Rewilding

ECOS Writing on wildland and conservation values

ed. Peter Taylor

Part III
Species

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Frontispiece: Sea Eagle in Scotland, (Mark Hamblin/Northshots)

Rewilding

Introduction and history of the Wildland Network

Part III

Species re-introductions

BEAVER

BOAR

WOLF

LYNX

BEAR

FERAL BIG CATS

WATER VOLE

BIG BIRDS

Authors and Contacts

Editor's Notes: As in all ECOS articles, the views expressed by the authors do not necessarily represent the views of their organisations. I have updated addresses and affiliations but an * marks contacts that may be out-of-date.

Philip Ashmole is volunteer Co-ordinator of the Carrifran Wildwood project. Philip.myrtle@ashmole.org.uk

Troy Bennett has studied wolves in France, Romania, Poland and Portugal, including tracking, radio telemetry, prey and scat analysis, kill-site analysis, and territory mapping. He gives seminars and on the wolf and its prey species. loopdeloup@hotmail.co.uk

David Blake is the Project Development Officer for the Cranborne Chase and West Wiltshire Downs AONB. dave.blake22@btinternet.com

Urs Breitenmoser is project leader at the KORA carnivore project based in Switzerland see: www.kora.ch

Gareth Browning is an Area Forester and Wild Ennerdale Partner based with the Forestry Commission gareth.browning@forestry.gsi.gov.uk

Peter Cairns is a freelance nature photographer based in northern Scotland specialising in human-wildlife interactions and land-use issues. He is also the founder of several conservation media projects such as Tooth & Claw, and more recently 2020VISION. info@northshots.com

Steve Carver lectures at the Department of Geography, University of Leeds, is a founder member of the Wildland Network and is director of the Wildland Research Institute www.wildlandresearch.org s.j.carver@leeds.ac.uk

Hugh Chalmers is Carrifran Wildwood Project Officer and Site Manager for Borders Forest Trust. www.carrifran.org.uk

Ciro Castellucci is president of the Gruppo Ecologico Apennino Centrale. He has been studying and promoting the conservation of the Apennine brown bear for more than 20 years. He is a founder and honorary member of the Italian Wilderness Association. *see* http://www.geacitalia.it/chisono.asp

Alister Clunas is property manager at National Trust for Scotland's Mar Lodeg estate marlodgeestate@nts.org.uk

Adrian Colston is now general manager for the The National Trust on Dartmoor adrian.colston@nationaltrust.org.uk & www.wicken.org.uk

Luke Comins is director of the Tweed Forum. luke@tweedforum.org

Howard Cooper is the Wicken Fen press officer, www.wicken.org.uk

Alasdair Dawes is Project Officer for the Great Bustard Group, see www.greatbustard.org

Samantha Ellis is a playwright. Her play about wolves, now retitled *The Last Wolf in Scotland*, had an amateur premiere at Stage@Leeds, and will premiere professionally at the Edinburgh Fringe in 2012. She blogs at http://samanthaellisblog.blogspot.com/

James Fenton was formerly the National Trust for Scotland's nature conservation advisor for the Highlands and worked for Scottish Natural Heritage. He is now a freelance consultant at info@james-hc-fenton.eu

Alan Watson Featherstone is Executive Director of Trees for Life. www.treesforlife.org.uk

Mark Fisher runs *Self Willed Land* mark.fisher@self-willed-land.org.uk

Martin Goulding is an independent wild boar consultant (www.wildboarconsultancy.org.uk) who has been involved with Britain's free-living wild boar since they became established in the 1990s.. Martin authors the website: www.britishwildboar.org.uk

Derek Gow is a consultant ecologist. He specialises in mammal reintroductions, water voles, and beavers. DerekJGow@aol.com

Adam Griffin is co-founder and trustee of Moor Trees, www.moortrees.org and is now a consultant at www.adamgriffinconsultancy.co.uk

John Hall is Director of the Essex Wildlife Trust.

Neil Harris is Land Management and Conservation Advisor with Natural England's South West Region. neil.harris@naturalengland.gov.uk

David Hetherington completed a PhD at the University of Aberdeen on the feasibility of reintroducing the Eurasian lynx to Scotland. He now works as Ecology Advisor for the Cairngorms National Park Authority. davidhetherington@cairngorms.co.uk

Peter Holden is senior ranger at the National Trust;s Mar Lodge estate marlodgeestate@nts.org.uk

Rebecca Isted is now policy and programmes officer - biodiversity, with the Forestry Commission in Bristol. Rebecca.isted@forestry.gsi.gov.uk

Michael Jeeves is Head of Conservation with the Leicestershire and Rutland Wildlife Trust. mjeeves@lrwt.org.uk

Keith Kirby is Forestry and Woodlands Officer (Evidence Team) with Natural England. keith.kirby@naturalengland.gov.uk
Gersa Kluth * is a member of *Lupus Wildlife Consultancy*
http://www.lcie.org/Docs/Regions/GermanyBohem/WolvesOnOurDoorsteps_en.pdf

Andy May is Conservation Manager at Essex Wildlife Trust. AndyM@essexwt.org.uk

Jonathan McGowan runs the zoological section at the Bournemouth Natural History Society and is a freelance naturalist, taxidermist and author *jrmczoo@tiscali.co.uk*

Richard Neale is the National Trust's Property Manager covering Snowdonia and Llyn in North West Wales**.** richard.neale@nationaltrust.org.uk

Matthew Oates is Advisor on Nature Conservation at the National Trust. He is a founder member of both the Grazing Animals Project and VINE - Values in Nature and the Environment matthew.oates@nationaltrust.org.uk

Roger Panaman * promotes wolf reintroduction in the Highlands.
Read more about reintroducing wolves to the Highlands at www.wolftrust.org.uk

Alison Parfitt is a freelance consultant on landscape and community and a founder member of the Wildland Network.

Hannah Pearce is a freelance journalist and communications consultant who has written extensively on the environmental policy and news agenda. zintl@gn.apc.org

Dan Puplett worked for Trees for Life for over 10 years. He now works as a freelance outdoor educator, teaching a range of skills including animal tracking, natural history and bushcraft. dan.puplett@gmail.com

Jules Pretty OBE is Pro Vice Chancellor (Sustainability and Resources) and Professor of Environment and Society, University of Essex. jpretty@essex.ac.uk and www.julespretty.com

Geog Rauer * is with the, World Wide Fund for Nature Austria, Ottakringerstraße 114-116, A-1160 Wien, Austria

Ilka Reinhardt * is a member of *Lupus Wildlife Consultancy*

Heather Robertson recently retired from Natural England and now works in orchard conservation.

Peter Samson is with the North Pennines AONB Partnership, Stanhope, County Durham, DL13 2FJ

Gavin Saunders is project manager for the Neroche Scheme and a freelance conservation policy and project advisor. gavin.saunders@forestry.gsi.gov.uk

Roger Sidaway is an independent consultant and lecturer. His book Resolving Environmental Disputes was published by Earthscan in 2005. roger@rogersidaway.plus.com

Chris Soans is now the Property Manager at Wicken Fen - he can be contacted on chris.soans@nationaltrust.org.uk

Peter Taylor heads the environmental consultancy Ethos. He is a founder member of the wildland-network and author of *Beyond Conservation* (Earthscan) peter.taylor@ethos-uk.com

Manuela von Aux is with the KORA project, based in Switzerland. www.kora.ch

Victoria Ward * was formerly at the Department of Geography, University of Leeds, where she helped produce the wildland-network data base.

Stuart Warrington is Regional Wildlife and Countryside Advisor at the National Trust, East of England Region stuart.warrington@nationaltrust.org.uk

Tony Whitbread is chief executive of Sussex Wildlife Trust tony.whitbread@sussexwt.org.uk

Charles Wilson * was Senior Wildlife Management Adviser in the Rural Development Service (later incorporated into Natural England) dealing with wildlife legislation and the resolution of human-wildlife conflicts.

Derek Yalden is President of the Mammal Society, and has recently retired after 40 years as Reader in Vertebrate Zoology from Manchester University.

Rachel Yanik (now Oakley) is the Wild Ennerdale Project Officer based with the National Trust. rachel.oakley@nationaltrust.org.uk

Additional contacts mentioned in the text: **Simon Ayres** is director of the Wales Wild Land Foundation and a founding member of the Wildland Network, simon@forestmoor.com; **Toby Aykroyd** organises the Wild Europe initiative - www.wildeurope.org and see also www.rewildingeurope.com; **Rick Minter** edits ECOS, is a freelance facilitator and is also a founding member of the Wildland Network **Robert McMorran** edits the newsletter of the Scottish Wildland Group http://www.swlg.org.uk/ .

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Introduction

There is a wealth of information and experience among wildland projects. much of which is recorded but dispersed in ECOS articles and in the notes and proceedings of Wildland Network meetings. This volume meets the growing need for a single source for this and related rewilding material for students, journalists and writers. WN felt it important to have a source book that reflects the very special work in Britain compared to the large scale projects and planning in the US and the special circumstances of continental Europe.

There has been a 'rewilding' movement in Britain since at least the mid-1980s (thinking in particular of the Trees for Life project in Glen Affric) but it has received far less publicity than American schemes. This rewilding has emerged from our own roots and circumstances, with a philosophy appropriate to a crowded island, rather than on a continental scale. The US dictum, 'cores, corridors and carnivores' has relevance, but we are some way from bringing back large carnivores - at least deliberately, whereas cores and corridors have been central to conservation thinking in Britain for several decades.

As this text has come together, one thing has struck me forcibly – the great range of topics and individuals, organisations and strategies involved, representing a formidable amount of work – truly a 'new wave' in nature conservation thinking. But perhaps *most* impressive of all is the range of on-the-ground projects with their histories. This is not a revolution of thinking alone, but a quiet practical unfolding of new and more creative ways of extending reserves and managing land

In this, the role of WN has been simply to network thinking and practical experience. Since its inception in May 2005, we have brought a very large array of people together from every major conservation organisation in Britain. I can recall a time when ecologists within government agencies in England knew very little of the pioneering work of Trees for Life in Scotland, or the significance of the Ennerdale project and its cooperative model engagement between major land-owning bodies such as the National Trust and Forestry Commission.

At the outset, a small number of people meeting as the 'wildland group' decided that a network structure would best facilitate what was effectively already under way. Our task would be to facilitate dialogue, mutual learning and opportunities to see things from other points of view in a 'neutral' space. Such a non-membership structure has the limitation that it cannot so readily lobby or campaign and this concerned some of us, but that limitation more readily supported a wider participation, with no one organisation or individual needing to fear being compromised by campaigns and press statements – whether calling for the re-introduction of carnivores or opposing wind turbines in wild and beautiful places.

We also did not get embroiled in academic issues of definitions – it was wilder to have none! Though the pages of ECOS did rehearse the issues, there was a wide church and we accepted that any practice that made things 'wilder' was relevant, and thus although there was always a core interest concerned with large-scale land management and restoration of ecosystems. our interests stretched to smaller scale rewilding of river systems and urban areas.

As editor of this volume, I have focused on issues, projects, and candidate species for re-introduction. The book is therefore in three parts, with an introductory history of the Network itself. This latter brief review covers eleven meetings and issue-based seminars in England, Scotland and Wales between 2004 and 2009 – the first being preparation for the launch of the Network in 2005 and the last being the launch of the Wildland Research Institute (WRi) in October 2009, after which the Network felt that its primary work was done. This historical section constitutes, among other things, a guide to activism that I hope students of conservation will study in itself, because conservation – much as I would personally like to replace a term that embodies conservatism, if it is to advance, *requires* active engagement in policy. Such engagement takes many forms: it requires hours of dedicated and dull work setting up meetings, booking venues, organising speakers, food and accommodation, controlling expenses and then writing it all up and disseminating the results. In this, I have been fortunate to work with some extra-ordinary individuals in the core-group who do not feature large in the writing of articles – the ECOS editor Rick Minter, alongside Alison Parfitt, have been stalwart organisers and facilitators, with Alison taking on a huge amount of work in the write-ups; Mark Fisher has held the website together; on a regional level, Simon Ayres and Mick Green have networked in Wales and Dan Puplett and Alan Watson Featherstone in Scotland; Toby Aykroyd has taken the message into the upper echelons of European bureaucracy under the Wild Europe initiative; and in the later years, Steve Carver with the help of Mark Fisher brought together the academic element as the Wildland Research Institute at Leeds University, just four years after we had our launch there.

In any appraisal of the schemes over the past twenty years, students should note above all that change has come through the actions of key individuals – champions *on the ground* and in their own community. David Russell, head forester with the National Trust, was hugely influential in pioneering a more 'hands off' approach to large areas under the Trust's management; Gareth Browning, beat forester in the western Lake District, took on the task of maintaining the Ennerdale vision. Keith Kirby at Natural England (and all its predecessors!) engaged with the many facets of this growing public desire for rewilding. Respected academics such as Jules Pretty at Essex University and Adrian Phillips at Cardiff University have chaired meetings that have helped raise an ill-defined movement toward respectability in the corridors of government. Simon Ayres, a forestry consultant, organised

meetings in Wales and latterly founded the Wales Wild Land Foundation and the Cambrian Wildwood Project. Progress in Wales has been slow and as with any shift in an old paradigm, movers and shakers face a lot of inertia.

At the start of 2011, members of the WN founding and coordinating group still network. However, they have realised that their earlier aspirations to raise awareness, bring people together to share and develop learning and experience have in large measure been achieved. Therefore a new phase of wilding and developing wildland is now needed. At this stage it is worthwhile to reflect on things that are missing from the picture or early aims that have not manifested. We had hoped to have had more detailed maps of potential wildland, 'opportunity mapping' of landscape scale projects and habitat restoration, corridors, barriers and conflicts (such as renewable energy developments). There are at present several such maps 'on paper' within organisations such as the Wildlife Trusts and the RSPB, but still no overall national picture or point of contact. This is work that WRi would be able to co-ordinate.

We had hoped to have seen greater levels of cooperation between the larger voluntary bodies such as the National Trust, Forestry Commission, the Woodland Trust, Wildlife Trusts and RSPB in creating core-areas and corridors – in particular through the strategic purchase of land. However, none of these organisations is entirely free to embrace the wildland ethos even as a subset of its broader strategic aims. Some of us would like to see a new organisation that would take on this task – of mapping the potential and then marshalling resources for strategic purchase. Just 10% of the income stream from the major voluntary bodies would exceed £20million/annum and there would be a good chance that government or lottery funds would match that investment.

In the immediate somewhat austere future, the Heritage Lottery Fund has an undiminished amount available and an enthusiasm for landscape scale projects - witness Neroche and the Great Fen project, but with that source also comes the need for access, interpretation and maintenance of a cultural heritage that does not readily embrace rewilding. I would still argue as I did in the book *Beyond Conservation* for three flagship core-area rewilding schemes in England, Scotland and Wales. And I note, that, as then, we know very little of developments in Northern Ireland and the Irish Republic.

There is also still much to be learned about European and US projects. In this volume we have pulled together a good few articles on the Dutch experience, which has great relevance for crowded, largely urban environments, and also on species re-introductions in Europe that may have lessons for Britain, but there is much more to document. Given the pace of development unleashed by the EU's intended remedies for climate change – turbines, barrages, biofuel plantations and hydro-schemes, with their attendant roads and pylons and all in wild places, we need to know much more about what is happening in Eastern Europe, Greece, Spain and Portugal.

We also need to know more about prospective changes to the EU's agricultural support schemes. They are currently being revamped and although many organisations are involved in lobbying, including Toby Aykroyd's 'Wild Europe' initiative, it is difficult to get any sense of how successful this process may be. There is an excellent website - www.rewildingeurope.com which features regional initiatives in Spain, the Carpathians, Croatia, and the Danube delta, all of which aim to bring wild grazers to open landscapes threatened by abandonment (see also www.largeherbivore.org).

Finally, there is a sense – expressed recently among BANC council, that with the 'new austerity' and the shifts in consciousness that go with it, that the constituency of conservation is also likely to shift. We are seeing a growing involvement of the health and education sector in wildland issues as well as in 'nature' generally. There is a public hunger for closer contact with wild nature – contact that has spiritual and therapeutic motives that are not necessarily met by the strictly scientific criteria and targets applied to key habitats (see the articles by David Russell, Samantha Ellis and Hannah Pearce).

The 'issues' we have covered in Part 1 are diverse: the nature and role of 'aliens' such as grand old Douglas Fir, Norway and Sitka Spruce...which the public have grown to love; grey squirrels; feral boar and big cats; preparing for climate change; the 'common' and popular (such as elder/blackthorn scrub) versus the rare and largely unknown (such as Large Blue butterflies). Indeed, love itself is gradually daring to speak its name as conservationists come out from behind their analyses of ecosystem benefits and EU Habitats Directives, and start to celebrate this broader world of public perception and desire. Wild nature still offers succour to the jaded souls of a crowded land and a competitive world and in this, the future constituency for rewilding is very large.

ECOS has always encouraged writing at the interface of conservation science, public policy and public perception, without necessarily elevating science above the world of appreciation and feeling. However, the more clearly poetic and artistic does not feature large and rewilding has a lot more to offer than traditional conservation practice in this respect. I would personally like to see more of a marriage in our work between the left and right hemispheres of the brain as evident in our gathering at Findhorn and in the *Forest Schools* approach at Neroche.

In Part II we present an amazing variety of projects. One of the great services that BANC and in particular Rick Minter has performed is the pulling together and presentation of this work in ECOS and in the commissioning of *Beyond Conservation.* I never fail to be impressed by the diversity of approaches – from private landowners such as Charlie Burrell at Knepp, who has little interest in a commercial project, compared with Paul Lister in Alladale, who envisions a touristic safari-park; to collaboration of large organisations like the Forestry Commission, National Trust and United Utilities in Ennerdale – all land-owners, some with tenant farmers, or the collective purchase by subscription of marginal grazing land in the Southern Uplands, by the Carrifran initiative and the Borders Forest Trust. Organisations such as the RSPB are engaged in large scale habitat restoration – such as reedbed and fenland as well as

coastal marshes, and we could have liaised more in the past to pull this together and showcase it here, as also with the Wildlife Trusts' regional initiatives. The role of government agencies and funders in relation to all of these projects would also make an interesting research topic as it is clear that Natural England and the Forestry Commission have worked to bend the rules that presently favour the old paradigm of domestic grazing. The Heritage Lottery Fund is becoming a key funding source and we should know more of it values and modes of decision making.

On species reintroductions, reviewed in Part III, there are more problematic issues to report. At the time of writing, Scottish Natural Heritage look to have actioned a capture and eradication scheme for escaped beaver on the Tay, whilst supporting a pilot but well-contained release project in Knapdale. We document the mixed reception that escaped wild boar have had and the dilemma that Whitehall faces. Government is still in (public) denial about the existence and possible breeding of feral big cats in Britain, despite mounting evidence and an admission from the Forestry Commission in the Forest of Dean that they have monitored panthers as well as wild boar in their woods. Several police forces accept the presence of the cats. I am still waiting for my first personal sighting (an impressive video of a distant running black panther was taken only a week ago in Westernzoyland, only a few miles away!), but donning my zoologist's hat, I have examined undoubted big cat kills in Wales – and many trusted friends have seen both black 'panther' and puma. There are many reports of lynx in mainland Britain.

We are thus faced with ongoing 'rewilding' as much by accident as design and a rather confused government response. Much is made by scientists of provenance and genetics – which a public admiring charismatic animals cares little about, and this surfaced with 'escaped' eagle owls breeding in Northumberland. Even the RSPB were unenthusiastic about this powerful predator. That ultimate symbol of the wild – the wolf, would be well received by large sections of the public, but governments respond to entrenched and often ignorant and irrational attitudes from both the farming and game-shooting communities, despite evidence that wolves in Europe and the US do not compromise the economic well-being of rural communities and may bring much-needed visitor revenue. If we ever get to an introduction of bears in Scotland, we will know not only that attitudes have fully revolved, but also that habitats have been extensively restored to support them.

From a privileged position of having either worked with or met many of the people engaged in this movement and featured in this book, I know that the rewilding process is very much a matter of the heart. In this, science takes its rightful place as a tool-kit. We are not here just to study or conserve nature, but to transform it! We are thus working as co-creators. Yet, nature reserves were set up very largely as laboratories for scientific study – representatives of ecosystems and habitats and assemblages of species in areas of *special scientific interest*. Only later, with the large scale transformation of agriculture and road transport, did they become islands besieged. They were not designed for this purpose. There is a need for larger scale reserves, corridors, core areas and re-introductions of species that in themselves transform and sustain habitats – such as beaver, wild grazers and their predators. We are perhaps one-fifth of the way forward on the ground, and perhaps as much as half-way in the shifting of paradigms.

Peter Taylor
May 2011

Development of a Wildland Strategy: a short history.

The concepts and practices of rewilding did not start with the Wildland Network, of course, but antecedents are not well traced. Certainly, the full rewilding ethos was articulated in the mid-1980s by Alan Watson Featherstone and the Trees For Life group which he founded at Findhorn. They pioneered the long process of looking for potential large areas, talking to landowners and managers, and getting volunteers on the ground – in this case to restore tree cover to the Scottish glens. TfL also mastered outreach and communication and was rewarded after more than twenty years of hard work in the field, by donations sufficient to buy their own land and build toward a core area.

By the turn of the Millennium there were many initiatives seeking funding for large area schemes – the Borders Forest Trust being notable, with a strategy for direct fund-raising and shares in the scheme at Carrifran. The National Trust and Forestry Commission were already mapping out the Wild Ennerdale Project. This work had built upon several initiatives of the 1990s – the National Trust Centennial Conference in 1995 at which 'wildland and wilderness' ethos was first discussed; BANC's Wilderness Britain conference at the Open University in that same year; a major conference at Newcastle University in 1999 on rewilding the National Parks; and the ESRC funded Seminar Series 1999-2001 on *Wilderness Britain: social and environmental perspectives on recreation and conservation* which were attended by government and NGO practitioners.

Thus, as the first meetings of the 'wildland group' began to form a network - finalised in the autumn of 2004, for a launch in May 2005 at Leeds, there was already plenty to network. In September 2004, the core-group met at Alison Parfitt's home in Hatherley Road, Cheltenham:

- Adam Griffin and Chris Layton travelled up from Dartmoor and introduced Moor Trees – the project inspired by Trees for Life and active on Dartmoor since 1997, with a major conference in 1999. It was a small start with tree nurseries, educational outreach and mobilisation of volunteers in what was a huge challenge to prevail against current land-use interests that kept the moor entirely barren and prevented the National Park from investing in wider restoration.

- Toby Aykroyd presented plans for a Wild Britain initiative that focused on economic benefits and outlined his busy schedule of meetings with directors of government and voluntary bodies in seeking a coalition – something that precipitated much discussion of the value of such top-down approaches compared to the grass roots initiatives. He also outlined plans to create coalitions in Europe.

- We had a student – Peter Parkes, join us, who was engaged upon writing a thesis on wilding projects at Nottingham University – a sure sign that the new thinking had penetrated academia and a good example for us of the value of the network, in that we could direct him to practical projects that otherwise he may have missed.

- Simon Ayres had come over from West Wales where he was championing the involvement of Wildlife Trusts and (hopefully then) the John Muir Trust in a rewilding of the North Cambrians – an area faced with massive expansion of wind turbines.

- David Russell, then chief forestry advisor to the National Trust, led a discussion on issues of intervention, public relatedness to and growing commodification of nature, targets and over-management based on species action plans – and how we can negotiate through this mindset.

Alison Parfitt, Rick Minter and myself, with Steve Carver at Leeds, then formed a core group to organise a launch at Leeds in the following year – when we also would launch *Beyond Conservation* – a compilation of issues and projects that I had worked on with a commission from BANC over the previous two years. We realised from the diversity of views and values within our own group, that diversity itself was a strength! There was still some unease that we would focus on networking rather than campaigning – against for example, quarries, turbines, roads, pylons, or CAP reform, but my own argument was that networking did not rule out any individual or participating organisation from campaigning and that the network would in that respect support and facilitate such political work. Our main focus would be the restoration of landscape and habitat, species re-introduction and the human value of nature and wildness – we would network 'best practice' through regional seminars, national conferences and special editions of ECOS. I was to work on a Wildland Manifesto that would be published on the Ethos website.

Our focus for 2005 was to be a North West regional meeting in the Lake District as a follow-up to the launch at Leeds. Toby Aykroyd would organise a gathering at the Royal Geographical Society to host the Dutch specialists in rewilding the polders and a trip would be organised to Holland in the autumn.

The launch of the Wildland Network at Leeds University, May 2005.

Forty two people attended the launch, with participants from English Nature, The Grazing Animals Project, the Wildlife

Trusts, the Countryside Agency, BANC, John Muir Trust and National Trust. Steve Carver led the proceedings in which I introduced the book and its list of projects; Toby Aykroyd led a workshop on economics and land use; Steve Carver and Simon Bates (of Natural England) on the value of mapping, Rachel Yanik of the National Trust at Ennerdale took on an overview of projects and Derek Gow on re-introductions.

The publication of *Beyond Conservation*: *a wildland strategy* was delayed and copies were not available for the launch, but the book was published a month later. I was able to outline is contents – the first wider publication of the large range of projects as well as discussions of the major issues.

Visit to Oostvaadersplassen in the Netherlands

The Network organised a study-tour to the Dutch project on the polder of Oostvaadersplassen during May 2006. This 5000 ha reserve has been managed as wildland with the instigation of more natural grazing regimes using red deer, wild cattle (Heck – reconstituted Aurochsen) and wild horses (Konik from Poland). This was an opportunity to discuss issues arising in relation to natural processes of death, disease, and intervention policies with wild herbivores, vegetation dynamics, biodiversity indices, absence of predators, connectivity, etc., and the site visit and lessons are reviewed by Alison Parfitt and Steve Carver in Part II.

Regional seminar in the North-West: Newton Rigg, Cumbria, October 2005

Over fifty people attended this fist regional seminar with a wide range on involvement from government agencies, community groups, individuals and voluntary organisations.

There was a small Scottish contingent and Robert MacMorran an advisor to Scottish Natural Heritage outlined the *Wild Scotland* initiative (he was later to found the Scottish Wildland Group and newsletter). Peter Samson of the North Pennines Area of Outstanding Natural Beauty, outlined a range of projects in the north and with Gareth Browning of the Forestry Commission, led a discussion on flexibility within government grant schemes for supporting wilder grazing (at this stage, not Aurochsen, wild horses and more deer, but more cattle on the fells and in the woods!). James Fenton of the National Trust and Martin Lester from NT's Wicken Fen project outlined the problems of welfare and fencing of livestock – NT was using Polish *Konik* ponies at Wicken Fen.

We asked Charlie Burrell, a farmer and landowner in Sussex, to speak about his pioneering project to return cropland to wild grazing with Exmoor ponies, semi-wild breeds of pig and long-horn cattle. Thus, participants from the wilds of the Lake District and Scotland could hear of the successes in adapting single farm payments and the economics of farming on boulder clay. Toby Aykroyd, who had joined the management group at the Alladale wilderness-park project, was able to discuss fencing, access, welfare and attitudes to danger. Adam Griffin came up from Dartmoor and contributed to discussions with Hugh Chalmers of the Borders Forest Trust on community initiatives, fund raising and purchase of land.

In all, eight small working groups -facilitated (and later documented) by Rick Minter and Alison Parfitt, discussed the practical challenges of wilder grazing regimes, animal welfare, land acquisition, revenue, species re-introductions, show-casing benefits, landscape quality and resilience. After the seminar, there was a BANC AGM hosted by Wild Ennerdale and a guided tour of the Lakeland project the following day.

The *ECOS* volume 25 (3/4) *Wilder Landscapes, wilder lives?* was published in the autumn – which provided an update on the projects outlined in *Beyond Conservation* as well bringing more projects into a data base that was being built for a WN website to be hosted by Mark Fisher and Steve Carver in Leeds.

Rachel Oakley of Wild Ennerdale briefing the group, September 2005.

Wild herbivores at the Royal Geographic Society

Under an initiative of Toby Aykroyd, specialists from the Dutch ministries and the Large Herbivore Foundation (LHF) were invited to present their projects and experience at the RGS on October 26th, and this gave an opportunity for a wider public to appreciate the cooperation between Dutch ministries and voluntary bodies such as the Lottery Heritage Fund in advancing large scale rewilding.

'Wilder landscapes, wilder lives?'

This was the title of an issue of ECOS (Vol. 25. 3/4) in 2005 in which members of the Network outlined their projects to the general conservation community.

Wild Boar – welcome back? National Seminar on DEFRA consultation, December 2005.

The network organised a national seminar on the issue of feral wild boar, hosted jointly with BANC and held at *Nature in Art*, Wallsworth Hall, Gloucester. Rick Minter and Alison Parfitt facilitated discussions with Charlie Wilson, Senior Wildlife Advisor at DEFRA, which had put out a consultation document on the issue.

Briefings on issues of biology, provenance, behaviour, diseases, farming conflicts, access and safety as well as impacts on woodland management were made by Martin Goulding – author of *Wild Boar in Britain*, Derek Gow – consultant ecologists, Derek Booth and Ian Horrell of the British Wild Boar Association and Jenney Farrant, a farmer with regular experience of boar on her family farm.

Over fifty participants came from Wildlife Trusts and AONBs, farmers, landowners and marketers. The day was organised into three groups dealing with the diverse issues such as intrinsic value of the species to Britain and the complex costs and benefits of their impacts. (These issues are reviewed in detail under the Wild Boar section of Part III dealing with re-introduced species).

Wildland in Wales: regional seminar held April 7th, 2006, Plas Dolguog, Machynlleth.

This seminar was organised by Simon Ayres and followed two morning presentations by Steve Carver on mapping wildland and criteria for wildness, and Derek Gow on the issues of beaver re-introduction. It was a relatively small gathering that was not well supported by the Welsh government agencies – who had felt that 'rewilding' might be too forceful an approach in an area of strong tensions between the farming community and conservation organisations.

There was much discussion of what was 'wild' and 'natural' and how perceptions varied in the locality. Scale was a key factor in wildness – along with the absence of roads and light pollution. On beavers, various myths were laid to rest on precisely what beavers needed and what impacts they could have – for example, that in Europe they seldom built dams. The experience at Ham Fen, Kent was rehearsed, where prolonged DEFRA licensing requirements had caused beavers to die in quarantine and at the Lower Mill estate at the Cotswold Water Park, where containment by sophisticated electric fences had been a requirement for release. (Editor's note: the Welsh Wild Land Foundation has just received a lottery grant of £5000 to prepare a beaver introduction site in Cwm Einion, close to their planting project).

There followed discussions led by Jeremy Wright of Powys County Council, on the value of branding and 'gateway' species such as the red kite, that could aid in eco-tourism. He pointed out that local people were more globalised than might be expected from the indigenous stereotype and that many hill farms wer facing a bleak future of an ageing population, falling incomes and financial indebtedness. Wildland could offer a range of ecosystem services as well as more direct uses for health and educational programmes. There was an issue of how to conserve wildland values and at the same time promote their use – and the need for sensitive developments, such as bothies in barns, was emphasised. Wilder grazing regimes and organic meat production were earmarked as ways to integrate wildland values and support a faltering upland economy.

We heard that the Countryside Council for Wales was planning for large-scale landscape restoration projects – but sadly at the same time, the Welsh Assembly was planning to open the Forestry Commission holdings to wind farm development – the North Cambrians had been selected as a major search area. We decided to make a review of the wind issue with respect to the Nant y Moch search area (on Plymlimon) and to lobby against its inclusion in the turbine search areas (I was commissioned by WN to prepare the background on wind turbines for a submission to have Nat-y-Moch excluded from the search zone). The over-arching message of the seminar was that the tranquility and beauty of the Cambrians needed to be positively promoted and marketed as the best defence against invasive development.

We all felt that the agencies were behind the times and a later invitation for me to give a presentation at a gathering of the Welsh section of the Grazing Animals Project – which was proving a successful partnership between the agencies, Wildlife Trusts and farmers, showed that many had realised rewilding was an advancing practice and should not be ignored.

Bringing back the Beaver: a joint conference with the Cotswold Water Park Society and Derek Gow Consultancy, May, 2006.

The purpose of this Network meeting was to further the cause of beaver re-introduction in England. I recall that Alan Featherstone, Rick Minter and I had travelled to France in 1991 to explore r-introduction issues, and yet, fifteen years on, only the Scottish government was making moves toward introduction. Simon Pickering at the Water Park organised a register of interests (he has since moved but maintains his involvement - simon.pickering@ecotricity.co.uk).

During the meeting, a range of issues were addressed: such as, do beavers' activities at sites with public access present a health and safety issue? What are viable populations for beavers and what distances will beavers travel to access nearby cropland?

It was noted that the Environment Agency was interested in catchment scale re-introduction for England, as a trial, but it remained a challenge to get awareness and interest in beavers into mainstream professional thinking and practice. A recently launched Wetland Vision (a joint initiative with DEFRA and NGOs) was discussed as a vehicle for focusing a commitment on re-introduction – in particular whether a beaver trial would be able to illustrate the benefits for water management as well as any problems.

There was already ample evidence from overseas and beaver's role in water retention needed clarifying and promoting to policy makers and politicians. A key reference on this aspect is Frank Rosell, et. al. 'Ecological impacts of beavers and their ability to modify ecosystems'. *Mammal Review* 35 (3-4) July 2005.

Scottish Natural Heritage already had much information on the benefits and the effects of beavers which could be used by practitioners elsewhere in UK and it was agreed there was no point in duplicating the information and research already produced. Duncan Halley offered to show people beaver habitat and management issues in Trondheim, Norway:

The situation in Scotland was indicated as open for partnerships of relevant bodies to propose demonstration projects which would show the consequences of beaver activity in different situations. In the Cairngorms written and e-mail support for beaver reintroduction would help back the case for including this in the Cairngorms Management Plan.

In Wales, Toby Aykroyd reported there was ongoing consultation amongst all stakeholders in relation to beaver reintroduction and his 'Beavers Mean Business' initiative was trying to catalyse action and interest in relation to the benefits, including for tourism. There were varying views about timescales for action with a feeling among some 'we now need to get on with it', whereas others felt there should be more time to persuade and involve bodies so that they have a chance to be on board.

Scary or what? September 2006, Cirencester.

A meeting to discuss the re-introduction of species generally was held at an organic farm's small conference centre near Cirencester. It was a joint initiative of WN and BANC and chaired by Adrian Phillips of the University of Cardiff – who is also an IUCN commissioner. Seventy six people attended with wide representation from English nature, the National Trust, the Wildlife Trusts, DEFRA, the RSPB, the Countryside Council for Wales, the Welsh Assembly and the Council for the Protection of Rural England. Troy Bennet traveled from France to contribute to wolf discussions and Robin Rigg from Slovakia. Dan Puplett and Alan Featherstone came down from Scotland to contribute their perspectives on the potential at Glen Affric.

Presentations were made by Roy Dennis on the experience of 40 years of bird re-introductions, especially of sea eagles and kites; Derek Gow on the issues of beavers; David Hetherington on lynx; Martin Goulding on boar; Peter Taylor reviewed bear and wolf introduction programmes in Europe and the USA; and Matthew Oates and David Bullock of the National Trust reviewed experiences and opportunities with wild herbivores. Group discussions were facilitated by Rick Minter and Alison Parfitt.

Big cats in Britain.

Following the Cirencester meeting, a seminar to specifically address the issue of feral big cats in Britain was convened at Oak Hall, Keynes Country Park at the Cotswold Water Park on 10th September. Thirty seven people attended with Rick Minter convening what had become, for him, after his own personal sighting of a black panther in Cumbria, a special area of interest.

Rick Minter introduced Jonathan McGowan, of the Bournemouth Natural History Museum, who had spent over ten years tracking animals in Dorset and Wiltshire. He presented the mounting forensic evidence for breeding populations of melanistic leopard and puma. Chris Moiser, a zoo keeper and Frank Tunbridge, who had tracked and encountered animals in and near the Forest of Dean, gave presentations. Discussion groups then fed back to the plenary.

Jules Pretty OBE, Professor of Environment and Society at University of Essex, chaired the meeting and summed up proceedings. Evidence had mounted that viable populations of big cats existed and this was accepted by numerous police forces (and confirmed by a spokesperson for the Forestry Commission in 2009. ed.). If damage mounted and in particular, anyone were injured, there would likely be calls for an eradication programme. There was clear evidence of melanistic leopard (or jaguar), puma (possibly also melanistic forms) and lynx. WN should be prepared for the eventual 'outing' of the cats and present information of their potential benefits to the ecosystem – in particular upon deer numbers. Jonathan MacGowan had been convinced that predation on deer and badger had altered behaviour and browsing patterns. His work was published in ECOS and there is a section under species re-introductions.

Rewilding Middle England, 22 November, 2006 at Cropston Visitor Centre, Leicester Wildlife Trust.

This meeting was organised by Micheal Jeeves of Leicester Wildlife Trust and chaired by Jules Pretty. Sixty six people attended with discussions ranging across the nature of the 'black hole' for wildlife in the Midlands, to habitat restoration projects, with Chris Gerrard of the Great Fen Project reporting on this large scale reedbed and grazing marsh initiative. Sam Lathaway reported on the progress of the new National Forest and Ruth Needham on the Trent Project of rewilding the river. Kieth Kirby of Natural England, Andrew Halston of the Environment Agency and Jonathan Spencer of the Forestry Commission presented the outlook of government agencies. There was representation from managers of the Wildlife Trusts, the Grazing Animals Project, the National Forest and National Trust's Wicken fen.

Rick Minter and Alison Parfitt facilitated discussion groups and feedback on reintroductions, wild herbivores, Biodiversity Action Plans and 'ecosystem services', with Michael Jeeves and Peter Taylor summing up the day. An article by Michael Jeeves was published in ECOS and is represented in Part II.

Making wildland pay – a review of markets and enterprises from wild land and rewilding. A one-day workshop hosted by the Knepp Estate and WN in Sussex, 12 April 2007.

This event brought together practitioners with examples of markets and enterprises based upon wildland. Thirty five people attended with representation across the government agencies, wildlife trusts and individual projects.

Jason Emrich, project manager at Knepp, outlined the estate's programme and experience to date – with the main purpose being to return several thousand acres of former farmland to wildland and use near-natural grazers such as Tamworth pigs and English Long Horn cattle, which would also provide an income from organic meat production. Exmoor ponies and fallow deer added diversity to the grazing regime.

Frans Vera of the Dutch Forestry Service and author of the seminal 'Grazing Ecology and Forest History', presented 'Fascination will Pay', an appraisal of the economic benefits from wild cattle, deer and horses grazing the Dutch river floodplains and the polder at Ooostvaadersplassen. Views from the UK Forestry Commission (Alison Field) and Environment Agency (Bill Watts) were also presented, discussing the FC's experience of managing visitors and rewilding its forestry practices, as well as the more general economic benefits of

wildland ecosystem services in flood control and water quality.

Discussions facilitated by Rick Minter and Alison Parfitt centred on key questions: such as the economic drivers for wild land: what are the priorities and how can they be sustained? In what ways can wild land add value and offer a brand to farms, estates, nature reserves, forests and related ventures ? How can Government bodies assist enterprises linked to wild land? e.g. through payments, advice, training, etc

I was commissioned by WN to write a review of the UK experience of relevant economic ventures – such as income and jobs created by visitor centres or branded marketing of wildland products, health and educational usage etc.. A report 'Wildland Benefits' is available for download on the Ethos website.

Wild, free and coming back? The return of key species to Scotland....what, where and how? 16-17th September, 2008. Followed by optional visits to Alladale's large mammal project, 18 Sept; Glen Affric 19 Sept - Caledonian ecosystem restoration, & wild boar experiment; Carrifran wildwood, 20 Sept - whole ecosystem restoration in the Moffat Hills.

