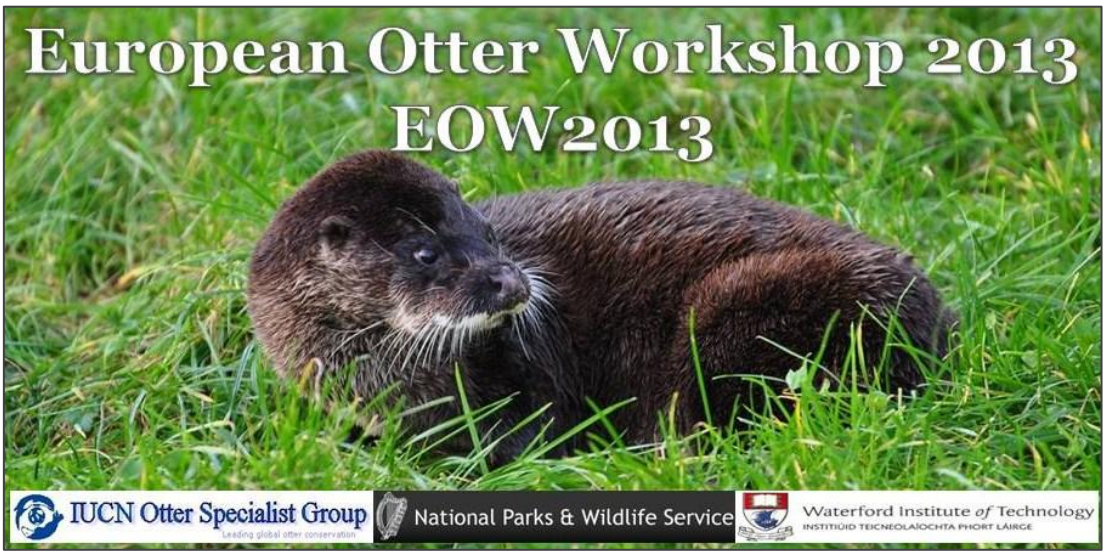

IUCN EUROPEAN OTTER WORKSHOP

KINSALE, COUNTY CORK,

Ireland.

APRIL 24th to APRIL 26th 2013

Conference Committee

Catherine O'Reilly (chair), Waterford Institute of Technology, Ireland

Denise O'Meara, Waterford Institute of Technology, Ireland

David O'Neill, Waterford Institute of Technology, Ireland

Peter Turner, Waterford Institute of Technology, Ireland

Lee Coffey, Waterford Institute of Technology, Ireland

Ferdia Marnell, National Parks and Wildlife Service, Ireland

Addy de Jongh, Dutch Otterstation Foundation and IUCN OSG

Anna Roos, Swedish Museum of Natural History and IUCN OSG European Continental Coordinator

Website: http://www.miseproject.ie/eow2013/

Twitter: @EOW2013

Facebook: European Otter Workshop

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Public Transport

Bus Eireann

Kinsale – Cork. The stop is located on the pier in Kinsale

http://www.buseireann.ie/

Taxi companies in Kinsale

Kinsalecabs: +35321 4772642

Cab3000: +35321 4773000

Tourist Information in Kinsale

Pier Road, Kinsale, Co. Cork
Tel: +35321 4772234
kinsaletio@eircom.net

Doctor

Medical Centre Kinsale +35321 4772253

Out of hours surgery: SouthDoc 1850 335 999

Police

Garda station Kinsale: +353 21 477 2302

Emergency number

For help in fire, police and medical emergencies call 999

PROGRAMME

Wednesday April 24th 2013

Registration and Welcome Reception

Venue: *The Harpoon Room, the Trident Hotel, Kinsale, Co. Cork*

18.30 Registration and presentation upload

20.00 Buffet dinner and Irish music

Thursday April 25th 2013

Workshop Day 1

Venue: *The Harpoon Room, the Trident Hotel, Kinsale, Co. Cork*

8.15 Registration and presentation upload

Session 1: Spraint/Dietary Analysis

Chair: Lukáš Poledník

9.00 Lukáš Poledník. Otter dietary studies – the past, recent developments and future perspective (20 mins)

9.25 Neil Reid *et al.* Review and quantitative meta-analysis of diet suggests the Eurasian otter (*Lutra lutra*) is likely to be a poor bioindicator (20 mins)

9.50 Rosemary Moorhouse-Gann *et al.* The diet of the Eurasian otter as determined by the examination of stomach contents (10 mins)

10.05 Andrew Harrington *et al.* A citizen science approach to otter dietary studies in Ireland and Wales (10 mins)

Funding Opportunities for Research and Networking

10.20 Catherine O'Reilly and Siobhan Harkin, Waterford Institute of Technology (10 mins)
To be continued over tea and coffee

10.30 *Tea & Coffee – poster viewing*

Session 2: Population Estimates

Chair: Marjana Hönigsfeld Adamič

11.00 David O'Neill *et al.* Non-invasive genetic monitoring of otter (*Lutra lutra*) populations (20 mins)

11.25 Neil Reid *et al.* Detecting detectability; identifying and correcting bias in Eurasian otter (*Lutra lutra*) incidence derived from the 'Standard Otter Survey' method (20 mins)

11.50 Marcia Sittenthaler *et al.* Do fishery management strategies affect otter (*Lutra lutra*)? – using faecal DNA for otter census (10 mins)

12.05 Gill Weyman *et al.* A non-invasive genetic survey of otters (*Lutra lutra*) in an urban environment: A pilot study with citizen scientists (20 mins)

12.30 *Lunch in the restaurant*

Session 2: Population Estimates continued

Chair: Catherine O'Reilly

14.00 Tali Magory Cohen *et al.* An ecological and genetic study of Eurasian otters in Israel (20 mins)

14.25 Ceri Morris *et al.* Non-invasive DNA survey of otters on the Lleyn peninsula, North Wales (20 mins)

Session 3: Tracking otters and otter habitat

Chair: Addy de Jongh

14.55 Addy de Jongh *et al.* Tracking coastal otters with GPS in Roaringwater Bay, Ireland (20 mins)

15.20 Gérard Schmidt *et al.* Monitoring of the Eurasian otter's (*Lutra lutra*) tracks and passages under bridges in the north of Luxembourg and south-east of Belgium (20 mins)

15.45 *Tea & Coffee – poster viewing*

Session 3: Tracking otters and otter habitat continued

16.15 Jiska van Dijk. Eurasian otter (*Lutra lutra*) utilization of two hydropeaked river systems using remote wildlife cameras (20 mins)

16.40 Ruairí Ó Conchúir and Glen Wightman. Catchment scale habitat enhancement work for otter (*Lutra lutra*) in a catchment degraded by both recent and historical drainage work (20 mins)

17.05 Margarida Santos-Reis *et al.* Otter response to crayfish invasion and consequences for the mink invasion process (20 mins)

