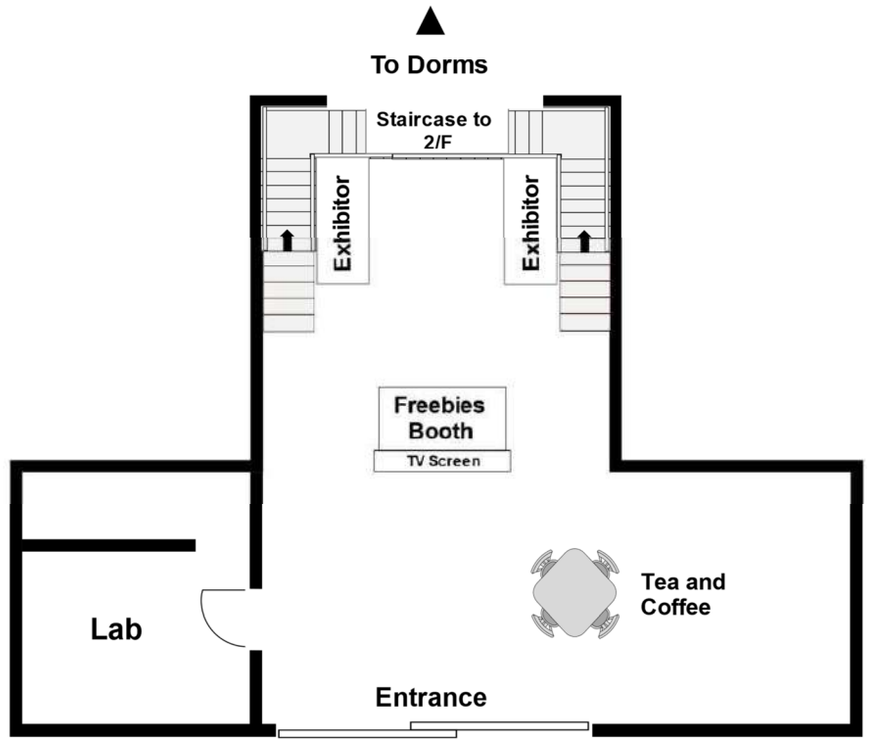
# Contents

Map of Tangjiahe Exchange Center for Scientific Research hotel complex

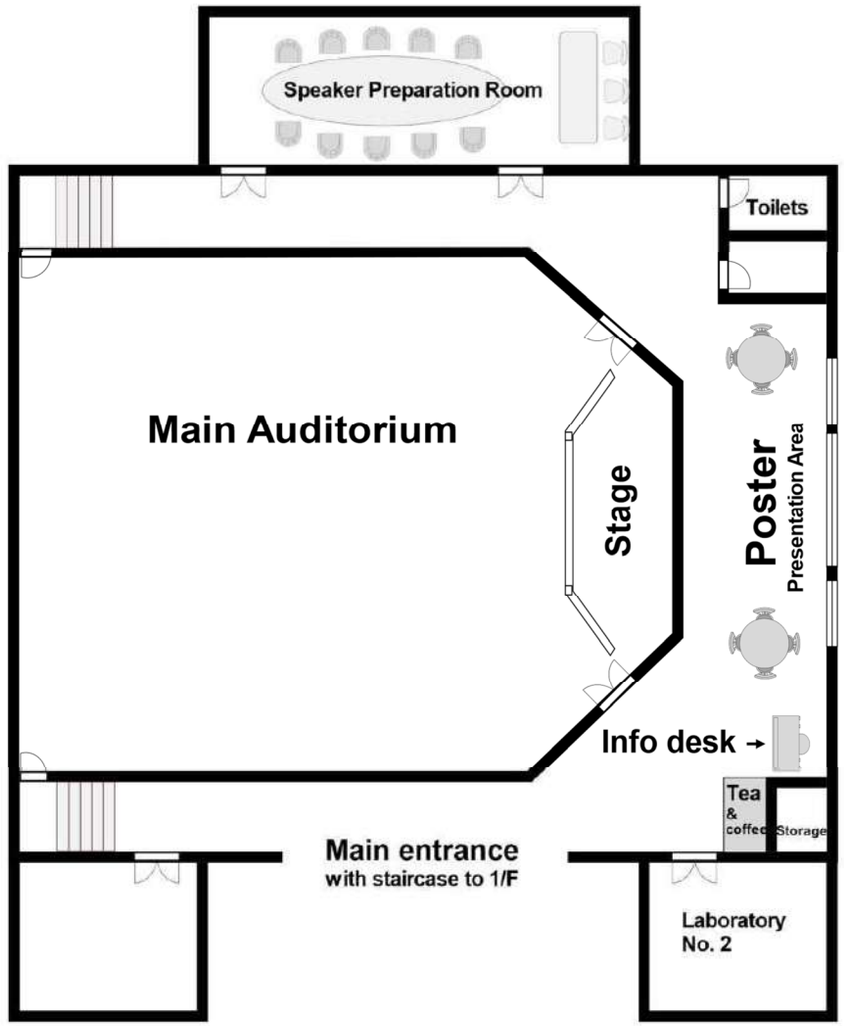

More contents online: 14th IOC Official Website

We are also on Facebook: facebook.com/pg/14thIOC

## CONFERENCE HALL FLOOR PLANS




1/F




2/F

**CHECK-IN**

Registered delegates shall collect name badges, conference bags, and pay for the lodging upon arrival. All delegates are required to wear their name badges for management and security purposes. Admission to all Congress sessions, meals and official functions are based on the badges. Please return the plastic badge case and strap after Closing Ceremony for recycling.

**INFO DESK**

Our staff members and volunteers will always be ready for your inquiries daily 8:30-12:30 and 14:00-18:00 during the Congress at the Info Desk, which is located on Level 2 of the Conference Hall.

**RESTAURANT**

The Congress Restaurant is located next to the hotel reception. All meals except the banquet gala will be served in the Restaurant with halal and vegetarian choices. Please refer to the program for meal times.

**SAFETY**

DO NOT venture outside the hotel complex alone at night due to the presence of potentially dangerous wildlife (i.e. Sichuan Takins and Wild Boars).

Always follow the instructions given by your guides while on tours. Remember that the delegates are responsible for their own safety and should purchase appropriate personal travel insurances. Please inform the Reserve staff immediately if you have a safety concern.

**EMERGENCY CONTACT**

In case of emergency, please inform any staff, call room **8017**, **8018**, or (+86) 139 9022 3739. General emergency numbers in China are: 110 – police, 119 – fire and 120 – ambulance.

**TOURS**

- The half-day field trip on April 11 AM in the Reserve and its neighboring communities is free for all delegates.
- Self-paid night safari in the Reserve will be organized for those interested in three evenings. Please refer to the program for schedule. Registration for night safari will be 12:30-14:00 each day at a counter in the Restaurant. Seats are limited and will be on a first-come-first-serve basis; priority will be given to delegates who have not joined the night safari before.
- Information about self-paid post-conference tours can be found on the Congress website. Contact Mr Jiawei Wu for inquiry: (+86) 138 8075 5758

**LIABILITY**

The Organizing Committee will not assume any responsibility for accidents, losses or damages, as well as delays or modifications of the conference program.

## Schedule

| April 8 (Monday) | | |
|---|---|---|
| **Time** | **Main Activities** | **Venue** |
| 17:00 - 23:00 | Congress Registration & Hotel Check-in | Congress Registration Desk & Hotel Reception |
| 18:00 - 21:00 | Dinner | Restaurant |
| **April 9 (Tuesday)** | | |
| **Time** | **Main Activities** | **Venue** |
| 7:30 - 8:30 | Breakfast | Restaurant |
| 8:30 - 10:30 | Opening Ceremony<br>• Opening Remarks<br>• Short film screening: **Tangjiahe: Safe Haven for the Eurasian Otter**<br>• Keynote Speech 1: **Ensuring the Future of Otters**<br>Dr. Nicole Duplaix, Founder and co-Chair, IUCN SSC OSG<br>• Keynote Speech 2: **Could otter become the next panda?**<br>Prof. Zhi Lu, Founder, Shanshui Conservation Center<br>• Group Photo | Main Auditorium |
| 10:30 - 12:00 | Oral Presentation Session 1<br>***In-situ* Conservation of Otters in China** | Main Auditorium |
| 12:00 - 14:00 | Lunch | Restaurant |
| 14:00 - 15:15 | Oral Presentation Session 2<br>***In-situ* Conservation of Otters in South Asia** | Main Auditorium |
| 15:15 - 15:45 | Tea Break | Conference Hall |
| 15:45 - 18:00 | Oral Presentation Session 3<br>***In-situ* Conservation of Otters Outside Asia** | Main Auditorium |
| 18:00 - 19:30 | Welcome Dinner | Restaurant |
| 20:00 - 21:30 | • Self-Paid Night Safari (optional)<br>• OSG Management Meeting (by invitation) | |

| April 10 (Wednesday) | | |
|---|---|---|
| **Time** | **Main Activities** | **Venue** |
| 7:30 - 8:30 | Breakfast | Restaurant |
| 8:30 - 9:30 | Keynote Speech 3: **Ecology of Asian Otters**<br>Dr. Syed Ainul Hussain, Red List Authority, IUCN SSC OSG | Main Auditorium |
| 9:30 - 10:00 | Tea Break | Conference Hall |
| 10:00 - 12:30 | Oral Presentation Session 4<br>***In-situ* Conservation of Otters in South East Asia** | Main Auditorium |
| 12:30 - 14:00 | Lunch | Restaurant |
| 14:00 - 14:30 | Oral Presentation Session 5<br>**Otter Taxonomy and Evolution** | Main Auditorium |
| 14:30 - 15:15 | Oral Presentation Session 6<br>***In-situ* Conservation of Otters in East Asia** | Main Auditorium |
| 15:15 - 15:30 | Tea Break | Conference Hall |
| 15:30 - 16:30 | **Poster Presentation Session A** | Conference Hall |
| 16:30 - 18:00 | Oral Presentation Session 7<br>**Otter Ecology and Behavior** | Main Auditorium |
| 18:00 - 19:30 | Dinner | Restaurant |
| 20:00 - 21:30 | • Self-Paid Night Safari (optional)<br>• Film Screening: Otters: River Masters of Yellowstone<br>with an introduction by Dr. Thomas Serfass | Main Auditorium |
| **April 11 (Thursday)** | | |
| **Time** | **Main Activities** | **Venue** |
| 7:00 - 12:30 | Field Trip<br>*Note: Takeaway breakfast will be provided on the bus* | |
| 12:30 - 14:00 | Lunch | Restaurant |
| 14:00 - 16:00 | Red List of Species Workshop | Meeting Room |
| 16:00 - 18:00 | Green List of Species Workshop | Meeting Room |
| 18:00 - 19:30 | Dinner | Restaurant |
| 20:00 - 21:30 | • Self-Paid Night Safari (optional)<br>• OSG Management Meeting (by invitation) | |