This conference was hosted jointly by the Wildland Network and Trees for Life at Findhorn, Forres. The meeting was held in the Universal Hall at the Findhorn Foundation and field visits were made to Alladale, Glen Affric and the Carrifran project. Alan Watson Featherstone of Trees for Life and Steve Carver introduced proceedings and Rick Minter and Alison Parfitt facilitated discussions and working groups. Sixty eight people attended, with many traveling from England and some from the continent. There was a wide representation of interests, with many students, individuals and managers from voluntary bodies such as the John Muir Trust – though fewer from the government agencies than WN would normally expect. The field trips were well attended with staff of the Alladale project hosting a day of briefing and walking into the glen; staff of the Forestry Commission and Alan Featherstone of Trees for Life hosted the tour of Glen Affric and Philp Ashmole and Hugh Chalmers took us round Carrifran.

Hugh Fullerton-Smith briefs the group at Alladale, October 2008.

On the first morning, Roy Dennis of the Highland Foundation for Wildlife gave a presentation on the history of bird introductions – with Scotland's extensive experience of sea eagles in particular. Iain Valentine, head of animals, education and conservation at the Royal Zoological Society of Scotland, relayed progress and prospects on beaver re-introductions in Scotland. Peter Cairns spoke about 'facing the predator – are we ready?' and his organisation 'Tooth and Claw' also organised an exhibition of high quality photographs on this issue. Alan Featherstone covered targets and visions for the return of Scotland's missing mammals and there was then a discussion on targets and time-lines. The afternoon was then split into discussion groups on species issues: beaver, lynx, wolf, herbivores and birds. In the evening, the conference was treated to a performance of 'Where the Wild Things Were' by the storyteller Margot Henderson.

On the second day of what was WN's first residential conference, Hugh Fullerton Smith, manager of the Alladale Wilderness Reserve, Philip Ashmole and High Chalmers of the Carrifran Wildwood project and Alan Watson Featherstone with Liz Balharry of Trees for Life, gave presentations on the theme of restoring whole ecosystems – 'what's happening in Scotland'. There then followed a presentation by Kenny Taylor on the 'Lore of Fauna Celtica'.

The gathering thus wove a thread between the science, public perception and folklore of animals and the issue of re-introduction, particularly of predators. David Hetherington, Britain's leading expert on lynx, chaired discussions on perceptions of predators, in particular the barriers created by myths as well as apparent economic interests. Simon Ayres chaired discussions on the potential livelihoods in the tourist or educational potential of introduction schemes; Chris Marsh chaired a session on farming issues and David Blake presented issues related to game shooting; I chaired a session on community-based re-introduction projects led by Roy Dennis, and Tony Whitbread chaired a session on ecosystem restoration and how it might be driven by key re-introductions.

A number of key questions arose:

- Is it best to promote reinstatement of iconic species in their own right, or to promote restoration of entire ecosystems, with reinstatement of keystone species as a necessary component?

- Can we identify specific parts of Scotland where large-scale habitat restoration could create conditions for reinstating particular iconic species?

- How can we mobilise support from politicians, agencies, NGOs, and private individuals to establish rewilding as the primary management objective in particular large areas?

The general feeling from the workshops was that species reintroductions and ecosystem restoration needed to be pursued in tandem – and that key species could drive restoration, for example, of wetlands by beaver or open forest by wild grazers. There was already a well-developed appreciation of habitat networks and opportunities, and although there was a rising level of awareness of wildlife generally, there was little public appreciation of the missing species or the scale of ecosystem restoration required. It was agreed there was a need for concerted action with regard to public perceptions and also a need to seek common ground among the conservation organisations. There was still a need for more detailed mapping of opportunities and more integration of objectives

among disparate organisations with regard to wildness and the need for ecosystem restoration.

On the question of how to mobilise support from politicians, agencies, NGOs and private individuals, the general feeling was that more could be done to establish rewilding as a primary management objective in some large area schemes. Thoughts on target audiences ranged from a rewilding 'task force', for example through Scottish Environment Link or the RSPB, and that a rewilding NGO needed to be created that could channel funding.

On the issue of farming it was evident that communication lines were not well advanced and that this community and perhaps also the game and fishing community, were far less aware of the potential balance of positive with negative impacts than was the case with forestry. There was clearly a need for economic support (subsidy) to include wildland objectives, such as payments for wild grazing regimes. Detailed examples of impacts in European communities that managed beaver, boar and predators in particular, should be communicated.

With regard to livelihoods from reintroductions, group discussions identified the following key issues:

- there would be a need for infrastructure to gain revenue, for example as happened in Yellowstone National Park, USA, with regard to wolf watching;
- land managers should be involved at a very early stage, for example, learning lessons from sea eagles on Mull;
- There are numerous indirect spin-offs from tourism and a need for a Farming and Wildlife Advisory Group form of service on rewilding – particularly with regard to keepering and the game community.

However, there were questions regarding the sustainability of car-based tourism and the dangers of 'commoditisation' of nature. A long term strategy would need to be in place for sustainable tourism, with better prospects if overseas travel became more expensive.

There was detailed feedback from the groups discussing perception of predators and general agreement that lack of public knowledge and education was a key issue and should be addressed well in advance of any plans for reintroductions. The role of the media is likely to be crucial – with a tendency to polarise views where there could readily be common agreement. It was important to establish common ground amongst all stakeholders. Experience-base education would be invaluable – for example, at wildlife centres where people can see wolves and lynx. Lessons needed to be learned from European experience – for example of opposition to reintroduction of bears in the Pyrenees or the positive approach in Sweden where government rewards landowners for the presence of wolves, lynx or bear (in contract to more negative government responses in Norway).

Often, predators had an 'image' that was far from the reality, with a tendency to be 'demonised' – these polarities could be offset by a strong programme of public education, starting in schools. The work of 'Tooth and Claw' in this respect was highlighted – and it was agreed that TfL with a contribution from WN would co-fund a DVD production for educational use.

The conference discussions raised many more questions than could be answered, and it is useful to re-iterate some points here as they show a certain level of critical self-reflection and realism, rather than an ungrounded enthusiasm: for example -

- The restoration work at Carrifran is taking place in a policy vacuum: the project has its own targets but these do not relate to any formal conservation policy context;

- Biodiversity Action Plans (BAPs) are about setting objectives for conservation policy and targets. But, rewilding points to further products beyond those within a conservation policy context. Rewilding could thus inform an evolving BAP policy.

- Conservation policy is wedded to a species-specific mindset. It needs to be shifted to embrace a wider awareness of what matters in nature and become more flexible.

- In their early stages, Trees for Life struggled to have any influence in conservation policy related to their interests. Thus they decided to get on and do it, as a way of actively demonstrating their philosophy. The practical results of TfL's work have served to influence both policy and practice.

- Are we humans and policy makers willing to give up control of nature? Rewilding challenges us to explore this.

- Beavers are a hybrid in policy and organisational terms. How can we learn lessons from the success of lobbying for birds and bird habitats?

- Can we achieve a mammal-based message about the worth of reintroductions, which matches the relative success of bird conservation?

- Who is 'we' in these discussions? When making recommendations and when taking things forward, it will help to be clear who 'we' is (this re-iterates the point about a rewilding advisory group)

- European legislation dictates many of these conservation-related issues and can take 10 years to take effect. Need to recognise this when planning ahead on these issues.

- What about setting up a large lobbying group to push for the return of key species, especially as a follow-up to this event?

A number of key points arose after Kenny Taylor's presentation that do not often get addressed within the conservation community – for example, that we need a closer relationship with nature (eg. as when solo in the wild) and to reconnect with ancestral knowledge and feeling for nature that would have been more right-brain than left. There was a need for *new* stories about the creatures we want to bring back that

would re-create the *power* of the old stories which existed within a shamanic consciousness – as in the power of totem animals in tribal cultures such as the American Indians. There was an argument that we have lost the knowledge of how shamanic journeys and the power and presence of animals can help us get round obstacles - including the limitations of old style conservation thinking! A signpost example is Jerome Bernstein's book *Living in the Borderlands*, *The Evolution of Consciousness and the Challenge of Healing Trauma*
www.borderlanders.com/index.html
about the cultural issue and loss of experience - a work that underlines the need to understand that eco-restoration sites can be healing for us as well as healing for the earth and for a cross over between the 'felt experience' and science/facts – this should be what environmental education does and for this there was a need for the right images and cultural engagement, especially with children and it is we (grown ups) who don't realize this connection. The idea arose of creating a prize for a children's story which explores a positive / mysterious / respectful / magic relationship with nature – the Good Wolf Prize (i.e. not the big bad wolf again)

Four workshops discussed and reported upon reintroduction of beaver, lynx, wolf and wild herbivores. Each group heard an outline of context, and questioned and commented on that, before discussing three questions. 'Visitors' from other groups then had time to review and contribute before key points were chosen.

The beaver group concluded that most large river systems in Scotland would be suitable and that reintroductions should be on a catchment scale. There was a need for openness and honesty with the public and education was crucial in avoiding misinformation and lobbying by uninformed special interests. The issue of sub-species and the 'right' kind of beaver was less important than establishing genetic diversity and adaptability to modern conditions – thus mixing populations from Norway, eastern Europe or Bavaria should not be seen in a negative light.

On the question of lynx, uppermost was the simple fact that the public does not know lynx - we are working with a blank slate and need education to win hearts and minds. Habitat is already suitable and available but there would need to be an ecobridge/connectivity across the Central Lowlands to link up with border forests and Northumberland. There was a need to target landowning organisations & advisers, prepare the ground for creating incentive payments – rather than compensation/profit and foregone payments. There would also be an issue of hunting versus protected status issues eg. at what stage to control. There was a general feeling that following an educational programme lynx was very feasible – habitat and prey animals were available, Eurasian populations could provide animals and there was practical experience in Europe of relocating animals. the key requirement would be to get a group or landowner and the Forestry Commission of Scotland on board to champion a project. The first such site might become iconic and would provide a potential 'branding' for local lynx-friendly produce, as occurs in parts of Europe. Political support would be essential and in this respect, learning from previous release projects would provide better understanding. A schools' education pack could provide the background.

On wolf reintroductions there was a clear need for an advocacy group for all large carnivores. Advocacy and education is more important than more information and an education & demonstration centre would be invaluable in this regard. But there was also a realistic sense that a paradigm shift would be necessary –a change in ourselves and attitudes with a need to rethink the whole question of risk.

On the issue of source population and viability, whilst there is general agreement on the availability of habitat and prey, the most appropriate source population might be from those habituated to red deer (perhaps in Scandinavia). There would need to be a robust management policy of dealing with individuals wandering from core areas of wildland, such as in the Cairngorms National Park.

There was an obvious marriage possible between conservation & ecosystem issues and the charisma of an animal with considerable tourist potential. We needed a European 'map' of experience with wolf; to study socio-economic, psychological & cultural as well as ecological issues, particularly with regard to conflict areas such as traditional hill farming – although current framing trends could create an economic opportunity. What was needed was imaginative communication with initial stakeholders in forestry, tourism interests and heritage and an incentive rather than a compensation approach.

On the question of herbivore reintroductions there was a feeling that Scotland had too many wild herbivores and among conservationists that domestic breeds would better deliver management objectives – with less complications for management! There was a pressing need to reduce deer populations and little understanding of the complex interactions between different wild herbivores – for example, wild cattle, moose, wild horses and wild boar. Feral goats were also an issue – as non-natives, should they be encouraged or eradicated? In certain areas there would be conflicts of interest – for example, for ground-nesting birds. It was not clear where specific sites existed or where there might be interest in a broad spectrum of grazers – Trees for Life has experimental pens for wild boar, as did Alladale, where moose were also kep in an enclosure to begin a breeding programme. There was a clear potential for economic benefits from eco-tourism, hunting and marketing of wild meat.

Participants were asked what they would like to see within ten years – here are some post-it notes from the conference discussion board:

"The first Lynx from Slovenia or Norway brought over by SNH/Forestry Commission/Tress for Life!"

"That reintroductions as a common talking point – schools, newspapers and acceptance!"
'White tailed eagle around all Scotland's coast. Red kite everywhere. Beaver pilot successful and spreading widely. Lynx reinstatement well underway"

"Common Cranes breeding up Scottish straths"

"Scottish Gov recognition through laws protecting all reintroduced species"

"Wildcat population stabilised & expanding. Beavers a success. Boar & Lynx started"

"Beavers properly established in the wild"

"Beavers fully reintroduced. Licence for Lynx trial"

"Beavers & Lynxes living widespread in a habitat that can support them indefinitely"

"Wild cat, Pine Marten & Polecat returned to the Southern Uplands"

"Wolves West of the Great Glen"

"Field study week an integral part of every school year through to the top year. A wilderness week to feature at least twice in every pupil's education"

"A public receptive to ecological restoration and hungry to see it happen"

"A Species Action Plan for Lynx"

"Beavers, wild boar, and Moose established. Realistic proposals for Lynx and serious discussion about Wolf"

"Political will & resources to meet EU obligations re reintroductions"

"A fresh perspective with our lost fauna and each other & a more Biodiverse UK"

"Beavers successfully reintroduced. Lynx reintroduced. Current species doing well eg Wildcats"

"More productive and integrated ecosystems with prolific runs of salmon feeding other animals along streams in Scotland. Greater awareness, understanding & examples of people living together with wildlife"

"Cranes displaying near beaver ponds beside forests with Lynx roaming free"

I was asked to make a summary reflection on the proceedings. Perhaps the key aspect was the need to avoid polarisation through advance planning, participation and above all education. There was work to be done showcasing the experience from projects in Europe and the USA and there was a cultural shift required in the general public's relationship and appreciation of wild nature, predators and risk – as well as a paradigm shift in management practices of control and focus upon specific objectives. The role of science, though essential, should not take precedence over the cultural elements of a closer relationship to nature – and in particular, there was a need for an understanding of nature as healer and educator, with each species having a certain 'medicine' or meaning, as they formerly had in shamanic cultures. It was clear that there was enough habitat and perhaps also enough goodwill in the conservation and forestry communities – it was less clear where the game conservationists would stand, and it would seem farming interests were implacably opposed, though largely out of ignorance and fear of economic losses. Education was the most important 'next phase' and in particular making use of pilot schemes and examples from Europe.

In this respect, there was an agreement to set up species working groups and begin production of educational materials {ed. note: we did not manage to follow up the species working groups in a productive way but Peter Cairns and 'Tooth and Claw' did produce the DVD and their work with photography and the book 'Wild Europe' has carried through the first phase of the public education). Rob MacMorran has set up a Scottish Wildlands Group with a newsletter.

Wildland Research Institute (Wri) launch, Leeds University, 21st Oct 2009

The WRi launch was the culmination of a 'wild' week of celebration in Leeds. The first day saw the opening of a stunning exhibition by the wildlife photographers who are Tooth & Claw and the week ended with a first staged performances of Samantha Ellis's play *The Last Wolf in Scotland*. In between, primary and secondary school children came into the University to do workshops as well as see the exhibition. And both Roy Dennis and Jay Griffiths gave thought provoking talks as part of an evening debate with an audience young and old who had come from both sides of the Pennines.

The launch day itself was a seminar for nature agencies, national parks & conservation NGOs as well academic representatives and activists to set some early research priorities. About 50 people worked through an agenda including:

- sketching out trends and drivers for wildland
- 3 presentations about national and European context & agendas
- detailing wildland issues
- imagining good and bad futures for wildland 50 years on
- back-casting what could, should happen to get us from here to 50 years on
- and then thinking of what we want and need to know to enable those changes.

The three presentations enlarged the context for the day, which were summarised as:

1. Working towards better protection of Europe's wilderness.

Zoltan Kun, Executive Director, Pan Parks Foundation, gave a briefing about wilderness/wildland in Europe, e.g. the EU Prague conference resolution (Apr 2009) and the Wilderness Think Tank and Pan Parks network.

2. Wild Europe, Turning Ideas into Policy.

Toby Ackroyd, who has developed the Wild Europe Initiative, sketched the formative steps and detailed an action plan for the

Wild Europe Initiative as well as finishing with next steps for more wildland in the UK

3. Current projects, Intent and Implication.

Keith Kirby, Chief Woodland Conservation Officer for Natural England, talked about wildland as a continuum and what it might look like. Then he offered a framework which relates degrees of wildness and scale. This very helpfully allowed us to see notions about wildland past and present and position current projects, e.g. Knepp, or species reintroductions, e.g. Red Kite, in relation to each other. It provides a helpful overview for what can be a confusing diversity of projects and intent which are broadly more wild.

Delegates suggested that 'heaven', for those of us alive in 2060 and wanting more wildland, would mean that there is green space in every neighbourhood and wildland in every region. Other aspirations gave us 30% of all land will be near natural and that the National Wildland Network would be complete, connecting uplands and lowlands, urban and rural. Sketching out steps in decades between then and now revealed a range of thinking or prophesy which included:

2040 - 2050

- Large scale Government buy-out of non viable farms to allow landscape scale wildland project
- Network of IUCN II sites designated
- Education provides courses for 'new' land stewards

2030 – 2040

- Culture of 'wild nature' as normal and is universally accepted
- Individual landowners cooperate & create core areas
- Changes of attitude after official reintroductions of species (lynx especially)

2020 – 2030

- Flagship report proposes PAN Park network & identifies sites
- Tourist Boards accept value of re-introductions

The Key research questions that emerged were:

- How do we deal with the switch from human control to natural process?
- What does this cost – in economic and cultural terms? Currently any cost benefit analysis is skewed by what we do not know.
- Would economic interests loose competitive edge by doing this? And how?
- What is the cost benefit of ecosystems?
- Need to look at the climate change effects on ecosystem delivery.

I personally argued against a standard academic research agenda and for greater focus upon *ways and means analysis* - i.e. What do we need to know, for instance, to achieve 10,000 sq kms of wildland in England, in Wales and in Scotland? This would involve weighing costs against benefits to arrive at cost efficiencies and current experience is too short a time to evaluate e.g. six years of Wild Ennerdale cannot tell us enough, yet, about benefits. So how do we value? How do we use numbers to value? But a ways-and-means approach could also be complimentary to a cost benefits approach: What areas do we have now that could be wildland ? What can we learn from schemes to date and can we identify gaps and assess transferability of overseas examples. What is determining how rewilding is taking place in different countries across Europe? How is this happening? Who is making this happen?

The issue of monitoring arose, as it always does in a research environment – what are the successes and failures? What data do we need – as there is little data about protected landscapes and reserves efficiency.

From these discussions the meeting moved to considering what are the best tools, strategies, and methodologies to influence and campaign for more wildland and how can we achieve core wildland areas in England, Wales and Scotland? We also need to identify what could prevent this, ie. talk to all stakeholders (social science research) to identify potential conflicts along any route we take to achieve this goal

A complete record of the seminar and the presentations is available on

www.wildlandresearch.org<http://www.wildlandresearch.org/>

Gathering at the entrance to Carrifran, October 2008.

Since then!

In December of 2009 the coordinating group of WN met to review progress and consider its future work. It was agreed that the 'network' phase had delivered on its key objectives – to further communication among practitioners and to raise awareness on rewilding issues. In that year, 'rewilidng' as a term had been heard on the lips of an environment minister giving a keynote speech, yet there were significant areas of work that still needed addressing. Prime among these was reform of the EU Common Agricultural Policy that supported domestic grazing regimes for conservation purposes, but had no payment scheme that would properly support 'wild grazing'. Although there was evidence that UK agencies would bend the rules in this respect, the situation needed improving at a European level.

We can feel happy that there is a beaver 'reintroduction' pilot project, but not at the limited scale, nor the negative

response of the Scottish government to the discovery of a free-living population of beaver on the river Tay. There is only a limited enthusiasm for the Dutch model of combining free-living 'wild' horse, red deer and wild cattle. On the other hand, there appears growing acceptance of wild boar and growing realisation that Britain has a population of feral big cats that appear to be breeding. We are likely to see more small beaver projects – for example, with the Wales Wild Land Foundation in the Cambrian mountains.

The 'new austerity' has already seen the abandonment of a sea eagle project in East Anglia, but moves are continuing to repopulate the east coast of Scotland.

The 'species group' idea has seen little activity, but there is an overall agreement that the lynx should be the main target species. In this regard the work of 'Tooth and Claw' and the WN-sponsored DVD is a step in this direction.

There is still a need for more coordinated thinking and planning between the main players on large scale management schemes – for example, the RSPB, the Wildlife Trusts, the National Trust, Woodland Trust and the Forestry Commission, and we have yet to see a government initiative in the form of a 'challenge fund'. Political developments may not favour government participation and it is to be hoped that whatever happens to the public land resource, key elements of forward thinking in the Forestry Commission and Natural England will be retained in the 'public service'. The voluntary organisations who might be expected to take up the cause – if government disposes of its forestry and conservation responsibilities to the private sector, are not yet well-practised and disposed toward cooperative schemes. The major public-private initiative in Ennerdale has depended a great deal upon the foresight and sensitivity of public servants within the Forestry Commission and it would be a great risk to have to fund this entirely from the private or voluntary sector.

The Wildland Network may have completed this phase but there is still a need for conferences and sharing of experience, and BANC will take up that role – an autumn conference is planned for 2011 at the Neroche project, led by the Forestry Commission, at which many of these themes will be discussed and networking can continue.

Our once and future fauna

ECOS 29 (3/4) 4-17 (2008)
This article looks at progress with reintroducing the beaver in Scotland, and beyond to the ecological and cultural issues surrounding lynx and wolf.

DAN PUPLETT

On a sleety day in late October, some friends, my wife and I were lured to the Highland Wildlife Park in Kincraig, near Aviemore. The new star attractions were two magnificent Amur tigers, which rank among the most splendid and endangered predators on the planet. I was suitably impressed as one of them stretched up to begin devouring the deer haunch which had been dangled from a birch tree. It was snowing more heavily now, but the cat looked unconcerned, tearing at the meat with almost lazy, yet soberingly powerful shakes of its massive head. I later reflected on how we naturally appeal to people in Russia, India, Africa and elsewhere to protect and try to co-exist with large animals, even those that present a potential threat to livelihoods and lives. I then wondered what some of those people might think of our pleas if they knew of our fuss over the return of beaver, a mellow aquatic rodent, to Scotland!

September's reintroductions conference, 'Wild, Free and Coming Back?', held in Findhorn, near Inverness, was to my mind a rich and fruitful event. In hindsight it would have been interesting to have had among the delegates people who live daily alongside leopards, elephants, tigers and the like, to give a different perspective on relatively easy-going neighbours such as the beaver and lynx!

Nevertheless, progress is slowly but surely being made with mammal reintroductions in the UK. What follows is a review of the current situation surrounding three of the most serious candidates for reintroduction, the beaver, lynx and wolf, including some thoughts and ideas arising out of the conference.

Return of the beaver

The granting of the licence for a trial beaver reintroduction in Scotland was a milestone for UK nature conservation, and a cause for celebration. It was also the culmination of a long and convoluted process and a great deal of hard work.

The European beaver *(Castor fiber)* was once widely distributed through Britain, but was hunted to extinction probably by the end of the 16th Century, chiefly for its fur, meat and castoreum.[1] This pattern of exploitation occurred throughout Europe, although it has since been reintroduced to more than 24 European countries. For over a century there have several unsuccessful attempts at restoring the beaver to Britain[2], but in 1994 serious investigations into the possibility of beaver reintroduction began, prompted by the 1992 EU Habitats Directive, which requires Member States to examine the feasibility of reintroducing certain missing species.[3] Although it was ascertained that there was sufficient habitat and public support, a small but powerful lobby opposed it with largely groundless concerns.[2]

Hopes were raised again in 2002 when an application was made to the Scottish Government for a trial reintroduction. However this was turned down in 2005 on the questionable grounds that as a protected species, the beaver could not be controlled by lethal means if the need arose. Also, as the proposed release site, Knapdale, is in a Special Area of Conservation, there were concerns that unacceptable damage would be done to the Atlantic Oakwood habitat. For the most part conservationists refuted the validity of these claims, but the licence was refused nonetheless.

Swimming beaver (Derek Gow Consultancy)

The beaver trial

Encouraging signs appeared with the newest Environment Minister, Michael Russell MSP, clearly expressing his support for a beaver reintroduction. At the reintroductions conference, Iain Valentine of the Royal Zoological Society of Scotland (RZSS) pointed out that the change of government and minister, combined with the European beaver's inclusion in the Scottish Natural Heritage (SNH) Species Action Framework were all key factors in the favourable response to the licence application. The Scottish Wildlife Trust (SWT) and RZSS conducted a consultation in the mid-Argyll area to assess local feeling towards bringing back beavers. Encouragingly, around 72% of the population were in favour and 24% opposed. In the immediate vicinity of Knapdale, opposition was stronger, with 44% for, and 54% against.[4] Nonetheless it was still deemed that this represented sufficient support overall.

SWT and RZSS submitted the licence application to the Scottish Government on Christmas Eve 2007, and approval was given in May 2008. The beavers were trapped in Norway in September and will be held in quarantine before being released in April or May 2009. The release site, Knapdale Forest on the Argyll Peninsula is owned by Forestry Commission Scotland and the trial will be jointly managed by SWT, RZSS and other partners, and guided by the Beaver Steering Group. The site contains a variety of woodland habitats and a substantial amount of lush riparian habitat.

The beavers will not be fenced in, but will be radio-tagged so that they can be retrieved if they go astray. The licence contains specific recommendations, such as mink control to reduce the possibility of predation on beaver kits, and the establishment of a forum to allow the views of the local community to be fed into the decision-making process. Effects on other wildlife, vegetation, hydrology and the local economy will all be closely monitored.[5]

The trial will be evaluated against a range of criteria. To be deemed a success there have to be certain levels of survival along with a stable or increasing population, the reintroduction has to be integrated with habitat management and restoration, and positive contributions to ecosystem function and the economy of the area must be demonstrated. It will be seen as a failure if mortality levels are too high, if there is significant ecological or economic damage, or if overall costs significantly exceed expectations.

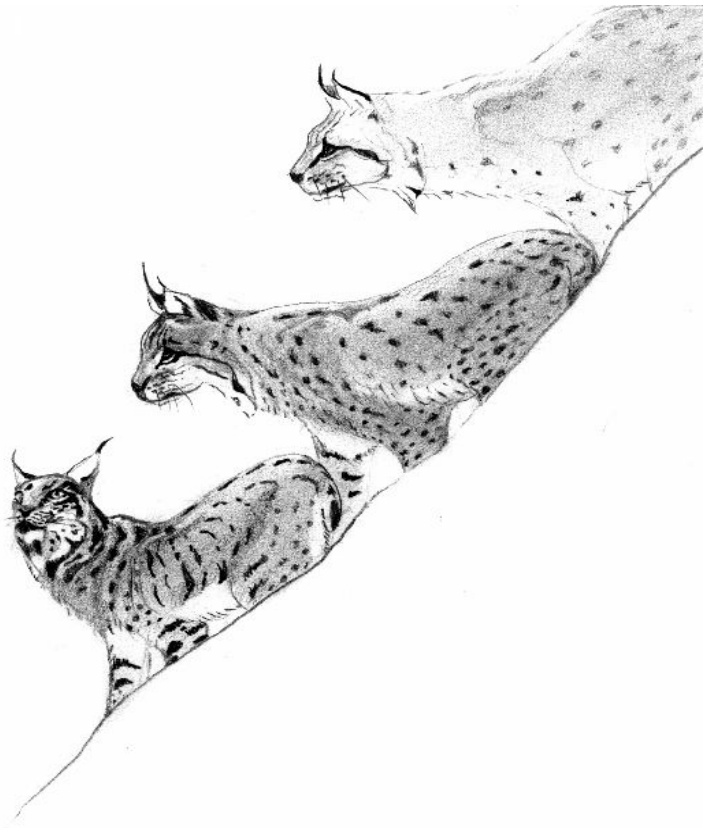
SNH will provide independent monitoring and report back to the Scottish Government on the relative success of the project. If at any point during the trial, insurmountable problems arise, then an exit strategy would be implemented. However, if the trial is successful, at the end of the five-year period, another licence application could be made to the Scottish Government, but this time for a full reintroduction.

It is encouraging to see that the arguments in favour of beaver restoration are becoming more widely appreciated, thanks to excellent educational work by the likes of SWT, RZSS, the Aigas Field Centre and others. There is no doubt that the presence of these ecosystem engineers can dramatically enhance biodiversity. Furthermore, worries about the *Giardia* parasite and impacts on salmonid movements appear to be unfounded.[3]

In recent years there have been several projects involving captive beavers that have played a useful role in educating the public and firing imaginations as to how much more complete our freshwater and woodland ecosystems might be with these influential and charismatic rodents back in their rightful place. Although none of these projects are reintroductions, I believe they will continue to have a crucial role to play in the process of restoring this mammal to Britain. It is also heartening that beaver reintroduction is being given serious consideration in England and Wales.

Return of the lynx

The Eurasian lynx *(Lynx lynx)* has been the most seriously discussed candidate for a potential predator reintroduction, much of the work on the feasibility of its return having been carried out by David Hetherington when at Aberdeen University. It is clear that there is sufficient habitat for lynx in Scotland. Lynx aren't overly choosy about the 'nativeness' of woodland, and conifer plantations would be welcome cover, in combination with the expanding area of native woodland.[6]



Lynx: lower, Iberian Pardel lynx; middle, Central European and upper, Scandinavian subspecies. (Peter Taylor)

It has been shown that there is a habitat network in the Highlands capable of supporting around 400 lynx, a viable population which would also be one of Europe's largest.[7] A smaller population of around 60 could live in the Southern Uplands, although this would not be viable as a breeding population and would need supplementing with new genetic stock. Measures to mitigate the barrier effects of busy roads in central Scotland would also be desirable to link the two populations.

There is sufficient prey, roe deer *(Capreolus capreolus)* being its main quarry, and thus the lynx could play a role in encouraging woodland regeneration. It is not a threat to humans, nor is it perceived as one, and the potential for conflicts with farming also seem minimal as the lynx tends to keep to woodland cover, and sheep are usually on open ground. Evidence from Sweden suggests that lynx predation can be a significant factor in limiting fox *(Vulpes vulpes)* populations[8] and therefore could have benefits for ground-nesting birds.[6]

On a visit to the Carpathian Mountains in Romania, my guide informed me that some of the shepherds in the region had been completely unaware that there were any lynx in the area, although they were accustomed to warding off bears and wolves with the aid of their fierce dogs. In a lifetime in the area, over a decade of which had been spent tracking and studying local carnivores, my guide himself had only ever seen a lynx on two occasions – and this was in one of Europe's lynx hotspots! Yet in spite of this elusiveness, there is no doubt that the lynx is a significant boost to tourism in parts of Europe where this charismatic cat is used to symbolise the wildness of places; the same could be the case in Scotland.

Wolves and the ecology of fear

Wolf *(Canis lupus)* reintroduction is a topic guaranteed to get journalists drooling. Clearly it is crucial to communicate the facts regarding any animal, maybe even more so with the wolf considering the amount of misinformation that surrounds it. Perhaps the most relevant piece of research on this issue is a report by researchers at Imperial College and the University of Oslo that used population modelling software to forecast some of the ecological and economic impacts of reintroducing a population of wolves to the Scottish Highlands.[9]

Their predictions were based on the hypothetical release of three wolf packs, each consisting of a breeding pair and two subordinates. The simulation showed that after an initial population expansion, numbers stabilised at 25 wolves per 1,000 square kilometres. After 60 years red deer *(Cervus elaphus)* populations would be reduced to seven per square kilometre. This reduction could represent as much as 50% of the population, and could be more dramatic than has been observed in other countries because of the slow rate of reproduction of Scottish red deer. It is often assumed that given the current high deer populations in Scotland, wolves would have little impact on their numbers. While that may be the case in the shorter term, an important influence on ungulates would be on distribution and feeding patterns. The situation in Yellowstone National Park illustrates this effect, referred to as the 'ecology of fear'.[10] In Yellowstone, where wolves were extirpated in 1926, elk (synonymous with red deer) had been

concentrating their browsing in riparian areas, which were sheltered and provided a ready supply of food. Following the reintroduction of wolves however, the elk were much more vulnerable in those areas, and tended to feed more on open hilltops where they had a better prospect of the surrounding area. This resulted in a trophic cascade, with riparian vegetation such as aspen and willow regenerating, encouraging and benefiting song birds, beavers, insects etc.

Spanish wolves (Archive)

In economic terms, the Scottish wolf report suggests that the influence of wolves on deer populations would dramatically reduce the need for hind culling.[9] While deer estates usually make a profit from stags killed as trophies, culling hinds actually incurs a loss, and a significant saving might be made if wolves were present. Other knock-on effects resulting from the presence of wolves would be increased woodland regeneration, a possible reduction in Lyme disease (which is carried by deer ticks), and benefits to grouse moors due to a reduction in foxes and other smaller predators.

The authors of the report acknowledge the potential for conflict with sheep farming. Free roaming Scottish sheep would be ready prey for wolves. If predation of sheep did occur, while it may have minimal economic consequences for subsidised farmers, the emotional response should not be underestimated. Wolves' propensity to prey on domestic dogs would be emotive and the authors suggest it would be partly addressed by education of dog owners. Compensation schemes for livestock losses could be employed, and organisations such as the Wolves and Humans Foundation may well have a role to play in administering these.[11] In 2005 subsidies changed so that rather than paying farmers per head of sheep, a Single Farm Payment is now in place. As a result of this and other factors, sheep farming is going into steep decline[12], and with proposals to end subsidies for hill farmers in 2013, the future of hill farming is in question.[13]

It could be that tourism may become a viable alternative to farming for some rural communities. Judging by the situation in Yellowstone, wolves could be a substantial draw for tourists. The Scottish wolf report does not address this aspect, but there seems to be no obvious reason why the presence of wolves would not result in a significant boost for tourism in the Highlands, possibly making a substantial contribution to the Scottish rural economy.

The report also surveyed attitudes of various stakeholders, and found that public opinion was fairly positive, and that while the National Farmers' Union for Scotland as an organisation was strongly opposed, the actual sample of farmers showed much milder opposition, possibly because of the low profitability of sheep farming.

At the conference, Alan Watson Featherstone made a case for the reintroduction of the wolf by 2043. There were comments that this was much too far off, while others believed it to be overly optimistic, and that attitudes would not change in time. In any case, he advocated the use of 'stretch goals' and 'backcasting'. This involves setting targets which may seem overly ambitious viewed from the current paradigm, but can be achieved with bold, creative thinking, strategic planning and a willingness to think outside the box.[14]

Thoughts on strategy

The granting of the licence for the beaver trial was a huge step forward for species reintroductions in the UK. The trial is in good hands, and financial support and continued good publicity are what is now needed. Regarding the predators, several interesting points were raised at the conference. There were strong calls to act soon to promote the reintroduction of the wolf and especially the lynx. Roy Dennis, who has experience in reintroduction projects, notably the sea eagle, felt that the conservation community is often far too cautious, compared to sectors such as business and industry, which are more inclined to make bold moves and to just get things done. There were also notes of caution – handling the issue clumsily, or preaching to the wrong people at the wrong time, could backfire.[15] Bearing in mind the Autumn 2008 protests from crofters on the west coast of Scotland, concerned that their lambs are under threat from sea eagles *(Haliaeetus albicilla)* it is clear that reintroductions can be an extremely sensitive issue and that appropriate timing and effective communication are crucial.

It is essential that the debate is kept as open and inclusive as possible. Roy Dennis pointed out that while it is impossible to get everyone to agree, it is also vital that communities have a sense of ownership for reintroductions, and ultimately it needs to be local people who drive reintroductions forward themselves. People have to *want* these creatures back for it to work.

There was general agreement at the conference that education is key. This would be true of any proposed reintroductions, although carnivores, particularly wolves, present the most significant challenges and suffer the most from a frequently inaccurate negative image. Developing an appropriate educational resource, and funding it, would therefore be critical initial steps, and it was highlighted that a good deal of this work needs to be aimed at tomorrow's decision-makers.

Science or emotion?

Peter Cairns, co-founder of Tooth and Claw, gave a fresh slant on the debate by stating *"the science doesn't matter"*. Some ecologists may have shuffled in their seats, but he was stressing that talk of "trophic cascades" and "keystone species" is unlikely to resonate with Joe Public. As the Tooth and Claw project demonstrated, most people's relationship to charismatic wildlife is to a large extent an emotional one.[16] While I, (and no doubt Peter) believe that the science *is* relevant, as humans we engage the world on many levels, and not only with our intellects. When animals are naturally perceived as sexy, cool, scary, infuriating and more, the science inevitably becomes just one part of the picture. Indeed, a strong case was made for engaging the cultural and aesthetic aspects of reintroductions, and recognising that art, literature and music relating to creatures such as the wolf, can influence people's attitudes.

As well as dramatically enriching our own island, from a global perspective reintroductions may have a role in the conservation of charismatic species overseas.[17] We encourage poorer and sometimes more densely populated countries to conserve animals that are often more dangerous than the proposed Scottish candidates. Might we have more credibility if we allowed a bit more wildness to return to our own back yard?

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BEAVER

Beavers in Britain – laying the foundations

ECOS 23 (2) 23-26 (2002)
Beavers will soon be out of quarantine and part of the Mull of Kintyre landscape. Where else can they go in Britain, and how will they refashion their host habitats?

PETER TAYLOR

The beaver is about to become the first formerly indigenous mammal to be re-introduced to Britain. Scottish Natural Heritage and Forest Enterprise have instigated a project in the forest of Knapdale (Mull of Kintyre) that will act as a pilot scheme. If 'successful', other sites will follow. The first animals are due to be released in Spring 2003. The scheme follows ten years of fact-finding and consultation, since the idea was mooted by, among others, Alan Watson of Trees-for-Life at Findhorn, The beaver was part of a longer term vision for re-establishing the ancient Caledonian Forest as a wild and dynamic ecosystem with its full set of herbivores and carnivores: first the beaver, then the boar, moose, bear, lynx and wolf.

By Brittany's streams…

In 1992 I accompanied Alan Watson and assorted SNH, English Nature, and Wildlife Trust enthusiasts on a visit to the closest European beaver re-introduction sites – just over the water in Britanny's Parc Amorique. We caught little more than a glimpse of the elusive nocturnal rodents, but had ample opportunity to look at habitats and see how the Parc dealt with the potential problems of conflict with agricultural and fishery interests. I was struck by the variety of habitats the beavers occupied – belying conceptions from literature, especially American.

The programme in Britanny had begun in the 1970s following successful introductions elsewhere in France, and the Parc was still expanding the programme by purchasing suitable habitat. Beaver had colonised a variety of sites ranging from small streams in meadowland, reed-fringed lakes (one with a nuclear power station much like Trawsfynnedd in Snowdonia), and most remarkably, some steep boulder-strewn mountain streams reminiscent of Dartmoor. Small dams were evident on the smaller streams, but there were no large beaver ponds and lodges – European beaver do not build large dams, but seem content with small pools, wet meadows and even mountainous terrain, where they engineer at most a series of still reaches and generally wetter meadows. Above all, beaver require luxuriant streamside vegetation for their summer feeding, and ample supplies of usually small trees for winter feed when they strip the bark from twigs.

We could see clearly how the French beaver had coppiced the emergent willow, alder, ash and even oak, creating a bushy habitat. The stereotypical knawed-off stumps of large trees were not in evidence. It took a practised eye to tell that beaver were present – the meadows and intermittent pools of still-water had lots of emergent vegetation with a pattern of small bushes and glades outward of 50m from the streams. In the mountain stream habitat there were few signs, and rather than a lodge, a den was secreted under big boulders on essentially dry land.