17.30 Fran Igoe *et al.* An integrated approach to the conservation of the Eurasian otter (*Lutra lutra*) in a southern Irish catchment through stakeholder engagement, habitat restoration and a sprinkling of research (20 mins)

17.55 Close

20.00 *Workshop dinner in the restaurant, the Trident Hotel*

Friday April 26th 2013 - Workshop Day 2

Venue: *The Trident Hotel, Kinsale, Co. Cork*

Session 4: Environmental Contaminants and Parasites

Chair: Anna Roos

9.00 Anna Roos and Ulla Eriksson. Contaminants, from mother to cub (20 mins)

9.25 Nuno Pedroso *et al.* Evidence of antimicrobial resistance and virulence in Eurasian otter faecal bacteria in Portugal: Conservation implications (10 mins)

9.40 *Presenting author* Willow Smallbone *et al.* Seroprevalence of *Toxoplasms gondii* in the Eurasian otter (*Lutra lutra*) in England and Wales (10 mins)

09.55 *Tea & Coffee - poster viewing*

Session 5: Conservation threats and conflicts

Chair: George Gorgadze

10.35 George Gorgadze. Hydropower stations – main threat for the otter population in Georgia (20 mins)

11.00 Rachel Kuhn and Hélène Jacques. Coexistence of otters and fish-farming in France (20 mins)

11.25 Hans-Heinrich Krüger and Mark Ehlers. Otters and fyke-nets – an investigation of the problem and the development of escape windows (20 mins)

11.50 George Bouroș. Assessing Small Hydropower Plants impact on otter. Case Study: Buzău River (10 mins)

12.05 Lauren A. Harrington and Andrew L. Harrington. Investigating the potential of acoustic deterrents to reduce otter predation at stillwater fisheries (10 mins)

12.20 Paul Chanin. **"**Otters eat £2m fishery": A cautionary tale (20 mins)

12.45 *Lunch at the Trident Hotel*

Session 6: Recolonisation, Recovery, and Re-introduction

Chair: Paul Chanin

14.15 Andreas Kranz and Lukáš Poledník. Otters recolonising the Austrian Alps (20 mins)

14.40 Roni Shachal *et al.* Extinction and re-colonization processes in the otter (*Lutra lutra*) metapopulation in Israel (20 mins)

15.05 Anna Loy *et al.* Spatial and temporal dynamics of an isolated otter population in Italy: Range expansion does not necessarily mean population increase (20 mins)

15.30 *Tea & Coffee*

Session 7: Country reports

Chair: Andreas Kranz

16.00 Various speakers will present country reports

17.30 Discussion and close of workshop

20.00 *Optional dinner at the Fishy Fishy Café*

Saturday April 27th 2013

Optional field trip to Sherkin Island – Bus leaves at 8.30 am

Departing Sherkin Island Monday April 29th

Oral Presentations

Otter dietary studies – the past, recent developments and future perspective

Lukáš Poledník

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General diet is one of the most known aspects of the otter biology. During the past otter diet was studied by many scientists involving either direct observation, analysing stomach content, but mostly by spraint analysis. All these studies described the otter as mainly fish eater and resulted in hundreds of prey species lists from different parts of otter range. However both due to methodological problems and also "logistical" problems (involvement of ichthyologists) only few studies were able to reveal detailed links between the otter as a top predator and its prey, namely fish. Recently otters are recovering throughout the Europe and conflicts with angling and fishery interest of humans are rising. Therefore the data on the impact of the otter on fish assemblages are urgently needed. Moreover with increasing pressure for solving the problem of perceived fish stock depletion by otters compensation schedules are established in several countries and the diet estimates are vital for estimating extend of damages to be compensated. As the otters become rather common species in many European countries another field of rather applied research start to be open. Otter is efficient and opportunistic predator, and their spraints are easily to find. Thus analysis of spraints can in easy and cheap way help to reveal large scale distribution of its prey species, both native and alien ones (e.g. crayfish). Changes in otter diet in time can show the efficiency of river habitat restoration (e.g. diversification of prey composition and size).

Review and quantitative meta-analysis of diet suggests the Eurasian otter (*Lutra lutra*) is likely to be a poor bioindicator

Neil Reid[1]*, Danielle Thompson[1], Brian Hayden[1,2], Ferdia Marnell[3] and W. Ian Montgomery[4]

[1]Quercus, School of Biological Sciences, Queen's University Belfast, Belfast. BT9 7BL. UK. [2]University of Helsinki, Kilpisjärvi Biological Station, Faculty of Biological and Environmental Sciences, Viikinkaari 9, Helsinki, Finland. [3]National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht, 7 Ely Place, Dublin 2. Republic of Ireland. [4]School of Biological Sciences, Queen's University Belfast, Belfast. BT9 7BL. UK.
Email: neil.reid@qub.ac.uk

We describe otter diet along rivers, using spraint contents, during 2010 and conduct a review and quantitative meta-analysis of the results of a further 21 studies throughout Ireland. We aimed to assess variation in diet in relation to river productivity, a proxy for natural nutrification and anthropogenic eutrophication, and availability of salmonid prey (*Salmo trutta* and *Salmo salar*), to test the hypothesis that otter diet is related to environmental quality. Otter diet did not vary with levels of productivity or availability of salmonids whilst Compositional Analysis suggested there was no selection of salmonid over non-salmonid fish. There was a distinct niche separation between riverine and lacustrine systems, the latter being dominated by Atlantic eel (*Anguilla anguilla*). Otters are opportunistic and may take insects, fresh-water mussels, birds, mammals and even fruit. Otters living along coasts have a greatest niche breath than those in freshwater systems which encompasses a wide variety of intertidal prey though pelagic fish are rarely taken. It is concluded that the ability of the otter to feed on a wide diversity of prey taxa and the strong influence of habitat type, renders it a poor bioindicator of environmental water quality.

The diet of the Eurasian otter as determined by the examination of stomach contents

Rosemary Moorhouse-Gann[1*], Eleanor Kean[1], Gareth Parry[2], Sonia Valladares Lago[1] and Elizabeth Chadwick[1]

[1]Cardiff University Otter Project, School of Biosciences, Cardiff, Wales, UK. [2]Shropshire Council, UK.
Email: moorhouse-gannrj@cardiff.ac.uk

In order for conservation strategies to be effective, it is essential to understand the factors that affect species distribution and abundance. For carnivorous species, prey availability is the primary factor that determines the status of populations. Thus, understanding the diet of a species is essential for conservation management. The diet of the Eurasian otter, *Lutra lutra*, is poorly understood. The majority of UK dietary studies have used spraint analysis, which carries a bias due to the variation in passage rate of different prey species. In addition, unless combined with molecular techniques, spraint analysis cannot identify associations between diet and individual level factors such as otter age or sex. This study uses 507 otters found dead in England and Wales, and combines dietary data from stomach contents analysis with information collected *post mortem* on factors including sex, age class and size. General linear modelling is used to determine how otter diet varies spatially and temporally, while also testing for differences between subgroups of the population.