| April 12 (Friday) | | |
|---|---|---|
| **Time** | **Main Activities** | **Venue** |
| 7:30 - 8:30 | Breakfast | Restaurant |
| 8:30 - 9:45 | Oral Presentation Session 8<br>**Otter Ecology and Behavior** | Main Auditorium |
| 9:45 - 10:30 | Tea Break | Conference Hall |
| 10:30 - 11:45 | Oral Presentation Session 9<br>**Otter Ecology and Behavior** | Main Auditorium |
| 11:45 - 12:30 | Panel Discussion (by invitation)<br>**Conservation Recommendations for Tangjiahe's Otters** | Main Auditorium |
| 12:30 - 14:00 | Lunch | Restaurant |
| 14:00 - 15:00 | Oral Presentation Session 10<br>***Ex-situ* Research and Conservation** | Main Auditorium |
| 15:00 - 16:00 | **Poster Presentation Session B** | Conference Hall |
| 16:00 - 16:30 | Closing Ceremony | Main Auditorium |
| 17:00 - 20:00 | Evening Gala | Yingping Village |
| **April 13 (Saturday)** | | |
| **Time** | **Main Activities** | **Venue** |
| 5:30 | Meeting time for 6AM Shuttle Bus to Chengdu Airport<br>*Note: Takeaway breakfast will be provided on the shuttle bus* | Hotel Reception |
| 6:00 | Shuttle bus to Chengdu Airport | |
| 7:30 - 8:30 | Breakfast<br>*Note: Only for guests taking 1pm shuttle bus* | Restaurant |
| 8:30 - 11:00 | Free Time | |
| 11:00 - 12:00 | Lunch<br>*Note: Only for guests taking 1pm shuttle bus* | Restaurant |
| 12:30 | Meeting time for 1PM Shuttle bus to Chengdu Airport | Hotel Reception |
| 13:00 | Shuttle bus to Chengdu Airport | |



# Keynote Speakers

## Dr. Nicole DUPLAIX

Dr. Nicole Duplaix received her master's and doctorate degrees in Ecology from the University of Paris, France. Her doctoral research focused on the giant otters of Suriname, the first time this endangered species was studied in the wild. She has studied otters and explored river systems worldwide for 50 years, and now focuses her otter research and conservation in Asia and South America. She is the founder (1974) and the current Co-Chair of the IUCN-SSC Otter Specialist Group – the authority in global otter conservation. She co-founded TRAFFIC in 1973, the global wildlife trade monitoring network, and set up TRAFFIC-USA. She is a Senior Instructor at Oregon State University's Department of Fisheries and Wildlife and teaches courses in Conservation Biology and Species Recovery Planning. She is a long-time contract photographer for the National Geographic Society.

## Dr. Syed Ainul HUSSAIN

Dr. Syed Ainul Hussain is working with the Wildlife Institute of India as a Scientist G / Professor. His cutting-edge research on the ecology of aquatic species such as smooth-coated otter, gharial and river dolphin has led to the enhanced understanding of the status, ecology and biology of these species. He was awarded the Ph.D. degree based on his research work on the ecology of smooth-coated otter in National Chambal Sanctuary. His work on ecosystem level processes such as biomass productivity of wetlands; ecosystem services of the mangrove ecosystems and forested landscape has generated some of the most cited research papers. He is currently working on a pioneering study to assess the biomass productivity of wet grasslands of Brahmaputra flood plains and its use by large herbivores, thereby filling the gap in research on the scientific understanding of community ecology and resource portioning among large herbivores in the Asian context. His pioneer work on environmental flow in the Chambal River contributed significantly in decision making at the apex level on water allocation for biodiversity conservation. His study on seals and penguins provides a baseline for future research in the face of increasing anthropogenic and climate change impacts on Antarctica. His research on the ecology and conservation biology of several other endangered mammalian species, ecosystems and their link to biodiversity conservation has helped bridge the gap between ecology and conservation biology. He has been awarded the degree of Doctorate of Science based on the synthesis of his work "Approach to science based management of natural ecosystems for wildlife conservation and maintenance of ecosystem services: a synthesis". He is spearheading the nationally important biodiversity conservation and Ganga rejuvenation project for restoration of aquatic wildlife of Ganga River. Through his research supervision and training, he has nurtured a generation of students and protected area managers who are at the forefront of wildlife conservation in India and abroad. Dr. Hussain is Focal person on global otter species for the IUCN Red List.

## Prof. Zhi LU

Professor Zhi Lu is a leading conservation biologist in China whose research covers multiple-disciplinary fields and deals with the complex sustainability issues for the Chinese society as well as promoting China's positive influence toward the world. The field projects she leads include the ecosystem services of forests and grasslands, and natural history and conservation strategies of endangered species such as the giant panda and the snow leopard. In recent years, she focused on studying and practicing the mechanism of community-led conservation and opportunities of coexistence between human and nature. In particular, she initiated various experiments testing conservation tools based on economic incentives (such as carbon sequestration), cultural value (such as sacred mountain protection) and policy improvements (such as pay-ment for ecosystem services) that may benefit local people from their conservation efforts. She is a key figure involved in conservation policy making at regional and national levels, and an active member of international conservation discussions.

Professor Lu received her education at Peking University from 1981 (undergraduate, biology) through 1991 (PhD, animal ecology). During this time she conducted a comprehensive research on the giant panda ecology and conservation in Qinling. Then she spent three years for a postdoc research at National Insti-tutes of Health in the United States on conservation genetics (1992-1995). Later she took a fellowship at Harvard University Center for Population and Development (2000-2001), and taught at Yale School of Forestry and Environmental Studies as a visiting professor (2001-2002).



## Presenter Guide

ORAL PRESENTATIONS

- Oral presentations are organized into thematic sessions. Please refer to the program for your session.
- Please adhere to the Chairperson's instructions during the session, particularly the timing of your presentation.
- Presentation will be 15 minutes each. Please limit your talk to within 12 minutes and allow 3 minutes for questions.
- You can prepare for your presentation and submit your presentation file using the Speaker Preparation Room next to the Main Auditorium. There will be staff members ready to help you during the Congress hours (8:00-18:00).
- Recommended slide size ratio is 16:9, and presenters should make sure that the file will be displayed properly.
- Congress staff will collect your presentation file at least one day before your session and remind you about your schedule. For example: If you are presenting on April 10, you should submit your presentation to staff members at Speaker Preparation Room before dinnertime on April 9. But if your session is on April 9, you need to submit your file upon registration.
- If you are late to turn in your presentation file and/or if it is found incompatible with our system, the Organizing Committee has the right to cancel your presentation.

POSTER PRESENTATIONS

Poster Session A:
Mounting: April 9, 14:00 – 18:00
Dismantling: April 10, 17:00 – 20:00
Presentation Hour: April 10, 15:30 – 16:30

Poster Session B:
Mounting: April 11, 14:00 – 18:00
Dismantling: April 12, 17:00 – 20:00
Presentation Hour: April 12, 15:00 – 16:00

- Posters must be set up at the given poster mounting time stated above.
- The presenters should be present by their posters during the designated Presentation Hour.
- The Organizing Committee bears no responsibility for any lost or damaged posters.
- Please ensure that no damage is done to the poster panel boards. Please use the material for sticking provided by the organizers.
- Please refer to the Conference Hall Floor Plans for location.

# Academic Program

**Oral Presentation Sessions**

| Session 1: *In-situ* Conservation of Otters in China | | 10:30 – 12:00, April 9 |
|---|---|---|
| | **Title** | **Presenter and Affiliation** |
| **1.1** | Preliminary results of the first otter survey in Sichuan Tangjiahe National Nature Reserve, China | Mr. Limin CHEN<br>Tangjiahe National Nature Reserve |
| **1.2** | Distribution change and conservation status of the overlooked otters in China | Dr. Lu ZHANG<br>Sun Yat-sen University |
| **1.3** | Expect the unexpected: persistence of Eurasian otter in a busy delta of South China | Dr. Bosco P. L. CHAN<br>Kadoorie Farm and Botanic Garden |
| **1.4** | Status of the Eurasian Otter *Lutra lutra* in the Sanjiangyuan Region, China | Mr. Xuesong HAN<br>Shanshui Conservation Center |
| **1.5** | Long-term ecological data for conservation Range change in The Eurasian otter (*Lutra lutra*) in northeast China | Dr. Li YANG<br>Sun Yat-sen University |
| **1.6** | The highly threatened Asian Small-clawed Otter on Hainan Island | Mr. Fei LI<br>Kadoorie Farm and Botanic Garden |
| **1.7** | Potential distribution of otter (*Lutra lutra*) in Northeast China | Prof. Xiaofeng LUAN<br>Beijing Forestry University |
| **Session 2: *In-situ* Conservation of Otters in South Asia** | | **14:00 – 15:15, April 9** |
| | **Title** | **Presenter and Affiliation** |
| **2.1** | What will be the fate of Himalayan otters under climate change? Predicting current and future potential distribution of *Aonyx cinereus*, *Lutra lutra* and *Lutrogale perspicillata* in Himalaya | Mr. Pushpinder S. JAMWAL<br>University of Molise |
| **2.2** | Status and Distribution of otter in Shuklaphanta Wildlife Reserve, Nepal | Prof. Rajesh JHA<br>Nepal Nature Conservation and Development |
| **2.3** | Ambiguity of Otter Distribution in Nepal- Need of Thorough Study | Mr. Mohan B. SHRESTHA<br>Free lancing Wildlife Researcher |
| **2.4** | First Phase National Key Informant Otter Survey, Nepal | Mr. Sagar DAHAL<br>Small Mammals Conservation and Research Foundation |
| **2.5** | Otter Conservation through Himalayan Otter Network in Nepal | Dr. Jyoti BHANDARI<br>Tribhuvan University |