Countering officialdom

Everyone on that fact-finding tour to Brittany was impressed and expectations were that re-introducing beaver would be no problem. There was ample experience of beaver co-existing happily with game fisheries in Norway, where they were re-introduced earlier in the century. Forestry interests had little to be concerned about (Finland led the European recovery programme – unfortunately bringing in American beaver to augment the native species at a time when they were thought conspecific) and in any case modern forestry now practices conservation planting for streamsides. Agriculture could prove problematic but given the plethora of EU schemes to pay farmers for conservation value in an area on essentially marginally economic land, that should not be a stumbling block.

However, attempts to interest the Countryside Council for Wales, the National Trust and others, for Snowdonia (and to steal a march on the Scots) demonstrated what lay ahead. Nobody wanted to stick their necks out – "the Scots are leading on that one", and officialdom was glad to keep out of any controversy. SNH persevered, however, and set up the obligatory consultation process that finally found an approving public and a willing participant in Forest Enterprise. Even so, neighbouring landowners in Knapdale campaigned to have the programme stopped on the grounds of potential impact on sport fishing. This despite an extensive educational programme that should have allayed such fears – salmon and trout can benefit from the enhanced riparian habitats.

Beyond quarantine

The Scottish project now has some Norwegian animals in quarantine and it looks as if the first family group will be let lose next spring. However, I was surprised to discover only last year that Kent Wildlife Trust were about to let beaver loose in one of their reserves! No consultation process, no computer models, no messing! Except on closer inspection it is not a 're-introduction' programme – the beaver are 'management tools' in a wider scheme to re-wild Near Natural Areas and use herbivores (Heck and Highland cattle and wild ponies as well as roe deer). The animals will be penned and carefully monitored to assess their effectiveness. The Kent Wildlife Trust now has several animals through the quarantine period. So, England lead by the back door. Perhaps the Countryside Council for Wales will be more open to assessing sites once the trial periods are over.

Beaver were once extensive residents on the major rivers and wetlands of Britain, and well into the Scottish highlands. They were trapped to extinction by the 13th century, for their musk as well as their fur. Derek Yalden gives a detailed account of their history, including place names related to beaver, and the archeological evidence for their general distribution.[1] They were already scarce by Saxon times. The question is to what extent could they re-establish themselves in former habitats such as the Broads, the Somerset Levels and marshes around the Humber? Most of the English wetlands are now a complex of levees, dykes and pumping stations with small nature reserves where water regimes are artificially regulated. In the fens, some reserves such as Wicken stand above the surrounding terrain, and in the Somerset levels newly engineered reed beds are as much as a meter below the water level in the main dykes. In these highly engineered systems, beaver would be rather chaotic management tools. Perhaps the answer lies in a few Near Natural Area schemes such as the Kent experiment, and they could be part of river restoration projects where natural watersheds prevent colonisation of areas where their presence would be more problematic. In the Parc Amorique, the authorities sought out and purchased suitable habitat, and held a land-bank for exchange with farmers.

Exit strategies

If we can cope with the beaver, the precedent will be set for the return of the other animals whose spirits have long been absent. In Native American lore, the beaver symbolises the building of strong foundations (the foundations of its dams are extremely resistant to winter floods), industrious activity, and the maxim of always having more than one exit from any situation. In ecological terms, the lush beaver meadows provide a foundation for richer biodiversity, and especially for moose, which feed in the shallows. Moose are also a major constituent in the diet of wolf. Native Americans would study the habits of animals and become imbued with their spirit, so it is interesting that for those who have worked hard to get the beaver here, there are many caveats and exit points for this re-introduction programme.

Notes and References

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Details of the projects mentioned in this article can be found at:

Scottish Beaver Network: www.scotsbeaver.org
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Scottish Natural Heritage: www.snh.org.uk

Bringing back the beaver

ECOS 27 (1) 57-65 (2006)

If we cannot restore the beaver as an architect of wetland biodiversity and good water management then any talk of future wild lands and wilderness is meaningless.

DEREK GOW

Beaver trends in Britain and Europe

The fact that the European beaver (*Castor fiber*) was once widely distributed throughout Britain is corroborated by a rich body of archaeological evidence, place name associations and historic references.[1] It was probably more abundant in lower Britain where larger, lusher wetlands with longer growing seasons ensured its prehistoric existence in considerable numbers. Dam remnants and field signs have been identified from a range of locations and an indication that the species excavated bank-side tunnels is supported by the discovery of an adult's skeleton in a burrow on the banks of the river Frome in Somerset.

Beaver were hunted to extinction for their valuable fur, meat, castoreum and body oils. Their slaughter was based purely on their product value and not as in the case of the wolf (*Canis Lupus*) because they were responsible for significant human inconvenience, commercial loss or superstitious fear.

The only written description of this species' natural history in Britain comes from the journal of Giraldus Cambrensis who recorded their presence on the Welsh river Teivi in 1188. In 1526 Hector Boece recorded them as being abundant around Lochness but by 1577 William Harrison the Canon of Windsor stated that:

> "I wortherilie doubt whether that of our beavers or marterns may be thought to be the lesse" "...the tail of this beast is like unto a thin whetstone, as the body unto a monstrous rat; the beast also itself is of such force in the teeth, that it will gnaw an hole through a thick plank, or sheer through a double billet in a night; it loveth also the stillest rivers." [2]

This historic pattern of over exploitation was repeated throughout Europe. By the 16th century European beavers were largely extinct and North American pelts were beginning to enter the British fur market.[3] At their lowest point the European beaver was reduced to 200 on the Elbe, 30 on the Rhone, 100 in Telemark and less than 400 in the Pripet Marshes of Belarus.[4] By the beginning of the 20th century this decline had been reversed with legal protection and European beavers have now been restored to over 24 nations where they were formerly extinct. They are currently estimated to number around 639,000 individuals in mainland Europe.[4]

So why are there still no wild beavers in Britain? It's not for the want of effort as there have been a number of historic releases of both European and Canadian beavers (*Castor canadensis*). In 1870 beavers escaped from Sotterley Park in Suffolk but "their lodges were deemed an eyesore and therefore they were destroyed".[5] Also in 1870 beaver were released into a large enclosure at Leonardslee in Sussex where one family of "five old beavers and their young… converted a narrow brook into a long lake of some 50 yards by 15 or 20 yards broad".[6] In 1874 the Marquess of Bute released one pair of French and one pair of Canadian beavers into an enclosure near Kilchattan bay on the island of Bute.[5] Although these animals fought with each other and none survived long they were replaced with another colony which was still in existence in 1890 when they were visited by the Glasgow Naturalists Society.[7] Around 1880 the photo shown here was taken of a tame beaver in a Scottish stream and in 1902 the Duke of Argyll introduced seven beavers into the grounds of Inverary Castle. Escapes of Canadian beavers have occurred in recent years in Dumbartonshire, Somerset and Kent.

A European beaver photographed in Scotland around 1880.

The most intriguing and forward thinking of all these random efforts was a 'nearly ran' exercise in the Lake District. In 1969 the Forestry Commission's chief forester for the Lake District, Bill Grant returned from a trip to Canada impressed by the habitat creation skills of the beaver. With the support of his boss Jack Chard he started to release beavers in Grizedale forest. Two holding ponds were dug and fenced to acclimatise the beavers, wetland trees were planted and an observation hide built. Although most of the personnel involved with this project are now dead it is believed that the Nature Conservancy Council persuaded the Commission not to proceed with this venture.

In 1977 a campaign to reintroduce the European beaver was instigated by *Wildlife Magazine* under the then editorship of Nigel Sitwell. This advanced all the modern arguments for their restoration but was put down by Sir Christopher Lever who argued that beaver reintroduction would lead to their felling conifers, that valuable farmland would be flooded, that they would consume fruit or cereal crops, that capture would not be easy and that farmers, foresters and fishermen would not support their presence.[8]

Beaver reintroduction - the groundwork and the prejudice

The torturous politics of official beaver reintroduction began in 1994 when, prompted by the 1992 European Union Habitats Directive, Scottish Natural Heritage (SNH) began to consider

the prospect of restoring several species of former native mammals. Wolves and wild boar (*Sus scrofa*) were discounted but beaver were considered possible. English Nature (EN) also examined the prospects for their restoration at this time and quietly concluded that it would be feasible before deftly ducking-out of the process in order to avoid the verbal flak of opponents. Consultants examining the feasibility of reintroduction into the Scottish countryside concluded there was widespread suitable habitat. Public consultation exercises on the desirability of reintroduction were undertaken and these suggested a local support of 65% and a national support of 86% in favour. (M. Gaywood. Personal communication).

Despite the transparency of this process a trade-off with opposing interest groups culminated in a virtual stalemate by 1998. This was broached in 1999 when a trial release was proposed for a site offered by the Forestry Commission at Knapdale in Kintyre. A comprehensive assessment of the impact of beavers on their immediate environment costing in excess of £500,000 was designed to prove to a minute but politically powerful opposition that their perceived concerns were groundless. They proved implacable to even this limited option and the Scottish Executive refused a licence for the project to proceed despite receiving a clear public mandate.

The project's few opponents accused SNH of being "economical with the truth" while they laboured to create a facade of malicious cant. Beaver were labelled as "disease ridden rodents" which rendered forests "killed, swamped, drowned". The most absurd of these 'braveheart' cries came from landowner Robin Malcolm who stated that "…these are English creatures. There are no plans to introduce them in England because the English wouldn't have them". These views were neither commonly held nor representative. In 2002 I took two juvenile female beavers to the Scottish Game fair in Perthshire for an information display organised by the Game Conservancy Trust. In talking to a wide range of country people at the event it was evident that most were content with the species restoration providing reasonable management controls were in place. A minority believed beaver reintroduction to be a good thing and a minority believed it to be bad. The only implacable opponent I encountered proved to be a large landowner who repudiated the ecological ability of beavers, raged about seals eating his salmon, raptors eating his pheasants and the fact that in his considered opinion there were too many coloured people in Birmingham. This 'cutting edge' thought process was not historically untypical of the large landowning class which linked strong antipathy to "them bloody useless" wild mammals with equally strong racist sentiment. In 1886 a debate to use public money to assist the extermination of the by then already scarce and economically insignificant Thylacine (Thylacinus cynocephalus) was considered by the Tasmanian parliament. During the proceedings a Mr Hawkes stated that "he might shortly have to ask for a vote to exterminate another animal his constituents were suffering from – the yellow agony - …the Chinaman".[9] Presumably by this stage there were no Aborigines left to hunt.

If a list of contemporary objections were independently drawn today they would differ little from those advanced by Christopher Lever. In a changing climate of land use they are however largely insignificant and in any case had a fragile grounding in fact.

Beaver grooming (Chris Robbins/ Derek Gow Consultancy)

Beaver benefits

In a time of changing political priorities the Forestry Commission is now moving from a timber production to an ecological ethos. We know that European beaver have no appetite for conifers other than the introduced North American hemlocks (*Tsuga spp*) and that although their dams do drown trees these now constitute a more valuable resource for woodpeckers, beetles and bats than they do for the treasury coffers.

Beavers have a positive effect on coarse fish populations and a neutral relationship with game fish. It has been suggested that beaver dams in the head waters of Scottish salmon rivers would destroy spawning beds. Although this is a debatable contention it is true that beavers

can build dams from rocks. However they have not yet developed the ability to consume them and in the treeless uplands scalped by historic overgrazing this myth is discountable. Experience from Norway where a healthy, wild salmon population exists demonstrates that they can readily leap beaver dams to spawn in the waters above (Halley. Personal communication).

Flooding of farmland is a relatively easy issue to resolve by the drainage of dams, their removal, the translocation of beavers or their humane culling when this is no longer possible. From ample European evidence in landscapes similar to Britain we know that beaver populations spread very slowly and are extremely easy to effectively control (Halley. Personal communication).

As the use of the countryside changes, more persuasive political arguments to restore this natural engineer are beginning to emerge. On 31 January 2006 the *Daily Express* ran a head line "Britain Runs Out Of Water". The article explained that both underground and surface water supplies were at their lowest level since 1904 and that water conservation measures would have to be introduced within weeks. Although this is being blamed on a second successive winter of lower than normal rainfall there is little doubt in the medium term that increasing water use coupled with extensive house building programmes in the South east of England will exacerbate this issue further. Politicians and policy makers now recognise that the over-engineering of our countryside has proved disastrous for water retention. An ever increasing number of communities are now faced with a hazardous cycle of 'boom and bust' typified by torrents pouring through their houses, villages or towns in the winter followed by a hose-pipe ban two months later. No matter how many reservoirs we build this will not prove sustainable if we do not address the vital need to retain more water in the uplands. Sponge complexes of bogs, pools, lakes and wet meadows are all common features of beaver generated landscapes. They slow and retain water allowing it to percolate at leisure down to the lowlands below. Recent studies in Keriou, France conservatively suggest that the retention of water in a single channel of 1025 meters in length rose from a capacity of 515.5 meters cubed to 3230.85 when it was dammed continuously by beavers. It is highly likely that the activity of this species in the uplands of Britain would give us water management services we badly need. As the value of upland agricultural production declines there would be a good case for landowners being paid to manage beavers.

Beaver are an incredibly well studied species in both continental Europe and North America. In Indian folklore they fulfilled the function of the "earths kidneys" and there can be little credible dispute about their pivotal ecological role as the generators of healthy wetlands. On 1 February 2006 the Royal Society for Protection of Birds, The Environment Agency and English Nature launched a Wetland Biodiversity Strategy for Britain. The importance of wetlands for wildlife and aquifers was highlighted in their press release which reeled out bitterns, water voles and otters as likely beneficiaries. No mention was made of the architect of just such an environment - the beaver. If we fail to return this creature then our own efforts to restore sustainable wetlands will be forever plagued by loss of open water, a requirement to create artificial barriers and scrub encroachment, all of which are transitory features of beaver habitats. There are unarguably greater densities of bacterial, plant, insect, fish, amphibian, bird and mammal life in the habitats created by beavers than in those where they are absent.[10]

Obstacles to change

Why has there been so much fuss over a species that we know from both historic and contemporary European experience is easy to control, extremely ecologically important and could be such a powerful tool for our own ultimate benefit? In many other European countries where reintroduction has occurred it has done so in the face of stiff opposition from other land-use lobbies only to culminate in complete anticlimax when beavers proved to have a negligible commercial impact. Beaver damage in the whole of Bavaria is currently estimated to amount to a couple of hundred thousand euros per year and is easily managed. The counter value of their ecological activities has never been assessed. In stark contrast car insurance companies pay at least 35,000,000 euros annually for collisions with game species. This figure does not include uninsured damage due to game bird collisions, death and injury claims, forest damage, crop damage, deer fence subsidies, deer damage prevention schemes, agricultural subsidies or un-harvested agricultural waste. Even if this is calculated on a conservative basis the annual bill for beaver damage equates to significantly less than the average daily cost to the public purse for all the above combined. (G. Schwab. Personal communication).

The concerns raised about the reintroduction of beaver are mainly based on ignorance, conservative thought, and fear of the unknown. This conservatism is a natural characteristic of tight knit communities used to facing natural hazards and is commonly reinforced by the precepts of tradition. In a time of changing land-use priorities and economics this does not negate the necessity for change. To an extent the stridency of a minority of the landed class is driven by a legacy of expectation that their views are correct and should be acted upon. Our modern wildlife compliment is a diffuse legacy of their historic whim and savage slaughter. They have a threadbare soapbox from which to lecture others on environmental responsibility.

A recent conference in Wales reported that of the national Gross Domestic Product agriculture contributed 1% which was falling whilst tourism contributed over 20% and was rising. Ecotourism developed by rural communities can allow them to reap the rewards and retain much of the income locally. This is something that we should all be concerned to develop. It is highly likely that the growing market in the watchers of sea eagles, red kites or ospreys would prove highly amenable to the addition of beavers.

Recent action and results

The refusal of the Scottish Executive to grant a licence to the beaver reintroduction in Knapdale poses a challenge. What should we do now? There have been two well publicised projects to employ beavers as habitat mangers in England. The first of these in 2001 at Kent Wildlife Trust's Ham Fen Nature Reserve with the sanction of EN encountered considerable opposition from the senior civil servants of Global Wildlife Division of DEFRA. Their political chicanery had no good reason and no legal mandate and extended the quarantine period from a statutory six months to thirteen. The personal intervention of Michael Meecher broke this deadlock which resulted in the needless deaths of several beavers and produced a weak release population.

The second attempt in 2005 at the Lower Mill estate in the Cotswold Water Park clarified the law in that no licence is required to contain European beaver in securely fenced areas. Six beavers – two family groups of three males and three females – are now enclosed on the Lower Mill estate in a 15ha gravel pit lined with an abundance of willow (*Salix spp*) and semi emergent plants. The whole site is on private land which is securely fenced to prevent escape and is being monitored by ecologists from the Cotswold Water Park. The beavers' interaction with other wildlife is positive and their wood debris is soon expected to help the fortunes of the greater stag beetle. In the near future the fence will be extended to incorporate 500 acres of the estate leaving the beaver population free to breed and expand. Both the public and the popular press support for this project has been significant. This exercise should now be repeated wherever possible, and related eco-tourism revenue should be explored.

Action or inaction?

The hollow excuse touted for years by both EN and the Countryside Council for Wales that they would wait for a Scottish result on beaver prior to acting should be immediately discounted and exploration should begin of the potential for restoration in both these regions. The paper thin excuses for the rejection of the Knapdale trial should be exposed. Most of the reasons given were site specific and projects elsewhere should now be developed by NGOs and private individuals to keep the issue of reintroduction on the agenda. The Scottish Wildlife Trust has played a creditable role in raising the profile of beaver and other groups should press for further political and public support for its reintroduction. The release of beaver into the wider countryside is still only permissible with a licence from the Secretary of State and it is overcoming this challenge which now needs to be addressed. If the organisations and individuals who support the restoration of the beaver work together with determination on this issue there is little doubt that it can be guided to a successful conclusion now. Nothing will happen if we remain supine.

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Tayside beavers – rights in the watershed?

***E**COS 32 (in press, 2011)*
Proposals to remove beavers on the River Tay have met with critical reactions. Many nature conservationists will regard the action as ill considered and profoundly wrong. The River Tay beavers provide an opportunity to learn lessons about beaver behaviour and effects outside the official trials.

DEREK GOW

Watch and learn or shoot and stress?

Although little is known about the distribution of the beaver population on the Tay they are known to be breeding - juveniles have been filmed playing outside their lodges - and are probably of mixed European origin - Polish, German and Scandinavian. The source population is thought to have escaped from a wildlife park in Perthshire in 2001.From that small beginning they have migrated up into Angus and other parts of east Perthshire. Estimates of the established population vary between about 30 and 100. Scottish Natural Heritage has asked the Scottish Agricultural Sciences Agency to to trap the Tayside beavers and relocate them to captive situations in Britain or wild ones in relevant parts of Europe.

Beavers do not hibernate and rely instead for over-winter survival on their autumn body fat reserves coupled with 'feeding caches' of branches which they collect and submerge in the bottom of water courses. While these strategies assist the survival of healthy adults they are less effective for juveniles in their first year of life. These small individuals cannot retain significant fat and are therefore reliant on the strong adults retrieving food from the caches. They are a social species and depend on the close contact of their parents and older siblings for warmth. Beavers live in families based around a central monogamous pair. The splitting of these bonded units through a regime of random capture will result in significant distress. The random removal of adults by trapping in winter could easily result in the death of one year olds from starvation or hypothermia. There is no sentient animal welfare case to be made for this casual action.

I have a beaver family on my farm in Devon and have been involved with the species for many years. I know most of the centres who maintain this species in Britain. A hidden detail in the Tay agenda is the ultimate fate of the captured individuals. If they are not to be sterilised and released then there is currently no zoological facility in Britain or Europe which has the capacity to keep around 50 beavers. Even if they could be exported to Europe there is little wild space for them there as a result of either natural re-colonisations or past reintroductions. If there is therefore no space in captivity for captured individuals and no prospect of their release elsewhere then they will have to be killed in significant numbers by rifle shots to their heads or lethal injections. It is inconceivable that SNH, the Scottish Executive and their partner organisations are not perfectly well aware of this.

An official study undertaken by Natural England (NE) suggests that once established in the wild that European beavers would be protected by EU law. This situation is however complex. Normally it would be an offence to "release or allow to escape into the wild any animal" which "is not normally resident…….to Great Britain". European beavers undoubtedly were a former resident and may have survived as a wild species until the 16th century. No definition of what is ordinary resident has ever been recorded in UK law and if the Tay beavers are established then no licence may be required from any nature conservation body in Britain for further releases.

Genetic nit-picking

The Tay beavers in the opinion of SNH are not the 'right beavers'. To understand this position it must be considered that by the beginning of the 20th century the beaver population in Western Europe had been reduced by human hunting to less than 400 individuals. These were confined to small populations in France, Germany and Norway. A study undertaken for SNH of the semi-fossil remains of beavers in Britain suggested that those in Scotland were more closely allied to the French population than any other. On the basis however that the English sample were closer in type to modern Scandinavian beavers a decision was made to use these for Knapdale. The genetic difference between these populations is insignificant and physical abnormalities have been widely recorded in Europe where reintroduced populations have been formed from these single source stocks alone. In Eastern Europe a population of perhaps 2000 beavers survived. These are much more genetically variable than those in the west and will readily interbreed. Both subspecies are already mixed throughout their current wild range as a result of natural re-colonisation and past reintroductions. As far as the wider ecology of the beaver is concerned the otters that hunt in the pools they create, the frogs that spawn in their wetlands and the woodpeckers which bore holes in the dead wood they provide will be un-influenced by what type of beaver created the habitat. If the restoration of the beaver in Britain is based on the significant ecological benefit they bring to wetland environments for other species then this dogma makes little sense.

Tayside – what we can study

It is to the credit of SNH and their partner organisations that they persevered with the return of the beaver for so long and were ultimately successful with a licence grant for the Knapdale Trial. Those involved with the project however recognise its limits. It will not answer many of its critic's queries regarding game-fish interaction with beavers or the impact of beavers in intensively developed agricultural environments. The Tay beavers are living in a landscape which affords these study opportunities in abundance.

Knapdale is an unusual site in respect of its ownership being largely held by the Forestry Commission. Throughout most of mainland Britain the opportunity to replicate projects of this type will be negligible. The single largest consummate challenge for those who wish to restore the beaver will be the development of a process which works in landscapes with multiple landownership. This is a social rather than scientific exercise. European beavers are a well studied species. We know the benefits they bring to riparian habitats and the challenges which arise from their presence in the contemporary countryside. There are effective blue-prints in Europe which show that the presence of beavers in developed landscapes is quite possible and that where issues do arise these can be managed. These projects rely absolutely on 'whole-community' engagement. The fact that beavers have survived on the Tay for some time now with no recorded conflict suggests either a degree of tolerance from private landowners or their pragmatic resolution of any arising issues.

Another perspective on the learning opportunity provided by the River Tay beavers has been summarised by naturalist and beaver expert Roy Dennis:

"It seems to me that nature is trying to tell us something with its Tayside beaver colony. We spend so much of our time and energy and resources trying to persuade nature to do our bidding, to operate within conditions we impose on it. Here is an all too rare opportunity to bear witness as nature unfolds the direct opposite of that process, as nature imposes new conditions on us. We should watch and learn and delight in the possibilities that will flow whenever we are willing to give nature its head."

The beaver population on the Tay is of considerable importance. Although its creation is unconventional its existence offers significant opportunity. All that is required to develop this resource is an informed, unbiased appraisal of its worth coupled with a flexible approach to its development. If Scottish Natural Heritage decides to remove the Tayside beavers, the decision will have nothing to do with welfare and little with legality.

BOAR

A wallowing good time – wild boar in the woods

ECOS 23 (2) 14-22 (2002)
The wild boar's return to parts of southern England impacts on farm land, and creates challenges for woodland managers. Is the wild boar a pest or an asset in the countryside?

DEREK GOW

Jumping the fence

In the last decade free-living wild boar have returned to Britain. Although anecdotal reports of escapees have been widely recorded the only two 'large' populations would appear to be in Dorset and on the border of Kent and East Sussex.[1] Purged from the British Isles in the late middle ages due to a combination of over hunting and habitat loss, they are a lost large mammal staging a return.

The founding fathers of the current population were audacious escapees from 'boar farms' where they were bred for their meat. Further odd truants from farm parks, hobbyists and zoos may well have subsequently added themselves to the melt. It would appear that the original farm stock, were largely derived from surplus zoo animals of predominantly French origin,[2] but both German and Polish animals are purported to be kept on some farms.

The medieval greenwood

Wild boar featured prominently in British folklore, heraldry and art. Roman legions carried their emblem on banners, Picts carved their whorlled caricatures in stone and the Celts cast the image of a charging boar in bronze to create head crests for their war helms. In Norman time's wild boar were protected by draconian forest laws as a beast of the chase, for the sport of the powerful. Penalties for poaching boar were severe, eyes of offenders could be put out and in extreme cases a tortured death could be ordered. When William the Conqueror died it was recorded in one obituary that he thought more of his stags and boar than of his own people, but rooted in this statement of haughty disdain were the seeds of the species' destruction.

Although wild boar were sought after for food and for feasts they were more highly valued by the nobility as trainers of men. The ritualised medieval boar hunt with its relays of chain mailed hounds and elaborate horn calls was believed to develop the qualities of stamina, courage and leadership most prized in a medieval war lord. This religious conviction led to a dramatic conflict of interest between the nobility who wished to retain this creature for its martial qualities, and peasant farmers who could not tolerate the destruction that wild boar sounders inflicted on their pitiful crops. Famine years as a result of crop failure, and human or livestock disease, would have exacerbated this struggle and despite severe penalties both wild boar and deer would have been eagerly slaughtered and consumed.

By the late Middle Ages the boar that survived were enclosed in hunting parks like that surrounding Falkland palace in Fife where they were difficult to contain. Despite this difficulty wild boar were maintained in enclosures in Windsor Great Park until the reign of Queen Victoria and wild boar wood is still identified on ordinance survey maps of the park today. As wild populations buckled and disappeared the genes of the species struggled to survive in corners of Britain carrying populations of hairy, wiry black pigs with large tusks. In the late 1800s one of these swine was described by a Welsh chronicler as more akin to an alligator than a pig, with bristles instead of scales. Eventually these semi-wild creatures proved so destructive to the emerging farming systems that they were eaten to extinction.

Given this dramatic historic tussle it is perhaps not so surprising that the return of the wild boar has prompted a ready nostalgia for the medieval Greenwood. In the past the simple biological activities of large wild mammals have always been viewed through narrow agricultural blinkers and their presence refused. In 21st century Britain the return of free living wild boar presents us with an opportunity to re-evaluate this relationship in a more balanced light at a time when the calls for major agricultural and countryside change are strident. Wild boar could be a potent ecological resource, with profound effects on woodland habitats. Properly managed they could also constitute an important economic resource for hunting and for game meat. Should we therefore welcome the return of the wild boar and celebrate the success of this former native species in its bid to reclaim its ancestral throne? Or should it be hounded again to a second national extinction as a result of its reputation as a fearsome fighter and agricultural pest?

Boar rooting and creating wallowing areas (ChriRobbins/ *DerekGow Consultancy)*

Effects on farm land

In several European countries wild boar are classed as a pest species as a result of their feeding on agricultural crops. In Poland, Italy, France and Luxembourg compensation schemes operate to re-imburse farmers for their economic losses, and research has been conducted into the appeal of different crop cultivars[3] to try to reduce the scale of the damage. In southern England, farmers were the first to detect the presence of wild boar, with reports of damage to agricultural crops being reported to the then Ministry of Agriculture Fisheries and Food in the early 1990s.[1]

Wild boar are mainly nocturnal and only venture from the security of woodland during the hours of darkness, so their original night time forays were rarely witnessed. Damage to pasture land was on occasion quite spectacular and immediately obvious where boar had ripped up large sods of turf with their snouts in search of roots, grubs and worms.

The foot and mouth outbreak of 2001 demonstrated how a larger threat to agricultural production might well stem from wildlife spreading transmissible disease to domestic livestock, with massive economic consequences. Wild boar can carry diseases such as Foot and Mouth, Rinderpest, African and Classic Swine Fever and Aujeszky's disease to domestic livestock. In Britain, should such a disease become established in the free-living wild boar population, domestic stock could be continually infected. Incidents of free-living male wild boar breaking into domestic pig enclosures, inadvertently lured by oestrus sows, have been recorded[1] and even filmed during the TV cookery series *Return to River Cottage*.

The risk of free-living wild boar becoming vectors of the foot and mouth virus was considered by DEFRA and its findings published in a Veterinary Risk Assessment.[6] The assessment noted that "if Foot and Mouth disease were to be confirmed in an area where feral wild boar herds are known to be present, cage trapping and serological sampling of the boar could be considered as part of the procedure leading to removal of the Infected Area restrictions". It also stated that "shooting is likely to increase dispersal (and so spread the risk), and should be avoided if possible". English Nature has issued a statement on the impact of Foot and Mouth disease on wildlife, and expressed concern about inadvertently promoting the dispersal of wildlife.[7] The statement acknowledged that deer, grey squirrels and hedgehogs also can carry the disease but suggested that control measures "should be targeted at key species known to be susceptible to disease or are likely to carry it significant distances (*eg*. wild boar)". Fortunately the Foot and Mouth outbreak has been eradicated and wildlife, particularly wild boar, can for the time being breathe a collective sigh of relief.

Part of the woodland ecosystem…

The effect of wild boar on woodland ecology is mixed. Rooting through the surface layers causes a disturbance regime that will favour some species but not others, although the intensity of rooting will vary from year to year due to fluctuating boar numbers and the abundance of natural food supply. Wild boar are a former native species and therefore the woodland ecology of the British Isles would have evolved in conjunction with their activity. For this reason they could be expected to directly benefit woodlands where they exist. Alternatively their absence for at least 700 years coupled with historic woodland loss, fragmentation and the replacement of rich, seed bearing broadleaf with conifer might compromise the likely benefits of their re-appearance.[8]

One question often asked is how will wild boar affect bluebell woods, which are one of Britain's great wild flower spectacles in the Spring.[9] Bluebells are a global conservation issue and the UK is credited with holding up to 30% of the European/World population.[10] Bluebells abound in the woodlands which wild boar frequent in Kent and East Sussex and are occasionally uprooted.[1] Commonly when this occurs many bulbs are not eaten and are even redistributed and recovered by the boar's truffling action. It is not yet clear whether wild boar rooting will bring about a further reduction in bluebell numbers, which have already declined by 25-49% in the last 25 years[10] and there has to date been no research on how rooting affects other important plants such as wood anemones.

Wood anemones also occur in continental woodland where the effect of wild boar rooting has actually been studied. One study determined that the feeding of wild boar on the plant's rhizomes greatly reduced their growth[12] but this contradicted earlier research which stated that the wood anemone benefited from rooting due to regeneration of the fragmented rhizomes.[13] Of more concern are plant species, which are already in serious decline, for example wild daffodils, which are now rare throughout most of England. Wild daffodils do grow in

woodlands where wild boar currently exist and these too have been up rooted. Due to their scarcity this species may be much more vulnerable to local extinction.

The short and long term effects of rooting on a woodlands floral ecology are unknown. One possible clue may come from Sweden, which like Britain has a recently established wild boar population that originated from captive escapees. A recent study there suggested that in the areas where wild boar exist floral diversity had increased due to the re-colonization of disturbed patches of rooted soil.[14] In Britain anecdotal evidence supports this view which is demonstrated dramatically in coniferous forest clearings where boar activity has destroyed mature bramble and bracken dominance, allowing many other plant species to proliferate. Significant holes dug by wild boar at the base of sweet chestnut stools in Kent last summer may have been connected to individual animals seeking edible fungi, but this benevolent aspect of their presence remains wide open for effective study.

Effects on woodland fauna

It is difficult to predict what effect the presence of wild boar will have on woodland fauna. Although their diet is predominantly vegetarian they will consume insects, larvae, birds eggs, nestlings, small mammals and carrion. These vertebrate food items are only taken opportunistically and significant direct predation on a single species is therefore unlikely. The wild boars main influence is likely to be as a food competitor, particularly with species such as jays, wood pigeons, squirrels and small rodents which rely on acorns. It has been suggested that wild boar will deliberately seek out wood mouse burrows, in order to purloin their acorn stash[15] and the relationship between wild boar and badgers would also be worthy of study. Their diets are very similar, both root through leaf litter, are opportunistic, omnivorous and nocturnal.

Wild boar's behaviour may well provide opportunities for other species. For example, does wild boar wallowing in the heavy clay soils of woodland rides provide suitable ephemeral pools for aquatic invertebrates or their larvae? Do their tusk marking habits which open up tree bark provide insect feeding opportunities? And might their ivomectin free dung provide a suitable dormitory facility for the larvae of decomposing beetles? These aspects of their activities remain to be studied

Who likes them? Who doesn't?

The prevailing attitude to a wild boar or feral pig population differs from one country to another. In certain countries they are viewed as a pest to be controlled or eradicated, while in others the animals are regarded as an economic resource generating considerable revenue from either trophy hunting fees or from the sale of meat.[16] Attitudes within a country can be equally varied: in Sweden, hunting associations want to keep the accidentally re-introduced wild boar whereas the National Board of Agriculture does not.[16] In France, prior to 1970, the wild boar was considered an agricultural pest to be eradicated. This attitude changed after the 1970s when they were declared a game species and a compensation scheme was established funded through hunting fees, to indemnify farmers suffering crop damage.[17]

The presence of wild boar in Britain has provoked conflict between organisations that are in favour of their presence and those who are opposed. The RSPCA is against eradicating wild boar as ''They are still very rare now and it's hard to see how the slaughter can be justified'' [18] while the National Trust favours their managed presence.[19] Conversely, the Pig Veterinary Society, the National Farmers Union (NFU) and the British Association for Shooting and Conservation (BASC) support eradication of the animals.[20,21,22,23] The Game Conservancy Trust, a charity whose objectives are to ''promote for the public benefit the conservation and study of game species'' has also called for the eradication of wild boar deeming it ''better to err on the side of caution'',[24] but to date there has been no comment from the Mammal Society - ''the voice for British Mammals'' which is apparently still clearing its throat. The official attitude of English Nature has been ambivalent and the Forestry Commission, which has supported the program of DEFRA research in its forest holdings has apparently no official opinion as this animal does not officially exist.

The role of the press in informing the general public of wildlife issues has become an important consideration for wildlife management programmes, particularly those involving re-introductions or population control. A review of press articles which referred to free-living wild boar showed a predominantly negative although improvingly positive media coverage.[25] Perhaps not surprisingly, the most commonly reported concern was the potential threat the animals posed to public safety.

Hazards to humans?

Captive wild boar are covered by the *Dangerous Wild Animals Act* 1976, as amended in 1984. Along with wildcats (*Felis silvestris*) they are the only free-living species in UK to have this classification apply to their captive brethren. Is it therefore still safe to walk in the woods which wild boar frequent? Kent County Council thinks it is. A notice at the entrance to its woodlands inhabited by wild boar includes: '' They are not regarded as a danger to the public; however, injured or distressed animals should not be approached.'' Similarly, East Sussex County Council display the notice ''Caution. Wild boar in Woods. Please take care and keep to the path'' in the presumable hope that the boar would not!. In these litigious times it obviously pays to show 'due-diligence'.

Wild boar are by nature shy and retiring animals whose daylight hours are spent hidden in thick vegetation. Even glimpsing an animal is unusual and although they will avoid human contact whenever possible their nonsensically fearsome reputation, acquired during the pig-sticking era, precedes them. Very few instances of wild boar attacking humans are recorded

throughout their extensive European range and those that do generally revolve around hunting accidents or poorly trained domestic dogs chasing piglets which are then attacked by the wild boar sow in defence of her young. Occasionally the owners attempting to retrieve their canine companions are also attacked but this set of circumstance is just as applicable to domestic cows and calves as it is to wild boar. To date the press have reported no instance of personal injury resulting from a wild boar attack in this country[25] and if European experience is anything to go by human injury from boar is much more likely to result from collision with a motor vehicle.

The prospect of wild boar causing a threat to human safety is officially the concern of the Home Office. DEFRA recommends that "cases involving wild boar where there is a risk to human safety should be reported to the police". Sightings of free-living wild boar "where there is no risk to public safety should be reported to the relevant local authority, as they are responsible for ensuring that wild boar are kept in secure conditions".[27]

Prospects for boar in Britain

The Government has pledged to consider the re-introduction of native species that have been lost in historical times through human activity (Article 22, EC Habitats and Species Directive, EC 92/43). Examples of such species are listed in Annex 4 of the directive and include the wolf, beaver and lynx. Wild boar are also such a species but are not listed possibly because wild boar numbers on the continent are on the increase. The biological feasibility of re-introducing wild boar into Scottish woodlands has recently been researched but as the authors state "a feasibility study must also consider the desirability of re-introduction of a species within the wider ecological, social, and economic aspects of ecosystem and protection".[26] Scottish Natural Heritage, officially responsible for wildlife re-introductions in Scotland, has no current plans to re-introduce wild boar.[26]

The wild boar in southern England established themselves in a clandestine manner without bothering about a feasibility study, but it is not clear whether DEFRA will allow them to remain. Doubts exist about the animals' genetic purity because some wild boar farmers in Britain cross purebred male boar with domestic pig sows to give larger litters and increased piglet growth rates. If the free-living wild boar in southern England escaped from an establishment containing pure bred and hybrid animals, the escapees may have been pure wild boar, hybrids, or a mixture of both. Some white or cream animals do occur in the Kent and East Sussex population but these colour variants also occur in some German and French populations - along with spotted individuals - and may well be indicative of nothing other than a small start up gene base which has a predilection for this trait. The bulk of the free living animals all look very like wild boar without any other notable characteristics of hybridisation.[1]

Stand up and be counted

For a 'new' mammal species to reach Britain, considerable stretches of water have to be crossed which are only realistically negotiable with the assistance of human activity. All the mammal species naturalised since the last ice age have either been deliberately released, have accidentally escaped from captivity or have relied on human activity.[28] Wild boar arrived again in this island as a bi-product of agricultural diversification. Unlike the North American mink and Coypu which followed the same route, they emphatically deserve to be here. They have skipped the process of population modelling, feasibility study and weary consultation which has bedevilled the restoration of the European beaver, and come off their marks running. For far too long British re-introductions have focused on cuddly or non-contentious species such as Pasque flowers, sand lizards or dormice rather than concentrating on bigger mammals which through their behaviour provide many other species with living opportunities. If conservation bodies are ever to raise their horizons then the return of the wild boar must be ringingly endorsed.

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Book review:

ECOS 24.2 (2003) Peter Taylor

WILD BOAR IN BRITAIN
MARTIN GOULDING
Whittet Books, Stowmarket. 2003.
112 pages
Hardback £14.99 ISBN 1 873580 58

This is a decidedly useful booklet dealing with the cultural and biological history of the boar in Britain as well as its reappearance in the woods of Kent, Sussex and Dorset, and the controversy that has followed. I found the cultural elements particularly interesting, including the Celtic mythology. The final days of this keystone species of woodland ecology are accounted from detailed historical records with the last dating from the mid 1500s.
The first re-introduction of a British mammal may have taken place at Windsor Park in 1608 by James I importing stock from France. Further attempts followed at various times in the 17th and 18th Centuries, only to founder on the unpopularity of crop-raiding boar with local farmers. The current successful populations in Kent are escapees from farmed wild stock and are thought now to number over 200 animals. Goulding describes them with some fondness, as escapologists and masters of evasion! They are equally unpopular in agricultural circles, but modern farming, at least in these wooded regions of Britain, is probably less intensive, with fewer people working the land, and hunting down wild boar, is a labour intensive operation.

Goulding's account of the initial refusal of officialdom to recognise the reality of wild boar parallels the 'big cat' phenomenon. However, he does provide ample evidence in the form of photographs, even of family parties, from his six years of close study of these feral populations. DEFRA is now considering policy. Sadly, farmers, as well as, curiously, the Game Conservancy, have been calling for eradication. Lovers of bluebell woods would likely form an effective pressure group, as wild boar can 'damage' large (and obviously 'unnatural') expanses of edible bulbs.