A citizen science approach to otter dietary studies in Ireland and Wales

Andrew Harrington[1], Denise O'Meara[2], Ceri Morris[3], Jenny MacPherson[4], David O'Neill[2], Peter Turner[2], Catherine O'Reilly[2], Kate Williamson[5], Rob Strachan[6]

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Email: aharrrington@waterfordcoco.ie

Citizen scientists are trained volunteers that participate in the collection of data for scientific studies and are increasingly being shown to be a valuable tool for the research community. The Mammals in a Sustainable Environment (MISE) project aims to increase awareness about wild mammals among local communities in Ireland and Wales by involving the public in mammal research. The otter (*Lutra lutra*) has been a key species in this community-led initiative and one of the projects that citizen scientists have been involved in is the dietary analysis of otter spraints. Workshops were held in Ireland and Wales led by an otter diet expert, where volunteers participated in the study of otter diet using samples collected from their locality. Using a citizen science approach to this work greatly increased the number of otter spraints that could be analysed in a short time, totalling approximately 365 work-hours over four days of workshops in both Ireland and Wales. Dietary studies have also shed light on the movements of otters between upland and coastal areas and have revealed the possible existence of a resident otter population in an upland area in Ireland where this had not previously been expected. Further results from these dietary workshops and the citizen science approach will be discussed in greater detail.

Non-invasive genetic monitoring of otter (*Lutra lutra*) populations

David O'Neill[1*], Denise O'Meara[1], Andrew Harrington[2], Peter Turner[1], Ceri Morris[3], Jenny Macpherson[4], Bernie Guest[2], Liz Halliwell[3], Henry Schofield[4], Lee Coffey[1] and Catherine O'Reilly[1]

Mammals in a Sustainable Environment (MISE) Project: [1] Waterford Institute of Technology, Cork Road, Waterford, Ireland. [2]Waterford County Council, Civic Offices, Dungarvan, Co. Waterford, Ireland. [3]Natural Resources Wales, Maes-y-Ffynnon, Penrhosgarnedd, Bangor, Gwynedd, Wales, UK. [4] The Vincent Wildlife Trust, Ledbury, Herefordshire, UK.
Email: dfoneill@wit.ie

Monitoring and conserving biodiversity is increasingly being recognized as critical for sustainable development. Developing strategies to maintain biodiversity requires baseline information on the current status of each individual species. The non-invasive approach to monitor mammals, especially elusive species, is an increasingly applied technique in obtaining information on the structure, size, genetic diversity and relatedness of a population. This study presents a suite of DNA-based assays to monitor otter (*Lutra lutra*) populations using a non-invasive DNA source (spraints). Novel species-specific real-time polymerase chain reaction (qPCR) assays using fluorescently-labelled TaqMan® MGB probes were developed to enable species and sex identification from spraints. Haplotypes were determined by DNA sequence analysis of a section of the mitochondrial DNA control region and individuals were identified by microsatellite genotyping. The assays have been shown to work efficiently with tissue, hair and spraint DNA.

Detecting detectability; identifying and correcting bias in Eurasian otter (*Lutra lutra*) incidence derived from the 'Standard Otter Survey' method

Neil Reid[1], Mathieu G. Lundy[1,2], Brian Hayden[1,3], Jane S. Preston[1,4], Ferdia Marnell[5], Robbie A. McDonald[6,7] and W. Ian Montgomery[8]

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Email: neil.reid@qub.ac.uk

The 'Standard Otter Survey' method involves the identification of otter field signs but as with any nominal presence/absence technique it is vulnerable to Type II errors (false negatives). We analysed levels of otter incidence at 1,229 sites throughout Ireland examining the impact of potential survey biases on species detection. Observed incidence

was 72% [95%CI 69-75%]. Occurrence was significantly affected by surveyor, and at running freshwater sites, rainfall in the month, but most notably the 7 days, prior to survey and the number of bridges present. Rainfall had no affect at static freshwater sites or the coast. There was little variation due to landscape, regionality (River Basin District or Hydrometric area), altitude or levels of productivity. The marginal estimated mean otter incidence that assumed the θ coefficient of the best surveyor, no rainfall and sites that had multiple bridges was 94% [95%CI 78-97%]. This was consistent across River Basin Districts suggesting that any apparent regional variation in the observed values was entirely due to survey bias. Results from the Standard Otter Survey method thus reflected survey conditions and not the otter population at the time of survey calling into question its efficacy for monitoring temporal trends in incidence.

Do fishery management strategies affect otter (*Lutra lutra*) densities? – using faecal DNA for otter census

Marcia Sittenthaler[1*], Helmut Bayerl[2], Günther Unfer[3], Ralph Kühn[2] and Rosemarie Parz-Gollner[1]

[1]Institute of Wildlife Biology and Game Management, University of Natural Resources and Life Sciences, Vienna, Austria. [2]Molecular Zoology Unit, Chair of Zoology, Technische Universitaet Muenchen, Germany. [3]Institute of Hydrobiology and Aquatic Ecosystem Management, University of Natural Resources and Life Sciences, Vienna, Austria.
Email: marcia_sitt@yahoo.de

Stocking of fish into rivers is a common management practice in recreational fisheries but may also attract additional predators to sites involved. Non-invasive genetic monitoring methods were used to show if changes in food availability as a result of fishery management strategies have influence on otter numbers and density. Otter faeces were collected from February to April 2011 along two rivers located in the province of Lower Austria. Genetic profiles were obtained based on 11 microsatellite loci and the Lut-SRY marker for sex determination. Additionally the capture-mark-recapture programme CAPWIRE was used to compute population size and confirm the number of individuals obtained from genetic analysis. Electrofishing data show significant higher fish biomass and abundance for the river where fish stocking takes place. Along these river stretches higher otter densities could be observed. In addition to otter numbers, information about sex, kinship and individual spatial distribution could be obtained using genetic monitoring. Thus, relationships between spatial and social organization of otters and food availability are discussed, as well as influence of stocking activities on food resources for otters. To evaluate and quantify the impact of otter predation on fish populations in general and on stocked fish respectively, further investigations are recommended.