| Session 3: *In-situ* Conservation of Otters outside Asia | | 15:45 – 18:00, April 9 |
|---|---|---|
| | **Title** | **Presenter and Affiliation** |
| **3.1** | Demographic effects of harvest on coastal Alaska river otters: the importance of spatial refugia | Dr. Adi BAROCAS<br>San Diego Zoo's Institute for Conservation Research |
| **3.2** | The Global Sea Otter (*Enhydra lutris*) Conservation Strategy | Dr. Shawn LARSON<br>Seattle Aquarium |
| **3.3** | The otter way of wildlife management – Developing otter-friendly exits from fykes in collaboration with stakeholders | Ms. Astrid KIENDL<br>Aktion Fischotterschutz e.V. |
| **3.4** | Recent updates about South American otters | Dr. Marcelo L. RHEINGANTZ<br>Universidade Federal do Rio de Janeiro |
| **3.5** | Conservation genetics of giant and Neotropical otters in the Brazilian Amazonia using genome-wide data | Ms. Vania Fonseca DA SILVA<br>Durham University |
| **3.6** | The Natural Recolonization of Long Island N.Y. by the North American River Otter | Mr. Mike BOTTINI<br>Long Island Nature Organization |
| **3.7** | Case La Ventanilla | Mr. Ricardo G. CORREA<br>ONG Lafken |
| **3.8** | Estimating African clawless otter *Aonyx capensis* densities from camera trap data | Dr. Trevor MCINTYRE<br>University of South Africa |
| **3.9** | Human-otter conflict the case of Austria, where otters are again hunted | Dr. Andreas Kranz<br>IUCN SSC OSG / ALKA-KRANZ |
| **Session 4: *In-situ* Conservation of Otters in Southeast Asia** | | **10:00 – 12:30, April 10** |
| | **Title** | **Presenter and Affiliation** |
| **4.1** | Otter surveys in the Annamite Mountains of Laos preliminary results, potentials and prospects | Ms. Camille N. Z. COUDRAT<br>Project Anoulak |
| **4.2** | Investigating the Distribution and Occupancy of Otter Species across Human Modified Landscapes in Sabah, Malaysia | Ms. Anna Y. M. WONG<br>Ms. Annabel T. PIANZIN<br>Universiti Malaysia Sabah |
| **4.3** | The Current Status of Bornean Otters and Otter Research in Sabah, Malaysia | Ms. Leona WAI<br>Danau Girang Field Centre. |
| **4.4** | Current Status and Distribution of Otters in Peninsular Malaysia | Dr. Pazil Abdul PATAH<br>Department of Wildlife and National Parks, Malaysia |
| **4.5** | Management of Human-Otter interactions in urban environments - Singapore | Mr. Max KHOO<br>National Parks Board Singapore |

| | | |
|---|---|---|
| **4.6** | The return of the smooth-coated otter to Singapore: distribution, growth, public perception and conservation management | Mr. N. SIVASOTHI<br>National University of Singapore |
| **4.7** | Distribution status of otters in coastal wetlands of southern Thailand | Mr. Wanlop CHUTIPONG<br>King Mongkut's University of Technology Thonburi |
| **4.8** | Conservation status of otters in Vietnam | Mr. Van Dung LE<br>Save Vietnam's Wildlife |
| **4.9** | Ecology and Behavior of Smooth Coated Otter *Lutrogale perspicillata* in Myanmar | Mr. Nobuhiro OHNISHI<br>Kyoto University of Advanced Science |
| **Session 5: Otter Taxonomy and Evolution** | | **14:00 – 14:30, April 10** |
| | **Title** | **Presenter and Affiliation** |
| **5.1** | Revisiting Pocock's treatment of Eurasian Otter *Lutra lutra* | Mr. Daniel WILLCOX<br>Save Vietnam's Wildlife |
| **5.2** | Sea otter genetics update: Diversity, population structure and taxonomy | Dr. Shawn LARSON<br>Seattle Aquarium |
| **Session 6: *In-situ* Conservation of Otters in East Asia** | | **14:30 – 15:15, April 10** |
| | **Title** | **Presenter and Affiliation** |
| **6.1** | Otter conservation in Hong Kong: The value of local people | Ms. Sharne MCMILLAN<br>University of Hong Kong |
| **6.2** | Re-discovery of the Eurasian otter *Lutra lutra* after extinction in Japan | Prof. Hiroshi SASAKI<br>Chikushi Jogakuen University |
| **6.3** | Otter monitoring surveys - Otter fecal (spraint) densities at the large scales mean status of the population | Dr. Sungwon HONG<br>Pusan National University |
| **Session 7: Otter Ecology and Behavior** | | **16:30 – 18:00, April 10** |
| | **Title** | **Presenter and Affiliation** |
| **7.1** | Molecular dietary analysis of Eurasian otter in Tangjiahe National Nature Reserve | Ms. Qiaoyun WANG<br>Sun Yat-sen University |
| **7.2** | Dietary analysis of Eurasian otter (*Lutra lutra*) using Genetic markers specific to the prey species for Korean otter | Mr. Daecheol JEONG<br>Seoul National University |
| **7.3** | Diet study on Eurasian otter in Kinmen Island using DNA information from faeces | Dr. Nian-Hong JANG-LIAW<br>Conservation and Research Center, Taipei Zoo |
| **7.4** | Group and individual foraging in smooth-coated otters | Mr. Philip M. Johns<br>Yale-NUS College |



| | | |
|---|---|---|
| **7.5** | Pharmaceuticals in otters from Sweden | Dr. Anna ROOS<br>Swedish National Museum of Natural History |
| **7.6** | Investigating Microplastic Ingestion in Sea Otters Through Scat Analysis | Ms. Jennifer E. VAN BROCKLIN<br>Oregon State University |
| **Session 8: Otter Ecology and Behavior** | | **8:30 – 9:45, April 12** |
| | **Title** | **Presenter and Affiliation** |
| **8.1** | Poo Power: non-invasive monitoring of stress-related physiological responses in African clawless otter | Ms. Tshepiso L. MAJELANTLE<br>University of Pretoria |
| **8.2** | Otter latrines as carnivore-biodiversity hotspots | Dr. Thomas L. SERFASS<br>Frostburg State University |
| **8.3** | Regional Differences in Wild North American River Otter (*Lontra canadensis*) Communication | Ms. Sarah WALKLEY<br>University of Southern Mississippi |
| **8.4** | Smooth-coated otter behavior and presence of hairy-nosed otter in the coastal mangroves of southwest Cambodia | Ms. Vanessa Herranz MUÑOZ<br>Centre for Biodiversity Conservation |
| **8.5** | Habitat selection of smooth-coated otters in a water hyacinth-invaded river system in the Deccan Plateau landscape | Mr. Aditya BANERJEE<br>National Centre for Biological Sciences, India |
| **Session 9: Otter Ecology and Behavior** | | **10:30 – 11:45, April 12** |
| | **Title** | **Presenter and Affiliation** |
| **9.1** | Spotted-necked otter's distribution and determining factors of habitat occurrence in the lower Ouémé valley, Southern Benin | Dr. Chabi DJAGOUN<br>University of Abomey-calavi |
| **9.2** | Venerable otters: Ecology and conservation of Asian-small clawed otter (*Anoyx cinerea*) in river Moyar, Western Ghats, India | Mr. Kannathasan NARASIMMARAJAN<br>Madras Christian College, Chennai |
| **9.3** | Evidence for seasonality in scat marking by north American river otters | Dr. Thomas L. SERFASS<br>Frostburg State University |
| **9.4** | Aquatic Habitat Classifications: Implications for Otter Conservation | Dr. Robert P. BROOKS<br>Pennsylvania State University |
| **9.5** | Habitat of Otters in Peninsular Malaysia | Prof. Shukor MD-NOR<br>Universiti Kebangsaan Malaysia |

| Session 10: *Ex-situ* Research and Conservation | | 14:00 – 15:00, April 12 |
|---|---|---|
| | **Title** | **Presenter and Affiliation** |
| **10.1** | Visibility of otter activities for zoo visitors | Prof. Motokazu ANDO<br>Yamazaki University of Animal Health Technologies |
| **10.2** | Data Saving Species: How Global, Shared Data from *Ex-situ* Populations Can Help Save Wild Otters | Ms. Meredith O. KNOTT<br>Species360: Data Saving Species |
| **10.3** | Characterization of non-invasive monitoring reproductive endocrine profiles from the captive and field Eurasian otters (*Lutra lutra*) in Taiwan | Dr. Jane F. YU<br>Taipei Zoo |
| **10.4** | Vocal Communication of the Neotropical River Otter | Ms. Sabrina G. BETTONI<br>University of Vienna |



**Poster Presentation Sessions**

| Poster Presentation Session A | | 15:30 – 16:30, April 10 |
|---|---|---|
| | **Title** | **Presenter and Affiliation** |
| **A1** | Artificial Shelter for the Eurasian Otter *Lutra lutra* in the Yushu City, China | Mr. Xuesong HAN<br>Shanshui Conservation Center |
| **A2** | Conservation management of Eurasian Otters in Mai Po Nature Reserve, Hong Kong | Dr. Carmen OR<br>WWF-Hong Kong |
| **A3** | Impacts of Aquatic and Riparian Environmental Factors on Eurasian Otter Presence Characteristics in the Nakdong River Basin | Mr. Geehoon SHIN<br>Keimyoung University |
| **A4** | Fecal DNA Analysis for Individual Identification of Eurasian Otters (*Lutra lutra*) Living in Naerincheon | Mr. Han-Chan PARK<br>Seoul National University |
| **A5** | Seasonal differences in diet and activity of the Eurasian Otter (*Lutra lutra*) | Ms. Jee Hyun KIM<br>Seoul National University |
| **A6** | The complete mitochondrial genome sequence and the preliminary assessment of population genetic variability for Eurasian otter *Lutra lutra* (Carnivora, Mustelidae) on Kinmen island, Taiwan | Mr. Chung-Hao JUAN<br>Taipei Zoo |
| **A7** | The Otter Boom in Japan | Ms. Yumiko OKAMOTO<br>Hsinchu Zoo |
| **A8** | Smooth-coated otter population and activity in the coastal mangroves of southwest Cambodia | Mr. Reaksmey SOPHATT<br>Centre for Biodiversity Conservation |
| **Poster Presentation Session B** | | **15:00 – 16:00, April 12** |
| | **Title** | **Presenter and Affiliation** |
| **B1** | Investigating the distribution of the Smooth-coated otter (*Lutrogale perspicillata*) using environmental DNA | Ms. Alexandra C. KAHLER<br>Wild Otters Research Private Limited |

| | | |
|---|---|---|
| **B2** | Patterns of resource use and distribution of Smooth-coated otter (*Lutrogale perspicillata*) in the sub-Himalayan river systems of Uttarakhand, India | Ms. Sayanti BASAK Wildlife Institute of India |
| **B3** | Preliminary results on the visitation pattern of the artificial tidal lagoon by the otters in the Kuala Selangor Nature Park | Mr. Chee Yoong WOO Malaysian Nature Society |
| **B4** | Volunteering for Otter Conservation in Nepal Communication with Local Communities | Mr. Sanjan B. THAPA Guangzhou University |
| **B5** | Conservation status survey and awareness of smooth-coated otters in Babai River of Bardia National Park, Nepal | Dr. Dhruba B. GC Tribhuvan University |
| **B6** | Behavior Adaptations of Otter *Lutra lutra* to Winter Conditions of Northern Latitudes | Mr. Aleksei Y. OLEINIKOV Department ecology of animals Institute of water and ecological problems FEB RAS |