Goulding makes a case for 'boar watching' as well as hunting, and in addition to providing a useful chapter on biology, gives an account of their status as a game animal on the continent. There is also a discussion of the genetics of wild and domestic animals – the new British wild boar are a mixture of the French sub-species, taken to be closest to the former indigenous populations, and the Eastern European, as well as some domestic genes. The evidence suggests there are no actual 'hybrid' animals and all those so far observed look like wild type animals. Some wild populations on the Continent are similarly 'impure' and Goulding, rightly in my view, questions the importance of genetic purity and provenance as against the value of this once native animal being an accepted member of our woodland fauna.

Wild Boar: what should DEFRA do?

ECOS 25 (1) 34-38 (2004)

Many wild boar farmed in Britain have broken the bounds of captivity for a more stimulating life on the outside. It is unprecedented in Britain for a former native species to take matters into their own hands and re-introduce themselves. There are now breeding populations of free-living wild boar in at least four counties. DEFRA has the task of deciding the fate of these escapees and their freeborn descendants. It is not an easy decision…

MARTIN GOULDING

Just rooting around…

Rarely has any one animal species put DEFRA's Policy Division in such a quandary, and that includes even the most TB ridden badgers. Step forward the wild boar Sus scrofa. Guilty as charged, wild boar will trample and consume cereal crops, rip up pasture, transmit disease to livestock (including TB) and slaughter as potential love rivals domestic boars, before servicing any receptive sows who are putty in the hands of this wild, carefree, shaggy haired Romeo. The resulting piglets take after their father and soon become uncontrollable delinquents, hell bent on escape. However, away from the farmyard the wild boar, a former native species, is one our keystone woodland species.

A missing piece of the ecological jigsaw, found again after being lost for hundreds of years, wild boar are mother nature's farmers. Rooting for food their strong snouts plough the surface layers mixing and redistributing nutrients and minerals essential for life. The bare earth left from rooting among, for example, monocultures of grasses or bluebells acts as a seed bed, enticing long dormant seeds to germinate or accommodating dispersed seeds from annual plants swift to take advantage.[1] Local biodiversity increases, temporarily at least, before the dominant grasses or bluebells return, but by then another seedbed has been prepared, and the cycle repeats. The wild boars' will even sow a few seeds themselves, collected in their hairy coat as they bulldoze through the undergrowth, and displaced after wallowing or whilst rubbing against a tree. An odd piece of fertiliser is also deposited for good measure. Pest control is broad spectrum and relentless, as grubs and larvae form part of their natural diet.

Their effect on a woodland ecology can quickly become apparent. For example, a patch of Fleabane *Pulicaria dysenterica* flowering in the corner of a wood I regularly frequent was, last summer, alive with butterflies. I recognised Common Blues *Polyommatus ivarus*, Red Admirals *Vanessa atalanta* and Speckled Woods *Pararge aegeria*, but many others amongst an

impressive display of colour were unfamiliar. A myriad of insects also competed for a place on the bright yellow flower heads. This riot of life in the corner of the wood was there for one reason only; there were wild boar in the wood. The previous winter, when the ground was wet and easy to work, the wild boar rooted up an area of perennial grasses to feed on the edible rhizomes. I watched the exposed soil being re-colonised by the Fleabane, which then flowered and became soaked in insects and butterflies. Unfortunately, that same winter there was not enough food in the woodland to sustain the wild boar and nocturnal forays into an adjacent field brought them into conflict with the farmer. The yield from his maize crop was seriously reduced and the wild boar made another enemy.

Welcome to the neighbourhood

Three free-living populations of wild boar are recognised to exist: in Kent/East Sussex, Dorset and Herefordshire.[2] Furthermore, animals are still haemorrhaging out of the captive enclosures where they are held and sometimes a main artery is severed; recently it was reported that 30 wild boar escaped in a mass break out from a farm near Bridport, Dorset, to supplement the free-living animals already present.[3] In-breeding depression is not likely to be an issue. Contrary to popular belief, wild boar are shy and retiring preferring to spend daylight hours hidden in the thickest vegetation available. Sightings by the public are therefore quite rare. However, a person walking through the wood with a dog off its lead scampering into the undergrowth may tell a different story. Dogs have disturbed sleeping boar, which once rudely awoken, may chase the dog.

This becomes a problem if the owner positions themselves between the boar and the dog. There are no reports to-date from already over stretched NHS casualty departments but time will tell. DEFRA side steps all responsibility and advises: “Public safety is primarily the concern of the Police rather than DEFRA. If you are concerned that wild boar are present and a safety hazard in a particular area you should inform the local Police”.[4]

For DEFRA, life is not easy. For example, the thought of an outbreak of swine fever or foot and mouth disease becoming entrenched in the free-living wild boar populations gives the Pig Veterinary Society nightmares. “We would urge the Ministry of Agriculture [now DEFRA] to waste no time in taking steps to control the current wild boar population now”, jointly wrote the society’s president and a past-president way back in 1998.[5] History suggests that future outbreaks will occur. Wild boars’ are great travellers and sub-dominants can wander over 20km in search of a better life, potentially coughing up infectious bacillus all the way. Conversely, scientists have already muted the feasibility of their re-introduction, on the grounds of replacing a native animal lost in historical times through human activities.[6] Furthermore, and of potential embarrassment for DEFRA, Margaret Beckett, Secretary of State for Environment, Food and Rural Affairs, launched amongst much trumpeting a Biodiversity Strategy for England in October 2002 at the London Wetland Centre. One aim of which is to ‘manage and extend woodland so as to promote enhanced biodiversity’.[7] The strategy had in mind red squirrels Sciurus vulgaris, bullfinches Pyrrhula pyrrhula, delicate flowers and gossamer winged butterflies, certainly not powerfully built wild boar complete with their own tusked armaments. Governments are not that bold. To now eradicate the boar, a former native species and prime contender for re-introduction, would make a mockery of DEFRA’s promise to enhance biodiversity.

DEFRA in the Greenwood – the choices

What policy decision can DEFRA therefore come up with in the face of such a controversial animal? It has tree options: eradicate, do nothing, or manage the population. It wil be difficult because wild boar are shy, nocturnal and rest during the day in thick woodland vegetation. Thus the practicality of targeting every animal in a population could be difficult. It may also be prohibitively expensive. For example, the last mammal deliberately eradicated in Britain was the unlovable and (crucially) non-native Coypu *Myocastor coypus*, at a cost of £2.75m in 1989 (but even this figure is cheap when compared to the bill for cleaning up after a Notifiable Disease outbreak).[8] Furthermore some members of the existing boar population are located on the estates of influential people who are known strongly to oppose the killing of animals. These estates could act as refuges. Eradication would also be unpopular with certain groups interested in animal welfare issues or who favour the species’ re-introduction. On the other hand, to do nothing would mean that we are likely to be overrun with wild boar as they have no natural predators, now the lynx and wolf have been forcibly moved on. As a former native species, climate, habitat and food supplies are all to the wild boars’ liking and an increasing number of sightings of characteristically striped piglets trotting through the Greenwood is testament to their breeding success.

Population management is the one option left. Should DEFRA now recognise the boar to be a re-introduced native species and designate it as a game animal? Disgruntled farmers and land owners could then 'exterminate' any boar caught marauding crops and fraternising with domestic livestock. Revenue from hunting rights and carcass sales would benefit the farmer and local economy alike. An annual closed season during the spring breeding period would protect pregnant or lactating sows. The health status of the animals could be periodically monitored by live trapping, while a contingency plan would be necessary, should the frightful scenario of transmissible livestock diseases such as foot and mouth or swine fever again raise its fearful head. Regarding public safety, recreational woodland containing boar, for example Forestry Commission land, should have notices posted advising the public that boar are in the area. People can then make up their own minds whether to venture forth or not.

The only certainty regarding Britain’s resurgent wild boar population is that a management plan completely acceptable to all interested parties is unlikely. Has anyone any better ideas?

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Decision time for the wild boar?

ECOS 27 (1) 49-56 (2006)

Defra has consulted on what to do about the free-living wild boar populations present across southern England. Opinion on the merits of wild boar varies amongst conservation, game, farming, and other groups, so what do we know about the return of this prodigal pig?

MARTIN GOULDING

Ten years ago farm-bred wild boar in Britain crossed the rubicon of freedom to establish free-living populations. From initial sightings in 1996 Defra subsequently confirmed that wild boar, after an absence of several hundred years, had re-colonised the counties of East Sussex, Kent and Dorset.[1] What have we learnt about the species in that time and are Defra any closer to deciding what to do next - can wild boar stay or should they now go?

Increasing populations and recent escapes

Not surprisingly, there are now considerably more wild boar on the outside than in the previous 10 years. A former native species with no natural predators (the wolf and lynx are long gone), the founding populations are holding their own despite considerable hunting pressure, and sightings in new areas continue to occur.[2] Furthermore, there have been some spectacular additions. In 2004 approximately 40 wild boar suddenly appeared in the Forest of Dean, Gloucestershire. These animals were relatively tame implying they were farm-bred animals deliberately dumped by a disillusioned farmer, or an impatient re-introductionist. More recently, in December 2005, Animal Rights Activists cut through swathes of wire fencing to liberate over 100 wild boar from a farm in North Devon. Mass breakouts such as these are the perfect seed for founding new populations as the animals are already in family groups of mature sows, dominant males and juveniles of both sexes.

Should the government have acted sooner and nipped the fledgling populations in the bud with a swift, no warnings given, desert storm eradication strike? No, their hands were tied because the Government had agreed in the European Community Habitats Directive 1992 (92/43/EEC) to consider the re-introduction of former native species, lost in historical times, through human activity. Although the wild boar was not listed by name, it has been suggested as a candidate for reintroduction on several occasions.[3,4] If Defra had acted as judge, jury and executioner, without a proper trial and with no defence witnesses called, it would have made a mockery of future commitments concerning species re-introduction. Better to have a considered response to an unprecedented situation than a knee jerk reaction.

However, it is not as if the Government wasn't warned. Back in 1990 *Mammal Review* published a paper, actually authored by a Defra (then MAFF) employee, which foretold if legislation to prevent escapes of captive stock was not effective "we will almost certainly see new species of exotic mammals established in Britain…and wild boar will probably be amongst the first".[5]

Public safety

What are the issues surrounding wild boar that have caused Defra to spend £433,305 of public money conducting a six year investigation?[6] Biodiversity Minister Jim Knight, in a recent News Release,[7] noted several issues surrounding feral wild boar. They included disease risk, potential for damage to crops and property, effects on animal exports, animal welfare, conservation and biodiversity, game and shooting interests, and human safety.

Personal safety is most peoples first thought when escaped wild boar are mentioned, and this subject gained most attention in a survey of press coverage of the free-living wild boar.[8] I am frequently e-mailed by concerned members of the public with comments such as this:

> *"Whilst cycling around the High Peak area in Derbyshire, I rode off the main footpath and came across three boar resting in the afternoon sun. One male (with very large tusks) and two females which I almost ran over. I am all for the introduction of extinct species back into the wild, but this fellow was rather aggressive - as this is an area used by mountain bikers and walkers; is this really safe?"*

Defra states that the only incidents where actual physical contact between a wild boar and the public appears to have been made involved two people knocked over by an animal that had just escaped from an abattoir.[2] However, Defra still issue general guidance on what the public should do to avoid dangerous encounters with wild boar whilst out in the countryside. This includes keeping dogs on leads, avoiding dense undergrowth and walking away from any animals that are encountered.[2] Defra add the caveat that people concerned that wild boar present a safety hazard in an area should inform local Police.

An accident waiting to happen? (Chris Robbins/Derek Gow Consultancy)

Road traffic accidents

"A large sow boar last night did some damage to my car. She ran off with a headache and I was left with a bashed car and having the fun of explaining it to my insurance company this morning! Very shocked that such a beast is running freely in my village"

- wrote Deborah from Beckley in East Sussex, an area with more than its fair share of free-living wild boar.

Road traffic accidents have claimed the lives of several wild boar in Britain to date. Wild boar that I radio-tracked in East Sussex criss-crossed roads throughout the night, particularly where roads bisect areas of woodland. To make matters worse, they often rooted on roadside verges, or loitered on the edge of the tarmac. In the dead of night, on a pitch black country road, breaking distances are likely to be woefully inadequate. No human injuries have been recorded, but the situation is a loaded gun with a hair trigger. Defra calculate, using data from continental populations, that the UK can expect about six wild boar road traffic accidents annually.[2]

Agricultural damage and disease

Emerging at night from the security of the woodland for a nocturnal nibble, wild boar can cause havoc in an agricultural environment by rooting up pasture, consuming cereal crops and

breaching stock fences. Indeed, wild boar are considered an important pest of agriculture in much of Europe. Defra note the most evident form of damage so far with the English feral populations is rooting of grassland, although other crop damage recorded includes rooting in recently sown cereal fields, damage to ripening maize, trampling in wheat crops and rooting and trampling in turnip fields. Agricultural damage is only minor and localised at present. Fields bordering woodland are particularly vulnerable. However, an expanding wild boar population would equate to an increase in agricultural damage.[9]

Crop losses attributed to wild boar are substantial enough for some countries, for example Poland, Italy and France to adopt compensation schemes to reimburse farmers for their economic losses. Revenue generated from the sale of hunting licenses forms a compensation kitty from which farmers are compensated, at no cost to the tax payer. Could such a scheme work in Britain should wild boar become an agricultural liability? In principle, I believe yes. Although a compensation scheme would be open to abuse and require considerable administration, it may also benefit the species. For example, in France prior to the 1970s, the wild boar was considered an agricultural pest to be exterminated. Attitudes changed when they were declared a game species and a compensation scheme was established funded through hunting fees, to indemnify farmers suffering crop damage.[10]

A more insidious threat to farming interests is that wild boar can carry transmissible livestock diseases such as foot-and-mouth, swine fever and bovine TB. There is a real danger that domestic livestock will infect the free-living wild boar with some economically unpleasant disease which will become endemic within the wild boar, who would return the favour by re-infecting the domestic livestock at every opportunistic meeting. The Veterinary Risk Assessment at the time of the UK epidemic recommended that emphasis is placed on rapid diagnosis and destruction of infected stock and exclusion of feral boar, rather than on control of the boar population. This is a sensible option considering wild boar can wander several kilometres in a single night, and occasionally move much longer distances. One animal I radio-tracked died in a road traffic accident 20km from where it was originally trapped and tagged. The thought of a poorly pig coughing up foot-and-mouth bacillus over such a distance would make a mockery of any contingency plans involving culling all susceptible wildlife, and domestic stock, within a designated area. Don't even mention contiguous culling.

The list of uncertainties about a resurgent wild boar population go on and on. For example, will the public refuse to visit nature reserves containing free-living boar? Should the Home Office be concerned about the increase in fire-power from the larger rifles that would-be boar hunters are quietly accruing? If the pro-advocates are wrong in 50 years time, who clears up the mess? (R.Trout *pers comm.*). Answers do not come easily, but perhaps we should look to fellow European countries where wild boar are widespread and these concerns are lived with and are rarely an issue .

Serendipity

Enough of the problems. Should we not rejoice that a species lost to these shores has honoured us, albeit accidentally, with its presence once again? Why should a former native species have to justify its presence in the first place? Defra, under the heading 'Potential Benefits of Wild Boar', and with one-eye on the piggy bank, suggests that the presence of a large and novel wild animal may provide economic opportunities for areas with feral wild boar to benefit from 'wildlife tourism'. The establishment of feral wild boar is also seen by some as presenting an opportunity for a highly valued form of hunting not previously available in this country. Revenue could be generated from the sale of sporting rights and carcasses.[2]

Defra make no mention of the wild boar's reputation as 'nature's plough'. Wild boar are adapted to search for food among the surface layers of the woodland floor. Their strong snouts root through the leaf litter and vegetation ripping up the earth, creating bare patches of soil. The disturbance this causes has noticeable effects on plant and animal communities. For example, on one grassy woodland ride in an East Sussex woodland I noticed the bare earth was first recolonised by the annual plants Scarlet Pimpernel *Anagallis arvensis* and Common Centaury *Centaurium erythraea.* Later followed perennials such as Dog Violet *Viola ariviniana* and Creeping Buttercup *Ranunculus repens.* A monoculture of grasses had become interspersed with flowering plants and the biodiversity of that particular woodland ride had increased. Ultimately, perennial grasses will again crowd out the recolonising flowering plants but by then other areas would have been rooted and the cycle repeats. And it is not just the flora that benefits, all the associated invertebrate life that depend on these species of flower for a stage in their life cycle may also benefit.

The impact of wild boar on woodland ecology is complex and has still to be fully understood. Rooting through the surface layers causes a disturbance regime that favours some species but not others. The intensity of rooting is likely to vary from year to year due to fluctuating boar numbers and natural food supply.

Silviculture and bracken control

Wild boar could also have use as a silviculture tool. Rooting and feeding behaviour by wild boar in commercial woodland has reduced populations of three harmful moth species at larval stage.[2] Pioneering work using wild boar to clear bracken is currently underway at Glen Affric National Nature Reserve, near Cannich, Scotland. Begun in 2005, under the direction of ecologist Liz Balharry, the four year project aims to reduce the spread and dominance of bracken, to increase the number of regenerating tree seedlings needed to regenerate the forest and provide an income from farming boar. Early results are fascinating.[11] On the upside, test plots indicate that the boar rapidly impact on the vegetation and create bare patches of well-dug ground suitable for seedling regeneration. The boar happily feasted on the al-fresco

bracken, consuming both the rhizomes and fronds, mature and young. On the down size boar in test plots which contained little or no bracken-rich areas caused damage to existing trees by bark scraping, root stripping and root exposure. Also wet areas became heavily impacted by the boar, whereas drier areas recovered quickly. The delicate balance between boar density and movement within the test plots is being fine-tuned to encourage the boar to spend more time in the bracken-rich areas and less time in more vulnerable boggy areas. Final results are eagerly awaited.

Defra's consultation

The public have been invited a say on what to do about the free-living wild boar and to submit opinions on the way wild boar are to be managed. Submissions closed on 6 January 2006. The Government's stated aim was "to create an acceptable balance between wild boar and the interests of farming, conservation, woodland management and human safety."

Five options were proffered for consideration ranging from 'no direct Government management on all current and future populations' to 'eradicate all existing feral populations and cull all new escapees'. Intermediate options were more ambitious and include treating feral pigs/hybrids and feral boar separately, eradicating all feral pig populations and culling all escaped feral pigs and hybrids but allowing the continued, managed existence of feral wild boar populations. Also on the table was managing existing wild boar populations on a regional basis by limiting the spread of existing populations and preventing establishment of wild boar in some areas, particularly those with extensive populations of domestic pigs in outdoor units. Finally, no direct government management of the existing established populations but prevention of new populations becoming established. A government announcement is due in summer 2006.

Defra has therefore nearly decided on how to manage the free-living wild boar. Meanwhile, reports of sightings still drift in:

> "Seen today (5 Jan 06) at Aldington in Kent (circa 5pm) four boar running from one field to another across country lane and seemingly heading towards a wooded area. Appeared to be a parent and three near-grown young, seemed to be healthy and enjoying themselves. Regards Councillor Woods."

Lessons from the recent escape in Devon

This damaged fence at a wild boar farm in West Anstey, Devon, was the work of animal rights activists. The herd of 100 wild boar escaped on 22 December, with 40 of the animals retrieved straight away, while 60 remained on the loose. Activists struck again at the farm in February.

And what about the hundred or so released in December in Devon? They could be anywhere by now. A much publicised 'boat hunt' to round-up the escapees using fox hounds and armed personnel on quad bikes was, thankfully for animal and public welfare reasons, a failure. During the hunt no boar or bystanders were scented, sighted, attacked or shot. The only boar to make an appearance was an individual wandering back to the pens on its own accord just prior to nightfall, much to the delight of a small army of assembled media reporters.

The exercise was always a non-starter as wild boar will not let themselves be herded like sheep, and they do not appreciate being disturbed by dogs, which they are more likely to attack rather than run from. Plus the alarming noises emitted from a quartet of quad bike engines would inform any beast that it would be wise to lay low for a while, or to quickly move to pastures new. Exmoor is just around the corner, quiet and peaceful - that will do nicely. The hunt was a desperate attempt from a desperate farmer trying to get his livelihood back before it was too late. Actively seeking help and advice from the authorities, he found none was forthcoming. It was too late from day one, the boar were out a day before Christmas and Defra, who do have experience in trapping free-living wild boar in Britain, had no-one available.

And that is where the gaping hole lies. Not in the sabotaged fences of a wild boar farm, but in our knowledge of this fascinating and formidable beast. Ten years on and we still don't know what to do when this species breaks loose.

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Living with wild boar in middle England – lessons from abroad

ECOS 29 (3/4) 39-44 (2008)

In various countries wild boar have become habituated to residential areas, but scavenging in dustbins and rooting up gardens has made the species unpopular with the locals and authorities alike. To stop our wild boar from becoming habituated to residential neighbourhoods across Middle England, do we need to be cruel to be kind?

MARTIN GOULDING

Boris from the Forest

'Boris' is a wild boar who to the delight of children but consternation of parents, frequently meanders out of the Forest of Dean and into an adjacent housing estate. Boris' appearance is rewarded with treats of apples, M&Ms, and anything to hand that the residents believe is palatable to a pig, which does not rule out much. Not surprisingly, Boris has become accustomed to these sugary delights, a notable change from his normal fayre of vegetation with occasional carrion. Boris is becoming habitualised to people. He represents a species that has throughout history been associated with bravery, ferocity and derring do, whose accidental re-introduction into Britain sent fear throughout the nation.[1] But has he sold his soul for handouts on easy street? More importantly, will this interaction between people and unpredictable beast be allowed to continue by a Forestry Commission ever fearful that this unlikely alliance may turn nasty with Boris biting the hand that feeds him?

Boris may be just one step away from the great woodland in the sky, where it rains truffles and bullets are banned, because one of his compatriots has already been dispatched there. A widely, and wildly, reported incident of a wild boar being shot dead in the playground of a primary school on the edge of the Forest of Dean recently made headline news.[2] Wild boar should not be in a school playground, and the boar's end was as sudden as predictable. I sympathise with the Forestry Commission ranger who had to act as judge, jury and executioner – I have primary aged school children, I would have done the same. When I wave my children off in the morning, I check they have remembered their dinner money, Power Ranger pencil case, and tennis ball for a playground kick-about. I don't check they are aware of what to do if confronted by a feisty wild boar as they change ends at half-time. However, the truth will always out and once the media hysteria died down it transpired that the playground was actually part of the school's nature trail at the edge of the forest, and the boar didn't want a kick-about, it was minding its own business eating wind-fall crab apples. Once spotted, the attention from onlookers unnerved the beast, its body language changed to threatening, and it

began to advance towards the assembled throng doing the school-run. The Forestry Commission's local marksman was called to despatch it.

Pointing the finger of blame would not be a fruitful exercise, but there are lessons that must be learnt as to how this situation can be avoided, because for certain another wild boar will one day fancy a crab apple or two. A child's safety is absolutely paramount, but playing fields should not be killing fields. I suggest now is the time for the school to fence off the nature trail to exclude wild boar, to post notices highlighting that wild boar are present, to devise interpretation boards explaining wild boar behaviour, and to add wild boar to the school's curriculum. Education, children and wild boar form a wonderful trinity, and I have been trying to marry the three together for some time. Following the principles that we fear what we don't know, and the pen is mightier than the sword, I had written a short book specifically for an audience of 5-15 year olds explaining about Britain's reintroduced wild boar populations, which included personal safety advice.[3] With more than a hint of embarrassment that I may be pouring petrol onto flames, I sent a copy to the schools' headmaster. I was relieved to receive a heart-warming reply thanking me, and with an unsolicited assurance the book would have a prominent place in the school's library "once I have been able to retrieve it from the staff". As *ECOS* went to press, there was news of more marauding wild boar in the Forest of Dean, when a freshly re-laid football pitch at Soudley was roughed-up by the rooting of wild boar. Team members and their friends were not happy, and this is the sort of incident which certainly does influence people's attitudes.

From Japan to Berlin – the boar's urban refuge

Other countries are home to wild boar populations far older and greater in number than our own emerging population. We should therefore look to these countries to see if they have an issue with wild boar fraternising with the locals and becoming habituated, and if so, learn how they deal with the issue. Unfortunately, a glance around the world shows the wild boar appear to have the upper hand and lesson-plans are still being drawn up. In the Far East, for example, the land of the rising sun also has a rising wild boar population that is becoming habituated to urban areas. In Kobe, a city in Japan famous for its Kobe beef, wild boar in search of food are reportedly breaking down front gates and garden fencing before ransacking vegetable patches and tulip bulbs.[4] Residents have also complained about rubbish bins being raided, wild boar droppings littering the ground, and frightening encounters at night. Some Kobe wild boar have taken so fondly to urban life they no longer return to sleep in the relative safety of the woodland, preferring to dream the day away in urban thickets or backyards. The reason for the troubles is partly blamed on those residents who have been putting out feed for the boar. Kobe officials have now introduced laws banning the feeding of wild boar and ensuring that household rubbish is only put out on the actual day of collection. The laws are designed to create an environment that will not attract wild boar, and are communicated by leaflets, signs, community newspapers and even loudspeaker cars. The odds are currently stacked in the wild boars' favour since the use of firearms inside Kobe is banned, and to even capture a wild boar a special license is required. The authorities state that they cannot trap a boar simply because it has ruined a garden, but they can act if "people are being bitten, chased and gored"![4] Captured wild boar are recommended to be put down because if returned to the woods, the animal is likely to wander back. It seems that once the bright lights and forbidden fruits of the city have been tasted, there is just no going back.

In Berlin, Germany, where east once met west, a similar situation has occurred as wild boar 'overspill' from burgeoning boar populations in the Grunewald Park have relocated to the city's suburbs. Wild boar have reportedly been found sleeping on garden compost heaps, caught red-handed devastating flowerbeds and prized lawns, and in the ultimate lack of respect, desecrated a graveyard by covering hundreds of memorial stones with overturned soil.[5] However, pro-wild boar groups have not appreciated forestry rangers sending the wild boar to graves of their own and have made their feelings known.[6] Shooting wild boar in urban Berlin is outlawed unless the animal, on a par with Kobe and common sense, is becoming dangerous. Ironically it is thought that heavy hunting pressure in forests close to Berlin, in itself a response to the growing wild boar populations, drove the wild boar into their urban sanctuary. Wild boar are intelligent creatures and quickly learn that they are less likely to be shot at in urban areas. Berlin's boars have reportedly not killed anyone to-date, although some domestic dogs that sows thought were threatening their piglets, have not been so fortunate.[6] A ranger has lamented that several old ladies have been feeding the wild boar causing them to become even less fearful of people, thus increasing the habituation problem.

International tales of boar as new neighbours

Similar tales of wild boar habituating to urban areas are reported in several other areas of the world. In France, a press report notes that numerous wild boar are spending their days hiding in the brush around coastal town of the Côte d'Azur.[7] During the night they descend into built up areas and make a bee-line for the lush watered private lawns and local golf courses where the worm content of the soil is irresistibly high. Local laws here too forbid the shooting of animals in built up areas and the wild boar have learnt they are safe as long as they stick to a residential environment. In Israel, a British expat and former wild boar farmer tells me there are small groups of wild boar active in a number of Israeli towns, including Haifa. The wild boar, safe from being hunted because of Muslim aversion to all things piggy, have lost their fear of man and are guilty of raiding dustbins and rooting up gardens. This former farmer has heard of no credible story of a member of the public being hurt by a wild boar, although he points out he always hesitates to tell the public that wild boar are not dangerous 'because people are prone to do the stupidest things". Herds of boar are reported to be running amok in the Polish city of Swinoujscie. The town's mayor is said to be "at the end of his tether" trying to deal with the problem and recently had to pay out from the town's coffers compensation to a tourist bitten by one of the wild boars as he was trying to pet it.[8] People really are prone to do the stupidest things.[7] It is happening in parts of Romania too - a neighbourhood in the city of

Constanta is having wild boar visitations, reportedly because an area of their natural habitat was cleared for construction work.[9]

In comparison to the Forest of Dean, wild boar in Collserola Park, Barcelona, Spain, were thin on the ground until quite recently, but a recent surge in wild boar numbers has led to a sharp rise in contact between wild boar and people. Like the Forest of Dean, Collserola Park attracts visitors who come to walk, jog or cycle in scenic surrounds. It bodes well for people visiting, or living near the Forest of Dean, that a colleague of mine who studies wild boar in Collserola Park has recorded no attacks by wild boar on visiting people.[10] However, general complaints from the visitors highlight the fear people have of these beasts, regarding their personal safety and especially that of accompanying children. As has happened with Boris in the Dean, some of Collserola's wild boar have become habituated to people and urban life, either by people feeding them (some boar apparently will even feed out of your hand), or by rummaging through lawned gardens and rubbish bins, often during broad daylight. No Collserola wild boar has yet turned ugly and had a go at a resident, but their nuisance factor (from digging up lawns, jay-walking across roads, and scattering rubbish) is high, and the boar are poorly tolerated by the majority of residents. In response, park rangers capture habituated wild boar using a dart gun and removed them to a discreet place away from public eyes, where they are sent away, permanently, to be rained on by truffles. However, prevention is determined the key management tool and Collserola Park maintains a public awareness campaign that informs visitors and locals alike to the negative implications of feeding the wild boar. Advice is also given on garden fencing and the disposal of rubbish inside specific containers to reduce the attraction to wild boar.

Back in Britain – meddling with fertility

In Britain, is the Forestry Commission learning these lessons? Yes it is beginning to, and credit where credit is due, notices have begun to appear in strategic locations in the Dean, such as camp sites and picnic areas, where visitors or locals are most likely to come into contact with a wandering wild boar. The notices advise that wild boar are not to be fed and dogs should be kept on a lead, it is a start at least. Defra on the other hand, and in cahoots with the Forestry Commission, has gone one giant step further and is conducting ground breaking research trialling chemical contraception as a method of reducing boar numbers in the Forest of Dean. This form of population control will also negate the need for shooting, which could have driven some of the wild boar out of the woodlands and into residential areas. The research, involving the gonadotropin releasing hormone (GnRH) under the trade name GonaConTM has been underway for three years. The hormone has been shown to be effective in preventing sows in captive enclosures from becoming pregnant, and also in trapped, jabbed, and then released free-living wild boar in the Forest of Dean.[11] In fact, Defra reports that all six females vaccinated in 2004, and five of the six females vaccinated in 2006 were still infertile in 2008[12], which to me is more akin to sterilization than contraception. However, it is early days yet and I must not be as negative as the sows' next pregnancy tests are likely to be. Flushed with success, Defra has just extended the research for a further three years, with an aim to "develop and evaluate species-specific systems to deliver oral vaccines to key target species". Sadly the research is, at this point, completely dead in the water as far as being of any practical use to humane wild boar management. Trapping wild boar is very labour intensive and not cost-effective, and for the vaccine to be of any value the sows need to eat a bait laced with the vaccine to achieve 'oral delivery'. However, no method has been devised or is ever likely to be, whereby a hormone-laced bait system can accurately deliver the correct dosage to the correct target wild boar, without the rest of the group also getting inadvertently dosed-up.

Defra has come up with the BOS (Boar Operated System), said to be "an effective, relatively inexpensive and species-specific device to deliver contraceptives and other pharmaceuticals to wild boar".[13] The BOS is described "as consisting of a metal pole onto which a round mesh base is attached. A metal cone with a wide brim slides up and down the pole and fully encloses the base onto which the baits are placed". However, such a system does not discriminate between sex, size or appetite, and individuals who eat like a pig are in danger of getting dosed-up to the eyeballs. If the prelimary results are anything to go by, the sows' eggs will be addled for a lifetime, and the boars will be grunting in soprano.

More sinisterly, wild boar are messy eaters and even if only wild boar, through intelligence or brute force, are the only species able to open a dedicated feeding device, they will spill part of what they eat onto the forest floor making it available to non-target species. When observing wild boar at bait stations, I was always amused to see kamikaze mice dash between stomping trotters to grab a morsel of grain before rapidly retreating. Mice of course are eaten by a host of other species and so on up the food chain. I also watched chaffinches, blackbirds, pheasants, and rabbits all dine out on the scraps from the wild boars' table. The effect of GnRH on small non-target species through direct consumption or environmental contamination from rain-induced run-off, for example, is as far I can ascertain through literature searches, completely unknown. Furthermore, having watched wild boar toss logs of wood the size of railway sleepers about as if they were match sticks, to get at grain I had strategically placed underneath, I strongly doubt the longevity or biosecurity of such a feeding device. I suspect that under field conditions BOS will soon be BUST, spilling its guts of drug-ridden grain to all and sundry. Let us hope that Defra has done its homework and it has been marked correct by a higher authority. Introducing strong biologically active chemicals into an ecosystem must be done very carefully. And if I was a frog, and wanted to hang on to all my limbs, I would certainly be fearful.[14] Unless Defra has a cunning plan it is keeping to itself, this research is likely to be a waste of so much public money that Baldrick himself would be embarrassed.

Older, wilder and wiser?

Interestingly, Britain's other main wild boar populations, in the south east, are considerably more wild than the boar in the Dean. In Kent and East Sussex, where the wild boar are totally nocturnal, even to observe the animals poses a considerable challenge, and there is no chance of hand feeding any, even with pockets full of M&Ms. When I needed to observe these wild boar for research purposes, the animals were so afraid of people I found it necessary to occupy my favourite vantage point well before nightfall, never daring to move for fear of betraying my presence. I measured time from a solitary distant streetlight that became increasingly brighter as the sky darkened, until it was the only light visible from the pitch-black woodland. At times it felt like being in another world and I would not have been surprised if Narnia's Mr Tumnus himself had appeared by the glowing light. By contrast, in the Forest of Dean the wardrobe door appears permanently open as the wild boar can often be seen in broad daylight. The reticence shown by the Kent and East Sussex wild boar to be gazed upon by curious eyes is understandable when hunting pressures are considered: 7 out of 10 animals I identity tagged were all shot dead within a few months of tagging. However, sanctuary for these boar lay in large blocks of woodlands owned by a celebrity musician with a strong aversion to shooting, as opposed to bullet-free zones in nearby suburbs.

Although the wild boar in privately owned satellite woodlands around the Forest of Dean are being hunted, the wild boar in the 'main block', where the Forestry Commission reigns supreme, have so far been reprieved. However, with the advent of Defra's Wild Boar Action Plan permitting local control with a rifle, and an increasingly nervous Forestry Commission management fearful of possible lawsuits for boar-damaged crops, dogs, cars or people, the writing is on the wall. Current Forestry Commission policy is that boar are only culled on an individual basis where they have directly caused problems relating to health and safety.[15] This policy relies on good intelligence and identification skills as all wild boar look alike. The possibility for mistaken identity will add further to the boars' growing uncertainty about their new two-footed friends.

I suspect that if Boris wants to live a long life, and avoid the truffle rains, he will have to forsake the M&Ms and return to a more mundane diet of roots, berries, and dead things. And if we want our wild boar to be truly wild, we must play our part too.

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The wild boar action plan - shooting in the dark?

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Defra's new action plan for wild boar simply offers a comfort break before assembling guidance and coordinating the action that has long been obvious and necessary.

MARTIN GOULDING

In February Defra released its policy document on the management of wild boar in England.[1] After reading it, the saying 'it is better to travel hopefully than to arrive', sprang immediately to mind. Furthermore, the journey was long - over 10 years, and the ticket expensive: well over one million pounds of tax payers money spent on research alone.[2] Regrettably, Defra has not delivered the first class service we expected.

A list of eight action points frames the plan, with each action delegated to one or more of the various government partners, for example, Natural England (NE), Deer Initiative (DI), Food Standards Agency (FSA) and Lacor - see list below.

Main action to be co-ordinated by Defra for advice on feral wild boar

- Guidance for land managers on the impacts of wild boar and their management. (DI & NE)
- Guidance on welfare such as minimum recommended firearm calibers. (DI & NE)
- Guidance on best practice and safe shooting (DI)
- Guidance on carcass handling including meat for human consumption and waste disposal (DI & FSA)
- Advice to aid hunters, gamekeepers and stalkers in disease identification (DI, FSA & Defra)
- Public awareness of wild boar including safety advice (DI & NE)
- Advice on dealing with wounded wild boar (DI)
- Advice for keepers of wild boar and local authorities to minimise the risk of further escapes (DI, NE, Local Authorities Coordinators Of Regulatory Services)

These action points will eventually deliver useful information, but not today. The journey still continues. This is just a comfort break. We have waited over 10 years and spent a small fortune just to be presented with a list of action points that were obvious from day one, when the first wild boar set down a liberated trotter on the outside of the fence.

Action and management needed now

What is desperately needed today, and what should have been delivered, is advice that is essential to enable the boar to be managed, borrowing a quote from the Deer Initiative themselves, with "a humane, responsible and sensitive approach".[3] For example, advice on a close season to reduce the number of lactating sows with dependant piglets from being shot. Advice on which age class of animal to shoot, and how many, and how often, and of which sex, and at what time of the year? Also, advice on how to shoot cleanly and safely without just maiming the pig or person - an injured wild boar is a very dangerous animal, an injured person very litageous. Furthermore, where is the awareness that wild boar groups are matriarchal and if the alpha female is shot, bang also goes group cohesion. More wild boars are therefore likely to turn up, in an excitable and unpredictable state, in unsuitable places as school playgrounds.

And that is where the truth behind the release of the action plan lies. Despite the considerable wait for the action plan, in the end it was hurriedly written and rushed out to placate parochial unrest in the Forest of Dean stemming from a wild boar straying onto a school playing field adjacent to the forest. And to silence a disgruntled Conservative MP who was using the wild boar to score political points.

As a result of the action plan stating *"regional management to be most appropriate"*, the Forestry Commission, particularly in the Forest of Dean, now has permission to start culling wild boar. Unfortunately it will be doing so with no idea as to what an acceptable or sustainable boar population level is. The wild boar reintroduced themselves into Britain through the back door, but they are now in danger of being eradicated by a government action plan using the same entrance.

However, the boar train does not recognise national boundaries. The action plan concerns only England, and there are feral wild boar populations in Wales and Scotland. I wonder if Defra has plans for a border patrol?

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Hindsight in the management of Britain's wild boar

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The reality of co-existing with wild boar has hit home with the first known dog casualty. Dogs need to be controlled in the presence of boar and the various messages on public information signs need careful thought. Meanwhile, perhaps the Forestry Commission should adopt a consistent line on management of wild boar...

MARTIN GOULDING

Cara the Greyhound has the unfortunate distinction of being the first known domestic dog to be killed in Britain by a free-living wild boar.[1] With a shoulder shattered beyond repair "*the damage was just unbelievable – it looked as if a sledgehammer had gone into her"*, the local vet had no choice but to put Cara to sleep.[1] Circumstances that stopped Cara's owner from intervening "*she was just screaming and screaming, it was this awful noise but I had the other two dogs so I did not dare go in after her"* [2] were a blessing in disguise, otherwise there may have been a human casualty too.