The successful use of volunteers with studies of Cork's urban otters

Gill Weyman[1], Shane White[2], David O'Neill[3], Denise O'Meara[3], Andrew Harrington[4], Catherine O'Reilly[3], Lee-Jane Eastwood[2], Sean Ronayne[2], Simon Harrison[2] and Paddy Sleeman[2]

[1]Cork Branch of the Irish Wildlife Trust, Dromavane, Enniskean, Co. Cork, Ireland. [2]School of Biological, Earth and Environmental Sciences, University College, Cork, Ireland. [3]Mammals in a Sustainable Environment (MISE) Project. Waterford Institute of Technology, Cork Road, Waterford, Ireland. [4]MISE Project, Waterford County Council, Tramore Civic Offices, Tramore, Co Waterford, Ireland.
Email: corkbranch@iwt.ie

While the use by otters (*Lutra lutra*) of Irish urban waterways is well known, it is unclear if these otters are residents, 'blow-ins' or part-timers in the urban environment. Are these urban populations part of a surplus from rural areas, or are they a self sustaining population, perhaps using both rural and urban areas? To address some of these questions, spraints (otter droppings) were collected during 2011-2012 by trained volunteers in Cork City. DNA extracted from the spraints was used for species verification, sex allocation and individual identification. The remaining spraint was used to identify prey remains. Eleven otters (five males and six female) have been identified. The diet to date has been dominated by eels, salmonid, frogs, birds and rats. The study has demonstrated the usefulness of volunteers working with an NGO and collaborative research techniques. It is hoped that the information gained from this study will disseminate into the wider Cork community and encourage citizens to sustain their local otter population.

An ecological and genetic study of Eurasian otters in Israel

Tali Magory Cohen[1*], Tamar Narkiss[1], Amit Dolev[2], Yossi Ben-Ari[3], Noga Kronfeld-Schor[3], Amichai Guter[4], David Saltz[5] and Gila Kahila Bar-Gal[1].

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The Israeli population of Eurasian otter (*Lutra lutra*) marks the Palearctic southern boundary of the species' distribution in the Levant. During the 20th century, the otter population in Israel experienced a dramatic decline due to anthropogenic habitat alterations. Currently, the otter population in Israel is estimated at about 100 individuals and defined as Critically Endangered. The aim of this research was to genetically characterize the Israeli otter population in order to determine its genetic diversity for conservation purposes. Four otter subpopulations, represented by 57 individuals, were genetically characterized by twelve

microsatellites, previously used to characterize the European otter populations. The results indicated three subpopulations correlating with three geographical regions: The Hula Valley, Sea of Galilee and the Harod Valley. A moderate genetic diversity (Fst = 0.087-0.123) was found among the subpopulations, suggesting sporadic interactions between individuals from distinct geographical locations along the Jordan Rift Valley. The Israeli otter population was found to harbor unique alleles absent from the studied European populations. Therefore, immediate conservation actions are recommended to prevent the deterioration of the isolated, small, demographically remote and genetically distinct otter population in Israel.

Non-Invasive DNA survey of otters on the Lleyn peninsula, North Wales

Ceri Morris[1], David O'Neill[2], Kate Williamson[3], Denise O'Meara[2], Andrew Harrington[4], Chris Hall[3] and Catherine O'Reilly2

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Email: ceri.morris@naturalresourceswales.gov.uk

The Dwyryd Otter Partnership conducted volunteer based otter surveys of the Lleyn peninsula in North Wales during autumn 2002 and spring 2004. During these surveys all spraints were collected and analysed for prey remains. The survey was repeated in 2011 when 123 spraints were collected by volunteers and analysed by the Waterford Institute of Technology in Ireland as part of the Mammals in a Sustainable Environment project. Using novel DNA techniques it was possible to identify species, sex, and haplotype from spraints. A small proportion of samples yielded sufficient quality DNA to enable genotype analysis to identify individual otters. 20 individuals were identified, with a low recapture rate. There was a strong sex bias, as 91% of the spraints were from female otters. These non-invasive genetic techniques have revealed a new insight into the population dynamics of otters in this area, and provide a useful new tool in surveying this elusive species.

Tracking coastal otters with GPS in Roaringwater Bay, Ireland

Addy W.J.J. de Jongh[1], Lughaidh Ó Néill[2], Tjibbe. de Jong[1], Ferdia Marnell[3], David O'Neill[4] & Catherine O'Reilly[4]

[1]Stichting Otterstation Nederland (Dutch Otter Station), Spanjaardslaan 136, 8917 AX Leeuwarden, Netherlands. [2]Department of Zoology, Trinity College Dublin, Dublin 2, Ireland. [3]National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, 7 Ely Place, Dublin 2, Ireland.[4]Mammals in a Sustainable Environment, Waterford Institute of Technology, Cork Raod, Waterford, Ireland
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At the end of June and in the beginning of July 2010, a total of nine otters (*Lutra lutra*) were trapped in Roaringwater bay, County Cork, Ireland during 10 days (License No. C82/2010) as described in Ó Néill *et al*. (2007). Seven otters were considered fit enough to be radio tagged with a special waterproof GPS GSM transmitter as was used in a Portuguese otter study (Quaglietta *et al*., 2012). Inside the transmitter's casing there was also a small VHF transmitter for later retrieval. The harness used for attachment of the transmitters in this Irish study was smaller and lighter in weight (License No. 09/2010). Its total weight was about 150 grams. The GPS GSM transmitters send their data by means of GPRS through the mobile internet to a server. On the server the data were stored in a MySQL database. The schedule of GPS data collection (so called GPS fixes) and GPRS transmission was set through a web based interface. The standard setting was 11 times/day. It was estimated that with this setting that used 2500 mAh battery, the transmitters could last for two months in the field. Because of a disappointing GSM network quality only four out of seven otters reported data to the server. One of these four otters, a female called Mar, was found dead after three days on the island Heir. Its wounds suggested that it had been attacked by an unknown marine predator. Sleeman (pers. comm.) believes this could have been a killer whale. One of 3 remaining otters, a male called van Bommel, showed to have an impressive home range along the east side of Sherkin island and the west side of the coast near Baltimore. The coast here has very high and steep cliffs. In total its linear home range was 5.569 km on both shores. Van Bommel's tag was retrieved near its holt on a steep cliff 18 m above sea level. The other 2 female otters, Ilen and Julie, shared their home range along the mouth of the Ilen estuary. Both animals used both shores and went up through a small stream to a freshwater lake, Lough Marsh. The home range of Ilen was 7.618 km and of Julie 6.362 km. Genetic analyses from hair samples revealed that Julie could be the mother of Ilen. According to this analysis another tagged, but not reporting otter, called Crom, should be Ilen's father.