# Presentation Abstracts

## 1.1

**Preliminary results of the first otter survey in Sichuan Tangjiahe National NatureReserve, China**

Author(s): Limin Chen[1] Ziyu Ma[2] Fei Li[2]

Affiliation(s):

[1] Sichuan Tangjiahe National Nature Reserve, China

[2] Kadoorie Farm & Botanic Garden, Lam Kam Road, Tai Po, Hong Kong

Eurasian Otter (Lutra lutra) was once widely distributed in China. But extensive hunting up to the late-20th century decimated their population. Since its establishment in 1978, Tangjiahe National Nature Reserve in northern Sichuan province, Central China put much emphasis on protection and restoration of its natural resources. Otter has not been confirmed in the Reserve for many years, but with a determined anti-poaching effort, the otter population appears to have bounced back, and Tangjiaheis one of the best places in China where Eurasian otters are reliably seen.

In April 2018, the reserve set up an otter monitoring team to study the distribution and status of the local otter population. The team interviewed the local communities to collect local ecological knowledge about otters, and conducted 31 transect survey along streams and rivers covering a total of 96 km. The preliminary results of our one-year study found that otters are distributed in the reserve's two major rivers: Beilu River and Tangjia River. Otter spraints were mostly found at elevation range between 1000m to 2000m. Simple spraint analysis demonstrated that fishes, especially the snow trout Schizothorax spp., are the otters' main food item in Tangjiahe.

## 1.2

**Distribution change and conservation status of the overlooked otters in China**

Author(s): Lu Zhang[a], Qiaoyun Wang[a], Li Yang[a], Fei Li[b], Bosco Pui Lok Chan[b], Zhishu Xiao[c], Sheng Li[d], Dazhao Song[e], Zhengji Piao[f], Pengfei Fan[a]

Affiliation(s):

[a] State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-sen University, Guangzhou, Guangdong, China

[b] Kadoorie Conservation China, Kadoorie Farm & Botanic Garden, Lam Kam Road, Tai Po, Hong Kong, China

[c] State Key Laboratory of Integrated Management of Pest Insects and Rodents in Agriculture, Institute of Zoology, Chinese Academy of Sciences, Beijing, China

[d] School of Life Sciences, Peking University, Beijing, China

[e] Chinese Felids Conservation Alliance, Beijing, China

[f] Institute of Zoology, Changbai Mountain Academy of Sciences, Antu, Jilin, China

As apex predators, otters are indicator species of some aspects of ecosystem health, and flagship species for conservation in freshwater ecosystems. Three otter species – *Lutra lutra*, *Aonyx cinereus*, and *Lutrogale perspicillata* – exist in China. They were once widely distributed but have experienced dramatic decline in the late 20th century. We searched otter records from different sources and conducted questionnaire surveys to obtain otter records to reconstruct the historical (1550–1950), recent (1950–2000), and current (post-2000) distribution maps of otters in China. Unlike many other mammal species, otters' range did not contract during 1550–1950. Otters' recent and current distributions were comparable or even surpassed their historical ranges. However, applying rigorous verification criteria, only 57 sites in China were confirmed with otter occurrence since 2000. The potential distribution of *L. lutra* was mainly on the Tibetan Plateau and in northeast China. Although being endangered, otters have been neglected in China, with few research projects. Consequently, even wildlife experts have poor knowledge of otters. Surveys and specific research are urgently needed, and public education is advocated to raise awareness of otter conservation. Without sound information generated from research and urgent conservation actions, otters will remain severely threatened in China.



## 1.3

**Expect the unexpected: persistence of Eurasian otter in a busy delta of South China**

Author(s): Bosco P. L. Chan & Li Fei

Affiliation(s): Kadoorie Farm & Botanic Garden, Lam Kam Road, Tai Po, Hong Kong

The Eurasian otter (*Lutra lutra*), although widespread globally, is extremely rare or extirpated from most of its former ranges in China, and is listed as Endangered in the Red List of China's Vertebrates. The Pearl River Delta (PRD) in South China is a megalopolis with a human population of over 66 million. The Eurasian otter was historically widespread and abundant in the PRD occurring in waterways, estuaries, as well as the coasts. Rampant hunting and rapid urbanisation caused a precipitous population decline of PRD otters since the 1980s, and since 2000 there was no evidence of any extant populations except at one single site in Hong Kong. We conducted field survey on the western side of the PRD, and although the area is under immense pressures from urbanization, reclamation, pollution and overfishing, a remnant population of Eurasian otter surprisingly persisted in a rocky coastal bay close to a burgeoning city with a human population of 1.6 million. While the rediscovery gives new hope to otter conservation in South China, government-driven city development is the biggest threat to the remnant population; direct dialogue with policy-makers to design an otter-friendly development plan is urgently needed.

## 1.4

**Status of the Eurasian Otter *Lutra lutra in* the Sanjiangyuan Region, China**

Author(s): Xuesong Han[1], Lu Zhang[2], Xiang Zhao[1], Ge Zhao[1], Zhi Lu[1]

Affiliation(s):

[1.] Shanshui Conservation Center, Beijing 100871, China

[2.] School of Life Sciences, Sun Yat-sen Univercity, Guangzhou 510275, China

The Eurasian Otter *Lutra lutra* population have been through a widespread disruption in China. Yet sheltered by the ahimsa doctrine of the Tibetan Buddhism, otters luckily survive on the Tibetan Plateau. The Sanjiangyuan Region is located at the hinterland of the plateau, which contains the headwaters of three great rivers in Asia: the Yellow, the Yangtze and the Mekong. Abundant water resources and healthy fish population make it a perfect otter habitat — in the end of 2017, we started our Eurasian Otter investigation and conservation project in the Sanjiangyuan Region. After 13-month field investigation, overall 1,386 images and video footages of the otter were collected with over 20 individuals identified, merely from 40-kilometer sample rivers. Moreover, several protective actions were taken to help the otter resist aggravating anthropogenic influences. Our still ongoing work may suggest that currently, the Sanjiangyuan Region perhaps serves as the last healthy and continuous habitats for the Eurasian Otter in China.



## 1.5

**Long-term ecological data for conservation Range change in The Eurasian otter (*Lutra lutra*) in northeast China**

Author(s): Li Yang[1,2], Minhao Chen[2], Xiaofeng Luan[2,*], Qiaoyun Wang[1], Lu Zhang[1], Pengfei Fan[1,*]

Affiliation(s): [1]State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-Sen University, Guangzhou, Guangdong, China

[2]School of Nature Conservation, Beijing Forestry University, Beijing, China

*Correspondence

The Eurasian otter (*Lutra lutra*) has undergone a dramatic decline throughout the 20th century in China, especially in the Northeast China. Effective conservation management is hampered by insufficient data on otter status and distribution. Therefore, we integrated an ecological niche model (BIOMOD2) with long-term ecological data on this species to estimate the magnitude of change in distribution over time (1950s-2070s). Our data suggests that otters were widely distributed with abundant populations in Northeast China in the 1950s, particularly in the area of the Songhua River basin and the Ussuli River basin. However in the following decades, its distribution has significantly decreased (nearly 70%). Our results indicate that the potential range will likely decrease in the future: the overall range change on average is 83.64%. Otters are mainly restricted to fragmented areas and national nature reserves, leaving little optimism for their future. To overcome this poor outlook, a conservation strategy should be established in sensitive areas, including the southwestern Greater Khingan Mountains and northern Lesser Khingan Mountains. Actions that should be considered include field investigations, establishing a monitor network, designing ecological corridors, and cooperating with local inhabitants, governments, and conservation biologists to improve the conservation of the otter.

1.6

**The highly threatened Asian Small-clawed Otter on Hainan Island**

Author(s): Li Fei[1], Luo Fanqiang[2] and Bosco P. L. Chan[1]

Affiliation(s):

[1] Kadoorie Farm & Botanic Garden, Lam Kam Road, Tai Po, Hong Kong.

[2] Hainan Diaoluoshan National Nature Reserve, China.

The Chinese island of Hainan siats at the northern margin of tropical Asia; two species of otters have been recorded from Hainan: the Eurasian Otter *Lutra lutra* and Asian small-clawed otter *Aonyx cinereus*.

Decades of wildlife and forest exploitation caused dramatic population decline in both otter species. The last confirm record for Eurasian Otter dated back to 1963, and the Asian Small-clawed Otter was only reliably recorded in the Diaoluoshan area in southeast Hainan based on an island-wide study conducted in 2009, but its distribution and status has not been updated in the last decade.

Since early 2017, we started an otter survey and monitoring programme in Diaoluoshan. Our fieldwork confirmed that Asian Small Clawed Otter still survives in low numbers, and we obtained a series of camera-trap photographs. Spraints were recorded in the hill-streams below 1000 m asl, and most latrine sites were detected in remote streams with relatively low human disturbances.

The continued survival of Asian Small Clawed Otter on Hainan Island remains a big challenge, as human disturbances such as poaching and electrofishing were frequently detected. To tackle these issues, an otter monitoring team has been set up to reinforce patrol effort, especially along watercourses.