Cara was being exercised on Forestry Commission land in the Forest of Dean, Gloucestershire, and her owner was reported to say "*If I had thought the boars were a danger, I would never have taken her to the Forest in the first place"*.[2] This I find the most disturbing aspect of this very regrettable, but completely preventable incident. Wild boar are a potential threat to domestic dogs, and this has been known since 1998 when the Food and Environment Research Agency (FERA), in their past life as part of MAFF (one life before DEFRA, two lives before FERA) first confirmed the presence of free-living wild boar in England "*...the question of safety can also be extended to domestic animals as wild boar are recognised as a potential danger to domestic dogs"*.[3] So is this information not being delivered where it matters? Ominously, the vet that treated Cara had just patched up a Golden Retriever attacked in the Forest of Dean just days earlier.[1]

Warning notices

The Forestry Commission does post warning notices around the Forest of Dean advising the public of the presence of wild boar, and the need for dog-owners to keep their dogs on a lead. I visit the Forest of Dean frequently and see the notices, and see the dogs, but rarely do I see the dogs on leads. The notices are not being noted. The message has become diluted or lost amongst the myriad of other notices around the forest advising on parking charges, penalty parking tickets, the need not to leave valuables in your car, gate-locking times, things to do and see in the Forest, your opinion of the forest, the latest open-air concert, the new Go-Ape climbing experience, cycle hire, etc, etc. Perhaps it is time the Forestry Commission had a policy rethink on how best to communicate important messages about the wild boar, such as those they recently quoted to the press: "*There's a need for dog owners to understand that when they're in areas where there might be wild boar, particularly at this time of year, that they're going to have to keep their dogs under quite close control"*.[1] The message is correct, but the Forestry Commission need to find the correct mediums to deliver it – and it would be wise to assume that in *every* area of the forest there might be wild boar.

Road Traffic Accidents

Cara's fait begs the question 'Are there other issues concerning Britain's wild boar where forewarned is forearmed?' Where, if we act now, future injuries, tragedy, hassles or unpleasantness can be avoided? Yes there are, and the potential of wild boar to cause a road traffic accident (RTA) immediately springs to mind. Warning shots have been sounded; wild boar RTAs have occurred on Britain's roads "*friends of mine, with whom we had just had a meal that evening, were first on the scene of this accident, and comforted the driver who was dazed and had struggled from his car to the gutter, until the ambulance arrived"* (pers comm.). It is now only a matter of time before a person is seriously injured or worse in a wild boar-related RTA. The clock is ticking.

A German automobile association recently carried out crash-tests by ploughing a Volkswagen hatchback into life-size models of wild boar at 80 km/h.[4] Emerging from the wreckage was the reassurance (for VW drivers at least) that although the front of the vehicle was damaged, the passenger cell remained stable. The association's practical conclusions to tackle jay-walking wild boar were:

- Don't swerve to avoid animals - trying to spare the animal's life by moving into the opposite lane carries a far greater risk of smashing into an oncoming car;

- Dip headlights to give animals a chance to run away - they get fixated by a strong light beam;

- If a wild boar appears suddenly apply the brakes as hard as possible, keep a tight grip on the steering wheel and stay in the lane - in the worst case scenario, a collision with the animal has to be accepted;
- Drive slowly to minimize the risks.

This advice is also relevant to Britain, and if it can save just one person from serious injury or loss of life, then we should be shouting it from the rooftops, or at least the Highways Agency should be. This government agency is responsible for 'managing traffic, tackling congestion, informing road users, improving safety, minimising adverse impact on the environment and more'.[5] The Forestry Commission's current advice to drivers around the Forest of Dean to "*drive at a reasonable speed in the Forest at night - boar can cause great damage to vehicles if hit"* [6] can now be usefully embellished, supported by the German research. Vorsprung durch Technik.

Urbanisation

Wild boar venturing into urban areas always causes a fuss, even in countries such as Germany, where the general public and local authorities are far more familiar with the species than we are in Britain. Wild boar have a propensity to become urbanised. They quickly twig they are less likely to be shot at by the houses than in the woodlands, and they find abundant food in vegetable patches and rubbish bins - some residents even deliberately put food out for them. However, not everyone is pleased and urban wild boar are accused of being a traffic hazard, attacking dogs, rooting up prized lawns, frightening residents, and bizarrely, office staff seated at their desks - just the kind of story the press delight in: "*Armed police had to gun down a wild boar that broke into offices in Hamburg when a herd of the animals went on the rampage in the city's centre. Officers armed with sub-machine guns were called to the consultancy in Hamburg on Friday night after one of 12 boars smashed through a window to enter the building. Stunned staff were evacuated as it crashed through open-plan office causing thousands of pounds of damage. It was shot dead next to the office photocopier".*[7]

Here in Britain our wild boar are now venturing into urban areas. The rural Gloucestershire town where wild boar were recently photographed scavenging amongst bin bags awaiting collection at the end of someone's driveway[8] doesn't quite equate to the bright lights of Hamburg, but it is the first step on the road to urbanisation. Are we paying heed to the advice that we should not be feeding these wild boar that are boldly going where none have gone before? It appears not. The local vet who euthanased Cara lamented "*It is becoming more evident that people are feeding the wild boar, encouraging human contact".*[9] The Forestry Commission stresses: "*Do not feed the boar - feeding encourages them into closer contact with humans where the scope for less desirable activity increases".* [6] Regrettably, this advice is often ignored, as people indulge in the novelty of feeding the wild boar anything from fruit to confectionary.

Livestock disease

The Forestry Commission have a difficult time trying to manage the wild boar on their turf. Some people and organisations want the Forestry Commission to shoot all wild boar, some a few, and some none at all. Sightings of wild boar have recently been reported from Thetford Forest, Norfolk, which is managed by the Forestry Commission, and boy are they are up-in-arms about it. Interviewed on Radio 4's Farming Today programme, the Forestry Commission's Head Ranger for the area described with gusto their zero tolerance policy towards wild boar in Thetford Forest:[10,11]

"We will resist a wild boar population establishing on a public forest estate in any way we can, be it with shooting, trapping or any legal method to stop them establishing a population here. We have men on the ground all times of the day and night who are trained for wildlife duties, controlling deer, rabbits, hares, that sort of thing. They are out at night as well. So there are eyes on the ground all the time. My men have instructions to shoot wild boar on sight, if safe to do so. If wild boar got into the forest they would be detrimental to the Breckland ecology.

Where is the mandate for the Forestry Commission to take such sweeping action, and what is the justification for this unilateral voice of hostility from the Thetford Head Ranger? The accusation that wild boar are a threat to the area's ecology is puzzling. Wild boar are a former native species, and our woodlands would have grown up with wild boar rooting amongst them. However, the forestry tracts of Thetford Forest stem from post first world war timber production, so perhaps this particular woodland's ecology is so far removed from a natural state there is no place for wild boar. Although, as Thetford Forest Park is a public forest estate, were the public asked what they thought before the Forestry Commission declared themselves judge, jury and executioner?

The Forestry Commission's wild boar management policy at Thetford Forest does have support from the National Pig Association (NPA),[10] a group that represents domestic pig farmers. The NPAs concerns are for the several large-scale outdoor domestic pig units within wild boar-commuting distance from Thetford Forest. Wild boar will freely mate with domestic pigs producing hybrid offspring that will throw any unit's economic forecasts to the dogs. More sinisterly, contact between free-living wild boar and domestic pigs could provide a transmission route for the spread of diseases. A transmissible disease becoming endemic in the wild boar population could continually re-infect the domestic pig stock, with considerable economic consequences.

To-date in Britain, most interference between wild boar and domestic pigs has occurred in small-holdings or petting zoos. Male wild boar are not choosy, and the breeds of domestic pigs receiving unexpected nocturnal visits from an amorous suitor have included Kune Kune, Oxford and Sandy and Black, and Berkshires.[12] Again, we have been forewarned that the day will come when a testosterone-loaded male wild boar will break into a large free-ranging domestic pig unit, and then the fun will really begin. I doubt whether shooting all wild boar on-sight is a feasible preventative measure. The ranger's men may well be out at night, but the wild boar will have the greater staying power, night after night, and especially on those long, cold, windswept, pitch-black nights.

As well as being a disease liability regarding domestic pigs, a wild boar in Britain has recently been confirmed as being infected with the zoonotic disease *Mycobacterium bovis* (*M. bovis*),[13] the causative agent of tuberculosis (TB) in cattle. *M.bovis* had previously been diagnosed on two captive wild boar farms in the Southwest of England, in 2000 and 2006 respectively,[14] and it was only a matter of time before a free-living wild boar was identified as infected too. Wild boar now join an eclectic mix of mammals susceptible to bovine TB infection including deer, pigs, sheep, llamas, camels, alpacas, and domestic cats and dogs. The epidemiology of bovine TB is not completely understood, but badgers are of course the most infamous animal regarding the transmission of bovine TB to cattle, but on the continent wild boar are also implicated as a potential reservoir for, and transmitter of, bovine TB.[15,16] I suspect this will not be the last we hear about bovine TB and Britain's wild boar.

Eco-tourism

A more 'desirable activity' of wild boar is their potential to generate income for local people through, for example, the sale of shooting rights, meat, and eco-tourism. The first eco-tourism holiday to focus on Britain's wild boar is now being advertised.[17] A farmer near Rye, East Sussex, is the first to tap into the potentially lucrative market of wild boar watching holiday-breaks by renting out their holiday cottages to 'the serious wildlife lover'. On offer are day and night guided trips to view wild boar in their natural habitat, a visit to local woodland to view boar signs, dinner at a local inn, and back to the farm to experience the nightly visits of the boar in safety. It will be fascinating to see if this enterprise is a success - I wonder if the Forestry Commission would ever contemplate something similar to increase awareness and understanding of the species.

Hindsight

In Britain we have the fortunate opportunity to manage our fledgling wild boar populations with the benefit of hindsight gained from how continental Europe manage their populations. Potential areas of conflict involving domestic animals, people, or livestock can be foreseen, and the necessary corrective action or contingency plans put in place, ready to be actioned. However, this opportunity will be lost if appropriate advice is not being heeded.

The death of Cara the greyhound exemplifies how advice from the Forestry Commission is not getting through to people who need it the most. All of us who have an involvement with Britain's wild boar, such as the Forestry Commission, government agencies, local authorities, private organisations, hunting enthusiasts, and interested individuals, need to ensure that these messages do get through.

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WOLF

Wolves are returning

ECOS 23 (2) 2-8 (2002)
Wolves are making a come-back in Europe and the US as opinions about them change. The last British wolves were exterminated in the Scottish Highlands, where we should now focus our efforts to reintroduce them.

ROGER PANAMAN

Changing attitudes

People's perceptions of wolves before the 1960s derived mainly from folklore. Because wolves were thought to be menacing, by threatening human life, livestock and game, people made a concerted effort to destroy them. By the early twentieth century the only wolves left in western Europe amounted to a few hundred in Spain and Italy. They had been wiped out from almost all theUS, and were extinct or severely reduced in many other countries.

Since the 1960s, research on wolves has grown apace and today they are among the most studied of mammals. Knowledge changes attitudes and has brought wolves a measure of legal protection in western Europe and the US. As a result, since the 1990s, wolves from remnant populations have started to recolonise Iberia, settle in France (from Italy), and migrate to Germany from eastern Europe. At about the same time, the US set a precedent by reintroducing wolves to a number of states.

The Scottish Highlands

In Britain, the last wolf population was exterminate in the Scottish Highlands in the seventeenth century.[1] Wolves died off last from the Highland region because of its rugged and remote terrain, which makes it a good place to reintroduce them. More importantly there is plenty of natural food for wolves in Scotland: about 350,000 red deer, 350,000 of the smaller roe deer, and over 100,000 fallow deer and sika deer. In comparison, England is deer-poor and Wales is almost deer-less.[2] With the low human density of the Highlands (one of the last large semi-wilderness areas in western Europe) wolves will come into less conflict there with human activity.

There is a myth that wolves need forest or wilderness to live in. In truth, wolves live in all types of terrain, from deserts to the Arctic.[3] Wolves even live on the outskirts of villages and towns. A wolf pack was even studied living on the outskirts of an east European city. At night the wolves went into town foraging for food. People did not kill them because they thought they were stray dogs.[4] Therefore, wolves are highly adaptable and the Highland landscape does not need reforesting or changing to accommodate them.

European wolves (Archive)

How many wolves?

How may wolves could the Highlands support? Wolf density is largely related to food supply: where food is scarce, wolves must search further to find it. Thus a pack's territory (from which it repels other wolves) may be as small as 100 km^2 where prey are plentiful or can exceed 2,000 km^2 where prey is scarce, as in the Arctic.

The Highlands (25,000 km^2) are awash with deer, therefore territories will probably be small. A wolf pack usually consists of fewer than ten individuals. So, as a rough generalisation, say each pack occupies a 500 km^2 territory and consists of five wolves, then there could be 250 wolves. Of course numbers would fluctuate, but they would be in the hundreds, not the thousands.

Wolves and people

Will Highland residents and hill walkers be safe among wolves? The first detailed study of attacks by wild wolves on humans in Eurasia and North America has been recently published by 18 researchers from several countries.[5] They reviewed the most reliable records they could find, dating from the 16th century to the present, and identified three kinds of wolf attack: rabid by wolves who have gone mad because the rabies virus infected their brains;predatory - where wolves appear to regard humans as prey; and defensive - where wolves are provoked by people to attack, such as when trapped or cornered.

The researchers found that several hundred people have been killed, with the majority of fatal attacks by rabid wolves (rabies does not exist in Britain). There were relatively few predatory attacks and none in North America, and wolves did not kill anyone when acting in self-defence. Predatory attacks were mainly on small children and characterised by lack of natural prey, habituation to people, and wolves living very close to large numbers of children left unattended by impoverished families - the kind of situation still found in the poorest parts of India today, but not in Europe or North America. The authors of the report found that most fatalities in Europe and Russia were before the 20th century. In the last 50 years, despite better recording and better access to reports, they could only find records of 17 people killed in Europe and Russia and none in North America

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Thus, averaged over centuries and large geographical regions, being killed by a wolf is a very rare event. In comparison, an average of three people die in Britain every year from the rarity of a lightning strike.[6]

Wolves and deer

Deer in Britain have had no predator other than humans since wolves were exterminated. It is thought that this situation has contributed to a decline in the overall health of deer populations. What impression would a few hundred wolves make on the Highland's massive deer population? This is a question predator-prey specialists will argue over, with few, if any, firm answers.

For example, first, by preying on calves and the very young, wolves might have a disproportionate influence on the number and health of deer in the population which reach adulthood. However, about 50 per cent of red deer and roe deer fawns die young anyway, so if wolves kill only the sick calves they may have little influence on the population. Second, a wolf might kill up to 20 adult deer a year.[7] So 250 wolves, say, might kill around 5,000 adult deer annually. This compares with the 60,000 red deer shot every year. What impact the loss of 5,000 deer may have on the food and sport shooting markets remains to be seen.

However, whichever way wolves influence deer numbers, at least their reintroduction will help the deer population to begin to evolve in the presence of their natural predator once more.

Wolves and farmers

Depredation (predators killing domestic animals) is the main problemfor any reintroduction of large predators anywhere in the world andthe number one problem for the wolf reintroduction in the Highlands.Farmers fear wolves will ignore fleet-footed deer and go for their slower sheep. So to what extent will depredation occur?

Most wolf research comes from North America, where about 40 percent of the world's (roughly 150,000) wolves live. The research shows that where wolves and livestock share the same range, wolves generally take few livestock (usually less than 0.1 percent per year on average over large regions).[8] The research also shows that wolves have a minimal affect on livestock ranches (usually less than 1 per cent per year),[8, 9] and depredation is negligible to the livestock industry.[8,10] This shows that wolves do not necessarily slaughter livestock. Why they do not is a question that has yet to be fully answered.

Spain and Italy were the only countries with surviving wolf populations in western Europe. Their wolf populations rose when given legal protection and Spain now has over 2,000 and Italy about 1,000. Researchers conclude that the main factor influencing sheep depredation in both countries is the style of sheep management.[11,12] Sheep in Spain wander the mountain region largely un-shepherded and depredation is 10 times higher than in the lowlands, where sheep traditionally are watched through the day by shepherds and enclosed at night; 20 per cent of wolves live in the Spanish mountains but cause 80 per cent of losses.[11] Similarly, in the Tuscany region of central Italy, most sheep depredation involves flocks unattended by shepherds.[12]

As depredation is increasingly researched, it is becoming clear that wolf depredation is not catastrophic (nor an easy problem to solve). Therefore, it is unlikely that the worst fears of farmers in the Scottish Highlands will be realised, but depredation can be expected to be a lot higher than if the sheep were guarded by shepherds. Shepherds work in the Highlands but presently they are too few and flocks are too big to guard the sheep effectively.

Farmers and subsidies

Most sheep farms in the Highlands are not economically viable because of the unproductive soil, inclement weather and remoteness of their markets.[13] They and other farms on poor agricultural land in Scotland (about 85 per cent of the country) depend on subsidies averaging £481m per year to stay in business.[14] Without the subsidies most farms would collapse. This raises an interesting question: given that most Highland sheep farmers are completely dependent on taxpayers' money, can they reasonably object if the public (the taxpayer) want a wolf reintroduction?

The subsidy system appears about to change as the momentum to revise it gathers pace. If the system changes to favour only farms competing successfully in the free market, then most Highland sheep farms could disappear. A new subsidy system should only give payments to farmers if they adequately care for their sheep (up to 4 million lambs die in Britain annually because of poor husbandry),[15] which could stimulate a move to more traditional shepherding. The balance of argument might then shift in favour of a wolf reintroduction.

Helping farmers

One way to help farmers is to manage the wolf population. A humane method is by fertility control which does not disrupt normal hormonal activity. Usually only a single male and female breed per wolf pack. In North America they have found that by vasectomising the breeding male and tying the fallopian tubes of the breeding female the birth rate of packs of wild wolves drops off without disturbing the wolves' behaviour.[16] In this way the size of a small wolf population can be reduced, and fewer wolves mean less potential for depredation. At the same time, because the population is not expanding, this control by contraception also limits the radiation of wolves looking for new areas to occupy, such as the Lowlands.

Researchers also find that wolf depredation tends to recur on the same flocks and farms.[9] Focusing on these hot spots would be better than a widespread indiscriminate cull of wolves. Individual wolves, therefore, who become habitual depredators would have to be shot (caging wild wolves as an alternative is cruel). Shooting wolves is unfortunate, and unacceptable to many people, but it does allow the greater number of wolves who do not kill livestock to continue to live without persecution. Research is ongoing to find non-lethal means to control depredation, but presently there is no single method that works all the time.

SNH remains evasive

According to Recommendation 17 of the Council of Europe's Bern Convention, Britain should promote public awareness about wolves and study reintroduction possibilities.[17] And under the European Union's Habitats Directive, Britain must "study the desirability, of reintroducing species in Annex IV".[18] Annex IV species include the wolf.

Scottish Natural Heritage (SNH), is the government conservation body responsible for considering and overseeing the reintroduction of wolves in the Highlands. It erroneously believes that 'Recommendation 17' has been superseded by 'The Action Plan for the Conservation of Wolves (Canis lupus) in Europe' which, SNH says, excludes the UK Government from having to take any action at all regarding wolves.[19] SNH also believes that by reintroducing the beaver (another species on Annex IV) it is fulfilling the 'Habitats Directive' and therefore claims it does not need to consider wolves as well. SNH is probably happy to bury talk of wolves for fear of a backlash from landowners and farmers, who control the land, and therefore SNH's conservation work. However, the very least SNH can do is just to allude to the recovery of wolves when an opportunity occurs, especially in its publications.

Wolves earn income

Wolves in the Highlands would present an opportunity to increase employment and income in the region through wolf ecotourism. Wolves are large charismatic animals, like elephants, tigers and whales. People pay to experience and learn about these animals in the wild and the income could benefit local communities, wildlife and the environment.

Ecotourism involving large carnivores (bear, lynx, wolf and wolverine) is developing in Europe. An example is the Carpathian Large Carnivore Project in the Romanian Carpathians.[18] Wolf ecotourism is well established in the US, with a number of wolf centres; the International Wolf Center,[20] in Minnesota, dedicated to wolf conservation through public education and wolf ecotourism, grosses over a million dollars annually.

Local control of wolves

If wolf ecotourism in the Scottish Highlands is managed carefully, a fund drawn from it could compensate farmers for livestock depredation - an example of private enterprise helping conservation. Taking part in the implementation of wolf ecotourism and controlling a board to manage and distribute compensation funds are two clear areas in which the Highland

community can take part in and help manage the recovery of wolves. In general, local people must be given every opportunity to manage wolves when they are reintroduced. When residents feel they have influence over the wolf recovery, they may be more willing to accept wolves.

Highland Wolf Centre

Public education is a necessary preliminary for any successful reintroduction of large mammals. This is especially true of wolves because a recovery will not succeed without good public knowledge and understanding of them. Therefore, a wolf centre in the Highlands would achieve a great deal. Like other wolf centres, it could have tame wolves for visitors to experience, and to go on outreach to schools and events for people to discover first hand what wolves are really like.

Given the lack of lupine ardour by Scottish Natural Heritage, the centre will have to be funded by donations and develop from wolf ecotourism income. After all, conservation need not, and should not, be entirely dependent on governments. The wolf centre is a great opportunity for private enterprise to show what it can do for conservation.

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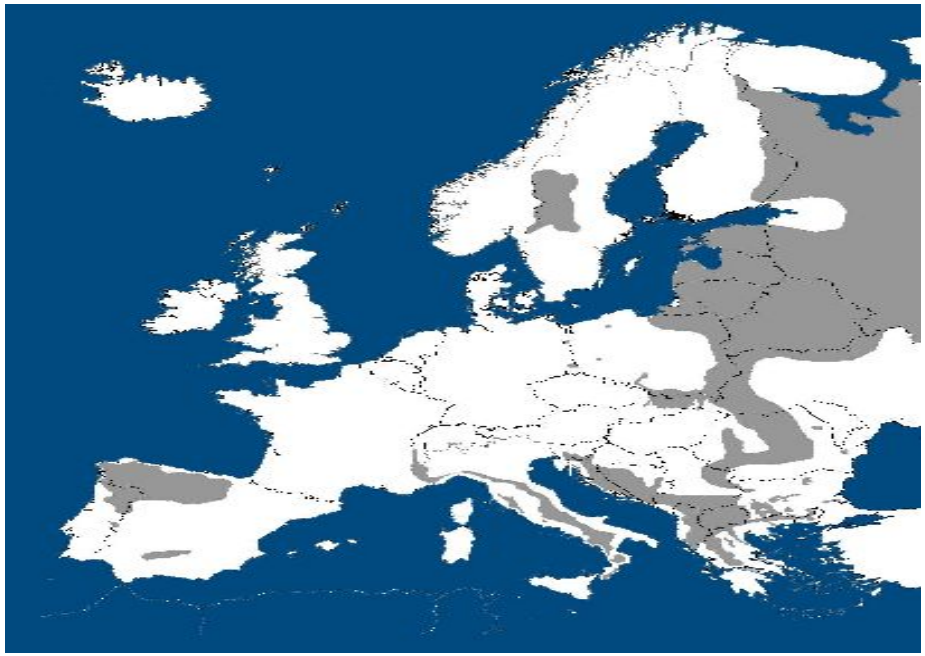
Wolf territory in Germany

ECOS 25 (3/4) 73-77 (2004)
Lessons from current wolf management in Germany show that action is crucial at the local level and across the countries across which wolf populations roam.

ILKA REINHARDT & GESA KLUTH

New wolf countries

After centuries of persecution wolves (*Canis lupus*) are on their way back in some areas in Europe. Eradicated in most of central and northern Europe by the middle of the last century, small but healthy populations survived in Eastern and Southern Europe. Due to an improved protection status some of these populations were expanding in the last two decades. But it was a slow process till the remaining populations could recover. Granting of closed hunting seasons (e.g. Poland in 1975),[1] the prohibition of poison (e.g. in Spain 1984)[2] and the abandonment of bounties gave these populations a break. Sometimes, for example, in Sweden, full protection status was given after the last wolf disappeared.[3]



Distribution of the wolf in Europe

Today the wolf is strictly protected in many European Countries. It is listed in Appendix II (strictly protected species) of the Bern Convention and Appendix II (needs habitat conservation) of the EC Habitats Directive - with the exception of the populations in Spain north of the river Duero; the population in Greece north of the 39° longitude and the populations in Finland. The new EU member states - unless giving full protection - have had to present management plans for wolf, bear *(Ursus arctos)* and lynx *(Lynx lynx)* to ensure hunting will be on a sustainable basis. This is the measure which makes it more likely that wolves will reappear in countries where they were eradicated a long time ago. France, Switzerland, Germany and the Czech Republic are such new wolf countries.

Making space in the German landscape

In Germany the very last wolf was eradicated in 1904. However, for the past 60 years, single wolves have wandered from Poland into Germany. Until recently they all were shot (first legally, later illegally) or run over by cars. The hunting law of former East Germany required the shooting of any wolf sighted. GDR authorities claimed there was no space for a big predator in its cultivated landscape – a view still widespread. The number of wolf immigrants reflected the situation on the Polish side.[4] When wolf numbers in Poland were growing more wolves made it into Germany, where they didn't survive for long.

Wolf tracks near Blomberg (Lupus)

Times are changing, for people and wildlife. Since the reunification of Germany in 1990 wolves are strictly protected in the whole country. However, even after becoming a protected species by law at least eight wolves were shot. Obviously it will take some time to welcome a once outlawed species as an enrichment of nature. In 1995 a single wolf made the right choice and established a territory in the Muskau Heath, an active military training area in Upper Lusatia, in Northern Saxony close to the Polish border. Military training areas are federal land. Hunting and forestry are managed under the jurisdiction of the federal forest agency. By 1998 the single wolf was joined by a mate and in 2000 the first reproduction of wild wolves for a century was documented.

Understanding wolf behaviour

During the first years of their appearance the presence of the new neighbours was kept almost secret. Some people think the best way to protect wolves is not to mention their presence, but this tactic turns out to be fatal in the long run. Nobody is going to miss a wolf that is not known. More over, wolves can draw attention to themselves in pretty spectacular ways, when killing large numbers of livestock. It is much easier to deal with these situations if the public has been well aware of the presence of wolves beforehand.

In 2002 a sheep flock in Saxony was attacked twice by wolves, resulting in a loss of 33 sheep, and great shock to the public and the sheep farmers in the area. Many media reports presented the wolf as a blood-thirsty beast, ignoring the fact that at least one wolf had been in the area for seven years without causing trouble. Previously the wolves roamed mostly on the military training area and there had been no need for public relations work. When the first generation of young wolves dispersed from their natal pack and attacked the sheep flock, the lack of previous public education and public relations work became obvious. Wolf management is only to a minor extent about managing the wolves themselves. It is mostly about helping people to understand and to live with wolves. However, Saxonian authorities were quick to react to the incident, compensating the shepherd and engaging wildlife biologists to monitor the wolf population. They also provided advice to shepherds in livestock prevention measures and carried out public relations work, (Since 2002 this work has been done by LUPUS wildlife consulting).

Upper Lusatia is the only area in Germany with permanent wolf presence and wolf reproduction. It is certainly not a wild area, but wolves have shown they can live anywhere where they find enough food and where they are not killed by humans[5] Besides the military training area of about 168 km², active and disused opencast coalmines are shaping the landscape. Though several federal roads are dividing the area, the density of 128 human inhabitants per km² is low compared to other parts of Germany. The forest consists mostly of intensively managed pine plantations. Five ungulate species, red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), fallow deer (*Cervus dama*) and mouflon

(*Ovis ammon musimon*) can be found here. The latter two are not native but introduced for trophy hunting. The area currently used by wolves covers about 600km².

Sheep strategies

Compared to countries like France, Switzerland or Norway where wolves can cause immense damage by killing free ranging sheep[6] the situation in Eastern Germany is quite favourable. Ungulate densities are very high in many parts of the country and the majority of the potentially vulnerable sheep and goat flocks are kept behind electric fences.

The areas' sheep farmers cooperated very well after realising that they were not left alone and that wolf-livestock conflicts can be kept at a low level with appropriate prevention. Two strategies are currently focused on: first, electric fences traditionally used in sheep herding have been upgraded to improve their protection value and second, livestock-guarding dogs have been introduced by some shepherds. The fact that Saxony does have a compensation system surely helps to keep tensions at bay. However, this regulation only applies if a professional shepherd is affected. For private sheep owners there is no such system. In the few cases occurring so far the German Society for the Protection of Wolves has paid for the damage. A more appropriate damage compensation regulation that is valid across state borders is nevertheless needed.

During the last two years a huge effort has been made to raise public awareness of wolf presence. This work is targeted on the wolf area, and informs inhabitants about wolves in general and 'their' wolves in particular. It replaces the old prejudices with facts. The unbroken interest of the media has led to a high level of recognition of wolf presence in Upper Lusatia all over Germany. With very few exceptions the reports are usually based on facts and communicate a tolerant attitude towards wolves.

Wild genes?

The year 2003 seemed to be a further step forward in wolf conservation in Germany. Two wolves had established a territory adjacent to the Muskau Heath pack and pups were born in both territories. The euphoria about this sign of stabilisation was over when the pups were filmed. They didn't look like wolf pups but like wolf-dog hybrids. International wolf experts reaffirmed this suspicion, and it was later confirmed by genetic analysis. Obviously the female wolf had mated with a dog. This may happen when maturing wolves do not find non-relatives as mates, a situation arising above all in small, scattered populations. With the development of new genetic methods, wolf-dog hybridisation has been proven in several countries, such as Norway[7], Italy[8] or Latvia[9]. When occurring in large healthy wolf populations these hybridisation events are of less concern. However, in small fragmented populations hybridisation may threaten the entire wolf population by swamping it with dog genes, thus counteracting any wolf conservation effort.

In Germany, the possible solution to shoot the putative hybrids as was done in Norway in 1999,[10] was considered to be socially unacceptable. In a long discussion about how to deal with these animals the decision was made to live-capture the pups. Early in 2004 two of the surviving four hybrids were successfully captured and transferred into an enclosure, the other two vanished before they could be captured. So far, the female wolf has remained alone. Although she tried to mate with a dog in Spring 2004 she luckily produced no pups, giving conservationists a break. However, the problem of possible wolf-dog hybridisation remains as long as the wolf population stays this small and isolated.

Local action in a big context

The German wolf story reflects the challenge that the return of wolves may provide. German wolves are Polish wolves and depend on immigrants from the Polish population. In Western Poland wolves are very scattered and decreasing in numbers[11] - they all are on the drip of dispersers from the Eastern Polish population, several hundred kilometres away. This illustrates the crucial wider context when dealing with wolf conservation. Wolves don't care about human territories. They ignore state borders and they don't know that wildlife management in Germany is under the jurisdiction of the states. Clearly management of large predators must be adapted to and focussed on local situations. On the other hand, the huge areas that wolf populations are roaming make a large scale co-ordination across national and international borders necessary. Bringing both issues together is one of the main challenges in wolf conservation. In Germany we are just at the beginning. Since their appearance, a handful of wolves have managed to keep wildlife managers in suspense, teaching us the essentials in wolf conservation. We are willing to learn these lessons. However, the German wolves are living a fragile existence and we have to learn quickly.

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Wolves in the French Alps – lessons in acceptance

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This article describes an example of farming alongside wolves in the French Alps, where the stock management has been adapted and the predator has been respected.

TROY BENNETT

Wolves are expanding their territories in several parts of Europe, including Spain, Portugal, Poland, Germany and Austria. In 1990 there were no known wolves in France. Today there are an estimated 100, covering the Alps from the Mediterranean in the south, up into Switzerland where there are now around 20 wolves. This article discusses what has happened as wolves have returned to part of the French Alps.

The Massif Du Monge in France rises to 2115 meters close to the border with Italy. There is a mixture of oak, beech and various pines, interspersed with open grasslands and scrublands. Hunting has been restricted for over 100 years, which makes for a high diversity of species. Large populations of wild boar and roe deer are present, and there is a high diversity of mustilids (the weasel family), and a great variety of birds. We also have lynx, and mouflon longhorn sheep were introduced 20 years ago. Baudinard, the village where my story comes from is situated on the western arm of the mountain, at 1100 metres. Just two people live here all year round and four of the houses are holiday homes. The rest are ruins.

The first tracks

In 1992 12 wolves were found to be living in the Mercantor National Park on the borders of France and Italy. Six promptly disappeared. National Park officials claim they found their way there from the Abruzzi Mountains further south. This is plausible as wolves have been documented to disperse for up to 600 miles to find a new mate, or a new territory. But 12 wolves all dispersing to the same place? And from the same origin? Legends could be founded on that.

It was in 1992 that I first came across the signs of wolves on the massif du Monge where I was at the time working as a goat herder. I was out tracking with my 12 year old daughter when she came across a print that measured around 13cm by 10 cm. When she asked me what it was I told her that it was probably some kind of monster. At that time I didn't know how close I had been.

The reality of the kill

In the summer of 1998 the shepherd who guarded sheep for our co-operative lost half the flocks in one night. 280 sheep were herded over a cliff - no one knew by what. In farming you accept that you will lose stock from disease and hard winters, from predators and occasionally thieves, but this seemed unnatural and disturbing, 280 sheep went over the cliff but many more hit the ground. Some hung on the cliff and in the trees below. Some were still wounded and bleeding.

You are not allowed to kill your wounded animals. A vet, the police and experts have to examine them to determine the culprit and cause of death, like a murder scene. But I could not watch sheep that I had bottle fed and nursed suffer in such a pitiful state. With great regret I killed them then and there, and I was then subjected to lectures from the vets, the police and the experts on why I should have waited before despatching them.

Despite being hardened by mountain life, no-one felt able to clear up the carnage from that attack. Instead we let scavengers do it, watched by forest guards who were also looking to see if the culprits returned. They didn't. The guards counted the species instead: eagles and vultures, corvids (the crow family,) mustilids, badgers and foxes. Feral dogs appeared, and these were dispatched and examined. The birds got so fat that they could not fly, and if you could stand the smell, the flies or the view, you could watch normally nocturnal animals in the daylight and walk within metres of golden eagles.

We were asked to help find and gather the lost sheep that were still wandering the mountains in small bewildered groups. With 10 volunteers working in shifts, this took around a week and a half. Every day we found fresh kills. On the Thursday morning of that second week my younger brother and I set out at 5.30am and began our long walk up to and along the crest. We found two lambs, one paralysed by a bite to the spine, the other who would not leave its side. We carried them on our shoulders for three hours until we recovered more sheep for the active lamb to run with. We carried the wounded one between us for seven hours and recovered 18 more sheep. With the light fading we descended. Then, on the lower slopes we stopped, and for no apparent reason both turned to look into the trees. There, about five metres away a wolf was looking back.

Connecting with the predator

People talk about the way wolves stare: how it holds you, and how it holds its prey. When a wild wolf fixes your eyes it looks deep, and you cannot look away. I did not feel fear, but I was held. And in that look I felt an exchange of information. I don't know what the wolf took from it, but something primeval in me was awakened that day.

When I was herding on the mountain the wildlife grew used to me: deer ignored me, mouflon came and fed with the goats, sometimes even trying to herd them into their own harems. I had watched the eagles outwitting marmots, and I had become the ravens friend and plaything. I knew where the foxes and martins kept their winter stashes. But from that experience with the wolf, I suddenly began to see things differently.

I began to look at things with a predator's eye. I now look at mountain features as likely places to catch unwary animals, or as lines along which to herd them into traps. And with this insight as I am tracking in the forest examining signs, I see where the prey will pass, and where it hides and where it will fall, and in knowing the prey you can work out the predators. This leads me to find their tracks, their scats and their kills, and occasionally to glimpse the wolves. I hear them howling, and find myself strangely drawn to howl back.

From that first chance encounter my life was changed, wolves have become a passion for me, and I have followed the life of that wolf and her family ever since.

First reactions to the wolves

It was three months later that the wolf was officially recognised as being in the massif du Monge and subsequently in France. I suspect that the foresters and officials already knew that they were there, but had kept it quiet, perhaps not to panic people or perhaps to hold off on compensation payments for as long as possible. The local papers were soon full of headlines like "shepherd sights wolves" and "300 sheep slaughtered". We lost around 700 animals that year: sheep, goats and even young donkeys. The farmers were not prepared for wolves and the wolves took full advantage. These wolves had come from Italy where natural prey was scarce and they existed mainly on domestic animals and refuse. Now in France they were amidst surrounded by game and hundreds of unguarded farm stock. That winter was even harder for us. The only stock left on the mountain was ours, and the wolves had followed the game down into our valley. Every morning we found fresh prints around our barn and every night the dogs went wild. We took it in shifts to sleep in with the sheep, waking constantly to the dogs barking or sheep's nightmares. My boss's wife left as the stress for her was too much.

With the coming of spring the pressure eased and we decided to find a solution. I signed up for the Large Carnivore Project in Romania, where I learnt livestock guarding methods from local shepherds. I discovered that by chance we were already doing most of the right things, such as 24hour guarding and locking the sheep away at night. This explained why we were losing so few animals compared to our neighbours.

I also learnt about wolves and soon realised that they had not read the textbooks. So much was unknown, and so many myths and stories sprang up around them. The wolf has been around for millennia, it is said to be the most successful canid ever to stalk the earth. Its range once covered almost the entire northern hemisphere. It is found from the frozen tundra just

south of the North Pole, down to the deserts of Arabia and India. In forests and on open plains. It is an ultimate survivor, and adapts readily. They have been persecuted to extinction across the world, but they are still found in many parts of the world. They are a mythical beast both revered and hated.

Keeping our heads and keeping our sheep

When I arrived back in France we built a protection area so that the sheep would not have to be crammed into the barn every night. This consisted of a two metre high fence with an additional metre buried into the ground to prevent tunnelling. We surrounded this with an electric fence. We were then able to sleep soundly at night. But our nearest neighbour was still experiencing problems - being only a summer resident he had no barn for his sheep. He used flexible electric fencing to pen the sheep at night. But the wolves learnt that by running alongside it they could panic the sheep and stampede them into breaking down the fence. They could then pick off the sheep as they fled into the forest.

They did this six times. We advised other shepherds to change their methods, but some refused and have subsequently given up keeping sheep after suffering too many losses and too much stress. Taking stock will always be viewed as a crime, especially with what appears to be wanton killing. Even if it is the fault of farmers, too slow, or too poor to guard properly. But the issue is not what it used to be: the average number of sheep lost during an attack in 1998 was 22. Today the figure is one or two. In addition, the wolves are helping control feral dogs, which are another predator - The wolves are either scaring them off or preying on them.

Compensation is a big stress issue. Firstly it depends on proof, and proof is hard to determine even if you can find your missing sheep while there is still enough carcass left to identify, or before other scavengers have covered all the signs. Most shepherds would rather kill their wounded animals, and not just because they attract predators. Farmers are hardened but they are rarely heartless.

Fear and prejudice

Some people will not respect the wolf for the wild predator that it is. Propaganda by newspapers or farmers blaming wolves in order to claim compensation money will never help. Folk tales like Little Red Riding Hood that have spooked our minds for centuries will not disappear. Sadly some of the stories are true: wolves do occasionally attack and kill humans. In Utah Pradesh in India wolves killed nine children in four years - this was a single pack that had attacked children whilst they were playing on the forest edge. Most of these wolves were destroyed but two are thought to remain. They might pass on this trait when drought or food shortage puts their supply of prey under stress. We have had one reported attack in France: an old shepherd was mauled by a female wolf and her two cubs. How this happened is unclear.

The summers for us are still problematic as all the sheep flocks are brought together and ascend to the summer pastures where there are too many to guard efficiently and they are vulnerable. We don't lose many sheep and some sheep often die naturally. Is it not natural that wolves take the occasional sheep? Wild sheep do form part of their prey. The wolves have every right to be there – perhaps we just have to adapt.

The wolves have adapted to our guarding methods: In 1998, 85% of the attacks were at night. Now, as we guard at night and lock away our flocks, the attacks are 70% by day when the sheep are out amongst the trees, or drinking at the river.

By sightings and scat analysis we found we had six wolves living in our area in 1999. An Alpha male and female, two yearlings and two pups. DNA analysis also proved them to be Abruzzi wolves that had indeed found their way from Italy. The yearlings and pups accounted for the surplus killings found amongst the sheep. Young predators have to learn to hunt and to kill, and with the unguarded stock they could have all the practice that they needed.