Monitoring of the Eurasian otter's (*Lutra lutra*) tracks and passages under bridges in the north of Luxembourg and south-east of Belgium

Gérard Schmidt[1], Sophie Rase[2], Nicolas Nederlandt[3], Sven Plattes[4], Christine Leclercq[5]
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The last otter population in Luxembourg and Belgium was found to be located in the north of Luxembourg and south-east of Belgium. In order to provide evidence of the evolution of this population, otter tracks and spraints were searched for by using the Information System for Otter Surveys (ISOS) developed as a standardised European method. Results collected by volunteers and the observers' network created in 2008 by the LIFE-Nature project demonstrate that the last otter tracks were found in 2003 in Luxembourg. Between that year and 2012 no more otter tracks and/or spraints were discovered, meaning that this otter population seems to be extinct. Other interesting data emanating from the study area indicate that the beaver is coming back and that the racoon's population has increased over the past ten years. In parallel, the nine passages for small mammals installed under bridges in 2011 were monitored from the year 2012 onwards using three digital scouting cameras together with active searching of tracks and spraints along the river banks. Initial results indicate that these passages are used by different mammals such as the fox, the racoon, the wild cat, the stone marten, the roe deer, but not as yet the Eurasian otter.

Eurasian otter (*Lutra lutra*) utilization of two hydropeaked river systems using remote wildlife cameras

Jiska van Dijk

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Email:Jiska.van.dijk@nina.no

The Eurasian otter (*Lutra lutra*) is a critical component of complete and well-functioning aquatic and semi-aquatic ecosystems. It is to be expected that due to rapid water level changes through hydropower plant operations the otter is affected. Otter foraging strategies are likely to be affected by local changes in fish abundance. Rapid water level fluctuations result in parts of the river becoming partly dry and fishes strand, or are at least become an easy target in the remaining ponds. On the other hand, rivers are kept open during the freezing and harsh Norwegian winters due to the water level changes which may attract otters as they remain to fish instead of switching to other food sources. Easy accessibility to (stranded) fish and open water during winter can be positive for the otter because it creates opportunities for efficient foraging. However, the hydropower plant operation causes violent currents that may make the river unattractive for otters as energy loss might be too high to swim upstream. A survey of otter signs in 2010 and 2011 showed a tendency for otters to avoid areas directly around hydropower discharge in spring, summer and autumn at least in one river but not in the other river which was included in the survey.

For both rivers, otters signs were found in the discharge areas during late fall when salmon migrate upstream and during winter when the rivers remained open. During autumn 2012 35 wildlife cameras were placed along the rivers to register otter passing in relation to water discharge regimes. Preliminary data analyses show that otters still use the river stretches despite full discharge levels. The methodology proved to be very effective for getting exact data on when otters actually use the river stretch and about the frequency of their visits. We will repeat the work during spring and summer this year to investigate seasonal effects.

Catchment scale habitat enhancement work for otter (*Lutra lutra*) in a catchment degraded by both recent and historical drainage work

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European populations of Otter *(Lutra Lutra)* have declined dramatically over the last 60 years. One of the main reasons for their decline in the Mulkear Catchment has been the lost of riparian habitat due to extensive drainage programmes. The catchment has been subjected to drainage works dating back to 1874. MulkearLIFE (www.mulkearlife.com) is an EU LIFE Nature project working on the restoration of the Lower Shannon SAC. The Mulkear River is a tributary of the River Shannon and the catchment drains an area of approximately 650 km². The river is one of the top five salmon rivers in Ireland, relative to its size, and produces a significant annual salmon run and also holds a substantial population of sea lamprey. Both species are key food sources for otter. MulkearLIFE's work with the otter is focused on several overlapping themes, namely; improving water quality, enhancing the abundance of food resources, instream enhancement works, controlling invasive species, catchment wide survey work, installation of artificial otter holts and the creation of additional prime habitat. All aspects of the five-year work programme are designed to reverse the decline in the otter population. Significant progress has been achieved in the first three years of operational work (2010-2012).

Otter response to crayfish invasion and consequences for the mink invasion process

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The American crayfish (*Procambarus clarkii*) and the American mink (*Neovison* neovison) are two relatively recent invaders in the NW Portugal and its effects on the native community of predators, otters (*Lutra lutra*) in particular, are been investigated in the frame of a project that aims to contribute to the definition of possible management scenarios and highlights a conservation dilemma (FCT/PTDC/BIA-BEC/102433/2008). Mink and crayfish arrived to the study region using opposite routes and different processes and are now part of the local riparian ecosystems interacting with each other and with the native communities of prey and predators. In spite of the high ecosystem-level concern towards the crayfish invasion in Europe, it is now widely recognised that it has a positive role as prey item for many native predators that are increasing in numbers exponentially. Evidence also point out that mink are eat crayfish whenever present, that suggests that this species is a potential facilitator of the predator invasion. Using a combined approach we assessed the: i) crayfish invasion process and current distribution (historical and field-based information on the basis of funnel trapping), ii) otter response to crayfish presence (analysis of DNA identified spraints, collected both in invaded and non-invaded areas) and iii) current mink distribution (floating rafts as footprint tracking devices and scats as tools aiding in species identification). Results indicate a quick response of otters to the presence of the crayfish and provide relevant information about the impact of exotic species in the functioning of riverine habitats.

An integrated approach to the conservation of the Eurasian otter (*Lutra lutra*) in a southern Irish catchment through stakeholder engagement, habitat restoration and a sprinkling of research.

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IRD Duhallow, a community development organisation is leading a €1.9m EU LIFE+ project, in partnership with Inland Fisheries Ireland, to enhance the status of the upper portion of the River Blackwater Special Area of Conservation, South West Ireland. The Eurasian otter is one of four main target species listed for conservation (Annex II) under the EU Habitats Directive present within the SAC. The initiative is the first and only community based EU LIFE Nature programme in Ireland. Otter are widespread within the area and although probably not as threatened as some other species listed for the site, the project recognises the unique position otter have as an attractive and iconic species capable of generating public support for wildlife and biodiversity conservation within the project area. To date the

project has engaged in the construction of artificial otter holts and log piles, the restoration of riparian areas, the removal of invasive non-native plants and a range of other on the ground initiatives to enhance the SAC. Stakeholder engagement and general public awareness campaigns are also being conducted using a variety of media. In addition the project has engaged with University researchers (MISE project) both to increase knowledge of the species but also as a practical way to further engage the public through the provision of data of local interest. Specifically in response to stakeholder feedback, the project has responded to local concerns, and has engaged in a public awareness campaign to address illegal otter hunting in the Duhallow area and also the problem of otter road kill. Ultimately the long term quality of life for communities, such as those within Duhallow, depends in part on the conservation of iconic species such as otter which bring a sense of pride and wonder to the day to day lives of people living there. The core objective of IRD Duhallow is to improve the quality of people's lives, through sustainable development of resources and believes that the otter are an integral part of the heritage of Duhallow to be cherished for future generations to appreciate.