1.7

**Potential distribution of otter (*Lutra lutra* ) in Northeast China**

Author(s): LV Jiang, YANG Li, YANG Lei, LI Jingxin, HUANG Mujiao, LUAN Xiaofeng

Affiliation(s): School of Nature Conservation, Beijing Forestry University, Beijing 100083, China

Eurasian otter is an important indicator species in freshwater ecosystems. Its in-situ conservation and ex-situ conservation are of practical significance in maintaining regional Biodiversity and aquatic ecosystem. The range of otter in North-east China has been decreased sharply, while the knowledge of the range was still insufficient.we integrated the occurrence records from data collection and interview investigation with the species distribution model to magnitude the otter potential distribution in North-east China. The results showed that the potential distribution area of otter is 39.17 million km2 (17.99% of the total area) and the nature reserves covers 4.77 million km2(2.19% of the potential distribution area) .The otter populations mainly distribute in four mountain areas: the Greater Khingan Mountains, the northern of the Lesser Khingan Mountains, the northeast corner of Sanjiang Plain and the eastern of the Changbai Mountains. Our result also highlight that the GAP have located in the southern part of the Changbai Mountains forest, south of the Lesser Khingan Mountains and the northern mountainous area of the Greater Khingan Mountains.We suggest to expand the area of nature reserves, upgrade existing nature reserves to higher level, and establish corridors between existing nature reserves for migration to enhance the protection effect.

Key words: *Lutra lutra* ;SDM model ;potential distribution ;Northeast China

## 2.1

**What will be the fate of Himalayan otters under climate change? Predicting current and future potential distribution of *Aonyx cinereus*, *Lutra lutra* and *Lutrogale perspicillata* in Himalaya**

Author(s): Pushpinder Singh Jamwal, Mirko Di Febbraro, Maria Laura Carranza, Anna Loy

Affiliation(s): Environmetrics Lab, Dipartimento Bioscienze e Territorio, Università del Molise, 86090 Pesche, Italy.

Ongoing climate change will become one of the significant drivers of species extinction by affecting the distribution and biological traits of species. In the present study, we modelled the potential distribution of *L. lutra*, *L. perspicillata* and *A. cinereus* under current conditions and future climate scenarios along the Himalaya chain. We made use of the MAXENT algorithms to calibrate models and accounted for two scenarios developed according to two representative concentration pathways (RCP.45 and RCP.85) for two periods (2050 and 2070). AUC and TSS metrics were used to evaluate model performance. The models for the three species achieved good predictive performances with mean AUC values 0.86 (SD=0.32) and TSS values 0.63 (SD = 0.04) for *L. lutra*, AUC values 0.89 (SD=0.05) and TSS values 0.84 (SD = 0.059) for *A. cinereus*, and 0.91 (SD=0.03) and 0.78 (SD=0.07) for *L. perspicillata*. Our results also indicate *L. lutra* to undergo the highest habitat loss under future climate change, followed by *L. perspicillata* and *A .cinereus*. Specifically, *L. lutra* will lose more than 13% (SD = 11.819%) suitable habitat under RCP.45 and more than 19% (SD = 13.491%) under RCP.85. In addition, *L. perspicillata* will undergo a loss of more than 5% (SD = 15.699%) of its suitable habitat in RCP.45 and about 17% (SD = 28.310%) in RCP.85. Lastly, *A .cinereus* is losing around 3% (SD = 6.339%) under RCP.45 and around 2.8% (SD = 16.303%) under RCP.85.



## 2.2

**Status and Distribution of otter in Shuklaphanta Wildlife Reserve, Nepal**

Author(s): *Rajesh Jha, **Melissa savage, **Ajay Mathema

Affiliation(s):

*Assistant Prof.OSG Member. Freelancer at Nepal Nature Conservation and Development

** Prof.OSG Member

*** Prof, Principal Schems College.

Otter belonging to Mustelidae family are top predator in wetland ecosystems and are considered as indicator of healthy wetlands. But they are decreasing in tremendous number due to water pollution, hunting, killing, loss of prey, loss of wetland habitat globally. Key Informant Survey,

Presence/Absence survey, Camera trapping, Scat deposition,transect Line has been done. Information regarding status, distribution and potential habitat of otter in Shuklaphanta wildlife Reserve. Key informant survey helps to understand overall picture on otter habitat. Otter species data will be represented. Potential habitat of otter within Shuklaphanta National Park mapped which may help in conservation issues, like potential re- introduction, policy making and further studies. It prefers plain areas and is widely distributed. Smooth coated otter is mainly upon fish. It is considered to be a suitable indicator of pollution level in wetlands, habitat fragmentation, otter-human conflicts and lack of awareness among general public are main threats to the species

Keywords: Otter, wetland, distribution, potential habitat.

2.3

**Ambiguity of Otter Distribution in Nepal- Need of Thorough Study**

Author(s): Mohan Bikram Shrestha

Affiliation(s): Member, IUCN-SSC Otter Specialist Group

Three species of otter such as Eurasian otter (*Lutra lutra*), Smooth-coated otter (*Lutrogale perspicilliata*) and Asian small-clawed (*Aonyx cinereus*) are reported present in Nepal. Studies revealed Eurasian otter dwells in mountain streams, river and lakes and have recorded from Rara Lake, West Seti, Rupa and Begnas lakes. Similarly, Smooth-coated otter has reported in major river basins of Nepal such as Koshi, Narayani, Karnali and Mahakali. While, Hodgson in 1834 reported presence of Asian small-clawed in Nepal but the distribution of this species is unknown in Nepal. Additionally, studies conducted for hydropower construction on rivers such as Chameliya, Khudi, Marsyangdi and Madi river has mentioned presence of otter in respective rivers. However, in absence of substantial evidences, distribution of otters in those rivers is mystery. In the essence, there are less than a dozen otter focused studies conducted. And, majority of them were carried a decade earlier implying the need of re-investigating. Moreover, concerned with 6000 rivers and more than 242 lakes in Nepal, the coverage of otter study carried are limited in few wetlands only. Hence, there is marked need of thorough study on otter presence in the rivers, wetlands and lakes before it is wiped out.

*Keywords:* Otters, Research, Distribution, Ambiguity, Threats, Nepal.



2.4

**First Phase National Key Informant Otter Survey, Nepal**

Author(s): Sagar Dahal[1*], Juna Rai[1], Deelip Chand Thakuri[1], Swechhya Shrestha[1] Arjun Thapa[1] and Kaustuv Raj Neupane[3]

Affiliation(s):

[1]Small Mammals Conservation and Research Foundation

[2] Co – Chair, IUCN Otter Specialist Group

[3] Southasia Institute of Advanced Studies

[*] Correspondence Email: sagardahalinktm@gmail.com

On the Tibetan Plateau, Eurasian Otter *Lutra lutra* have been through a time of population decline. With the joint efforts of the Chinese Government and several native religion leaders, the otter population prosper in past decade. Under the rapid urbanization in recent years, however, we noticed that otters are losing their natural cavities, especially those used as temporary shelters. Yushu City, among the biggest settlements in the Sanjiangyuan Region with the population over 200,000 people, is located at a T-shaped cross of three rivers, which are all inhabited by the Eurasian Otter. In Nov. 2018, with our self-designed artificial shelters, we made a habitat restoration attempt in the Yushu to help otters safely cross the city. After two months' trial, two of the four shelters we set were used nine times by the Eurasian Otter, and beyond that, Leopard Cats *Prionailurus bengalensis* were also captured for many times, which may suggest that artificial shelters we designed could be an effective way to help otters endure the negative influence from urbanization.

2.5

**Otter Conservation through Himalayan Otter Network in Nepal**

Author(s): Jyoti Bhandari

Affiliation(s): Tribhuvan University, Institute of Forestry, Pokhara Campus, Pokhara, Nepal.

The Himalayan Otter Network was created in 2014 to foster a partnership connecting conservationists and researchers across the Himalayan region. We seek to strengthen communication among partners, facilitate collaboration, share information and best conservation practices, and create sustainable community partnerships to better protect Himalayan otter species. The region is defined as the mountainous portions of Afghanistan, Northwest and Northeast India, Bhutan and Nepal. Very little is currently known about the abundance, distribution, or health of otter populations in this region.

Nepal has the best knowledge base and the most otter researchers of otter ecology in the region, but researchers are hampered by the fact that they largely work in isolation. The country is also a global hotspot for the illegal traffic in otter pelts, both locally sourced and traded across borders. This project hold a workshop for otter researchers and NGOs in Kathmandu, Nepal in 2017, to enable a collaboration to develop detailed otter conservation strategies and projects for the country of Nepal as a whole.

The second meeting of the Himalayan Otter Network is scheduled for February 15-16, 2019 in Pokhara, Nepal. This workshop will bring together otter researchers and conservationist to: 1) assess the current status of otters in Nepal, 2) set out a framework of priorities for which tools and actions to employ to best protect Nepal's otters, 3) develop a timetable for accomplishing those actions, and 4) identify partners and funding sources for the objectives. The overall goal of the project was the creation of a Nepal Otter Conservation Strategy for protecting the three otter species in Nepal.

Hope in future, this Himalayan Otter Network will be able to bring the otter ecologists together for the conservation and protection of otter in this Himalayan region.

Keywords: otter, conservation, isolation, Himalayan region



3.1

**Demographic effects of harvest on coastal Alaska river otters: the importance of spatial refugia**

Author(s): Adi Barocas[1,2], Howard N. Golden[3], Merav Ben-David[4]

Affiliation(s):

1- San Diego Zoo's Institute for Conservation Research, 15600 San Pasqual Valley Road, Escondido, CA, 92027, USA

2- Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, Tubney, Abingdon, OX13 5QL, UK

3-Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage, AK 99518, USA.

4- Department of Zoology and Physiology, University of Wyoming, 1000 E University Avenue, Laramie, WY, 82071, USA

Wild carnivore populations are increasingly exposed to multiple anthropogenic stressors, including exploitation by harvest, which can have negative demographic effects. Such effects can be mitigated by the maintenance of healthy populations within protected areas. For centuries, coastal river otters (*Lontra canadensis*) in southcentral Alaska have been harvested for their fur. We used non-invasive genetics to evaluate the value of spatial refugia for these carnivores by examining the effects of recent harvest in two coastal areas. We compared rates of migration, relatedness and abundance between harvested and adjacent harvest-free locales, as well as a protected area. We found higher otter densities in unharvested areas. Proportions of migrants were significantly higher along previously-oiled shorelines and harvested areas, suggesting that they function as dispersal sinks. Our analyses also indicated that market demand and human habitation are significant drivers of harvest. Combined, these results suggest that unharvested areas may act as migrant sources and mitigate demographic damage to stressed river otter populations. We conclude that management actions such as the protection of remote areas, where harvest is consistently low, can secure the conservation of carnivore populations. Because in coastal Alaska river otters play a role in nutrient transfer, their conservation can have ecosystem-wide implications.