The deadly bait

In 1999 the pack split. Four remained and two passed the crest to start a new pack further north. I continued tracking these two packs until 2001 when they suddenly disappeared.

They stopped howling. I searched but found nothing. Then one day I came across a deer skeleton, badger and fox skulls, two dead badger cubs, rat skeletons and a dead feral cat. This was not a natural find and I soon realised that the deer carcass had been poisoned. Two local dogs died confirming this. From my observations, the following fauna feed on a carcass: first come flies and butterflies whilst the blood is still warm. Beetles, tits and corvids then arrive, and vultures, eagles and mustilids follow. As night falls along come cats, rats, foxes and badgers, and wild boar clean up. Wolves, if not protecting the kill, come last, especially if the scent of humans is around. So, how many animals are you willing to kill with a poisoned carcass? I have even fed from fresh kills myself, if I have been tracking for days living off the forest.

Poison is documented to be the easiest and most efficient way of killing wolves, and I fear it was. In a few months of tracking I came across the tracks of only one wolf, the large male. Maybe he had arrived late at the carcass as he was often on his own, or maybe he was just too big for it to work properly? But had he had to watch his mate die? His pups? He began to be hard to track. I would think that he had gone and then find a deer carcass or a single track in the bed of a river.

Back on the trail

In the autumn of 2003 I began to find two sets of prints and more kills. Then in the winter of 2004 the forest guards found blood in the sets of tracks they had been following.

DNA tests showed this to be menstrual blood; the wolves were back and hopefully breeding. They began to howl once more, filling the nights with their haunting songs.

In autumn 2004 forest guards howled from different points on the mountain to elicit a response, but these tests proved inconclusive, probably due to the inflexible way in which they were conducted. During those surveys we came across two sheep wandering lost in the forest. Closer examination of these sheep showed that they had cyanide capsules glued to their necks and rumps. We had to shoot them, and we used them to try to bring a case against the farmer who owned them. This is still under investigation.

In winter 2005-6 we tracked to see if the wolves had bred, but we only found traces of a single wolf. DNA will show us whether it is the male or the female, but it is evident that our pair has gone, perhaps poisoned by a sheep we failed to find. Or perhaps the male has succumbed to old age. We hope that the remaining wolf will attract another and once again build our hopes of wolves breeding in our mountains.

LYNX

Reintroduced lynx in Europe: their distribution and problems

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Experience of reintroducing lynx in Europe shows what is needed to make future reintroduction programmes a success – the biological, organisational, and commincation factors all need rigorous attention.

MANUELA VON ARX & URS BREITENMOSER

Reversing the downward trend

The Eurasian lynx (*Lynx lynx*), once widespread across Europe, reached the minimum of its historic distribution during the first decades of the 20th century. Due to human persecution, habitat destruction and loss of prey, the species only survived in the large continuous forests of Scandinavia, where it was almost extinct, and mainly in Russia, the Carpathian Mountains and in the western Balkans. Around 1950, the general downward trend came to a halt and the autochthonous populations started to recover. Not only the ecological conditions had improved, but also the general attitude of people towards large carnivores had changed and they were granted legal protection or at least some form of controlled hunting.[1] A natural re-colonisation of the former habitats in central, southern and western Europe from the remaining populations was however no longer possible – the lowlands between the forested mountain ranges were too heavily altered. Therefore, several lynx reintroductions into suitable areas were implemented from the 1970s (Table 1).

Lynx in the Harz Mountains National Park (www.luchsprojekt-harz.de)

Population / Occurrence	Location of the re-introduction	Years	Number of animals	Origin of animals	Fate *
Bohemian-Bavarian	Bavarian Forest (DE)	1970-75	5-9	mix	failed
	Sumava Mts. (CZ)	1982-89	18	wild	(success)
Dinaric	Kocevje (SI)**	1973	6	wild	(success)
Alpine	Swiss Alps	1971-80	14-18	wild	(success)
	Kocevje (SI)**	1973	6	wild	(success)
	Gran Paradiso NP (IT)	1975	2	wild	failed
	Austrian Alps	1977-79	9	wild	failed
Alpine/Jura	Swiss Plateau	1989	3	unknown	unknown
Jura	Swiss Jura Mts.	1971-80	10	wild	(success)
Vosges-Palatinian	Vosges Mts. (FR)	1983-93	21	mix	uncertain
Kampinos occ.	Kampinos NP (PL)	1993-95	30	captive	uncertain
Harz occ.	Harz Mts. (DE)	since 2000	at least 19	captive	uncertain

Table 1*:* Lynx (*Lynx lynx*) reintroductions in central and western Europe. Data compiled from Breitenmoser et al. 2001 [2] and von Arx et al. 2004. [5]

* Fate: "Success" in brackets as these populations have up to now been surviving for 20-30 years with reasonable numbers of animals, however their long-term survival is not yet secured (see Table 2)
** Animals expanded as well south (Dinaric Mts.) as north (Alps)

At the outset of the reintroduction programmes, nobody was aware of the various and long-lasting problems when reintroducing carnivores: first, the return of large predators can provoke massive opposition from people who regard them as competitors. Further, large carnivores need extended living space to establish viable populations, and nowhere in Europe can protected areas alone offer such space. Finally, the realisation and monitoring of a reintroduction programme is a difficult, expensive and long-lasting task due to the slow turnover and elusiveness of the animals. It needs long-term commitments of all partners.[2] To make reintroductions a success, many additional factors, listed in the guidelines of the IUCN Re-introduction Specialist Group, are important, such as the number, age, sex ratio and origin of the animals released, the time scale, and the quality and number of release sites.[3, 4] Finally, a sound knowledge on the species' ecology, behaviour, and genetics is required, and the ultimate scientific surveillance of the programme helps to inform the optimal strategy.

The effects of reintroductions

Table 1 summarises the lynx reintroductions in Europe. Many of these reintroductions were poorly prepared and documented, and the public badly informed. Furthermore, unofficial releases caused public mistrust.[2] Normally, fewer than 20 lynx, often much less, have been released at a few sites. Where wild caught animals were used, they were taken from the Slovak Carpathian Mountains, the geographically nearest autochthonous population. Apart from the Vosges reintroduction, the fate of the released animals was nowhere monitored. In Switzerland, a scientific follow-up was only established in 1980. In spite of these shortcomings, in around half of the reintroduction attempts the released animals established well, reproduced and expanded their distribution range. The remaining projects, however, failed (Table 1).

Lynx released in eastern Switzerland (Fridolin Zimmermann/KORA)

At present, we distinguish between the Bohemian-Bavarian, Dinaric, Alpine, Jura, and Vosges-Palatinian populations that were founded through reintroductions (Table 2, Figure 1).[5] A recent inquiry for the Eurasian Lynx Online Information System (ELOIS) for Europe[5] revealed that, some 30 years after the reintroductions, all populations are still considered to be "Endangered" to "Critically Endangered" according to the IUCN/SSC Red List criteria.[6] The

population sizes range from 20-37 (Vosges-Palatinian) to 130 (Dinaric). To be upgraded to "Vulnerable", an effective population size of at least 250 mature individuals would be necessary. Many reintroduced populations however showed rather a negative than a positive trend during the past few years (Table 2), thus indicating that it will still require a long time and continued support before they can actually be considered as not threatened.

Table 2: Status of the reintroduced Eurasian lynx (*Lynx lynx*) populations in Europe in 2001 (von Arx et al. 2004 [5]). Area: cont. = range continuous, frag. = range fragmented. Trend: → = stable, ↗ = increasing, ↘ = decreasing, exp = expanding. Judgement: EN = Endangered, CR = Critically Endangered. Threats: il = illegal killing, rc = road constructions, tr = traffic accidents, pb = limited prey base, ld = limited dispersal.

Population	Coun-tries	Area (km²)	Size 2001	Trend 96-01	Judge-ment 2001 ***	Legal Status	Livestock Depred-ation	Main Threat
Bohemian-Bavarian	CZ, DE, AT	14'200 (± cont.)	~75	↘	(EN)	fully prot.	occasionally, no problem	il, (rc)
Dinaric	BA, HR, SI	24'400 (cont.)	~130	→ to ↘	(EN)	mainly hunted	occasionally, no problem	il, tr, pb
Alpine	CH, SI, IT, AT, FR	18'100 (frag.)	~120	→, exp	(EN)	fully prot.	yes, potential source of conflict	il, rc, tr, ld
Jura	FR, CH	11'500 (cont.)	~80	exp, ↗	(EN)	fully prot.	yes, potential source of conflict	il, tr, (rc), (ld)
Vosges-Palatinian	FR, DE	6'400 (± cont.)	~20	exp/↘	(CR)	fully prot.	occasionally, no problem	il

*** Judgement according to the *Guidelines for Application of IUCN Red List Criteria at Regional Levels* (IUCN 2003 [6]). Judgement in brackets as 30 years of existence are obviously not enough to fulfil the criteria for the not threatened categories.

Most people in favour of large carnivores live in urban areas, where these species actually do not (yet) exist. Amongst the rural population, many people are more sceptical about predators, and may regard them as a pest and a threat to livestock and wildlife.[1] The last survey on the Eurasian lynx in Europe [5] revealed illegal killing to be the main threat for the species, although there is not much hard data to support this belief. This is especially true for the reintroduced populations (Table 2). Between 1996 and 2001, the yearly number of illegally killed lynx in the Bohemian-Bavarian population – where the topic was thoroughly studied – was seven. In other reintroduced populations, cases discovered per year ranged from one to four.[5] Considering that the majority of illegal acts never become public, we can assume that this is only the tip of the iceberg.

Opposition and illegal killing

The interest groups least in favour of the return of lynx are the hunters and sheep breeders. Hunters consider the lynx as competitor for roe deer and chamois, the cat's main prey in the range of the reintroduced populations. Hunting may indeed become more difficult in the presence of a natural predator. Although the long-term development of the roe deer hunting bag and the lynx numbers both in autochthonous and in reintroduced populations indicate that there is enough prey for the human and the feline hunter, lynx predation can locally have a considerable impact on roe deer. Livestock depredation, mainly on sheep, occurs in all reintroduced lynx populations (Table 2), but to date has only been notable in the French Jura Mountains and the western Swiss Alps. Between 1996 and 2001, lynx killed 775 sheep in Switzerland and 980 in France, and this triggered a major conflict. Depredation in these two countries was only exceeded by Norway, where the numbers are high: more than 50,000 sheep were considered to be killed during this same period.[5] In all three countries, sheep breeders are financially compensated for livestock being killed by large carnivores. Furthermore, lynx causing too much damage are legally removed according to criteria defined in management plans approved by the respective governments. In spite of all these measures, lynx are still illegally killed. The problem goes far beyond financial and rational reasons (see reference[1]), and to mitigate the conflict, both public education and collaboration with key interest groups is crucial.

Influences on population dispersal

There are also some objective obstacles for the reintroduction of lynx. In central and western Europe, the human density, fragmentation of the landscape, and a biologically low dispersal potential of the species, hinders the expansion into new areas. Only the Dinaric and Alpine populations are potentially big enough to be genetically viable in the long-term. However, the gap between the western and eastern Alpine subpopulations (Figure 1) has first to be filled, and this might not be possible without further translocations. The other populations in western and central Europe must be considered under a meta-population concept: improving the connectivity and hence the exchange between isolated and small occurrences is essential. As none of these meta-populations is limited to a single country, cross-border collaboration has to be improved, and coherent strategies developed.

Given the unprofessional approach in most of the reintroduction projects in the 1970s and 1980s, the development of the populations was surprising. However, the assessment of the reintroductions depends on the definition of success and the time frame applied. All

populations are still small in size and extension, which makes them not only vulnerable to human induced mortality, but also to genetic and stochastic processes. Obviously, 20 to 30 years are not enough to assure the long-term persistence of the lynx in central and western Europe, and further active support is needed. If the early attempts were not all successful, they have at least allowed us to learn about the reintroduction of controversial animals such as the lynx, and to develop better schemes. Unfortunately, there have recently been two rather counterproductive projects: the reintroductions in the Kampinos National Park in Poland and in the Harz Mountains, Germany (Table 1, Figure 1).[5] Both projects neglected important recommendations from the IUCN guidelines and other professional institutions, and based their justification on false assumptions about the status and biology of the species. The most important shortcomings are:

- a mixture of zoo-born animals of unknown subspecies and unclear genetic status were used,
- release sites are small islands within unsuitable habitat,
- no objective control of the project,
- poor information to the public;
- poor documentation of the project,
- lack of governmental responsibility, and
- no regional co-operation.

Why worry? The tactic of activity groups is “to do something” in favour of the lynx, to try and make progress, regardless of all objections. Such an approach will ultimately backfire. Reintroducing carnivores is a serious business implying a long-term commitment of all partners involved, especially from government bodies. All these projects are controversial, and so diverging interests need to be enabled to negotiate on a clear and long-term goal of reintroducing and managing a lynx population.[5]

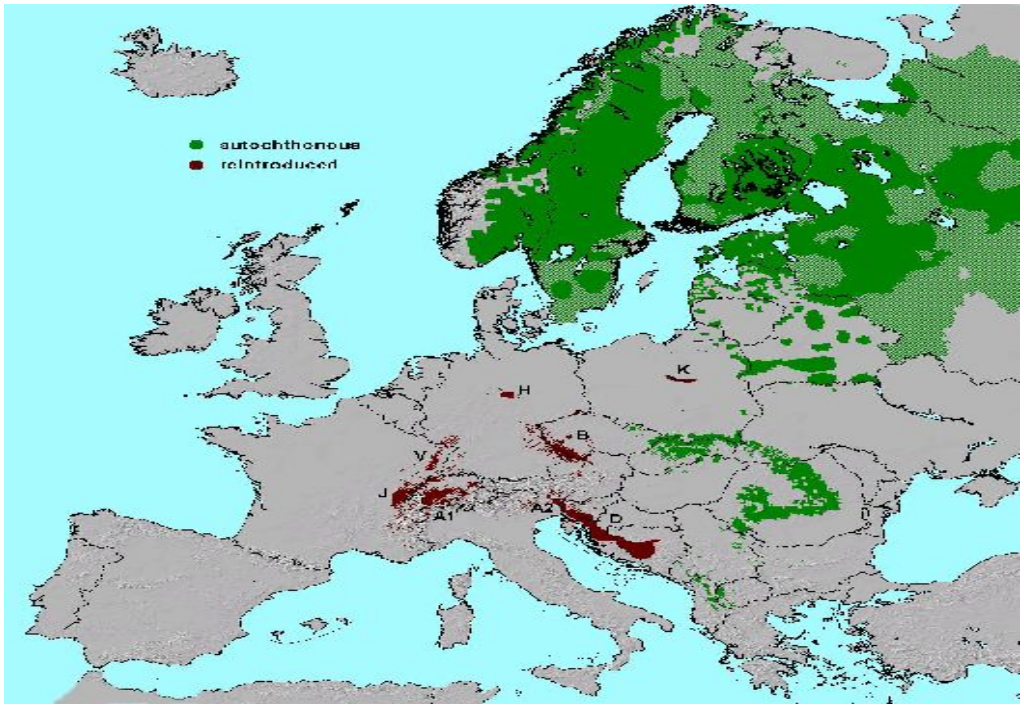

Figure 1: Current distribution of the Eurasian lynx (*Lynx lynx*) in Europe (von Arx et al. 2004 [5]). Constantly occupied area and single observations (brighter shade) . Reintroduced populations: B = Bohemian-Bavarian, D = Dinaric, A = Alpine (with a western (1) and eastern (2) subpopulation), J = Jura, V = Vosges-Palatinian, K = Kampinos occurrence, H = Harz occurrence.

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{Editor's note: Since this article was written, the Harz project reports 10-16 wild-born lynx per year. The National Park now uses the lynx as an emblem of rewilding the forest with a special exhibition announded on 20.5.2011:

see www.luchspojeckt-harz.de
and
www.http://www.nationalpark-harz.de/de/aktuelles/2011/05/luchssonderprogramm/#intNavBreadcrumb}.

The lynx in Britain's past, present and future

ECOS 27 (1) 66-74 (2006)
Experience from other European countries shows that a well-planned lynx reintroduction could bring both ecological and economic benefits to the human-modified landscapes of Scotland.

DAVID HETHERINGTON

The calls to reintroduce Britain's extinct mammals have been born of an eagerness to repair the damage done by our ancestors and to restore the missing ecological functions these species performed. Scientific and public discussion of species restoration in Britain has continued to intensify, but until very recently, the Eurasian lynx *Lynx lynx* was often overlooked in favour of other species, especially the wolf *Canis lupus*, largely because of the lynx's rather obscure history in Britain. However, developments in palaeontology, in particular the use of radiocarbon dating, are beginning to paint a much clearer picture of the species' historical occurrence and extinction in Britain. This, along with environmental and societal changes that have occurred in the British countryside, means that a stronger case for lynx reintroduction can now be built.

The history of the British lynx

We know from bone evidence recovered from limestone caves that the Eurasian lynx once roamed Britain from the south coast to the north coast. These bones now tell us that the species survived in North Yorkshire until at least the 6th century AD.[1] Cultural and linguistic evidence further suggest that the species was being hunted in the Lake District during the 7th century AD, and that the Gaelic inhabitants of the Scottish Highlands were still observing its movements into later medieval times. These faint traces of Britain's lost cat are significant in that they point the finger of blame for the species' extinction, not at natural climatic processes which occurred millennia before, but instead at the activities of humans. Under these circumstances, there is an ethical argument for considering reintroduction.

The lynx is a solitary ambush hunter requiring large areas of cover from which to launch a surprise attack on small ungulate prey, such as roe deer *Capreolus capreolus*. It cannot tirelessly run down its prey in open habitats in the same manner that a pack of wolves can. The very severe deforestation carried out over the centuries by Britain's human inhabitants, not only removed the cover that the lynx required, but also led to the depletion of the woodland deer that formed the lynx's prey. Remnant forests were grazed with high densities of domestic livestock by subsistence farmers, thus placing enormous pressure on dwindling woodland deer populations. Lynx would have had little choice but to prey on sheep and goats, and that transgression would have been the final nail in its coffin. The eastern Grampians are likely to have been the last area of Britain to support lynx, as this landscape was last to relinquish its tracts of forest and never entirely lost its roe and red deer *Cervus elaphus*.

Why consider reintroducing lynx?

Lynx release in Eastern Switzerland (Fridolin Zimmermann/KORA)

International treaties, such as the Bern Convention (1979) and the Rio Convention (1992), oblige the UK to encourage the restoration of populations of native species, while the EC Habitats Directive (1992) obliges the UK to consider the desirability of reintroducing such former British natives as the beaver *Castor fiber*, bear *Ursus arctos*, wolf and Eurasian lynx. Guidelines on reintroductions drawn up by the IUCN state that the factors responsible for a species' extinction should no longer be operating, if it is to be considered for reintroduction.[2] Britain, and in particular Scotland, witnessed a sudden and large-scale process of reafforestation during the twentieth century, as well as the problematic growth and spread of woodland deer populations, both native and exotic. Research I carried out for my PhD suggests that environmental conditions over much of Scotland today are suitable for lynx.[3] Forest cover

is now sufficiently extensive, well connected and stocked with suitable prey populations that a viable population of lynx could survive in mainland Scotland north of the Central Belt. A smaller, less viable population could exist in the Southern Uplands and extend across the border into the English portion of Kielder Forest.

The lynx as a hunter of deer

The obvious ecological function of most large carnivores is to kill and eat large herbivores. Lynx focus on the smallest species within an ungulate community and right across its huge range from Western Europe and Siberia, the roe deer is the single most important prey species for the lynx. They are, however, capable of taking larger ungulates, and regularly do so, especially in areas where roe deer are scarce or absent. In Finland, lynx hunt introduced white-tailed deer *Odocoileus virginianus*, while right across northern Scandinavia they prey on semi-domesticated reindeer *Rangifer tarandu*s. In the forests of Eastern Europe, lynx often take red deer hinds and calves, while in the Jura Mountains and in the Alps, they frequently take chamois *Rupicapra rupicapra*. In Scotland, roe deer are especially well distributed, occurring in every 10 km square on the mainland, usually at higher densities than those found in lynx-inhabited regions of Europe. Red deer and sika deer *Cervus nippon* are both widespread and numerous in forest habitats in the Highlands, as well as in parts of the Southern Uplands. Given that Polish red deer are considerably larger than Scottish woodland red deer, and that chamois are around the same size as introduced sika deer, then a lynx population in Scotland would certainly encounter an abundance of prey throughout the habitat available to them. Scotland's deer populations are controversial and their browsing and grazing causes problems and can inflict costly damage on forestry, agricultural and natural heritage interests. It has been argued that Britain's deer populations have recovered too well from their historical suppression and that they are out of balance with their environments. It has also been suggested that the return of Britain's native top predators could bring about a reduction in deer populations, thus instilling a more harmonic balance. In some parts of Europe, such as in Norway and eastern Poland, lynx do exert a control on roe deer populations, but densities of roe are much lower there than those encountered in most of Scotland. It is likely that Scottish deer populations have grown too far to be controlled by a reintroduced lynx population. However, experience from areas where lynx occur in forests with high ungulate densities, such as in the Swiss Alps, shows that lynx can have a significant impact by changing the behaviour of its prey.[4,5]

Large carnivores had been absent in Switzerland for around a century before lynx were reintroduced in the 1970s. Prior to the lynx population expanding into new areas, both chamois and roe deer occurred at especially high densities at favourable sites, usually where food was abundant. Colonising lynx would exploit these clusters by repeatedly targeting the naïve prey time and time again. The home ranges of colonising lynx were far smaller than those of lynx in the more established core of the population, because all their prey requirements were being met in a much more concentrated area. After a while, sustained lynx predation brought about considerable local decreases in both chamois and roe densities. After about five years, the remaining chamois and roe had developed stronger anti-predator behaviour and had become much more evenly distributed through the landscape. The lynx responded by greatly expanding their home ranges. If, as in Switzerland, lynx in Scotland focus their predation on those areas that support the highest concentrations of deer, they could bring about a substantial reduction in localised deer densities by changing deer behaviour. Young conifer plantations and areas of naturally regenerating woodland often attract high densities of roe deer and are vulnerable to browsing damage, while thicket stage plantations often harbour high densities of sika deer which can have dire economic consequences for forestry. It is quite feasible that lynx could focus their feeding on areas as compact as a young conifer plantation. One female lynx with kittens in the Swiss Jura Mountains, spent several months in one area of windfall woodland, killing roe deer after roe deer, while a male lynx spent almost a year in 4 km^2 of woodland on the edge of Zürich, where it killed 40-50 roe deer.[6]

So by restoring lynx, we would be restoring predation on our deer populations, something that, for centuries, has only been achieved by humans with rifles or opportunistically by the odd fox *Vulpes vulpes* or eagle. By killing a deer a week all year round, and leaving what it doesn't eat on the forest floor, including meat, bones and rumen, the lynx also regularly provides food for other species in a way that humans and the opportunistic predators tend not to do. A study in a Norwegian forest found a greater abundance and richer diversity of beetles around a roe deer carcass than elsewhere in the forest.[7]

The function of deer predator could also be performed by our other two missing large carnivores, the wolf and the brown bear. The lynx, however, has several advantages over these two other species, which I believe make it a more realistic candidate for reintroduction. The first of these, and perhaps the most fundamental, is that it is easier for human populations to live alongside it. At around 20kg, the lynx is not a threat to human safety and is not perceived as such. Its relatively small size and its extreme wariness of humans have resulted in no recorded attacks by lynx on people in Europe. Bears are much larger and wolves hunt in packs so that humans tend to perceive these species as a much greater threat to their own safety than lynx. Furthermore, the evidence from Europe shows that lynx cause far fewer problems with livestock than wolves and bears do. In areas such as the Slovakian and Romanian Carpathians where all three species occur in good numbers, the shepherds are most concerned about the depredations of wolves and bears. The measures the shepherds employ to protect their sheep from wolves and bears are extremely effective at limiting losses to lynx, which are negligible.

Another advantage of lynx reintroduction is the greater level of technical experience and advice to call upon. Other than one project in Georgia on the very fringes of Europe, the wolf has not been subject to a European reintroduction project. It has instead relied on its impressive dispersal ability to return to some of its former haunts in Scandinavia, Germany, France and Switzerland. The bear has been the subject of restocking projects in France, Italy

and Austria, but always to areas where they already occurred, albeit in very low numbers. On the other hand, a series of lynx reintroduction projects has taken place since the early 1970s in areas of Switzerland, France, Germany, Italy, Austria, Slovenia, Poland and the Czech Republic from where the species had been totally extirpated. Not all of these projects have been successful, but useful lessons can be learnt from the failures as well as the successes. The successful projects have seen the return of the lynx to several human-modified landscapes of western and central Europe, most of which have far higher human population densities than are encountered in either the Scottish Highlands or the Southern Uplands.

The human dimension

Perhaps understandably, a human population unused to living alongside large carnivores will have concerns about their return to the countryside. It is essential for the success of a reintroduction that all sectors of the rural community are involved and allowed to contribute to discussions about the project. A lack of public involvement in the governmental project to reintroduce lynx in Switzerland in the 1970s led to a sense of disenfranchisement, particularly among sheep farmers and hunters. As a result, the illegal killing of lynx in Switzerland still regularly occurs and is a significant source of mortality for the lynx population there.

Those people who are most unfamiliar with lynx may be unclear about their size and habits, and assume that lynx pose a physical threat to them. The dissemination of good quality information on the species is essential to prevent the formation of myths and public concerns about safety should be straightforward to allay.

The interactions of lynx with wildlife and livestock

Gamekeepers and conservationists alike may be concerned about potential impacts on wildlife. Their reluctance to stray far from cover means that lynx are most unlikely to make a nuisance of themselves on the open expanses of the grouse moors. There are, however, likely to be concerns expressed about the effect that lynx would have on threatened populations of the forest-dwelling capercaillie *Tetrao urogallus*. It is true that in the boreal landscapes of Scandinavia and Russia where deer densities are very low, and where woodland grouse are abundant, lynx supplement their diet with capercaillie. However, in western and central Europe where deer are much more abundant and where capercaillie densities are typically much lower, capercaillie is a very rare feature of lynx diet. An intensive 10-year study of the diet of 29 lynx in the Swiss Jura Mountains, where capercaillie are more abundant than in the Scottish Highlands, recovered the remains of 617 individual prey animals using snow-and radio-tracking.[8] As expected, roe deer and chamois represented the bulk of the remains, but in the 10 years of the study, only one capercaillie was found to have fallen prey to the local lynx population. Interestingly, 37 foxes also fell prey to the lynx in the study. Aside from killing large herbivores, large carnivores also frequently kill smaller carnivores. I suspect that 37 foxes would have a greater negative impact on the local capercaillie population than the loss of the one bird attributable to the lynx. Lynx very occasionally kill wildcats *Felis sylvestris*, and one was recorded in the Swiss study. It could be argued that feral cats *Felis catus*, which pose the most serious threat to wildcat populations through interbreeding, are at a relatively greater risk of predation by keen-eyed lynx, because domestication has dulled their anti-predator behaviour and robbed most of them of the camouflaged pelage of their wild cousins.

A central aim of discussions of reintroducing lynx to Scotland should be to allay the fears of farmers that lynx will ignore the ample deer in favour of even more ample livestock. Lynx don't kill calves, but attacks on sheep, particularly lambs, are known from several European countries. It is important, however, to put this in perspective. As already mentioned, levels of lynx depredation on sheep in the Carpathians, where livestock-guarding dogs and intensive shepherding are employed, are negligible in number. The opposite end of the scale is the rather unique situation encountered in Norway, where no protective measures are taken, but where 2.5 million sheep are grazed free-range and unshepherded during the summer in forested habitats, where the lynx occur.[9] Densities of roe deer are very low, and sheep are many times more abundant and even replicate roe deer behaviour by occurring singly or in small groups, and not in flocks. This scenario results in the loss to lynx of round 6000 sheep, mostly lambs, each year, and nearly every lynx is killing sheep. Despite their relative scarcity compared to sheep, however, the most common lynx prey species is still the roe deer. Unlike Norway, the vast majority of forest in Scotland contains no sheep, and the vast majority of sheep are grazed in open habitats. A far more likely scenario for Scotland is the one that occurs in the Jura Mountains and Alps of France and Switzerland. Just as in Norway, very few anti-predator measures are adopted, but the major difference is that the sheep are grazed in open pasture. Here, only a small number of lynx within the population kill sheep, and only at very specific locations or 'hotspots'.

Numbers of sheep killed or wounded by lynx in the French Jura vary from around 100-400 each year, but studies have shown that more than 70% of attacks occurred in nine small hotspots representing 1.5% of the area affected by lynx attacks.[10,11] The majority of affected sheep flocks in the French Jura experience only a very low level of depredation, i.e. 1-2 attacks per year. In the Swiss North-western Alps, 350 of the 456 (77%) sheep pastures experienced no incidences of depredation by lynx in 20 years.[12] A further 15% experienced only one incidence of depredation during this time. The distance of the pasture from woodland or scrub has a strong bearing on levels of depredation. In the Swiss Alps, 88% of lynx kills occurred within 200m of the forest edge, and 95% within 360m. Sheep less than one year old are more susceptible than older sheep, with 78% of those killed falling into this age group. Of those sheep owners who lost livestock in the Swiss Alps from 1979-1999, 80% lost three or fewer sheep during this period. In the French Jura, it was discovered that shooting a nuisance lynx would often solve the problem for a few months, but that ultimately a new lynx would take over the home range of the dead lynx and sheep depredation would commence once again. In these circumstances it is clear that site-specific, environmental factors are determining the likelihood and extent of depredation.

In this last scenario, most lynx depredation occurs to a geographical pattern and to an extent is predictable in its location, allowing steps to be taken to manage the problem. The grazing of sheep, particularly lambs, away from the forest edge reduces the risk considerably. The pattern of hotspots and problem individuals, which affects only a small number of sheep flocks, also allows a targeted response. Problem lynx repeatedly taking sheep can be shot under licence, while those hotspots that appear to be predisposed to depredation by a succession of lynx, justify the use of more costly protection measures. The use of shepherds, or guarding animals such as livestock-guarding dogs, donkeys and llamas are all recommended for reducing lynx depredation of sheep, and are most cost effective where there is an acute problem such as at hotspots. Recently in Switzerland government funds have been used to reduce conflict between lynx and sheep farmers by encouraging changes in animal husbandry, subsidising protection measures and compensating for losses. This has been effective, with the annual number of lynx-killed livestock in Switzerland dropping year by year from a high of 219 kills in 2000 to just 36 in 2005.[13]

The economic opportunities

The tourism economy is especially important in Scotland's remote, rural areas. The wildlife tourism sector in particular is expanding quickly and is likely to continue to do so, with over 3000 people now directly employed within the sector.[14] Large carnivores have the potential to bring economic benefits to rural areas through visitors and tourists, either directly, as people seek opportunities to catch a glimpse of such charismatic species, or indirectly, by acting as a powerful icon of wilderness. Large-carnivore tourism is being developed in several areas of Europe, and since the reintroduction of the lynx to the Harz National Park in Germany in 2000, authorities and businesses have moved quickly to utilise the lynx as a marketing tool. On the German tourism agency's web-site, potential visitors to the Harz Mountains are invited to experience "Incredible wilderness in the Kingdom of the Lynx".[15] Images of lynx are also used extensively on brochures, posters, t-shirts, books and signs promoting the park, and visitors are lured by the possibility of glimpsing a lynx and by an increased perception of the area's wildness. By being similarly marketed in Scotland, especially to UK visitors who represent the leading market for Scottish tourism, reintroduced lynx could bring real economic benefits to remote rural areas. The chairman of the national tourism agency, VisitScotland, recently stated that he felt that discussion of the reintroduction of large carnivores to Scotland was a "hugely positive development".[16] Another advantage of the human fascination with charismatic large carnivores is that there exists a much greater potential to attract sponsorship from private sources. If marketed prudently, a lynx reintroduction project could attract considerable funding which would otherwise not be available to nature conservation, thus considerably reducing the need to divert limited funds away from extant conservation priorities.

Lessons from the sea eagle

Encouragingly, we already have a template in this country for the successful assimilation of a reintroduced and iconic large predator into the rural economy. Persecuted to extinction as vermin, the white-tailed eagle *Haliaeetus albacilla* is now highly valued and jealously protected by the islanders of Mull despite the odd lamb being taken now and then. These losses to the local economy are more than offset by the considerable revenue brought to the island by wildlife tourists who come to see the thriving eagle population. The Mull Eagle Scheme recently launched by Scottish Natural Heritage offers financial support to hill sheep farmers who manage their lambs in a way that reduces the likelihood of predation by the eagles.[17] Furthermore, the scheme rewards farmers who improve habitat and help safeguard the eagles by monitoring their nests. It is this kind of positive agri-environmental funding which could permit the painless absorption of lynx into the human-modified landscapes of modern Scotland.

Conclusion

Extrapolating current trends in afforestation, deer abundance, agri-environmental spending, and public attitudes towards wildlife and the environment, would seem to indicate that conditions are likely to become more and more favourable for lynx reintroduction in Scotland. Indeed it is possible that the reintroduction of Eurasian lynx to Scotland, in addition to restoring natural processes in the forest ecosystem, may actually bring economic opportunities in rural areas. Despite the suitable ecological conditions, reintroduction of lynx in Scotland will only succeed in the long-term if the human population is closely involved and is willing to co-exist with lynx.

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BEAR

Re-introduced bears in Austria

ECOS 25 (3/4) 69-72 (2004)
Austria has a detailed management plan for nurturing its small brown bear population. Commitment from government, foresters and hunters is needed to make it work.

GEORG RAUER

In Austria brown bear populations became extinct in the 19th century.[1,2] The main reasons for the final decline were habitat loss and direct persecution. Due to damages to crops and livestock people tried to eliminate bears for centuries. Authorities encouraged the killing of bears through a system of bounties and by obliging land owners to organize hunts and forcing local people to participate as beaters.[3,4]

Advocates for bears

After their extinction bears occasionally occurred in Austria as migrants from populations in neighbouring countries, but they usually left Austria again or were shot.[5,6] In the 1970s bears became protected by being listed in the provincial hunting laws as game species without open season.[7] At the same time provincial hunting organisations started to compensate for damages caused by bears. In 1989 World Wide Fund for Nature (WWF) Austria started a restocking project in central Austria in an area where a migrant from Slovenia had settled in 1972. One male and two female bears were released until 1993. Further augmentations were stopped due to the occurrence of two problem bears in Austria that caused a lot of negative publicity. [1,8,9]

Austria's management plan for bears

In 1995-1997 brown bear management was put on a new basis, through an EU LIFE project. It was carried out by the Munich Wildlife Society, the University of Natural Resources and Applied Life Sciences in Vienna, and WWF Austria, and it covered the following steps:

1. **A management plan was developed** in collaboration with stakeholders and provincial and federal authorities;

2. **Public education** materials were produced in the form of brochures, videos, and school material, and by offering courses to hunters and schools;

3. **Over 100 electric fences were distributed to beekeepers** in bear areas;
4. **"Bear advocates" were appointed** as contact persons for the local people living in bear areas; in addition "bear advocates" were responsible for population monitoring, damage inspection and the propagation of information about damage prevention;

5. **An "emergency team" was formed for trapping, radio-tracking and aversive conditioning of problem bears.**

Population recovery

Legal protection of bears in the provincial hunting laws was the basic prerequisite for the recovery of brown bears in Austria. The restocking project was successful in terms of reproduction: at least 26 cubs have been born since 1991. However, monitoring of population development by signs of bears, and through observations, and damages as well as genetic population monitoring do not support the estimate of 15-20 bears in central Austria derived from expected mortality rates but rather a population size of 7-10 bears. It is an open question if this difference in population estimates is due to methodological problems with monitoring or due to higher mortality rates than expected. At any rate there are indications that several bears were killed illegally.

WWF has to face a specific difficulty because of raising bear numbers by restocking: even 10 years after the last release of a bear many people believe that the bears somehow belonged to WWF and WWF was responsible for them like a cattle breeder. Yet, even people who accept that bears are wild animals are convinced that damage compensation is indispensable. The management plan was adopted by the provincial authorities but only partly implemented. For example the co-ordination board of provincial representatives for hunting and nature conservation has not played the active role it was designed for, the involvement of interest groups has not happened, and the emergency team has never been officially requested.

Public education

The effect of public education programs on bear conservation is not easy to judge. It is generally assumed that better knowledge means higher acceptance, but this may not be the case. Nevertheless, in the information campaign carried out from 1995-1997 a great demand for public information became evident and information offers were greatly appreciated. However, local opponents could not be convinced. The distribution of electric fences to beekeepers with endangered bee yards proved effective (1989 – 1996: 19.3 bee yards were depredated per year, 1997 – 2002: 1.5 bee yards per year). The installation of bear advocates was a success. Their role is today broadly accepted by both the authorities and the public, whereas many forest managers and hunters are still reluctant to cooperate.

Political commitment

At present lack of funding is not a central problem in bear management. A second LIFE project is funding new information material (brochure, webpage, newsletter, and school material), more intensive monitoring (a third bear advocate for western Austria, DNA analysis of hair and scat samples), the revision of the management plan, and the investigation of habitat fragmentation and migration corridors.

A major obstacle to the recovery of the Austrian brown bear population is the lack of political commitment. The responsible authorities' main interest in bear management is to suppress immediate troubles, not to achieve a viable population size. Management options are quite limited and are complicated due to hunting law regulations. For example the permission to capture a bear can only be given to the owner of the hunting right of a certain area and not to the emergency team. There is no prospect of hunting rights being adapted in the near future because of problems arising by the presence of bears. Illegal killings may happen to an extent that they have a major impact on population development. Living together with bears is still a relatively new and very emotional topic for the public in Austria which makes it difficult to properly balance management decisions and actions when bear problems arise. It seems like bears are still viewed as an exotic species and not seen as an integral part of the natural fauna. In a case of a lethal attack the majority will presumably demand the removal of all bears.

A successful development of the brown bear population in Austria will need the full implementation of the revised management plan, the revision of the legal basis of bear management and an increase in the commitment of provincial and federal authorities to bear conservation.

Bear management is carried out to a large extent by WWF Austria. This means continuity is not guaranteed because of possible future financial constraints. In addition, the willingness of many forest managers and hunters to cooperate is low because WWF sometimes confront them on other nature conservation issues.

The development of the Slovenian bear population and its management is of vital importance for the Austrian bear population. Contacts to Slovenian management authorities have been sought mainly by WWF. The Slovenian government is willing to maintain a migration corridor from the core area of the bear population in the Dinaric mountains into the Alps, but only if the Austrian government is signalling commitment to bear conservation. The commitment of the Austrian authorities must be achieved soon and a major goal of the current LIFE project is to achieve a memorandum of understanding concerning future bear population development and management between the Slovenian and Austrian government.

Damage prevention and compensation

Damage compensation is through a voluntary contribution of provincial hunting organisations to bear conservation, but only as long as damage levels are not too high. With rising bear numbers the number of claims for damage compensation might increase and additional governmental funds will be necessary to ensure indemnification. Damage prevention has to be further propagated as most people are not yet willing to take measures to prevent bear damages, because methods are new and often linked to additional labour and costs. Bears must be able to roam in their fragmented habitat to thrive as a population and regional planning will have to consider migration corridors that are still to be defined.

Collaborating with foresters and hunters

The integration of forest owners and hunters into bear management has to be improved as any management action that takes place on their land needs their approval. The problem of possible illegal killings of bears has to be addressed more vigorously by involving hunting organisations and district authorities. Research on population development has to be continued. Population growth by reproduction and migration is more easily accepted by people than the augmentation by the release of transferred individuals. Therefore WWF will not resume the restocking project. Nevertheless augmentation can be the last option in case the migration from Slovenia should stop and bear numbers should be low and decreasing.