Contaminants, from mother to cub

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The otter is an aquatic top predator and subjected to elevated concentrations of environmental contaminants. Some life stages are more susceptible – and exposed - to contaminants, for example during fetus and/or juvenile stages. Here we compare contaminant burden in mothers and their cubs, all killed in traffic. We analyzed the chlorinated compounds HCB, HCHs, DDE, and seven chlorinated biphenyls. Also five polybrominated diphenyl ethers were analyzed. One mother-cub pair was analyzed for several perfluorinated compounds including PFOS. The cubs often had higher concentrations of the lipid soluble contaminants. The highest ratio cub/mother was over 50 (for CB-118, -153 and -163); most other ratios were approximately between 5 and 10. Similar concentrations in both cub and mother with few exceptions were found for CB-28, -52 and -101 and HCB and the HCHs. As for the brominated substances, HBCDD and BDE-154 were mostly under detection limit and the others were most often 2-6 times higher in the cub compared to its mother. Only one pair cub-mother was analyzed for 12 perfluorinated substances and the opposite pattern was seen, mothers had higher concentrations compared to their cubs in liver for all substances, indicating a limited transfer from mother to cub for these contaminants.

Evidence of antimicrobial resistance and virulence traits in Eurasian otter faecal bacteria in Portugal: Conservation implications

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Bacterial antimicrobial resistance and virulence factors dissemination are well recognized hazards for public and animal health. Nevertheless, the role of wildlife as potential reservoirs for such bacterial trails is yet to be established. Otters constitute ideal models for this analysis: they are free-range animals that occupy a large diversity of aquatic environments, being hardly ever in direct contact with humans or subject to antibiotic administration. We evaluated the presence of virulence and antimicrobial resistance traits by phenotypic and genotypic methods in a collection of enterococci isolates (n=29) obtained from spraints of Eurasian otters (n=35) collected in two large dams and associated river stretches in South Portugal, in areas shared by otters, livestock and man. High levels of antimicrobial resistance were detected. Environmental exposure of intestinal microbiota to antimicrobial agents (e.g. antimicrobial compounds present in ground water contaminated by animal and human wastes) may be selecting for resistant bacterial strains. Virulence traits were also detected, indicating that they should be included in risk assessment and decision support for management and conservation of otter habitats. Data gathered in this work may contribute to elucidate upon the circulation of bacterial resistance and virulence determinants, their diffusion pathways and corresponding impact on public health.

Seroprevalence of *Toxoplasma gondii* in the Eurasian otter (*Lutra lutra*) in England and Wales

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Toxoplasma gondii is a zoonosis of global importance, found on all continents, with the ability to infect all endothermic vertebrates, and has potentially devastating health implications. Transmission occurs through ingestion of cysts in infected meat, oocysts in soil or contaminated water, or congenitally. Epidemiological data collection for *T. gondii* has been recommended by the World Health Organisation, but the prevalence of *T. gondii* is seldom monitored in wildlife even though there are links between human, domestic animal and wildlife infection. The current study uses the Sabin-Feldman Dye Test to test for *T. gondii* in >200 Eurasian otters (*Lutra lutra*) found dead, mainly as road-kill, in England and Wales. It is the first spatially widespread study of *T. gondii* in UK wildlife, and the first extensive survey of *T. gondii* in Eurasian otters. The relatively high prevalence of *T. gondii* in a predominantly piscivorous freshwater mammal suggests widespread faecal contamination of freshwater ecosystems with oocysts. Continued surveillance of the Eurasian otter for *T. gondii* is valuable because of conservation concerns and because of the host's role as a sentinel for freshwater health.

Hydropower stations – main threat for otter population in Georgia

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In spite of the fact that Eurasian otter was fully protected for many years and included in the red list, at the end of the last century the population declined dramatically. During the last 10 years, with development of various sectors of economy, habitat fragmentation and conflict with fish farm owners became a serious problem for the otter. In 2012 NACRES undertook the first national otter survey in Georgia. Existing satellite and topographic images were analyzed to identify suitable sites for Eurasian otter survey. The whole country was divided using 100 km square grid and at least one potentially good otter site was identified. In total 646 sites were checked and survey form was completed for each site. Where possible, with assistance of NGO Georgian Fishery Club, fish species composition was identified in lakes and rivers. During last 10-15 years, building of fishponds and production of commercial fish became very popular. Most fishponds were not registered and to carry

out wide public awareness and conflict mitigation measures was impossible. Based on satellite images, the first full fishponds GIS database were completed and mapped. Most of the fishponds were checked later and where possible, owners and guards were interviewed in order to estimate level of conflict. National survey found more than half of the country has any evidence of otter presence. The fish resources are very limited in all high mountain rivers due to high pressure from poachers. More than 60% territory of Georgia are high mountain regions where trout was the main species spread in rivers. In most of the rivers, trout had disappeared and otters had disappeared with them. Building trout fish farms became especially very popular and cost effective for fish farm owners. Now when fish stock is very limited in rivers, otters have great impact on such ponds. Fish farmers see otters as competitors, resulting in their persecution through illegal leg-hold traps set near fishponds. Since 2011, the government has decided to build additional dams for hydroelectric purposes, which will involve the major rivers of Georgia. In addition, Run-of-the-river hydroelectricity (ROR) will be the main hydro stations on high mountain rivers. In general, projects divert some or most of a river's flow (up to 95% of mean annual discharge) through a pipe and/or tunnel leading to electricity-generating turbines, then return the water back to the river downstream. In high mountains, water flow is not stable during the seasons. Building such stations will cause habitat destruction, loss of fish resources in most valleys and it seems that the otter will disappear entirely.

Coexistence of otters and fish-farming in France

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In France, the Eurasian otter used to be distributed over the whole country (except Corsica). The population declined sharply during the 20th century because of intensive trapping and destruction of the habitat. Protected since 1972, the otter is now recovering. At the end of the nineties, a young fish-farmer bought a trout-farm in the region of Limousin. He very soon realised that his fishes mysteriously disappeared and after a while, find out who the culprits were: otters. In order to find a peaceful solution, he asked the authorities and nature conservation organisations for help. His facility then turned into an experimental farm where systems to prevent access by otters could be tested. This pilot project highlighted the otter and fish-farming problem in France. How to reconcile otter and fish-farming is now one of the main issues of the French National Otter Action Plan, which was compiled in 2009 and which is implemented from 2010 until 2015. The plan recommends compiling knowledge on the subject, studying the impact of otter predation, testing systems to protect fish-farms, educating fish-farmers and offering them technical and financial help to protect their facilities from otter predation. Ongoing and planed projects will be presented.

Otters and fyke-nets – an investigation of the problem and the development of escape windows

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Fyke nets used by commercial fishermen to catch specific types of fish can be lethal to non-target species. The problem of by-catch is particularly troubling when it involves protected species like otters. It is suggested that about 25% of otter mortality is due to death in fyke nets. But good data is scarce and there is reason to believe that in the last decades fishers do not report all otters found dead in fyke nets. One way to solve the by-catch problem is to develop otter-safe fishing gear. Stop-grids have little acceptance among fishermen because they are time consuming and decrease the catch of some fish species. Therefore we conducted some experiments with different "escape windows" in the enclosures of the Otter-Centrum. Two different types of escape windows were developed. First a kind of flap, which could be opened by trapped otters to escape. Second a kind of predetermined breaking seam which allows the otter to tear open the net. The trials with the otters in the enclosures were restricted to just 12 specimens. That means that the effectiveness of both designs need to be tested under field conditions in the future.