3.2

**The Global Sea Otter (*Enhydra lutris*) Conservation Strategy**

Author(s): Angela Doroff[1], Shawn Larson[2]*, and Nicole Duplaix[3]

Affiliation(s):

1. Lead Scientist/Research Coordinator, South Slough National Estuarine Research Reserve, Charleston, Oregon USA,

2. Curator of Conservation Research, Seattle Aquarium, Seattle, Washington, USA

3. Chair, IUCN/SSC Otter Specialist Group and Senior Instructor, Fisheries and Wildlife Department,
Oregon State University, Corvallis, Oregon USA

Since 1974, the IUCN-SSC Otter Specialist Group has produced otter conservation programs and has seen many successes but also witnessed the sharp acceleration of environmental threats that affect otters everywhere: pollution, deforestation, overpopulation, illegal trade, limited protection, and the escalating effects of climate change. In the *2018 Global Otter Conservation Strategy*, we are moving forward with a holistic conservation approach. The goal is to build a collaborative web of researchers, educators, captive population specialists, legal and policy experts, habitat conservation specialists, and social science tools for connecting to all sectors of society in order to support maintaining healthy otter populations. With these goals in mind, we identified threats and mitigation measures, highlighted captive programs, and population success stories for sea otters (*Enhydra lutris*). We identified projects and funding opportunities by country and common threads were: species coordination (social science), surveys to document population status and trends, funding for competitive graduate fellowships for wild population and captive research, and travel to attend, present, and conduct outreach and education.



3.3

**The otter way of wildlife management – Developing otter-friendly exits from fykes in collaboration with stakeholders**

Author(s): Habbe, Dr. Britta[1]; Krueger, Dr. Hans-Heinrich[1]; Reckendorf, Anja[2]; Goeckemeyer, Steffen[3]; Hahn, Albrecht[4]

Affiliation(s): [1]Action for Otter Conservation, [2]University of Veterinarian Medicine Hannover (Foundation), [3]Chamber of Agriculture Lower Saxony, [4]Association of Inland Fisheries and Pond Hosts in Schleswig-Holstein

In most parts of Europe, the European otter (Lutra lutra) has been eradicated due to intensive habitat destruction and hunting. In the early 70ies, the otter became protected by law in Germany and restoration of habitats became more and more common. Thus, this species started to recolonize most parts of its former distribution area. The otter population slowly but constantly spreads out from the eastern parts to the western parts of the country. Consequently, human-wildlife conflicts are arising. Otters are at risk of getting trapped in fykes, which are commonly used in fishery in northern Germany. To date there is no possibility for otters to escape from conventional fykes. Thus, an otter-friendly way of using fykes is needed.

In the past, fishers were supposed to use so called fyke grids. These grids were placed at the entry of the fyke and prevented otters from diving into it, at the cost of reduced fishing outcome.

We evaluated other possibilities to prevent otters from drowning in fykes. We tested two different exit systems to be integrated into the third section of a common fyke. The first system is constructed as a rubber band tear seam. The second system consists of two metal holders that are held together with a spring. Both exit systems are supposed to open at working loads bigger than 1.3 kg. Otters are known to bring up such working load and shall be able to escape, but fish are expected to stay in the fyke.

We used N=12 otters in a total of fourteen trials – five trials for the tear seam and seven trials for the metal holder exit. The fyke was placed in the pool of an otter exhibit and the animals swam in the fyke via a net tube. It is known for sure, that otters can stay under water for more than two minutes. That's why every trial was limited to max 120 seconds. In twelve trials, otters escaped easily from the fyke after a time period ranging from 11 seconds up to 70 seconds with an average escape time of 21,29 seconds for the tear seam and 32,8 seconds for the metal holder. Two trials had to be cancelled because the animal showed abnormal behavior.

Both exit types were proofed to be useful to prevent otters from drowning in fykes. As all those tests were conducted together with the stakeholders, we hope that these exits will be accepted and used wide spread in fishery.

3.4

**Recent updates about South American otters**

Author(s): Marcelo Lopes Rheingantz[1]; Caroline Leuchtenberger[2]

Affiliation(s):

[1] Universidade Federal do Rio de Janeiro, Brazil

[2] Instituto Federal Farroupilha, Brazil

South America host four otter's species (>30% of the world's species). Recent conservation efforts include five regional workshops aimed to update information (including updating distribution ranges) and planning actions for each species. Additionally, contributions to the global strategy, and 55 scientific articles were published between 2016-2018 (*Lontra longicaudis*, 29; *Pteronura brasiliensis*, 20; *L. felina*, 3 and *L. provocax*, 3). The first known freshwater population of L. felina was registered in 2017 in Perú. Although we found advances in the knowledge about all South American otters, more research are still needed, such as understand long-term impacts of human activities (mining, hydroelectric, agriculture, forestry, aquiculture, tourism, etc.) and introduced invasive species (feral dogs, American mink, etc.), genetic analysis applied to phylogeography and connectivity among populations, socio-ecological studies aimed to comprehend the increasing human-otter conflicts, studies on water contaminants, and even update distribution gaps. Modification and fragmentation of habitat, overfishing, water contamination, mismanaged ecotourism, predation by dogs and poaching remain as the main threats for all South American otters. Conservation actions such as creation of protected areas, increase the public awareness through media campaigns, and enhance legal protection are essential for the future of these species.



3.5

**Conservation genetics of giant and Neotropical otters in the Brazilian Amazonia using genome-wide data**

Author(s): Vania Carolina Fonseca da Silva, Alan Rus Hoelzel

Affiliation(s): Department of Biosciences, Durham University, UK

Since recent molecular technologies started being used in conservation genetics, a wide range of opportunities has opened to shed light on the study of threatened species, allowing researchers to discover patterns that can reveal key risks and the potential for mitigation. Understanding the processes underlying those genetic diversity patterns and effective population size in natural populations is of utmost importance for effective conservation planning.

Giant and Neotropical otters are currently facing threats expected to lead to major reductions in population sizes over the next two decades. Since sound demographic data are lacking and difficult to obtain, especially in vast areas such as the Brazilian Amazonia, the development of conservation strategies requires the ability to make transferable inference, for which genetics can be a powerful tool. We will present the methodology and preliminary results of the first study on Brazilian otters using high-resolution genetic analyses and a novel approach of DNA target capture in otter scats. The main goal of this study is to provide knowledge on the diversity, insularity and effective size of otter populations as well as on the pattern of connectivity among regions, through a comparative analysis of a social versus a solitary species of otter.

3.6

**The Natural Recolonization of Long Island N.Y. by the North American River Otter (*Lontra canadensis*)**

Author(s): Mike Bottini

Affiliation(s): Long Island Nature Organization

Long Island, New York is the largest island in the contiguous United States whose numerous tidal estuaries and freshwater ponds provide excellent habitat for the otter. As a result of several factors, including unregulated trapping, the otter was considered extinct on the island by the early 1800s. Field studies in the 1960s found no evidence of otters on Long Island. Natural recolonization of the island faces several challenges, including the presence of a highly urbanized landscape (New York City) at the closest point to the mainland. Records of otter sightings and roadkills dating back to the mid-1990s were used to conduct an island-wide otter latrine survey in 2008. This documented the successful recolonization of portions of the island's north shore. A 2013 latrine survey on nearby Fishers Island confirmed that island as a potential source of recruitment for eastern Long Island via a twenty-mile-long archipelago of islands. In 2018, a series of citizen science workshops were held to train people in otter latrine survey techniques. The 2018 survey results revealed that over the past decade otters have significantly expanded their range on Long Island despite its highly developed and fragmented landscape.



3.7

**Case La Ventanilla**

Author(s): Ricardo Gonzalo Correa

Affiliation(s): Lawyer, OSG Member Valparaíso Chile

In Chile, marine otters, common "chungungo", are protected by law, considered a hydrobiological species, in a Vulnerable state, with a 30 year closure ban (DS 225-1995), campaigns from the NGOs. The purpose of sensitizing the communities about the presence of these sea otters, on our coastal edge, unfortunately, even today, is largely unknown by the population in general, as well as by the State itself. This situation becomes critical for the species, at the time of submitting to environmental evaluation the intervention projects in the coastal border, since the intervening authorities with competence in these evaluations territorial environmental, omit the presence of *L. felina*.

We will analyze the intervention of the group "La Ventanilla" (2017-2019) as an example of conservation "In Situ" of a group of threatened otters and the administrative and legal actions raised and still in development, which have generated favorable reactions from the organisms of the State, so that these situations do not happen again in the future. At present we are working with the authority to develop necessary protocols for said change.

## 3.8

**Estimating African clawless otter, *Aonyx capensis*, densities from camera trap data**

Author(s): Trevor McIntyre[1,2], Tshepiso Majelantle[2], David Slip[3,4] and Robert G. Harcourt[4]

Affiliation(s):

[1] Department of Life and Consumer Sciences, University of South Africa, Florida, South Africa

[2] Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, South Africa

[3] Taronga Conservation Society Australia, Mosman, NSW, Australia

[4] Marine Predator Research Group, Department of Biological Sciences, Macquarie University, NSW, Australia

African clawless otters (*Aonyx capensis*) are currently classified as Near-Threatened on the IUCN Red List. However, there is a recognized need for improved population density estimates under a range of habitat types and disturbance conditions to better inform this classification. Here, we firstly describe an approach to model camera trap detection probabilities of otters under a range of conditions. We then use this information to generate otter density estimates for two contrasting environments using random encounter models, while incorporating the modelled effects of (1) otter distances from camera traps, (2) ambient temperature and (3) variance in individual camera trap performance on the overall detection probabilities. Estimated otter densities were 0.76 ± 0.07 otters/km$^2$ in a relatively undisturbed riparian system, but were substantially inflated (3.39 ± 0.25 otters/km$^2$) at a trout (*Oncorhynchus mykiss*) fishing estate characterized by high levels of human disturbance. These results highlight the likely adaptive capacity of African clawless otters, which are seemingly able to exploit the abundant food availability of some artificial environments, while tolerating increased human presence. The methods described here are further broadly applicable and show promise to reliably inform density estimates of otters, as well as other cryptic mammals.