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The Apennine brown bear and the problem of large mammals in small populations

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Despite the availability of suitable habitat the relict brown bear population in the Italian Apennines appears to be in decline, partly as a result of direct human-caused mortality. The inherent vulnerability of small populations, which this highlights, needs to be taken into account when considering species for reintroduction in human-dominated landscapes.

CHARLES J. WILSON & CIRO CASTELLUCCI

The reintroduction of large mammals that were once part of the British fauna is being taken increasingly seriously.[1,2,3,4,5] Given the right circumstances, it has even been suggested that this could include the European brown bear *Ursus arctos*.[4,6] However, some existing relict bear populations are already in trouble and before we even get to the stage of considering if this 'ultimate' mammal reintroduction could meet IUCN guidelines[7] perhaps we ought to ask ourselves, in any case, "what's in it for the bears?"

The case of the Apennine bears

Like many large mammals the brown bear is a '*K*-selected' species; slow to reach sexual maturity and with a low reproductive rate when it gets there. So small populations, which any reintroduced population is likely to be, will always be vulnerable. The relict bear population in the Italian Apennines, until recently thought to be the largest in western Europe south of Scandinavia,[8] appears to be showing worrying evidence of this. A recent study identified more than 12,000 km² of suitable bear habitat in the Apennines and suggested a population density in the core area of 1 bear/50-80 km².[9] This implies sufficient habitat for at least 150-240 bears. However, the current core bear range is in good quality habitat, with extensive ancient beech forest blanketing the slopes of limestone mountains, and earlier studies have indicated that this rich environment could probably support even more than this. The first scientific census of the population, at the beginning of the 1970s, using sightings and other signs to estimate population density, gave a figure of 70-101 bears in only 520 km² of the main bear habitat, in and around the Abruzzo National Park.[10] This was almost certainly an over-estimate as it was assumed that the bears were relatively sedentary and did not have ranges extending beyond the study area.[11] However, the study did not encompass the entire bear range and figures of between 70 and 100, for the population as a whole, continued to be cited until quite recently.[8,12,13]

Since the mid-1980s population estimates have become increasingly pessimistic (Fig.1). Some local experts now believe there may be as few as 30-40 animals[14] and even this could be an over-estimate. A recent genetic study involving sampling from hair traps and faeces, although not designed as a census, only identified 26 bears in a study area of over 1500 km² encompassing most of the bear range.[15] So, although the precise figure remains unknown, the population is almost certainly below some estimated minimum viable population sizes for bears of about 100-250.[16,17,18] Nevertheless, there appears to be little evidence of inbreeding[19] and it might have been expected that the population should have a good chance of recovery as long as the bears are given effective protection.

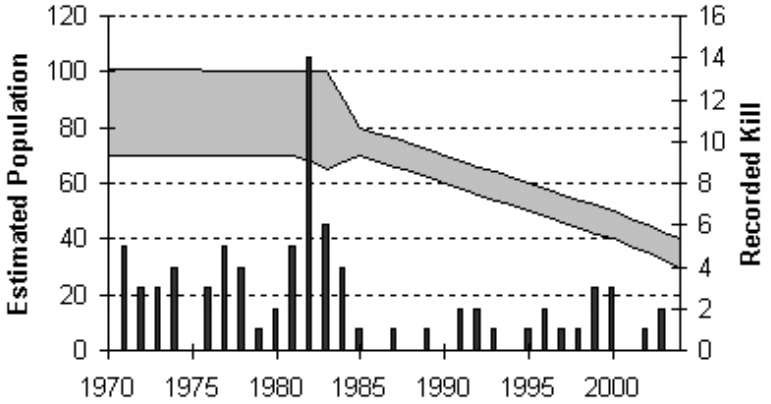

Fig.1. Maximum/minimum range of estimated size of the Apennine bear population (shaded) extrapolated from published estimates for 1970/71[10,] 1981[20], 1983[21] (with 20 added to allow for animals outside the authors' study area), 1985[8] and 2000[33], and for 2004, from L. Boitani.[14] Kill data (bars) from 1970 to 2000 from Castellucci (2004).[22]

Causes of decline

So why does the Apennine bear population appear to be in steady decline? A number of factors may be responsible, including increased tourist pressure[20], greatly increased numbers of wild boar *Sus scrofa* competing with the bears for food[21] and perhaps the decline of traditional farming, which used to provide additional food for the bears. However, in recent years, direct human caused mortality has been the single most important factor. From 1970 to 2000, 78 bears are reported to have been killed, with the majority of deaths caused directly by man.[22] Almost 75% of these were killed within the Abruzzo National Park itself or its External Protection Zone. According to WWF, Italy[23], 36% of the bears killed since 1980 are known to have been shot or snared, 13% were killed in road accidents and 4% were poisoned. Since these figures were compiled, an adult female was shot in the Mainarde, to the south of the

National Park, in October 2002, and in September 2003 another female and her male cub were poisoned near Pescosolido in the Park's External Protection Zone.

The vulnerability of small populations

Although the worst death toll in the Apennine bear population occurred in 1982 (Fig.1), and it is possible that this tipped the balance, even the more modest losses suffered since then could have an effect on such a small population. To illustrate this we simulated the possible effects of comparable losses on a starting population of 50 bears using the VORTEX population model.[24] We used population parameters estimated from the literature and carrying capacity set at K=250 (Table 1). This is a reasonable maximum, not only for the Apennines, but for any reintroduced population that might be established in a crowded country like the UK.[18] Because VORTEX requires the same age/sex composition of animals to be removed at set intervals, and the numbers being removed are small, we assumed that animals would be removed every two years. Each simulation was re-ran with maximum breeding age increased to 18 years, or age of first breeding increased to 5 years to allow for variation in the lifetime productivity of adults and to bracket the results with figures for what might be considered high productivity and low productivity populations. All simulations were ran 100 times, with and without in-breeding effects, and without including effects of environmental stochasticity.

Table 1. Parameters used in VORTEX simulation model estimated from published data[10,34,35,36]. Standard deviations (SD) estimated as 0.4 x the mean. Other values used were defaults provided in the model. LP and HP = 'low' and 'high' productivity populations, respectively.

Parameter	Values used in model
Mating system	Polygamous
Age of first breeding	4 years (5 years for LP population)
Maximum breeding age	15 years (18 years for HP population)
Sex ratio at birth	1:1
Percent females breeding	30 (12.0 SD)
Percent litters of: one offspring	20
two offspring	55
three offspring	25
Percent mortality: 0-1 years	20 (8.0 SD)
1-2 years	12 (4.8 SD)
> 2 years	10 (4.0 SD)
Percent adult males in breeding population	50

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The results show that, without any losses, the population has a reasonable chance of survival, particularly in the absence of in-breeding depression (Table 2). However, losing as few as one bear per year has a marked impact on long-term viability. Risk of extinction is increased if in-breeding effects are present, but even without them it is above acceptable levels.[25] The loss of adult females greatly increases the population's vulnerability and, if they are included in losses of three or more animals every two years, extinction is highly likely. So every single individual lost reduces the survival chances of the population, especially if the victims include adult females.[16]

Table 2. Probability of extinction (%) predicted by VORTEX population simulations for brown bear populations subject to different kill levels and with and without the effects of in-breeding. Start population = 50; K = 250. Each simulation ran 100 times for 100years. LP and HP as for Table 1.

Number & age/sex class killed every 2 years	With In-breeding (HP; LP populations)	Without In-breeding (HP; LP populations)
None	6 (4; 25)	3 (0; 9)
2; 3 yr old male and female	45 (15; 82)	20 (11; 66)
3; as above plus adult male	59 (30; 89)	30 (12; 74)
3; as above but adult female, not male	85 (76; 97)	83 (55; 99)
4; as above plus adult male	91 (79; 100)	78 (52; 99)*
6; as above plus male & female cub	96 (88; 100)	93 (77; 100)

**Lower figures than for kill of three animals reflect inherent variability in model.*

In the Apennines there are a number of causes behind the killings but it is not usually deliberate persecution. In the past, bears were sometimes killed because of depredation on sheep or perhaps in illegal trophy hunting.[8] However, the main problems now appear to be accidental shooting during wild boar hunts, accidental snaring or poisoning with illegal baits set for dogs *Canis familiaris*, wolves *C. lupus* or foxes *Vulpes vulpes* and animals being killed in road accidents.[8,19,23,26] Some of these might not be relevant in the UK but there are other factors that are; adult females, the most important part of any population, may be disturbed by human activity and development[27]; roads open to vehicular traffic tend to be avoided[27,28,29], effectively restricting available habitat, and access provided by roads almost inevitably increases the risk of mortality.[30] Disturbance of females at winter dens can also lead to increased cub mortality[31] and limit denning to only the most inaccessible refuges.[32]

A reintroduction too far?

So whilst smaller more resilient species may be feasible candidates for reintroduction in the UK, realistically, talk of brown bears is probably a reintroduction too far. Not simply because of potential human opposition or lack of suitable habitat, but because it would be a disservice to the animals themselves, which would probably be doomed to extinction in any case. There is more than enough conservation effort still required to save the existing relict populations elsewhere in Europe, such as that in the Italian Apennines, and it is these that should provide the focus for those concerned with the conservation of Europe's bears. Franco Zunino, former Park Naturalist at the Abruzzo National Park, wrote of the Abruzzo bears in 1981: "nobody, not even a child, is particularly afraid to meet one in the wild".[20] Sadly, the bears have a lot more to fear when living cheek by jowl with humans.

European brown bear (Peter Cairns/Northshots)

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Big Cats

Big Cats in Britain: restoration ecology or imaginations run wild?

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For some, reports of panthers stalking not just the wilds of Bodmin or Exmoor, but the suburbs of Cheltenham and Gloucester, are to be classed along with crop circles and UFOs. However, the big cat phenomenon can no longer be ignored: there is much convincing evidence of an expanding population of black leopard and puma in Britain. Conservationists need to consider how we live with these predators and manage places accordingly.

PETER TAYLOR

Facing up to the issues

Big cat sightings are widespread in Britain, but were absent from the last issue of *ECOS*, which featured reports of lynx and at least one animal shot and photographed. The 'big' cats remain the subject of eye-witness accounts and tell-tale corpses of their prey, with a certain amount of circumspection from scientists who fear the potential ridicule that the profession traditionally reserves for paranormal phenomena. However, it is now accepted by a growing number of experienced field naturalists and zoologists, as well as many local police forces, that large pantherine cats are present in Britain. There are now websites logging the sightings, and plans are afoot for a trip-photography campaign to capture final proof. I present here a brief review of the evidence thus far, together with my own experience. The issue raises a number of challenging questions for conservation groups, ranging from 'alien' invaders *versus* naturalised escapes, to the very real issues of public safety.

Public safety is an issue because these are *big* cats – that is, members of the genus *Panthera (*and *Puma)* quite capable of killing a human. Thus far, they have predated sheep, cattle (calves), foals, rabbits and other small game, and several instances are known of potentially dangerous human contact. The evidence suggests that numbers are growing and the animals are not always shy of contact.

A catalogue of sightings involves two 'types': a black panther three to four feet long with a two or three foot curled tail, often described as slinky and muscular and somewhat larger than a Labrador; the other a fawn, grey or brown panther but sometimes black, longer in the leg, smaller in the head and similar in size. On zoological grounds, this would suggest melanistic leopard *Panthera pardus,* or jaguar *Panthera onca*, and puma *Puma concolor.*[1]

The beasts of Bodmin and Exmoor

Sightings of black panther seemed to begin on Bodmin and Exmoor and reached a peak there in the early 1980s, when I recall the press interest generated by the Government calling out specialist army squads on Exmoor in order to control sheep losses. Army marksmen reported seeing a large black panther, but were unable to get a clear shot. The naturalist Trevor Beer spent six weeks tracking the animal from carcasses of deer, and finally was rewarded with a close up sighting described in his small book, *The Beast of Exmoor.*[2] His drawing is reproduced here – to my eye, it has the look of a puma, rather than a leopard – a smallish head, longer legs, and quite a distinct pale muzzle. In certain parts of North America, black puma are regularly seen, but are very rare in South America. The running pattern, reminiscent to Beer of a greyhound, looks more like a cheetah than the usual ground-hugging stealth of the relatively shorter-limbed leopard. Indeed, zoologists now place the puma close to the cheetah, and there are great similarities in skeletal structure with the small head and longer limbs. Beer's animal, however, had markedly clear green eyes like a leopard. Since the publication in 1984, the author has had a number of sightings and is convinced both black leopard and puma are breeding in the South West of England.

Field drawing of the 'Beast of Exmoor' (Trevor Beer)

The Mendip panther

After the Exmoor incidents seemed to die down, I took little more interest until moving to Somerset in the summer of 1997. The local papers were reporting irate farmers so convinced their sheep were being killed by a large cat, one near Cheddar had employed an ex-SAS marksman to guard his flocks. In the spring of 1998 a close friend saw a black panther in an open field at nearby Priddy in the Mendips. Shortly thereafter things went quiet around Somerset. A year later, the *Daily Mirror* carried a front-page story of a young boy who had grabbed the tail of what he thought was a pussy-cat in bushes, only to have a large black cat rear-up, covered in blood and smelling of rabbit, swipe his face and depart leaving three widely separated but superficial scratches – which the *Mirror* called "mauling". This incident occurred at Trelleck in Gwent, and although such superficial marks are hardly convincing – the local police scrambled a helicopter and firearms team.

An efficient sheep-killer

Despite this coverage, and a sighting in Cumbria by *ECOS*'s managing editor, I took little further interest until last year when close to our holiday campsite in Carmarthenshire, seven sheep were killed in one afternoon, in the very next field to us. Police called at our camp asking had we dogs, and I walked with the officer to the scene. Six of the sheep had been dragged and stashed under the riverbank, the seventh had been partially eaten. Despite the wet conditions I could find no tracks. Dogs usually bring sheep down by snapping at the legs as well as the neck.

Sheep kill in West Wales showing claw marks on back and canine punctures to the throat. (Peter Taylor)

Each of these animals had been killed cleanly by a single bite to the neck – in most instances the canine indentations could be clearly seen, and this is how powerful cats clamp the air-pipe and suffocate their prey. The eyes show characteristic bulging (see photo). One sheep had been dragged down from the rear and had claw marks on the back so deep that they had ripped through to the intestinal wall – each claw mark clearly defined. The canine holes seemed to suggest two animals – one five cms between the teeth, the other about one cm less. The policeman conceded it did not look like the work of dogs, and said there had been reports of a large black panther-sized cat.

The Forest of Dean hotspot

However, it was at our last summer camp that I decided it was time to take the matter more seriously. Two of my children among a group of others were severely traumatised by a night-time encounter in the Forest of Dean woods. They had been out playing with torches and had panicked when they saw a black panther apparently stalking them. In their rush to get out of the woods, one became impaled on barbed wire and their terrified screams brought us to the

scene. My 13-year old son, a veteran of tiger stalking in India, related how he could see the animal in his torch-light close by as he hung helpless on the wire. It made no attempt to harm the children. I resolved that the time had come to investigate the subject of big cats more systematically.

USA mountain lion areas

I had just returned from spending several weeks in a wilderness zone in North America where mountain lion were frequent (and black ones at that!), and the children had been instructed that any encounter was to be met by careful behaviour – not to run, not to stare at the animal, and if it approached to stand tall, wave arms and make a lot of noise. There were warning notices on the trails advising members of the public to take precautions. However, North American mountain lions are wary of human contact and generally keep to the wilder mountain areas. Here we are dealing with a population of cats that has never been hunted and has no reason to shun human contact.

Indeed, given how hard it is to see truly wild leopard or mountain lion overseas, the number of broad daylight sightings in Britain, especially on farmland and around cities, is extra-ordinary. If such sightings were due entirely to over-active imagination on the part of the lay public (including postmen, police and farmers), then one might expect the occasional spotted leopard, striped tiger, or maned lion – but there have been no such sightings. Several footprints have been plaster-casted and sent to zoos, and recently the *Independent* newspaper reported that London Zoo experts had identified casts taken in Lincolnshire as being those of a puma. *The Times* (29 January 2000) interviewed an animal trainer, Leslie Martin, who admitted releasing a black leopard and a puma on the moors near Sheffield in 1974 prior to the introduction of restrictive legislation. He said that several trainers he knew had done the same, rather than put the animals down.

After the Forest of Dean encounter, and still believing that active imagination could be playing a part, I checked out the websites of the Big Cat followers – somewhat expecting a mix of crop-circle and UFO mentality. I was surprised to find a well-mapped incident site run by David Walker and very detailed scientific coverage by Scottish observers, as well as lots of useful press reports on the more popularised British Big Cat Society's pages. The Forest of Dean proved a hot-spot. I realised Trelleck, where the young boy was scratched, was no more than four miles from our campsite across the Wye. Police had also issued warnings around Monmouth, six miles further north, after a black panther was seen close to the town. Sightings in the Gloucester and Cheltenham suburbs were frequent. Two weeks later the Independent carried reports of a police team called to a farm on the Gwent levels – the police reported seeing one adult black panther and one smaller animal. The helicopter and tranquilliser team were called out but failed to locate the animals. This incident was less than 20 miles from our campsite.

Checking the website data – and sifting out the problematic 'large moggy' possibilities, leaves several areas as hotspots – starting from Devon in the south, the Forest of Dean for regular sightings of black panther, with north Dorset, the Somerset Levels and Mendips, Malverns and Worcester for periodic sightings, and finally, Fife as the epicentre of black panther sightings in Scotland. In the last instance the website shows a photo taken of a deer carcass after a driver had surprised a black panther dragging it across a road near Cupar. The characteristic clean white bones of the half-eaten animal are caused by the rasping action of the big cat's tongue. Pumas are sighted regularly in the Surrey woods and Hampshire, Northumberland and Durham (where the police have a special liaison officer), but there are also reports coming from such unlikely un-forested areas as the fens around Kings Lynn and Lincolnshire. My brother, an experienced naturalists' tour leader, saw a puma charge into and take a pheasant from a group in a rearing area in Hampshire.

At the time of writing (October 2002) it was reported in my local press that the Animal Rescue Centre on the hills overlooking the Somerset Levels had a sheep attacked and killed. What was so surprising was that this 'farm' had a series of paddocks by the visitor centre. The attack happened within hearing of the centre, but nothing actually was heard. The vets called to the scene were convinced that the unfortunate animal had been killed by a large cat. A few days later a local farmer at Yetminster had a sheep killed, and he warned in the local press that he had seen the panther and other farmers should guard their stock.

Origins: deliberate releases, or are some indigenous?

What then are we to make of all this? I personally have three friends who have seen large panthers or pumas, and the kills I have examined certainly appear to have been the work of a very powerful cat (try dragging a sheep for 50 yards, or rather, six of them one after another – I know of no dog that can do that).

It appears most likely that these animals are the consequences of releases in the 70s following new legislation: the *Dangerous Wild Animals Act* brought in a licensing system which prompted some private owners to relinquish their big cats. It has been reported that black panthers were popular in the gangster's world as frightening caged pets – but they must have been difficult to procure in such numbers. Puma were apparently easy to buy and keep, and one animal was recaptured near Inverness in 1980 after it had been released. There is the possibility that a small population of inbred puma could produce a large proportion of black animals. It has been suggested that many of these animals result from escapees from the travelling menageries popular in Victorian times – but then why only black leopard?

Some laypeople have suggested the black cats are indigenous – either survivors of an earlier age, or the product of feral cat and wildcat interbreeding. Taking the latter first: wildcat and feral inter-breeding is common in Scotland and thought to have produced the Kellas Cat, a

black form larger than an average feral cat (*Felis sivestris* ranges from 3-7 kg). But we are talking of cats that must weigh between 50 and 100 Kg. We know that dog breeders have managed to produce animals of one species that range across these sizes and colours, but it would appear most unlikely that feral cats, with or without wildcat genes, could be worked on by natural processes of selection over such a short time. Indeed, domestic cat genes are derived solely from the African subspecies of *F.silvestris,* and feral crosses between these domestic forms and the European race (*e.g.* the Scottish wildcat) would have begun in Roman times. There appears little possibility of great plasticity in size, although the potential of wolf genes to produce such great plasticity in the domestic dog, and the absence of competition for a large predator niche, should make us wary of generalisations.

What of an indigenous large feline? This is not as outlandish a suggestion by laypeople as might first appear. There are fossil antecedents. European temperate forest fauna evolved to its present assemblage about one million years ago as adaptations to periodic ice ages, and was relatively stable over the last three inter-glacials. Only after the last ice age, a mere 13,000 years ago, did those returning forests lack a large panther (as well as elephant and rhino) typical of their Indo-European connections.[3] The English fossil fauna of the late Pleistocene is replete with leopard, as is a line from mid-England to Hungary. Post-glacial fossils are recorded as near as Italy. Going back to the mid-Pleistocene, produces ancestral forms of a stocky European Jaguar, known as Owen's Panther after the Victorian paleontologist who found its jaw in the Mendip cave deposits. Furthermore, the British form was cold-adapted and persisted even at the glacial maxima and the American jaguar extended to the boreal forest zone before the major extinction event of 13,000 years ago.

What happened to the British leopard?

Why then did leopard fail to return along with their favoured woodland prey of roe deer, wild boar, and the young of aurochsen? Remnant and very secretive populations of leopard still exist in the mountains of Turkey, Palestine, Arabia, Persia and the temperate forest of the Amur in eastern Russia. They have only recently been studied by professional zoologists – most of whom never see the animals in the wild, but rely on trapping and trip-photography. I can see no ecological reason why leopard could not have accompanied the temperate forest herbivores on their return. Most of the other missing elements of the Pleistocene fauna can be explained by habitat change or human hunting pressure. The horse and steppe-bison were grassland dependent, and so probably was the large European lion. The mega-herbivores such as straight-tusked elephant and forest rhino were probably hunted out in the glacial forest refuges in Spain and SE Europe before they could move north as in all previous millennia, and with them went the sabre-toothed cat that specialised on the large pachyderms. Of the other forest predators, wolves, lynx and bear made it here and were present at the time the Romans invaded, and the last Scottish wolf was shot about 300 hundred years ago.

Leopard are a lot less obvious than wolves, but it seems inconceivable that a large cat could have been missed – and why only in Britain? I think the argument deserves a considered response. The latter question first – Britain, as a far-western mountainous outpost, does appear to have refuge potential. Kurten, the great vertebrate paleontologist noted that there existed a remnant population of sabre-tooths in Britain until much later than elsewhere. Some naturalists consider the wild white 'park' cattle as indigenous remnants, and I have seen photos of white cattle, with characteristic neck spotting, in cave drawings of 20,000 years ago. Exmoor ponies are regarded as particularly ancient and may be direct descendents of the forest 'tarpan'. Curiously, Exmoor was the only place in England and Wales that did not lose its free roaming red deer herds. By 1800, most of England and Wales had virtually no deer at all, and of course no wild boar either. The current over-population of roe deer and muntjac is a post-war phenomenon, and they have yet to re-populate Wales to any significant extent.

The legendary Black Dog

Surely, though, the intrepid English game-keepers and amateur naturalists of the Victorian period would not have missed even a small population of big cats (prior to that, almost anything bar a rhino or elephant could have been missed in the remote parts of Devon!). Disconcertingly, these parts of England, and indeed, many parts, have folk legends of large black 'dogs' that haunted the moors. Many people might have readily assumed that what they saw were large 'dogs'. And for those who were a little more advanced in field technique, such as keepers, there would be adequate disincentive to suggest a large cat – just as there has been today in the modern police force and among the farming community who have 'known' about large cats for at least three decades.

Remnants and relics in small areas

Such small areas and small populations are not however that unusual. Currently, the remnant Asian lion numbers 200 animals in an area equivalent to the size of Dartmoor National Park, but fortunately populated only by wild ungulates. The Amur leopard is confined to reserves in areas of a few tens of thousands of hectares. Geneticists reckon the current widely dispersed and endangered population of cheetah must have been reduced to only one family at some time in prehistory. It is not impossible that a relic population of small leopard (the Palestinian form averages only 30 kg), inbred and throwing up regular melanism (the genes of which may confer other advantages in a cold damp clime), could have survived in Britain, but, of course, unlikely.

Deliberate release of caged animals

The likeliest origin is the release of caged animals. We have admissions that some *were* released. Unlikely as it may seem, black leopard were a fashion item for British gangsters. It seems that to account for the population, some dozen or so animals must have been released and subsequently bred in the wild. Escapes of smaller cats are regular occurrences – in

addition to lynx (8-30 kg) of unknown origin, such as the one shot in Norfolk (*ECOS*, 21(2) page 11), leopard cat *Prionailurus bengalensis* (3-7 kg) and jungle cat *Felis chaus* (7-13 kg) are known from road kills and farmers shooting them (see the websites for details). Also, one of two escaped clouded leopard *Neofelis nebulosa* (11-20 kg), was at large for several months before being trapped in a London suburb.[4] There is an apocryphal story of a leopard that escaped in transit to a game reserve whilst in the suburbs of Johhanesburg, much to the consternation of the authorities who immediately set up traps. They caught six leopards in one night!

Living with big predators, accepting aliens

Do we, as the community of conservationists, have anything specific to say about all of this? It fits rather squarely into current debates about alien species, assuming they *are* alien, as well as the obvious absence of functional large predators for an over-abundant deer population (and maybe, soon, wild boar as well!). But these are dangerous animals – and therefore, even if we were to get over the alien concept, and turn to a functional approach to species, we would need to look at the potential for human fatalities. We might also look into the psychological differences between having your throat clamped and bones stripped by a big cat, or getting your tongue stung while eating an ice-cream (wasps regularly kill in this way!).

Let us take the alien concept first. Where leopard are concerned, they were a regular native prior to the present human-dominated interglacial, and their absence is not readily explained, as is their demise in the wilder parts of Europe that still hold wolf, bear and lynx. Zoological purists might want to draw a time-line at the Mesolithic and the closure of the English Channel – but that is entirely arbitrary and not representative of the functional ecosystems that existed in all prior inter-glacials. The IUCN rules on re-introductions have the same near-time focus.

There is also a present and future problem with aliens. As Paul Green argued in *ECOS* 23 (2), the whole 'alien' concept requires scrutiny in the light of a globalised wild ecology.[5] In Britain, the main food web for our pitifully reduced diversity of carnivores – top predator being the fox, consists of rabbits, brown hare, brown rat, red-legged partridge and pheasant - all aliens. Our biggest 'forests' consist of alien monocultures of Sitka spruce, Japanese larch and Norway fir. In deeper time – the previous inter-glacial, Britain had Douglas fir, hemlock spruce, and rhododendron.

All of evolutionary history is about invasion, competition and replacement, as land bridges open and close like revolving doors. Since the very recent human invasions of Britain, the larger herbivores have no predators and thus over-grazing has seriously impacted upon biological diversity throughout Scotland (red deer) and the uplands of England and Wales (domestic free-range sheep). We could find cogent ecological arguments for a small population of mountain lion and black leopards, but it is the political argument that will decide. As for that – the risks are obvious, though perhaps likely to be overstated – cars in rural lanes are a far greater threat to free-roaming children, as is pneumonia and rogue collies to hill sheep. But such matters are not rational – and Britain has what can only be described as 'beast' consciousness, reflecting our over-tame national psyche.

However, if we are to have any influence upon Indians to conserve tigers in areas ever more greatly encroached upon by humans, and where fatalities are annual, then we could hardly use 'danger' as a sufficient excuse. We could look to the USA for a modern approach to big cat parallels. Except, much as I would personally welcome it, I cannot see the British public accepting new billboards in the Forest of Dean's country parks, warning children not to stray alone, and to stand tall and make a lot of noise if approached by a black panther! Unless, perhaps, as has happened in the US in modern times, people come to welcome elements of vulnerability, real risk and fear as essential to conserve wild places in the countryside and the wildness in themselves.

If the presence of these big cats is finally proven by trapping or photography, I would hope that we will have anticipated the arguments, and that some conservationists of the re-wilding orientation will stand up for what would be a frisson of risk in the wilds of British nature.

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Big cats in Dorset:
the evidence and the implications

ECOS 28 (1) 73-78 (2007)
New alpha predators have melted into the Dorset landscape…

JONATHAN MCGOWAN

In the autumn of 2006 I gave a presentation on large cats in Dorset to a national gathering of the Police force's Wildlife Liaison Officers. They needed no convincing on the evidence for these cats and their comments revealed the respect they pay to the subject. Indeed, they are aware of past and current trends in the exotic pet trade, which is believed to be responsible, in part, for large cats living wild in Britain's great outdoors. There were also some Defra staff members among the delegates, and despite their organisation's uncommitted stance on the subject, they too showed a keen interest, which extended to reporting the location of some scratch marks they were aware of. When I discussed the issue of large cats at a BANC workshop, also last autumn (see report at www.banc.org.uk), people's main concern was to know more about the species 'out there' so that discussions on possible lynx reintroduction could be more informed about the real context of free-living cats across Britain.

'Coming out' on big cats

Dorset is the area where I have done most of my research on free-living large cats (referred to as 'big cats' in the rest of this article for convenient shorthand). It is the area from where I have had most of my sightings, starting in 1984 when I witnessed a puma at close quarters stalking a badger. I then saw what I believe to be the same puma on two more occasions. At first I kept my sightings to myself, having been used to people's sceptical nature. Through my tracking and my nocturnal and crepuscular wanderings I have had several more sightings since: not just of puma, but of leopard and leopard-like animals, and of lynx. On two occasions I have seen puma cubs (each of a different litter) and I have once seen cubs of leopard. Dorset seems to be a hotspot like the rest of the West country, with many sightings a year by credible witnesses, including naturalists, biologists, police officers, foresters, ecologists doing field survey work, and by other people who are regularly outside such as dog walkers, horse riders, car drivers at night, and not to mention lampers and poachers. Often, I ask farmers on the off-chance, and I frequently get a matter-of-fact reply: "Yes, we have them", "No we don't, but the next farm does", "My wife sees them" and so on. It seems that more people see cats than badgers in some areas. That's not because the cats have eaten them all, although some have, as we will see later.

The three main suspects

Big cats are not much of a news story in Dorset any more, as sightings are so regular. The amount of sightings in different areas often on the same day means that there are more than just one or two individuals around, even though they can cover many miles, especially at night when they are more active. Many researchers believe there are several hundred large cats living wild in the UK. The black panther (melanistic leopard, and possibly some melanistic jaguar) is the most commonly seen cat. Sightings of spotted cats are rare, save for small cats like the leopard cat, of which there have been several road kills in the past two decades. Leopard are in the genus of *Panthera* like the tiger and the lion, while puma (or mountain lion) is the second most often seen species, and belongs to the genus of *Felis*, along with most other species of 'small' cats, but physically they can be as large or larger than a leopard. The official term 'big cat' has nothing to do with size, but is based on whether or not the species can roar, due to a fixed hyoid bone in the throat. The lynx is the third most commonly seen species. This gracile cat is of much interest to many conservationists because as a once native species, its unofficial appearance in Britain is welcomed by many, and its official reintroduction is on many people's wish list.

There is much misidentification of all three large species, but generally it is the consistency of witness reports which makes the evidence more robust, coupled with the field evidence, and the occasional amateur video footage, as seen last year on Sky TV's Big Cat Tracks. For my own observations, chances of photographing the cats have been thwarted by lack of time, lack of light and even the lack of a camera – I am not sitting in a hide with an array of photographic and infra red equipment, but on the move, tracking in the field. There are reports of smaller non-indigenous cats but as I have had no evidence in the county, I will not include them in my consideration here. Their impact on the ecosystem is minimal, and their numbers are far fewer than feral domestic cats, which would be feeding on the same sorts of food. I will also exclude jungle cats from my analysis here, of which there are believed to be small numbers across Britain, and possibly some ocelot, perhaps especially in their melanistic form. To back up the sightings of small-medium cats like ocelot and jungle cat, I have found cat spoor larger than domestic, but smaller than lynx, along with smaller droppings in typical habitat such as reed beds in harbours and estuaries.

Understanding the territories

To try and map the large species, I first looked at all the alleged sightings in Dorset and the borders of neighbouring counties. I marked them on a map along with all areas of woodland, rivers, roads, herd deer, rabbit colonies, game rearing, badger sets and any other features relevant to a cat's territory. I then searched these areas for evidence, and found signs in all locations at some time over a period of six years. Some of the signs were old but most were fresh, mainly consisting of paw prints, tree scratches, spraying areas and remains of kills.

Particularly helpful are deer remains that have the characteristics of being eaten by large cats as opposed to dogs or other scavengers. A leopard may kill one deer every four or five days, depending on whether it can keep it from other scavengers. It will not kill in the same location twice a week, in order to keep the prey less alert, or so it seems. I have found many field signs scattered throughout the county, but certain hotspots seemed to have emerged. Signs would prevail every week or two in certain areas, in the form of footprints and scats.

Sometimes it took up to three years before these signs ceased, so one can conclude that the animal had a territory. I looked at possible natural boundaries such as main roads, wide rivers, expanses of arable land without much cover, or large tracts of conifer plantations. To judge other parameters of the territories, I have used people's sightings, and speculation as to how far a large cat would travel for food, water, cover and other members of the same species. On the whole, the UK has concentrated amounts of natural prey, especially deer and rabbits. Indeed, these conditions are better than many areas of native country of leopard and puma. Males can encompass several female territories within their own range, but recent research suggests that both leopards and puma may often have smaller territories than was previously first thought.

Proof that these cats are stealthy and elusive comes from a well reported incident when six leopards were once caught in traps left out one night in Johannesburg, SA, meant for one known problem animal. This demonstrated that leopards can live amidst urban settlements but go unnoticed by people.

I first concluded that in Dorset there had to be at least eight leopards since the year 2000 because of the number of cubs seen by myself and others during that time; and taking into account that two is the average litter, and they can remain as juveniles with their mother for up to two years. These are the ones seen or at least known about. It is estimated that for every reported sighting, there are at least 10 unreported. As at Summer 2006, the police estimate in Dorset was of around six big cats.[1]

Looking at the availability of food in these areas and at how many cats they could support along with all the other info, I concluded that there were possibly 20 to 30 leopards, a few less puma, and at least 6 lynx in the county. There are rumours of a lynx liberation group, and even a huge holding compound with many animals caged, has been seen, allegedly, and the police and RSPCA have uncovered unlicensed lynx in captivity. Something is undoubtedly going on in relation to lynx, as cat investigators elsewhere in Britain also conclude from their intelligence. So the facts point to lynx now being introduced to the UK, and I am finding possible signs of their habits in Dorset, backed up by people’s regular sightings.

The abundant food supply

I have found that the leopards in my five study areas tend to keep to the large forested tracts and the assumed territories may be up to around 70 per cent woodland. This is mixed woodland with areas of carr in between marshy areas or heathland, and woodland of willow, pine and mainly oak often with an under storey of rhododendron.

These areas are the ideal habitat for sika deer, and in all but one of my study areas there are herd deer, with one herd being fallow. The area with no herd deer has many roe, but I think this territory is larger because of the lesser availability of deer. I believe these forested areas of heathland are the best areas for cats, with lots of cover, water and food. Perhaps the leopard has the upper hand over puma in these areas because from my own sightings there is a marked size difference between the two species here: the leopard seems to be larger than most puma, or the leopards in these areas seem to grow very large. The warm heaths seem to be more suitable for leopards reflecting scrubland or open jungle habitats with very thick cover in the way of bracken, gorse and rhododendron, as these are the areas where I tend to find a lot of signs. Most hunting areas tend to be near water, and several sites are drinking areas for deer among purple more grass which forms dense, high tussocks - the perfect ambush site. The puma also uses this area and in two of my study areas I believe there are at least two species of cats coexisting. These areas are the richest ecosystems and are centred on estuaries and heath bordered by high chalk downs. There is a plentiful supply of prey: thousands of migratory birds such as sandpipers, godwits, curlew, brent geese, shellduck, pintail, teal, and mallard, and large amounts of egrets and herons, of which the later have been predated on quite extensively. Also swans have been taken and dragged a few hundred yards from the waters edge to be consumed under cover of bracken. In these areas are large colonies of rabbits, badger sets and lots of foxes. Amongst the flocks of Canada geese I have found signs of predation by both foxes and cats. There are also large colonies of black headed gulls, where I have also found signs of predation. Within the area are high sea cliffs holding breeding colonies of kittywakes, guillemot and razorbills. The cliffs themselves have natural, but mainly man-made quarrying caves for Purbeck stone, providing the most secure of breeding dens. The chalk downland surrounding the heath and harbour bays hold plenty of hares, roe deer, many badgers and rabbits, and game bird rearing. In addition there are numerous amounts of rats, mice and voles.

The mix of territories

Thus one area which could be a 'small' leopard territory of just five square miles has a concentrated amount of every food source required by the cat. In addition, there may be one or two females of the same species overlapping, or totally within his boundaries, and another species of large cat coexisting alongside with no problems. There is enough food here for that to happen without any part of the ecosystem being changed to any degree, and the way in which cats rotate there hunting areas prevents that. The leopard I believe to be a male mainly concentrates on sika deer, and mainly animals under two years of age. I have noticed that many deer taken have had previous injuries or were sick, and some road kills are scavenged by the cats. From my field work it appears that puma in Dorset tend to keep to the farmland or hills with a small overlap into the valley heathlands, which may suggest mainly rabbit, hare and roe predation. Most lynx sightings are in similar areas but with large tracts of woodland, especially

if there is dense cover. I have seen puma cubs on heathland only two miles away from active leopard areas. I am unsure whether they meet, but it seems that each species finds its own niche. This is the case in Africa and Asia where you have areas hosting multiple cat species.

Deer kill - showing typical snipped ribs and stripped flesh (J.McGowan)

The predator in the ecosystem

In my areas I have found a slight reduction in the numbers of deer especially young animals. This may suggest that older wiser animals tend to spread their genes which will make for a more healthy herd. I also observe a slight reduction in the number of foxes mainly cubs, and I have found cat scats containing the whiskers of fox cubs. Badgers are taken too, and in my northern study area where there are no sika deer but a small herd of fallow and many badger sets. Of a whole colony of badgers, most of the approximately 20 animals were taken out, with only 6 remaining in one year - the large boars and elderly sows. These individuals even took to foraging in the daytime. There are numerous amounts of hares and game rearing, so I wonder if the cat could have been injured and unable to catch such well sighted quick animals. The large cat species tend to be doing exactly what nature intended them to do, and in some instances they do a better job than deer stalkers, but I am sure there is room for them both! There may be other benefits, with some species of invertebrates evolved to use the dung of carnivores, albeit that those species are extinct or rare in the UK, while other insects rely on carrion, or bones. Top predators allow this important niche to be filled. As these top predators breed and spread in Dorset I detect a slight change in other animals' behaviour, such as roe resting in the open, foxes and badgers becoming more diurnal, and deer taking less notice of people, and concentrating on the real threat that confronts them.

There is little potential risk to people from large wild cats in comparison to certain dogs, and not to mention wasps, which kill many people across Europe each year, including through throat stings when they get into fizzy drink cans. Many people welcome the prospect of predators and feisty beats such as wild boar back in our countryside, making us more observant, alert, and attuned to risks and responsibilities. Britain and its wildlife can only benefit from having large cats back in the ecosystem.