Estimating occupancy of otters (*Lutra lutra)* using fresh spraints and adjacent spatial replicates

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Traditionally, detection data in otter surveys are recorded by identifying spraints of all ages along 600 m stream sections. Recording only fresh spraints potentially allows estimation of the proportion of sites where the otter physically occurs, a useful state variable. Moreover, in small study areas fresh spraints allow data collection from spatially independent sites. However, a major concern with stream section surveys is the spatial auto-correlation of adjacent detections. We applied and adapted a recently developed spatial auto-correlation model in a Bayesian framework, in order to estimate the detection probability of fresh spraints and to determine the segment length at which detection of fresh spraints ceased to be dependent on detection in the preceding segment. Data were collected at 59 sites in the Cilento and V.D. A. National Park (Italy). At each site we explored 1200 m of river bank. Autocorrelation models showed that between-segment dependence decreased with segment length and became negligible at 200 m. Detection probability decreased with time of day and it was relatively high (> 0.5) only within three hours from sunrise, probably due to spraint drying. By conducting surveys within seven hours from sunrise precise occupancy estimates require at least five spatial replicates (1000 m).

Assessing Small Hydropower Plants impact on otter. Case Study: Buzău River

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In recent years, Romania has registered a substantial increase in the number of small hydropower plants (SHPs) as an alternative renewable energy source. The construction of SHPs on the rivers of Romania's NATURA 2000 areas is often controversial and often violates national and European legislation. The study area is located in the SE of Romania, in Bending Subcarpathians, on Buzău River where it is desired to construct a hydrotechnical complex composed of five SHPs and a catchment which will have an accumulation of 9,000 m³ and a culvert length of 40,501 meters.
Major short term impacts of the SHPs on otters are:

- increase in accessibility and human presence;
- movement of heavy machinery and workers;
- deforestation with habitat loss and fragmentation;
- change from lotic to lentic ecosystem;
- lower prey availability and harsher capture;
- changes in land use adjacent to the reservoir.

The European otter is a top predator of the aquatic ecosystem, is directly affected by the decrease of food resources, destruction of otter holts due to reduced river flow from 22 m³ to less than 5 m³ and the heavy machinery and workers who work in the riverbed.

Investigating the potential of acoustic deterrents to reduce otter predation at stillwater fisheries

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The recent national recovery of the UK otter population is a conservation success. However, this increase in otter presence, in some areas, has led to conflict with inland freshwater fisheries. Otter predation at stillwater fisheries can be a particular problem (especially locally), and especially at specimen fisheries that stock valuable carp. One possible method for keeping otters out of stillwater fisheries is acoustic deterrents, similar to those used to keep marine mammals away from fishing nets and fish farms, but there is no scientific evidence of their effectiveness as otter deterrents. The aim of our project is to assess the potential for acoustic deterrents as a management tool for otters. This work is at an early stage - we will be presenting preliminary results, and discussing plans for development of the work. Trial deployment of a seal scarer in a small fishing lake was promising. Currently we are focusing on captive trials in an attempt to identify an underwater acoustic signal (noise) that might keep otters out of the water. Challenges include effective monitoring of

otter predation rates at lakes where impacts can be short-term and unpredictable, lack of knowledge of underwater hearing in otters, and risk of habituation.

"Otters eat £2m fishery": A cautionary tale

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In 2012 Mr Brian Dodson sued the Environment Agency for damage caused to his carp fishery in North Wales. He claimed that the actions of the Agency in improving the habitat of a local river had led to otters eating 8,500 of his fish and that it had a duty to inform him that its actions might lead to that consequence. As expert witness for the Environment Agency I was asked to respond to his claim and to appear in court if necessary in order to assist the Agency in its defence. I will describe the ecological aspects of the claim and how we responded to them and then outline the issues that were considered in court and the Judge's decision. The implications of this judgement will be briefly considered.

Otters recolonizing Austrian Alps

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In 1990 otters were almost extinct in the Austrian Alps. There was just a tiny population left. During the last 20 years otters recolonized the Alps both from the North and from the East. Surveys focus on provinces and are based on checking suitable bridges for otter signs. In total four bridges are usually checked within each 10 x 10 km UTM square. Surveys are always carried out in autumn, because in Central Europe marking behaviour of otters is seasonal. It is not only the presence and absence of otter spraints which is recorded for a given bridge, but also the number of spraints. After a short overview on Austria, we focus on the province of Styria, where the re-colonization is particularly well documented.In Styria otters were mapped in 1993, in 2003, 2006 and 2011. In 2003 31% of the area of Styria was still not colonised, in 2006 this figure dropped to 22% and in 2011 otters were absent just in 2% of Styria. This development is also shown for the Alpine and Continental bio-geographic regions, for river catchments and districts. In addition to these large scale surveys, otter numbers were identified by snow tracking in 33 10x10 km UTM squares. On average 3.0 adult otters were recorded per square.

Extinction and re-colonization processes in the otter *(Lutra lutra)* metapopulation in Israel

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The "Critically Endangered" Eurasian otter population in Israel has gone a dramatic decline in abundance and distribution since the 1960s, largely due to habitat degradation, drainage of water sources, habitat fragmentation and road mortalities. Due to the Israeli Mediterranean climate, otters inhabit discrete patches of streams and ponds, with limited movement, thus may be subject to constant local extinctions and re-colonizations. Therefore, the population performs a metapopulation spatio-temporal dynamics, and understanding the extinction and re-colonization processes in the patches is essential for this species management. We developed an "occupancy model" using "MARK" program, analyzing a multiple-visits presence-absence data of the last 12 years, based on spraint detection, also considering detection probabilities. Environmental variables such as habitat type, patch size, and connectivity potential of each site were incorporated into the model, allowing us to recognize the most crucial factors affecting the occupancy changes along the years, as well as the extinction and re-colonization rates of the sites. Results show a continuous decrease in the proportion of occupied sites and increase in extinction rates. Extinction rates are affected mostly by the connectivity values of each sites, whereas re-colonization rates of previously occupied patches are largely affected of the habitat quality itself.