## 3.9

**Human-otter conflict the case of Austria, where otters are again hunted**

Author(s): Dr. Andreas Kranz

Affiliation(s): IUCN SSC OSG / ALKA-KRANZ e. U. Consultancy for Wildlife Ecology and Nature Conservation. Am Waldgrund 25, 8044 Graz, Austria andreas.kranz@alka-kranz.eu

Thirty years ago, the Eurasian otter was almost extinct In Austria. Meanwhile populations recovered and are now widespread throughout most of this central European Alpine dominated country of EU. The recovery causes serious conflicts, both in context of fish farming (trout and carp) and river sport angling interests. In 2017 and 2018 the administration of three federal states have given permissions to trap and shoot otters along rivers, streams and fish ponds. This caused protests from nature conservation NGOs since the permissions are believed to be not in line with the legal framework, the Fauna Flora Habitat Directive of the EU and the federal state laws implementing it. In the follow up court decisions one permission was cancelled and another is pending. The presentation outlines the history and state of the art of this conflict and underlying ecological and economic aspects. However, such human-otter conflicts are also growing in other EU countries and beyond, and neighbouring countries (e.g. Germany) are up and about to follow the approach taken by Austria. Hence the case of Austria may have consequences for otter conservation in general and may serve also as an example for reconciling other human – wildlife conflicts.

4.1

**Otter surveys in the Annamite Mountains of Laos preliminary results, potentials and prospects**

Author(s): Camille N.Z. COUDRAT (presenting author)[1;] Jean-Baptiste DECOTTE[2]; Eric BAIRRAO RUIVO[3]; Tony DEJEAN[4]

Affiliation(s):

[1] Project Anoulak www.conservationlaos.com

[2] Vigilife http://www.vigilife.org/

[3] Beauval Nature http://www.beauvalnature.com/en/

[4] Spygen http://www.spygen.com/

Very little is known of otters' taxonomy, distribution and population status throughout Southeast Asia and this is particularly so in Lao People's Democratic Republic (Laos). Three species have been confirmed to occur in Laos: Vulnerable Asian Small-clawed Otter *Aonyx cinereus, Vulnerable* Smooth-coated Otter *Lutrogale perspicillata* and Near Threatened Eurasian Otter *Lutra lutra,* but their national distribution and conservation status remain unknown. We are conducting otter-focused surveys using camera-trapping and environmental DNA techniques in one of the largest national protected areas in the country: Nakai-Nam Theun, located in the Annamite mountains. Environmental DNA (eDNA) from water samples is an innovative method that has proved effective for surveying aquatic and semi-aquatic species, and has great potentials for surveying otters. The methodology we are using is developed by pioneer in eDNA techniques laboratory SPYGEN. We present the methodology used, preliminary results and next steps. Our findings will contribute to national status reviews, inform conservation plans for otter species in the region and support the development, improvement and validation of survey methods for otters.



4.2

**Investigating the Distribution and Occupancy of Otter Species across Human Modified Landscapes in Sabah, Malaysia.**

Author(s): Annabel Timothy Pianzin*and Anna Wong

Affiliation(s): *Universiti Malaysia Sabah; Malaysian Nature Society, Malaysia*

Only a handful of studies have been carried out on otters in Malaysia, whereas in Sabah, published information on the occupancy or habitat use of otters is absent and accurate distribution of otter species are not well known in Borneo. Therefore, researches focusing on their distribution and ecology are vital as healthy river system and riparian reserves across the state play an important role in their survival. SAFE Project, located within the Kalabakan Forest Reserve, is one of the largest ecological experiments in the world exploring effect of human activities to biodiversity and ecosystem functions. The main purpose of this research is to investigate whether human modified landscapes still possess critical habitat attributes to support otter population. A total of 36 stream segments of 500 m in length, two per stream, were surveyed in 18 streams of four types of habitat treatments: Virgin Jungle Reserve (VJR) – 2 streams, Logged Forest Reserve (LFR) – 6 streams, Riparian Reserve (RR) – 8 streams and Oil Palm Reserve (OPR) – 2 streams. Information gathered from this study will aid in identifying suitable habitat characteristics for otter species and to design a management to best protect intact and altered habitats as otters still depend on them.

Keyword(s): otter, *Aonyx cinereus*, *Lutrogale perspicillata*, distribution, occupancy, riparian reserve, conservation, human modified landscapes.

4.3

**The Current Status of Bornean Otters and Otter Research in Sabah, Malaysia**

Author(s): Leona Wai [1,3,4], Dr Benoit Goossens [1,2,5], Meaghan N. Evans [1,5]

Affiliation(s):

1. Danau Girang Field Centre (DGFC), c/o Sabah Wildlife Department, Wisma Muis, Block B, 5th floor, 88100 Kota Kinabalu, Sabah.
2. Sabah Wildlife Department, Wisma Muis, Block B, 5th floor, 88100 Kota Kinabalu, Sabah.
3. Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah. Malaysia.
4. Institute of Tropical Biology and Conservation(ITBC), Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah. Malaysia.
5. Organism and Environment Division, Cardiff School of Biosciences, Cardiff University, Sir Martin Evans Building, Museum Avenue, Cardiff CF10 3AX, UK.

Despite being one of the richest biodiversity in the world, very little is known about the Bornean otter species in Sabah and otter research is sorely lacking in this biodiverse region. Historically, all four Asian species were recorded to exist in Borneo, however, recent records of all four species are lacking. In Sabah, *L. perspicillata* and *A. cinereus* were commonly seen, but most observations are opportunistic. Meanwhile, the other two species, *L. sumatrana* and *L. lutra* are very rare and were not seen in Borneo for almost 100 years. However, both of this rare species were rediscovered and photographed in the 21st century. The knowledge on the population status, distribution and threats to otters in Sabah remains patchy due to lack of scientific surveys and research. Despite their global population declines, otters are often being neglected and appeared to be given less priority in terms of conservation in Sabah. Therefore, this project aimed to establish the current status of the Bornean otter in Sabah as well as to gather other otter researches has been done and ongoing in the region.

Keywords: *Lutrogale perspicillata, Aonyx cinereus, Lutra sumatrana, Lutra lutra,* Borneo



4.4

**Current Status and Distribution of Otters in Peninsular Malaysia**

Author(s): Pazil Abdul-Patah [1, a)] , Hiroshi Sasaki [3, b)] , Shukor Md Nor [2, c)] ,Nur Syafika Mohd-Yusof [2, d)] , Badrul Munir Md-Zain [2, e)] *

Affiliation(s):

[1] Department of Wildlife and National Parks (PERHILITAN), Peninsular Malaysia, Kuala Lumpur, Malaysia

[2] School of Environmental Science and Natural Resource, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Selangor, 43600 Bangi, Malaysia

[3] Chikushi Jogakuen University Junior College, Dazaifu, Japan

A study on the distribution and ecology of otters (Mustelidae) was investigated in all states in Peninsular Malaysia. Four species of otters have been recorded in Peninsular Malaysia in the past. These are Asian small-clawed otter (*Aonyx cinereus*), Smooth-coated otter (*Lutrogale perspicillata*), Hairy-nosed otter (*Lutra sumatrana*) and Eurasian otter *(Lutra lutra*). This study was conducted to determine the exact number of otter species using DNA sequences of the D-loop and Cyt-b region and to examine otter's distribution in Peninsular Malaysia. These results imply that only three species of otters present in Peninsular Malaysia namely *A. cinereus, L. perspicillata* and *L. sumatrana.* All these three species found in Perak, Kelantan, Pahang, Selangor and Johor while other states only inhabited by *A. cinereus* and *L. perspicillata*. The recent discovery of the *L. sumatrana* has confirmed that this species still exists in Peninsular Malaysia since it was last recorded in 1995. The cooperation of all sectors of society is needed to ensure the survival of otter species in Peninsular Malaysia.

4.5

**Management of Human-Otter interactions in urban environments - Singapore**

Author(s): Max Khoo [1,2] , Tianjiao Li [1,2] , Rekha Mohan [1,2] , Jeffery Teo [2] , N. Sivasothi [2,3] , Adrian Loo [1,2]

Affiliation(s):

[1] National Parks Board, Singapore

[2] Otter Working Group, Singapore

[3] Department of Biological Sciences, National University of Singapore

Smooth-coated otters in Singapore are not confined to waterways, but utilise and search surrounding riparian and terrestrial areas for drying, resting points, spraints sites, holts, and new foraging sites. This brings them into urban areas and thus interactions with humans who utilize similar areas (e.g. park users, workplace users, residents) are inevitable. The Otter Working Group (OWG) in Singapore, chaired by the National Parks Board, compromises of government, non-government entities, and individuals. OWG work collectively on solutions using a multi-stakeholder approach to address a variety of situations such as providing advice in scenarios with human-otter interaction, otter rescue and release operations, outreach events, and more. The responses by OWG have been informed by experiences of the IUCN/SSC Otter Specialist Group, and are developing over time with the various expertise of OWG members. The uniqueness of such a situation in Singapore, especially with the involvement of public in a highly urban context, require an adaptive ability to respond to novel situations. With time, these responses are being codified into Standard Operating Procedures.



4.6

**The return of the smooth-coated otter to Singapore: distribution, growth, public perception and conservation management**

Author(s): Sivasothi N., Meryl Theng & Max Khoo

Affiliation(s): Department of Biological Sciences, National University of Singapore

Resident otters disappeared in a rapid developing Singapore by the 1970's. However, cleaned waterways, protected areas and increased green cover eventually enabled the smooth-coated otter (*Lutrogale perspicilata*) to return from southern Malaysia in the late 90's. Some 70 individuals in about 10 families are resident now, many living off an abundant diet of mostly exotic cichlids. Rivers canalised for recruitment and storage of rainwater, lack sloping banks or riparian vegetation. Still, smooth-coated otters have utilised semi-natural and artificial habitats alongside rivers with families raising multiple litters to reach social groups of 16. Otters are challenged by urban barriers and roads but are largely indifferent to or tolerant of people. An appreciative public has limited conflict. Enthusiastic otter-watchers who share reports and photos on Facebook (OtterWatch & OtterCity), provide detailed spatial information on What's App, enabling management by the Otter Working Group, which consists of government and non-government entities. They champion prevention/ mitigation of conflict, public outreach, and have facilitated the rescue of individuals, and carcass recovery for autopsy. The unique proximity of urban otters in Singapore have contributed to a better understanding of the ecology and behaviour of these otters in Asia.

