperation with local conservation NGOs. Some zoos may use special interactive activities to inform visitors about native species.

Many city zoos provide a green oasis in an otherwise urban environment and as such can provide much-needed habitat for native species. Some zoos capitalise even further on this potential by providing nestboxes for birds and/or bats or by managing their grounds in a way that encourages pollinating insects.

Finally, there are a number of zoos that manage nature reserves either within or outside their zoo boundaries; examples include Antwerp, Wroclaw, Paignton and Marwell. In the UK some zoos have been designated Sites of Special Scientific Interest (SSSI), a status that brings with it a number of conservation responsibilities.

We hope that from the above you have an impression of the many and diverse ways in which EAZA members can support conservation both nationally and locally and that the examples provided in this issue of *Zooquaria* will inspire you to take European conservation on board in your zoo as well.

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