Spatial and temporal dynamics of an isolated otter population in Italy: range expansion does not necessarily means population increase

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The Eurasian otter is one of the most endangered mammals in Italy, surviving only in the south with two isolated subpopulations in 25 rivers. Among conservation priorities are periodic monitoring of remnant populations, joining of subpopulations and range expansion. During the last decade we monitored the smaller and most endangered subpopulation. Two standard surveys were run in 2002-2004 and in 2011-2012, checking respectively 200 and 214 sites in seven river basins. Positive sites were interpolated through a friction grid approach to estimate the total length of rivers stretches occupied by otters. Otter signs were found at 22 sites in 2002-2004 (11%, 226 km of river stretches), and at 40 sites (18,7%,

313 km of river stretches, $P_{detection}$= 0.83) in 2011-2012, with an increase of both positive sites and total length of river stretches occupied by otters. Analytical results indicated a decrease in the length of river stretches in river basins extensively occupied in 2002-2004 (from 205 to 106 km), and a rapid expansion phase at the northern boundary (29% and 206 km of river newly occupied in the river Sangro). Spatial and temporal patterns within each basin allowed to elucidate the metapopulation dynamics and to identify specific areas of concern.

Poster Presentations

Do Otters Bioaccumulate and Biomagnify Pharmaceuticals and Personal Care Products from the Environment?

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The global consumption of pharmaceuticals and personal care products (PCPs) are rapidly rising, with a consequent increase in the unintentional contamination of aquatic habitats with these compounds. Some pharmaceuticals are excreted from patients relatively unchanged, and as these are not always effectively removed during sewage treatment processes, the residues are discharged into aquatic environments. Current understanding of the fate, behavior and effects of pharmaceuticals and PCPs once they reach the environment is poor, but it is at least theoretically possible that they could affect wildlife, particularly as they are designed with the primary intention of exerting effects in biological organisms. Eurasian otters (*Lutra lutra*) consume large quantities of fish, which contain detectable amounts of pharmaceutical and PCP residues, so it is theoretically possible that these chemicals are also present in otters. As apex predators, otters may even bioaccumulate and biomagnify these chemicals to the point where they reach sufficient concentrations to exert pharmacological effects. Here we present preliminary results from empirical measurements of select pharmaceuticals and PCPs in otter tissues and discuss the potential threat that these chemicals present to otters.

Long term monitoring of a sentinel species of freshwaters

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The CUOP has received funding from the Environment Agency (EA) since 1992 to conduct post-mortem examinations of otters found dead in England and Wales. Although the original focus of the project was to use tissue samples for contaminant analysis, it has since diversified, and CUOP now uses the archive of specimens and data to conduct a wide range of research, to (i) conduct surveillance of contaminants, (ii) monitor health and disease, and (iii) help inform conservation. Our surveillance of contaminants and monitoring of otter health and disease contribute to our understanding of otter recolonisation and population recovery in addition to conservation threats and conflicts. Approximately 90% of the otters received by CUOP died as the result of road traffic accidents and the localities of these accidents have been used to identify priority sites for mitigation. We present an overview of this multifaceted project, with particular emphasis on several research areas including chemical communication, parasitology, toxicology, diet and population genetics.

Estimating occupancy of otters (*Lutra lutra)* using fresh spraints and adjacent spatial replicates

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Traditionally, detection data in otter surveys are recorded by identifying spraints of all ages along 600 m stream sections. Recording only fresh spraints potentially allows to estimate the proportion of sites where the otter physically occurs, a useful state variable. Moreover, in small study areas fresh spraints allow to collect data from spatially independent sites. However, a major concern with stream section surveys is the spatial auto-correlation of adjacent detections. We applied and adapted a recently developed spatial auto-correlation model in a Bayesian framework, in order to estimate the detection probability of fresh spraints and to determine the segment length at which detection of fresh spraints ceased to be dependent on detection in the preceding segment. Data were collected at 59 sites in the Cilento and V.D. A. National Park (Italy). At each site we explored 1200 m of river bank. Autocorrelation models showed that between-segment dependence decreased with segment length and became negligible at 200 m. Detection probability decreased with time of day and it was relatively high (> 0.5) only within 3 hours from sunrise, probably due to spraint drying. By conducting surveys within 7 hours from sunrise precise occupancy estimates require at least 5 spatial replicates (1000 m).

Determination of pure-tone hearing thresholds in Eurasian otters (*Lutra lutra*) using brainstem auditory evoked potentials (BAEP)

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Beside road mortality one of the major causes of mortality in Otters (*Lutra lutra, L.1758*) is the drowning in fyke nets. A possible mitigation mechanism to prevent mammals to be caught in marine fishing gear is the use of acoustic deterrent devices called pingers. Because of the known effectiveness of marine pingers it was proposed to construct otter-specific pingers. A prerequisite for the construction of these devices is knowledge about the specific hearing capabilities. Therefore, we determined pure-tone hearing thresholds in Eurasian otters using brainstem auditory evoked potentials (BAEP). We examined 5 adult female otters using a previously established auditory-evoked-potential protocol. During isoflurane anaesthesia, we visually determined the presence of an electric brainstem response to tone pulses (50 ms) in the frequency range between 128 Hz and 32.7 kHz systematically varied in amplitude (dB SPL, **s**ound **p**ressure **l**evel). The result was a V-shaped audiogram with a region of best hearing around 4 kHz. The relatively high minimum hearing thresholds found in the Eurasian otter can presumably be explained by insensitivities inherent to the BAEP-method. The relatively high SPL thresholds could be explained by an ecological lack of the need for a high developed hearing system in this species of underwater foragers.

AQUAVIVA LIFE+: Live Water - from Biodiversity to the Tap

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The LIFE+ project AQUAVIVA (2011 -2014) is using the otter (*Lutra lutra*) as a flagship species and representative of aquatic life for effective public campaign which aims to attract public attention to biodiversity loss in freshwater ecosystems. We relate water biodiversity with human treatment of water environment. Through information, communication and education at all levels the project aims to raise public attitude towards water environment and to improve everyday praxis. The necessity of preserving freshwater ecosystems as the living environment of different species as well as for everyday ecosystems services available to humanity is promoted. The project is supporting implementation of European environmental policy and nature conservation legislation exposing their mutual positive impacts. The principles of Integrated Water Resources Management (IWRM) are explained to target audience and supported by assistance of the otter as a top predator and an ambassador of freshwater biodiversity.

STOPOTTER: Otter road mortality in Slovenia in last decade

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We have gathered data on otter road mortality for last decade. The data evidently show that otter road mortality in Slovenia is increasing. This correlates with otter dispersal in Slovenia after 1999 when the otter is no longer treated as a game species. The second reason for increased road mortality could be in construction of new roads and highways and inappropriate planning and constructing of roads and bridges. According to data otter road mortality is higher in winter and spring months, due to mating season, dispersal of juvenile animals and high water levels. The third reason established in last season appears to be feeding on amphibians crossing the roads in masses in spring time. In Slovenia, we still lack national otter survey and consequently also adequate monitoring according to paragraph 17 of Habitat directive. For particular areas, otter road kill data are the only reliable evidence of otter presence.

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