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WATER VOLE

Water vole reintroduction projects – the lessons and the success factors

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This article summarises lessons from a sample of water vole reintroduction projects. A longer version of the article is at ECOS *28 (1) on www.banc.org.uk*

DEREK GOW

The endemic subspecies of the Northern water vole (Arvicola terrestris amphibius) was once such a familiar aspect of riparian Britain that Kenneth Grahame based his Wind in the Willows character Ratty on this species. Although widely referred to in modern times as water-rats they were once accorded a variety of other titles such as Crabers, Water dogs, British beavers and Campagnols.[1]

Field signs of water vole

The water vole is the largest of the three vole species native to mainland Britain. Although mature adults in lowland England can weigh up to 350 grams fully grown, Scottish specimens are commonly much lighter in weight with a large individual weighing 265 grams. Unlike its European counter-part (*Arvicola terrestris Sherman*) British water voles normally inhabit riparian fringe habitat and are seldom found in substantial landlocked populations. Water voles can mate on land or in water and females in England can produce between 3-5 litters averaging around 20 offspring per annum in captivity. This figure is in stark contrast to the reproductive capacity of upland Scottish populations which have been recorded as producing only two litters of two offspring per annum.[2] Early litter females are capable of reproduction in their year of birth.

Field signs of water vole presence such as stems of plant material cut at a distinctive 45-degree angle, excavated or gnawed tubers, latrines, feeding platforms, tracks, runs and burrows are easy to observe where they are common. Water vole feeding activity may play a role in the dispersal of some food plant species such as yellow flag iris (*Iris pseudacorus*) whose naturally gnarled root systems are easily separated by gnawing.

Stephanie Ryder writing in 1962 stated that " wherever there is good water contained in firm banks…you may be sure to find signs of water vole habitation" and until comparatively recently this was still widely perceived to be the case. In 1990 a series of national surveys funded by the Vincent Wildlife Trust[3], identified a serious constriction in the national range of the water vole and subsequent repeat surveys[4] now suggest that this species may have disappeared from over 90% of its former range.

Water vole (Chris Robbins/Derek Gow Consultancy)

Impacts on water vole and its population decline

This steep decline is linked directly to the intensification of agricultural practice over the course of the last century. Extensive wetland drainage, overgrazing of riparian vegetation by domestic livestock and arable cultivation to the edge of watercourses have been coupled with substantial river, stream or ditch canalisation programmes and unsympathetic annual dredging regimes. The impact of these processes has been compounded by bank side reinforcement programmes employing concrete or metal pilling, the successful colonisation of introduced North American mink (*Mustela vison*) – a predator against which they have no developed defence - and an associated range of further incidental factors such as accidental poisoning or sporadic human persecution.

As a result of the above water voles are now legally protected under Schedule 5 of the Wildlife and Countryside Act but this legal protection although preventing their reckless destruction can do little to halt their continued decline. The national distribution of this species is highly fragmented and in many counties they are already extinct. Current predictions are that this situation will worsen leading to further countywide extinctions by 2010. Where extensive populations of water voles still occur, species recovery incentives are generally focused on improving and extending tracts of suitable habitat coupled with the co-ordinated destruction of mink. Where significant vole populations are no longer extant a more active process of restoration to support, restore and rejoin relict populations will be essential if this species is to recover.

It is against this back-ground that water vole restoration utilising either translocated animals or captive bred offspring has become an identified component of the national Biodiversity Action Plan (BAP) for this species.[5] Water vole translocations (the direct movement of wild caught animals from one site to another) – which have commonly been practised as a component of human development projects - are problematic[6] due to the low number of animals frequently involved, their high territorial fidelity[7] and their short reproductive lifespan. The sourcing of sufficient offspring from healthy donor populations (harvesting) might be a mechanism for providing future release stocks but this - as yet un-quantified - process can only be employed if the security of donor populations can be guaranteed. Water voles are known to be predated by a range of 'native' predators such as red foxes (Vulpes vulpes), otters (Lutra lutra) stoats (Mustela erminea), pike (Esox lucius), grey herons (Ardea cinerea), brown rats (rattus norvegicus) and domestic cats.[8] In a population study on the river Itchen – where no mink were present - the average seasonal mortality of a robust water vole population was estimated to exceed 70%.

Steps towards recovery

The first large scale water vole breeding project began in 1994 at the New Forest Nature Quest with the express aim of developing a sustainable methodology for reproducing this species consistently. Although breeding attempts had been successful in a study population at Queen Mary and Westfield College[9] no effort had been made to reproduce this short-lived species in sufficient numbers to render reintroductions possible. Even though this was not a conservation priority action at that time it is a fundamental error in any recovery process for an endangered species to leave the development of a captive breeding component until individual founders are in short supply. Genetic diversity will by this stage be extremely low and if husbandry protocols have to be developed from scratch any resultant human errors can be critical to the survival of the species.[10] For this reason captive breeding as a component of an overall conservation package is best refined when an initial threat is perceived as part of any process of general biological research.

The first monitored reintroduction of water voles was trialled at the Barn Elms Wetlands Centre in 2001. Although a few older animals were utilised for this project the bulk of the released population of 147 were captive bred juveniles in their year of birth. These animals were all fitted with individual microchips and were selected to ensure an average release weight of around 108 grams. Animals released at Barn Elms in July and recaptured in late summer had more than doubled their body weight and one female released weighing 90 grams produced a litter in a trap when captured in October (Strachan.R. Pers comm). Under a suite of good habitat conditions water voles can obtain a weight gain of 1.2grams per day attaining breeding condition in a single season.

Juvenile water voles were released on both a hard (straight into areas of tall vegetation with no subsequent support) and soft (from release pens dug into the ground with food support for a time) release basis. Preliminary results from this and subsequent projects suggest strongly that the latter option is more effective. (Strachan.R. Pers comm). If maintained together juveniles can be released in sibling groups of up to four animals. Various different styles of release pens have been trialled successfully but they all operate on the principal that the voles dig to freedom through an open earth floor whilst providing temporary cover from predators. Release cages must be supplied with abundant bedding and chopped apples for both food and moisture. They should be dug well into the ground immediately adjacent to the waters edge and screened from the sun with dense vegetation. Water voles are a physically robust species but in common with most riparian mammals they have an extremely dense fur coat and if subjected to stress during periods of extreme heat they can die rapidly. Chopped apple – a quarter per animal – must always be included for consumption to provide moisture during transport and release. Water voles will commonly continue to utilise well-sited release pens as latrine and feeding areas for some time following release.

The timing of release for juveniles should coincide with late spring/early summer vegetative food and cover abundance. Care should be taken that water level stability is guaranteed in potential release sites as severe fluctuations either way can be a critical factor in the success or failure of a colony (Strachan.C. Pers comm). Failure to achieve this threshold in their year of birth is best remedied by holding over winter and releasing as breeding adults in spring. Releases of both juveniles (in their year of birth) and breeding adults (late litter offspring over-wintered and released in the spring) have been trialled and worked well. The release of small populations of individuals exceeding these age groups produces poor breeding results (Gow and Holder. In preparation).

At the time of writing the authors have participated in the production of over 3000 animals for over 20 translocation/reintroduction/supplementation projects in England. To date one release has failed due to a variety of external factors, seven have successfully established vigorous populations some of which are expanding rapidly, two are indeterminate and ten are too recent to adequately assess. Animals provided historically from this captive breeding programme have established an additional two low-level populations (R.Strachan. Personal communication) which are still extant and a similar captive breed and release project run by Bristol Zoo on a site near the Royal Portbury docks (Eyre. Pers comm) has been highly successful. The best of these projects in large wetland complexes – Pagham harbour and Barn Elms - have within a few years seen released populations of captive bred animals expand rapidly to colonise the entire available reintroduction zone.

Requirements for successful restoration

In conclusion it must be clearly stressed that this captive breeding and release process is currently an effort in the refinement of technique. The two keys to successful water vole restoration are the availability of large-scale mosaics of sustainable wetland habitat and the effective long-term control of North American mink.[11] Both these criteria are obviously reliant on significant cooperative partnerships and until recently is was difficult to envisage how these could be effectively secured. The development of the Chichester Costal Plain sustainable farming partnership provides a tantalisingly, intelligent example of how this can actually be achieved.[12] This remarkable venture has seen a consortium of organisations combine to create through agri-environment schemes a 8,400ha project site within which the availability of water vole habitat has trebled in a very few years. This has been accomplished by the restriction of livestock in riparian corridors by fencing, the creation of field margin junction ponds and the restoration of existing farm ponds. This project has employed a simple but highly effective "mink raft" system designed by the Game Conservancy Trust to target, eliminate and the re-monitor for the presence of this alien predator. Water voles from our captive breeding project released into this site in May 2002 have now combined with few relict populations to colonise most of the available habitat within the project area.

The fact that the once common and widespread water vole has suffered in excess of a 90% range decline in the British Isles is a damning indictment of many previous damaging land-use practices. It is however a robust species capable of incredible regeneration where the circumstances are suitable. There are grounds for considerable optimism that even at this late stage, the water vole's declining fortunes can still be reversed by coordinated action.

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BIG BIRDS

Big Birds in the UK: the reintroduction of iconic species

ECOS 32 (1) 74-80 (2011)

There has been over three decades of success with reintroduction of large birds, some with fierce reputations among farmers and game keepers, some demanding of habitat restoration and undisturbed nesting grounds – are there lessons here for mammalian reintroduction programmes?

PETER TAYLOR

The reintroduction of bird species formerly eradicated from Britain contrasts markedly with the mammalian equivalents. Whereas it took almost twenty years from the first fact-finding trip of Britain's conservationists to see a beaver reintroduction site in Brittany in 1991 before masses of red tape and consultations brought this harmless and iconic mammal to a small remote site in Scotland, big bird enthusiasts began reintroducing sea eagles to Scotland in 1975 and red kites to England in 1989. Programmes of releases continue, with sea eagles now on the Scottish east coast and potentially in East Anglia, golden eagles already breeding again in Ireland, and the red kite programme on its ninth release project in the north-west of England, following the first project in the Home Counties. Great bustards and cranes are currently subject to captive breeding and release programmes in Wiltshire and Somerset. Apart from the cranes and bustards, the avian success story involves large predators that could be expected to engender opposition from farming and game interests unless handled with full involvement of these interests, yet these programmes have had striking success. Are there lessons here for future mammal projects?

The sea eagle

This magnificent eagle – also called the white-tailed sea eagle, is a close relative of the iconic American bald eagle, and despite being a predator and scavenger mainly of fish and wildfowl, had an undeserved reputation as a lamb-killer. It was systematically eradicated in Britain and Ireland where it was confined to coastal wilderness areas, probably numbering about 100 pairs in Britain and fifty in Ireland at end of the 18th century – by 1916, the last pair on Skye had been exterminated.

Sea eagle (Mark Hamblin,/ Northshots)

The reintroduction programme began in 1975 – with Roy Dennis being a key champion of

the project. Over a ten year period, 82 birds were released, first in the Hebrides, and in 1985 the first chicks were reared. In the 1990s the programme was extended to Wester Ross, and by 2010, there were 50 breeding pairs raising 46 young with a 10% increase over the previous year. Young birds disperse and one is currently wintering in Hampshire! The RSPB has begun a 5-year project in eastern Scotland, with more young birds being brought over from Norway.

A recent project to begin releases in East Anglia, initially along the Norfolk coast near Brancaster, has been halted, officially due to shortage of funds, but perhaps partly due to bad press and local resistance from farming interests.

Overall, the sea eagle programme has been a resounding success. The eagles released on the Isle of Mull in Scotland have proved a major tourist draw for the island, which receives around 350,000 visitors every year, of whom two-thirds spend their holidays in Mull and 33 per cent are day-trippers spending £38 million in total. Of this, between £1.4-1.6 million per year is attracted by the presence of sea eagles.

The project illustrates the nature of a necessary long term commitment and continued releases over a decade to reach the critical threshold for a slow-breeding top predator.

The golden eagle

Scotland has a relatively stable population of golden eagles – and a significant proportion of the European population of this holarctic species. It would appear another iconic candidate for re-introduction to England, but no attempts have been made. A single pair has attempted breeding several times in the Lake District with a few years of successes and many failures. It may well be the case that prey species and carrion are not abundant enough in the English fells. In contrast, golden eagles were returned to Ireland by taking young birds from Scotland to Glenveigh in Donegal in 2001 and by 2007, there were eight territories and two chicks. This programme was supported by the EU Life fund and many Irish charities and agencies. The Glenveigh National Park has a healthy population of Irish hare and the eagles also feed on fox and badger cubs.

The red kite

Red kite (RSPB)

Although this species had a recovering population of Welsh birds that had hovered on the brink of extinction and were nursed back by diligent nest-protection under the auspices of the RSPB, the birds had yet to colonise their former haunts in England or Scotland. Reintroductions began in 1989 in the Chilterns, bringing chicks from Spain and Sweden and by 2002 there were 140 pairs in the hills of the Home Counties. Another eight release sites from Devon to Northumberland have seen the English population rise to over 300 pairs, with 200 pairs now breeding in Wales. Scottish releases centred in Inverness and Galloway have been very successful, with the Scottish population at 160 pairs raising nearly 300 young birds in 2010 – a rise of about 10% on the previous year. In 2011, a release programme began in Northern Ireland.

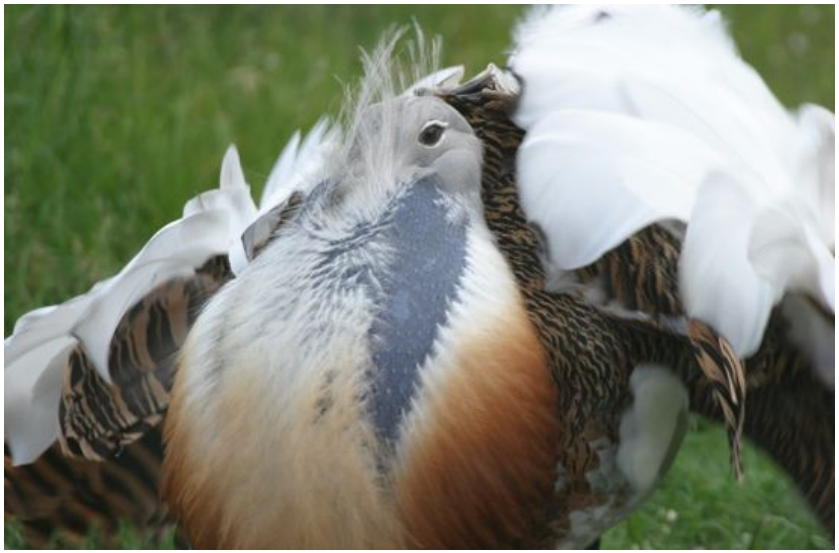
The osprey

Ospreys had been similarly eradicated by Victorian obsessives but recolonised Scotland from Scandinavia in the early 1950s. A diligent programme of nest protection (from egg thieves) by the RSPB saw the Scottish population steadily rise to over 200 pairs by 2010. As this raptor is migratory, young birds began long stays on Welsh estuaries, in the Lake District and Rutland and Kielder reservoirs and this prompted the erection of artificial nest sites leading to the first rearing of English and Welsh chicks.

Osprey over Rutland Water (John Wright/ LRWT)

The great bustard

This large game bird – perhaps the heaviest flying bird, died out on the central plains of England toward the end of the 19th century, and a brief attempt at reintroduction failed. A ten year programme began in 2003, spearheaded by a consortium of interests – the Great Bustard Group, consisting of the RSPB, Natural England and Bath University. In cooperation with the Russian Academy of Sciences, eggs taken from nests endangered by farming in the Trans Volga steppe region of Saratova are first hatched and the chicks transferred to rearing facilities at the Salisbury Plain reintroduction site. The object was to release about 100 birds and to have a breeding population by 2015 – and the first British-born chicks arrived in 2010. The target is 20 breeding pairs by 2030. The project has just been awarded £2.2m of EU Life funding over three years (ed. note: see Alistair Dawes article that dates from 2006).



Great bustard display (Great Bustard Project)

Prospects for this programme are better than might be expected as the source population have adapted to cropland in their home range and seem to prefer it to remnants of the original grassy steppe vegetation. The main threat will be high predation pressure on vulnerable chicks from Britain's high density of foxes. The species is very shy and it remains to be seen whether it could extend further than the relatively unpopulated land used for military training.

The crane

Another ancient denizen of Britain, well-featured in folklore, has received the helping hand of restoration. It had already begun a slow process of natural colonisation in the fens of East Anglia over the last two decades, but the population remained at about 6 breeding pairs, with about 40 over-wintering adults. The Great Crane Project was set up to establish another population in England, with the Somerset Levels the chosen site. This project is a joint initiative of the RSPB, the WWT and the Pensthorpe Conservation Trust together with interest and funding from the Viridor landfill credits scheme.

Young cranes on the Somerset Levels (Great Crane Project)

Eggs were taken to the Wildfowl and Wetlands Trust at Slimbridge and hatched with the chicks then reared by humans in baggy non-human costumes with dummy crane beaks for delivering food! The first young birds were released in the autumn of 2010 at a site on the Levels. The source population of 350 pairs is in the 130,000ha Schorfheide-Chorin biosphere reserve in eastern Germany.

The goshawk and eagle owl

I bracket these two raptors together as they are classic examples of inadvertent, surreptitious, quasi-legal and accidental re-introductions. The goshawk suffered extermination at the hands of Victorian game-keepers, as it is a powerful predator of reared game birds such as pheasant. The eagle owl existed only in the post-glacial fossil record and if it did survive into medieval times, as we now know the lynx did, as with that animal, it did not impinge upon the national folklore.

The goshawk began breeding in central England sometime after the war and doubtless as a result of falconry escapes. Some of these may have been deliberate, but inadvertent losses of hunting birds are common and this hawk is a favourite of the dedicated falconer. There are now over 400 pairs in England. Scotland and Wales and all of various origins with a mix of sub-species from North America, Scandinavia and Central Europe.

Goshawk (RSPB)

The eagle owl has been observed on numerous occasions since the mid 1800s, but all birds have been assumed escapees, as it is a popular zoo animal and is held in private collections. It breeds well in captivity and is readily sold on to devotees who may not have appropriate training or facilities. The RSPB has data showing that in the ten years to 2007, 123 birds were recorded as escapees, with 73 not recovered; there were 440 voluntarily registered in captivity and over 3000 sold on (a certificate of origin is required by law, but there are no other requirements of ownership). That is not to say that some of the sightings may have been of birds crossing from Scandinavia – another owl species, the long-eared, may be able to make this crossing during winter dispersal, as this forest-dweller is regularly encountered on the headlands of the NE coast.

Whatever their origins, at some time during the last decade, several pairs of eagle owls established a breeding population in a remote upland area of Northumberland. This was not welcome news to the RSPB who were concerned for their small breeding population of English hen harriers – a ground nesting raptor, as eagle owls are known to prey upon other raptors up to the size of buzzard. . A pair of owls that established themselves in the Forest of Bowland were recently seen to take a hen harrier on its nest. There were initial questions of capturing and returning the birds to captivity, despite the outside chance they were indeed colonisers from Scandinavia! However, a government sponsored consultation process came to a view that they should be monitored and action taken only if they became a problem for other conservation priorities and this view was endorsed by the RSPB late in 2010.

Eagle owl (Peter Cairns/ Northshots)

This species has been imported and kept in captivity in Britain for over a hundred years and birds have come from many parts of its range in Eurasia and even North Africa. Sub-species vary in size, from small pale desert races to larger dark-plumaged Siberian forms. It is a bird of wild forests, deserts and crags and highly susceptible to disturbance.

I did once have the pleasure of watching an escaped bird that haunted the local churchyard and rooftops of Glastonbury High Street. It was a magnificent sight and much loved by the more switched-on members of the community. However, others were concerned for their small pet dogs and cats – not that there was any evidence the owl was a danger and it must have found adequate rats and mice, and it was eventually trapped and sent back to prison. In contrast, an incident reported in the Forester and on local TV in a Coleford quarry concerned a very tame eagle owl that apparently brought presents of mice and sundry furry animals to the quarry workers' tea hut - it was seen to be shot by vandals with an air-rifle nd thought to have died, after which the workers left flowers at its favourite perch, only to be later found alive and is now recuperating at a local birds of prey centre.

Issues and lessons

This rather successful history of re-instating large birds, including predators that engender some opposition, is an object lesson for mammalian projects. Firstly, the projects encompass not only exterminated species, but also those re-colonising of their own accord but deemed in need of a helping hand. If we consider the history of mammals, then this would include not just wolves, bears, lynx, moose, beaver, boar and reconstituted wild cattle, but also extending a hand to pine marten, polecat, and wildcat as well as the less problematic water vole.

The example of goshawk is of note from a provenance point of view: the population is made up of genetically diverse races, some quite distinct in appearance – North American birds are large and pale grey, where their European cousins are smaller and browner. From a genetic point of view, the larger the gene-pool, the more resilient and adaptable the population is likely to be. In the case of the legal introduction of red kites, again, birds were of mixed origin and it is seldom noted that the Welsh population, having been isolated from its European cousins, had begun to evolve a distinctive whiter head. Much is made of genetic sub-specific status in mammals – for example, the Amur leopard pedigree is jealously guarded in zoological collections to maintain the sub-species, despite that population being on the verge of extinction compared to the relative success of other more adaptable leopard populations. Likewise, much has been made about the origin of the Tayside beavers (with SNH branding it the ‘wrong’ subspecies - see Derek Gow’s article in ECOS 31 (3/4), and of the genetic purity of wild boar, remnant Scottish wildcat and the Exmoor wild horse.

The issue of aliens has arisen with the eagle owl – despite the presence here of its tiny family member – the little owl, never native and introduced by the Victorians. There is an argument for pragmatism. The natural environment of Britain is far from original, even in its wildest examples in the glens of Scotland. Who is to say what constitutes the best genetic mix for an adaptable and successful repopulation, especially as the climate is changing (natural and otherwise)?

The success of the early ‘suck it and see’ programmes is also an argument against ‘red tape’ and the inevitable high cost of official project infrastructure, particularly the propensity for high-tech monitoring with GPS-satellite, and radio aerials in addition to the obligatory wing-tags and leg-rings. These iconic species are symbols of the wild, but I cannot help feel something is lost when birds are encumbered with radio aerials and wing tags. I understand that these are a feature only of the beginning of a programme and a valuable research tool with regard to dispersal. But it can be overdone and despite Ospreys becoming well-established, they continue to be tracked.

In Wales, kites have become a branding emblem and tourist draw, but not as remote dwellers of the fells, rather with many hundreds congregating at public kite-watching facilities, where they are fed offal and religiously watched for their ring colours and origins. The RSPB

has osprey and eagle nests wired with video links to the watchers hides which are a powerful tourist draw. In Galloway they estimate over £20 million has been brought to the local economy from kite-watching since 2004 and the sea eagles have equivalent benefits on the economy of Mull.

Conservationists have long argued for the economic benefits of rewilding to be considered in strategies that involve future lynx, beaver and possibly wolf, but without care, wildlife conservation organisations can morph into tour operators and merchandisers with visitor centres, increased car-based tourism and interpretation facilities that are far removed from a wild experience and contact with real nature.

When I saw my first red kite gliding over the M4 near High Wycombe, it brought little excitement – not like my first encounter as a boy on the high moors above Llandovery, in the days when the red kite was a symbol of wildness. I am excited by eagle owls in a remote corner of Northumberland and the mystery of their origins – legal or otherwise, less so by the fledgling cranes just down the road, with their numbered wing tags and radio antennae – not because I do not welcome them back, but because I had been awaiting the first really wild unaided arrivals from Norfolk.

In this part of the world conservation priorities have focussed upon habitat recreation – rewilding the hydrologically challenged Levels with artificial reedbeds aimed squarely at one species – the BAP priority bittern, and yet this has brought six great white egrets to overwinter, cattle egrets have bred, and last year, little bitterns arrived to breed unexpectedly – having bred only once before in Britain. The habitat has increased diversity in the heron and egret family and who knows what might be next? But overall, the feeling remains that the helping hand removes an element of chance and mystery. And my ever present eye on conservation's corporate interest notes the large funds to be had for giving nature that helping hand. It is just a cautionary note – to make the research and monitoring phase as short as necessary and the watcher facilities as small and unobtrusive as possible, lest the object of iconic true wildness be lost.

Details of many of these programmes can be found at www.rspb.org.uk and for the bustard project; damonbridges@rspb.org.uk; see also www.the greatcraneproject.org.uk

Good news from the Plain - the reintroduction of Great Bustards to the UK

ECOS 27 (1) 41-48 (2006)

Reintroducing Great Bustards on Salisbury Plain is helping a globally threatened bird and enriching the chalk grassland habitat.

ALASDAIR DAWES

The Great Bustard *Otis tarda* is the world's heaviest flying bird with old male birds regularly reported weighing as much as 20 kg. However, it is only the males that attain such huge proportions outgrowing females by up to 50 %, to stand over a metre tall with a wing-span of 260 cm. They are highly gregarious birds that form social units termed 'droves' although males and females will often group into separate droves. Their great difference in size (sexual dimorphism) means that females are easily bullied, especially when feeding. As a result, males and females tend to live very independently only coming together at breeding time. The incubation and rearing of chicks is carried out by the female alone and the young birds will stay with the females for at least the first winter.

The Great Bustard is recognised as being a Globally Threatened Bird[1] and is consequently listed as Vulnerable by IUCN.[2] Formerly widespread throughout Europe, many populations of Great Bustards have become fragmented and disappeared since they hit their all-time low in the 19th and 20th centuries. In the past most English counties supported Great Bustards but the last confirmed breeding in the UK was 1832, in Suffolk. Although Great Bustards were certainly caught for food in historical times, their demise in most countries was due to relentless persecution in the form of hunting. The current global population of Great Bustards is thought to be fairly stable with some populations possibly even increasing. What is cause for concern is the continual loss of suitable habitat due to change of land use, general human disturbance and agricultural intensification. Globally, there is still a gradual but noticeable contraction in their range so that in many regions the populations are becoming denser in an ever smaller area. There are obvious problems that lie ahead for seriously fragmented populations and great potential for catastrophe if all your Bustards are 'kept in one basket'. Consequently, several conservation projects have been set up throughout Europe working to secure and manage protected areas and revert areas to natural grasslands. There are projects in Germany and Hungary releasing captive-reared birds to reinforce existing, small and previously declining populations. The UK project is unique because it is the first and only project to expand the global range of the species by reintroducing them to an area from which they have become extinct.

Great bustard ready to transmit (Great Bustard Project)

The reintroduction project – its planning and delivery

The formation of a Great Bustard Group was proposed in 1997 under 'any other business' at the final meeting of the Great Bustard Trust, a registered charity that had been set up by the Honourable Aylmer Tryon in 1970. The Trust was largely concerned with captive breeding Great Bustards at Porton Down in Wiltshire, with an aim of one day releasing captive-bred chicks. Unfortunately, no-one has ever managed to get Great Bustards to breed successfully in captivity and the Trust proved no exception to this trend. The original stock that had been captured in Portugal for the project eventually lived out their days in the care of Whipsnade Zoo. This project is often misinterpreted and cited as being an unsuccessful attempt to reintroduce Great Bustards to the UK when in actual fact no Bustards were ever released into the wild.

The Great Bustard Group became a registered charity in 2002 with David Waters appointed as Director. The Group is dedicated to the interests of the Great Bustard and aims to establish a self-sustaining population of Great Bustards in the UK by carrying out a series of yearly releases of young birds for 10 years in the same location.

The Group had been made aware that in Saratov, an area in the south of the Russian Federation, hundreds of Great Bustard nests in arable fields were being abandoned or destroyed as a result of intensive agricultural activity. The Russian government had been collecting the eggs from doomed nests to supply stock for what ultimately proved unsuccessful captive breeding projects across the Former Soviet Union. The Group proposed that the eggs from these nests should be collected, incubated and reared in captivity in Russia and the chicks released back into the wild. The releases would help boost the existing donor population which is actually considered stable or possibly increasing whilst a more sustainable agricultural program was developed. It was considered that enough eggs would be collected to also support an introduction of Great Bustards to an entirely new location. In 2003, the Group were successful in application to Defra for a trial licence to release up to 40 Great Bustards a year for ten consecutive years on Salisbury Plain. The Plain is the largest known expanse of unimproved chalk downland in north-west Europe, and represents 41% of Britain's remaining area of this rich wildlife habitat. It can almost be thought of as the British steppes[3] and has the potential to provide ideal habitat for Great Bustards.

The successful application was based on a feasibility study that took several years to compile. The study was comprehensive and included cultural aspects as well as ecological and considerable academic investigations. The scientist given the contract to write the study and application demonstrated that the project would not be detrimental to the donor population or to the existing ecosystem that was to receive the Great Bustards.

The birds arrive

August 2004 saw the first batch of Great Bustards arrive from Russia. They were brought to Salisbury Plain aged approximately 6 weeks old and spent 30 days in quarantine. During quarantine they were given all the necessary health checks and on the day of release were fitted with numbered wing-tags that display a unique number and are colour coded according to the year of release (yellow = 2004, orange = 2005, green will be 2006). Unsightly as they may be, the tags are essential for the project. They enable each Bustard to be identified individually. This enables the Group to keep accurate records of the movements and behaviour of each Bustard released. About three quarters of the birds are also fitted with radio transmitters which aid their tracking after release. A common method of attachment for radio and GPS satellite transmitters was used which utilises straps around the body so that they are worn like a back-pack.

The first Bustards were finally ready for release in early September and were taken from quarantine and put into a larger, fully enclosed compound. The purpose of this pen was to give the Bustards more space than quarantine allowed, where they could exercise and acclimatise to the wider environment free from the potential dangers of predation. In reality the pens proved to be a problem with many of the birds exercising so well that they were taking off and hitting the roof netting which catapulted the birds back to the ground. Several birds suffered injuries and it was decided to let the birds go directly into the final 'release pen'.

The release

Twenty-two Great Bustards were let loose in the release pen. The pen had been sown with various crops that are known favourites of Great Bustards and once in this pen the Bustards ceased to be fed and had no more human contact. There is no roof on the pen, although it is fox-proof, so it is up to the Bustards how long they wish to stay in it. Sadly, the Bustards suffered further problems flying out and around the release pen with some of them colliding with the very fence that had been erected to protect them. The wind picked up soon after release and the birds seemed to be suffering with the harnesses used to attach the radio transmitters. The harnesses were restricting the Bustards ability to fly so they were removed from all injured birds that had been taken in. Several birds suffered mortal injuries whilst others were left permanently disabled. Two birds dislocated beaks and sprained limbs so had their flight feathers clipped to enable them to recover in the safety of the pen. They remained in the pen until October 2005, when their flight feathers had grown back and they were finally able to fly free. Although they made a full physical recovery they were not terribly wise to the world and tragically succumbed to foxes about a month later.

The attachment and type of radio transmitters were therefore changed in the second year. The new transmitters are much smaller and are glued to the tail feathers rather than tied around the body. They obviously only stay on the bird as long as the tail feather does, which in Great Bustards is about 12 months. This gives the project long enough to track the birds and follow their movements through their first year and also recover any of those that die for post mortem. The release procedure also changed in the second year and in September 2005, 32 new Bustards went straight from quarantine to the release pen. The behaviour of these birds was noticeably different to those of the previous year. The new birds soon left the pen and formed a single flock that lived on the hills surrounding the release site. The flock regularly interacted with the previous year's birds that were still around the site. They were flying spectacularly well and regularly flew around the Plain, thrilling visitors to the site. Thankfully, they were so capable at flying that there were no collisions with the pen fence.

Predation, mortality and disturbance

The natural mortality of Great Bustards in the wild is high at around 80 % dying within their first year. Great Bustards are ground-dwelling birds, lacking the ability to perch, making them particularly susceptible to predation when feeding, nesting and roosting. The most critical time for young birds is when they are still in the eggs. The chicks are nidifugous, meaning they are capable of looking after themselves soon after hatching and able to leave the nest site. Upon hatching their long muscular legs are well developed and enable them to run quickly. This affords some protection from predation but this is nonetheless a treacherous time. The lucky 20 % to make it through the first year usually live on for another 15 or 20 years. They grow incredibly quickly and by six months are approximately three-quarters full size. Predators of the eggs and small chicks are numerous but as the birds grow, the number of predators reduces to typically include foxes and where they occur, wolves and large raptors such as White-Tailed Eagle. Full grown adults, especially those in groups, are normally capable of either seeing off, or fleeing safely from these predators. In the UK, the only predator of the released Bustards is foxes, and the smaller females are particularly vulnerable. However, the project notices a sudden reduction in the number of Bustards predated after the age of about six months.

A large, healthy population of Great Bustards in the UK should withstand normal levels of predation and the odd collision but in the early days of the project each death is a significant loss. Although the birds tend to stay as one flock, individuals and smaller groups do splinter off making them much more susceptible to predation. To reduce the risk of flocks separating the Great Bustard Group discourages the general public from looking for these very wary and shy birds. Instead, visitors are welcome to view the Bustards at the release site but only on guided tours at certain times of the year. The release site is on private property and adjoins the Ministry of Defence's (MoD) Salisbury Plain Training Area's Danger Area. The lack of public right of ways is also beneficial as the Bustards suffer little disturbance from ramblers or dog-walkers. Bustards will tolerate a certain amount of disturbance but whilst the project has such small numbers of birds, it cannot afford for the small flocks to be flushed and fragment especially if it results in singled birds.

Dispersal

Released Great Bustards can be very capable at living on their own. This has been demonstrated by several birds from the first year of releases but perhaps most dramatically by birds from the second year. In October 2005, a female that had not been seen since the day of release turned up spectacularly almost 100 km from the release site. Despite complete astonishment, the Warden of the Portland Bill Bird Observatory managed to photograph a Great Bustard flying around the Bill. It was only later, when the photos were enlarged on the computer, that the wing tag was clearly visible and it was realised the bird was from the project. This bird demonstrated that not only can Great Bustards find a place to live in the UK countryside without being noticed or disturbed but also that captive-reared birds can learn to feed and fend for themselves, managing to attain sufficient condition to fly considerable distances.

Dispersal from the release site was always anticipated. Most populations of Great Bustards undergo predictable movements between summer and wintering grounds and show high site fidelity. They are not generally thought of as migratory because the distances that different populations move vary enormously from 30 km up to 1,000 km. The population of Great Bustards in Saratov are known to fly to the Ukraine in winter but depend on severe winter conditions in Saratov to prompt their departure. If conditions remain mild then most Bustards stay around Saratov rather than fly the 1,000 km.

There were three noticeable departures from the Project site in December 2005 and the distances flown fit well within the known dispersal range of Great Bustards. The furthest that we know a Bustard from the project to have flown is over 900 km to south of Toulouse. Females are known to disperse further than males and all three birds that made it to France were female. A more typical distance seemed to be about 80 km south-west with several groups wintering in Dorset. Some Bustards moved very little and remained around the Plain but the larger dispersal distances threw up problems with keeping track of the birds. The VHF radio transmitters in use by the project only give a line-of-sight range, which on the ground typically equates to around 5 km. Thankfully sightings by the general public were numerous and enthusiastically reported. There has been some discussion as to whether the Group should use satellite transmitters to relay exact locations of the birds. However, the Group have major concerns not just about the price but also the method of attachment. Trials are currently underway which already suggest it might be more economically sensible to fund aerial surveys from light aircraft using the existing transmitters because the line-of-site reception increases to about 40 km.

Is the reintroduction a success?

The true measure of success of the project will be a self sustaining population of Great Bustards that requires no human intervention and minimal management but in order to reach this point there are many fences to cross. Bustards are notoriously difficult to observe, especially when incubating and rearing chicks. So locating and monitoring nesting females will bring with it a new suite of problems. Male Great Bustards are typically about five years old before they start to breed which would mean that the first breeding in the UK released birds in not to be expected before summer 2009. It is thought that 20-30 birds will be enough to start a population.

The first year of release saw major problems with the transmitter straps causing the birds to collide. The Group often wonder how many birds there would be now if those transmitters had not been used. Having acted on the lessons learned in year one, the project has been encouraged by the behaviour of the birds released in the second year. A significant milestone for the project was the recent return of two birds to the release site that had spent 10 weeks wintering 80 km away on a farm in Dorset. Spring 2006 is an anxious time and all fingers are crossed that other Bustards find their way back.

Great Bustards and the benefits to other wildlife

Habitat management undertaken directly for the Great Bustard is mainly confined to the release pen. Approximately one third of the pen was sown with a feed mix for the Bustards and another sown with an alfalfa (Lucerne Medicago sativa) and pollen and nectar mix. Lucerne is a known favourite of Great Bustards on the continent and the mix attracts insects in the spring and summer. The remainder of the pen is grass that has been left to grow rank, providing good cover for the Bustards and is ideal habitat for small mammals. Outside the pen, several game strips have also been planted nearby and there are numerous fields in the vicinity with crops favoured by Bustards. In winter, Great Bustards will often seek out winter arable crops, in particular Oil Seed Rape Brassica napus moving onto set-aside and natural grasslands in the summer. Great Bustards are mainly vegetarian, eating young shoots, leaves and seeds year round but also take invertebrates and small vertebrates in the summer months. The management of the pen for the Bustards has helped to increase the number of birds locally and benefited several species in particular. Some 11 species (7 with Biodiversity Action Plan status) of farmland birds of Red List Conservation Concern[4] are highly associated with the pen when breeding, foraging or wintering. These include Corn Bunting *Miliaria calandra*, Grey Partridge *Perdix perdix*, Hen Harrier *Circus cyanus*, Linnet *Carduelis cannabina*, Skylark *Alauda arvensis* and Yellowhammer *Emberiza citrinella.*

Although management of Salisbury Plain for nature conservation has lapsed and occasionally been in conflict with military training in the past it is now being managed sympathetically by Defence Estates (an agency of the MoD), with the help of the recent EU-Life project, restoring and maintaining this internationally important grassland.

A successful regional agri-environment scheme boosted by the Life project targets Stone Curlews *Burhinus oedicnemus* and also appears to benefit Great Bustards. Stone Curlew Plots are ploughed each year before March and remain bare for the arrival of this migratory species. The Curlews lay their eggs on the bare ground and the plot grows weedy throughout the summer providing cover and food for the chicks. When the Curlews have fledged the plots find a new role providing ideal cover and food for the newly released Bustards. Several nearby plots are regularly used by the Bustards in the autumn and consequently it is hoped that the Group can develop an agri-environment scheme with similar prescriptions to the Curlew plots that will no doubt benefit both species.

Funding and support

Funding the project has proved the biggest challenge for the Group. A major obstacle is the fact that the Great Bustard is considered an alien species by the Wildlife and Countryside Act 1981 (as amended). This means a complicated licence procedure is required to release the Bustardsa and the Great Bustard is not eligible for Biodiversity Action Plan (BAP) status because it is an alien species. Most conservation funding organisations have adopted the BAP status as their criteria for eligibility which means that most avenues of funding the reintroduction are not open to the Group. So far the project has relied heavily on an EU and Defra rural grant programme called Sustain the Plain and various Landfill Tax Credit grants. The Great Bustard Group is a membership organisation that generates some of its own income by charging a membership fee and charging visitors who come to see the project and the birds.

It has developed a wide range of high quality merchandise which is ever expanding and the sale of these items also provides a valuable and sustainable income.

The Great Bustard reintroduction project is proving to be hugely popular on a local, national and international level. Media interest helps raise awareness of the many global issues that are affecting Great Bustards. It also acts as free advertising for any organisation or individual that supports the project which in turn helps to attract further funding. The project enjoys a uniquely high media profile amongst UK single-species conservation projects. To date, the project has been the subject of over 150 newspaper and magazine articles and is regularly featured on national and regional TV and radio.

Education, interest and pride

The immense charisma of the Great Bustard and the story of its demise combine to produce a powerful educational tool. Each year, over 2,000 people from all over the country visit the release site on guided tours and about 200 presentations are made to organisations ranging from schools and youth groups to conservation groups and pensioner clubs. Groups that come to the project vary from dedicated ornithologists to local residents curious about the project. Salisbury Plain was formerly a major stronghold of Great Bustards in the UK and it has a left a large imprint on the local culture. Support for the project has been enormous from local residents and farmers who all want to see their county bird make a comeback. There also is a sense of pride in having a high profile international conservation project working with a globally threatened species on their doorstep.

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