4.7

**Distribution status of otters in coastal wetlands of southern Thailand**

Author(s): Wanlop Chutipong[1], Naruemon Tantipisanuh[1], Dusit Ngoprasert[1], Worata Klinsawat[2], Anucha Kamjing[1], Pongnapa Wongtung[1], and Kitipat Phosri[2]

Affiliation(s):

1 Conservation Ecology Program, Pilot Plant Development and Training Institute, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

2 School of Bioresources and Technology, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

Coastal wetlands in Thailand are encroached and diminished in size and quality in the expense of agricultural expansion, human settlements, and coastal developments. These habitats may be strongholds for some of globally threatened mammal populations such as otters, but they are under-surveyed. We survey Andaman coastal wetlands in southern Thailand using direct observation on line transects, camera-traps, and questionnaires to assess distribution status and threats to otter populations between July 2016 and September 2018. Smooth-coated Otter and Asian Small-clawed Otter were camera-trapped in 65% and 39%, respectively, of 171 grid-cells surveyed (approximately 4,275 $km^2$). Breeding populations were detected in both otters, based on direct sighting and camera-trapping. More than 54% of local fishermen interviewed (n=187) opined that otter populations had declined in the past 20-30 years. They attributed it to anthropogenic causes, including hunting for pelt trade and consumption, keeping for pet, harassment by domestic dogs, prey depletion, and habitat loss. Survey results are periodically updated with the government agency in charge of wetlands management and conservation to highlight areas of high conservation value, as part of the current landuse zoning program. Surveys will be continued in the eastern coast and expected to be completed by 2022.



4.8

**Conservation status of otters in Vietnam**

Author(s) and Affiliation(s): Daniel Willcox and Le Van Dung, Save Vietnam's Wildlife, Cuc Phuong National Park, Vietnam

It is well-known what a poor state Vietnam's wildlife is in. Decades of overexploitation for the illegal wildlife trade and poor governance have combined to cause a biodiversity crisis in the country.

The country's four otter species have all suffered. If still present at all in Vietnam, Smooth-coated Otter is probably very rare. The status of Eurasian Otter is uncertain and it may persist in higher altitude protected areas. Asian Small-clawed Otter is reliably recorded in one protected area but its status in others is very uncertain. The current conservation status of Hairy-nosed Otter in Vietnam (formerly known from the Mekong Delta north to Hue) is unknown.

Although not yet at the level seen in Thailand or Indonesia, Vietnam's demand for exotic pets, including otters, is growing and is an emerging threat. There have been 13 Small-clawed Otters received by SVW's rescue centre in the last 18 months. Identifying how best to rehabilitate these otters is challenging. This presentation will give an update on otter conservation in Vietnam, including efforts by SVW to address the otter pet trade, and a recent update on Hairy-nosed Otter status in U Minh, where a 2018 captive record gives hope to the species's persistence there.

4.9

**Ecology and Behavior of Smooth Coated Otter *Lutrogale perspicillata* in Myanmar**

Author(s): Nobuhiro Ohnishi[1], Kyaw Yadanar Min[2], Ye Htet[2], Khin Swe Oo[2], Kay Thi Mya[3], Khin Ohnmar Htwe[4], Myint Myint Soe[5], Than Zaw[6], Ai Suzuki[7], Kyaw Myo Naing[8], Wai Wai Hnin Kyaw[8]

Affiliation(s): 1: Kyoto University of Advanced Science, 2: Myeik University, 3: Pinlon Uiversity, 4: Myanmar Environment Institute, 5: Friends of Wildlife, 6: Wildlife Conservation Society Myanmar Programme, 7: Tokyo Metropolitan University, 8: Pathein University

The ecology and the behavior of Smooth-Coated Otter *Lutrogale perspicillata* were investigated in Myanmar from March 2016 to January 2019. We found *L. perspicillata* in the mangrove area of Ayeyarwady Region and Tanintharyi Region.

The behavioral study was conducted in Taninthryi Region, the southernmost part of Myanmar. We tried to observe otters from the boat and also used the trap cameras. Both groups and solitary individuals were observed in the mangrove area. This species seems diurnal in this area. They occurred in the main stream of the mangrove during the low tide periods. They swam along the shoreside of the mangrove and preyed on fishes and the mantis shrimp during their move. Sometimes, they were rubbing themselves against the tree and rolling on the ground. According to local villagers, *L. perspicillata* nested on the hole of the large tree or the gap of stones in the mangrove area.

There were few information of the distribution of the otter species in Myanmar (Than Zaw et al., 2008). We will add some records of the distribution of otters in Myanmar.



5.1

**Revisiting Pocock's treatment of Eurasian Otter *Lutra lutra***

Author(s) and Affiliation(s): Daniel Willcox, Save Vietnam's Wildlife, Cuc Phuong National Park, Vietnam

Eurasian Otter *Lutra lutra* taxonomy is poorly understood. The species distribution is very large; it is known from Palaearctic Africa, Europe, and temperate and tropical Asia. Whilst populations in Europe are well-known, the same cannot be said of populations of Asia. This is a barrier to Eurasian Otter conservation; there may exist highly threatened species or subspecies of 'Eurasian Otter' in Asia that have not yet been identified. Recent verifiable records from India have indicated how distinctive this species's Asian populations can be from its European counterparts. Japan's Eurasian Otter population is considered a separate species *Lutra nippon*, though it is now, sadly, thought to be extinct.

R. I. Pocock identified seven subspecies of Eurasian Otter; this presentation will revisit this treatment based on the specimens lodged at the British Natural History Museum. Eurasian Otter shows striking morphological variation across its range and there are distinctive groupings for some populations in India and Sri Lanka. This initial assessment will hopefully serve as a foundation for a more rigorous taxonomic investigation into this species, as well as provide a note of caution into overconfident identification of Eurasian Otter in Asia, when so little is known about its populations in the region.

5.2

**Sea otter genetics update: Diversity, population structure and taxonomy**

Author(s): Dr. Shawn Larson

Affiliation(s): Curator of Conservation research, The Seattle Aquarium, 1483 Alaskan Way, pier 59, Seattle, WA 98101, USA, s.larson@seattleaquarium.org

Sea otters, *Enhydra lutris*, were once abundant along the nearshore areas of the north Pacific Rim from northern Japan to Baja California, Mexico. Starting in 1741 the Pacific maritime fur trade eliminated sea otter populations throughout nearly all of their range and by 1910 resulted in 13 small scattered populations, totaling less than 1% of their original abundance. Previous work found lower genetic diversity in sea otters sampled in the early 1990s compared to pre-fur trade samples. Sea otter populations were re-sampled between 2008-2011 throughout much of their range and analyzed using 20 microsatellite markers. Here we report genetic diversity and population structure compared to samples collected 20 years earlier. Genetic diversity was found to increase in most sampled locations but particularly in those founded by translocations founded by more than one population and those experiencing immigration from adjacent groups. We also investigated taxonomic relationships between populations. There are currently three recognized sea otter subspecies based on skull morphology: Russian (*E.l. lutris*), Northern (*E.l. kenyoni*), and Southern (*E.l. nereis*). Microsatellite and the mitochondrial DNA D loop variability suggest there may be more than three taxonomically distinct populations.



6.1

**Otter conservation in Hong Kong: The value of local people**

Author(s): Sharne E. McMillan*, Billy C.H. Hau, and Timothy C. Bonebrake

Affiliation(s): The University of Hong Kong

* Presenting Author: sharne_mcmillan@hotmail.com

Although little known, Eurasian otter (*Lutra lutra*) persists within the wetland habitats of densely populated Hong Kong. We know very little about this population due to its rarity and elusive nature. However, it now appears to be restricted to a wetland area dominated by commercial fishponds and intertidal shrimp ponds. The broader area has seen rapid urban expansion since the 1980s and now forms part of the world's largest megacity, the Pearl River Delta. In the absence of fundamental knowledge of the otter population, means of adequate protection from increasing development pressure and successful conservation and management of this species, is not possible. We investigated the value of local ecological knowledge (LEK) and human dimensions in conservation in providing timely, baseline information on which to develop management and conservation strategies. We found an intimate relationship between this rare carnivore and the local people who live and work in the aquatic habitats that they share. LEK provided evidence for small population size, decline in otter numbers and distribution over recent decades, and potential for threats to the otter population. We show that understanding local attitudes can point a way forward for otter management in increasingly under-pressure and urbanised landscapes.

6.2

**Re-discovery of the Eurasian otter *Lutra lutra* after extinction in Japan.**

Author(s) and Affiliation(s): Hiroshi SASAKI* (Chikushi Jogakuen Univ.), Takeshi SEKIGHCHI (Kyushu Univ.) , Masako IZAWA (Ryukyu Univ.) , Nozomi NAKANISHI (Ryukyu Univ.), Daisuke WAKU (Tokyo Univ. of Agriculture), Akihiro YAMANE (Seinan Gakuin Univ.)

In Japan, the last otter was observed at Kochi Pref. in 1979 before our finding and Government declared their extinction in 2012. In Feb. 2017, one otter was recorded at Tsushima Island, located between Korean and Kyushu Island in Japan, by a photo-trap which was set for survey of leopard cat. Surveys in July, from August to September 2018 and in Dec., 2019 were conducted to study their distribution and number. Photo traps were set from Dec. 2018 to Mar., 2019 for otters and feces has incidentally been collected by support of naturalists. Otters were recorded by photo-traps four times. DNAs were extracted from collected feces and 12 feces of otters were confirmed by Mitochondrial DNA. DDX3X, DDX3Y and SRY genes on sex chromosome were used for sex identification and micro-satellites for individual identifications. Existence of two males and one females at least were confirmed. Locations of feces were scattered through the island, and they might not be sedentary. Otters were recorded only in about 1735 and 1809 at this island. Haplotype of mitochondrial DNA coincide with it in southern parts of Korea. These otters are assumed to come to Tsushima Island by Tsushima current.



6.3

**Otter monitoring surveys - Otter fecal (spraint) densities at the large scales mean status of the population**

Author(s): Sungwon Hong[1*], Mirko Di Febbraro[2], Anna Loy[2], Gea-Jae Joo[1]

Affiliation(s):

[1] Department of Biological Sciences, Pusan National University, Busan 46241, Republic of Korea

[2] Department of Biosciences and Territory, Universita del Molise, Contrada Fonte Lappone, I-86090 Pesche, Italy

Over 30 years, use of spraint (otters' feces) density for monitoring the population has been debated. In this study, we investigated otter spraints densities at the large scales (23,800km$^2$, a quarter of South Korea) during four years (2014 – 17). During three years (2014 – 16), we surveyed at 250 sites and made models with 28 environmental factors (six landscape, eight anthropogenic, 13 aquatic health indices, and one prey abundance factors) using Generalized Linear Mixed Models (GLMM) with repeated measurements using four different distributions, and validated the equation using 355 sites data of 2017. In addition, to clarify the spatial heterogeneity of spraint densities distributions, we applied the global Morans' I test and hot spot analysis. The most parsimonious model with zero-inflated model well explained spraint densities were significantly affected positively by BMI, precipitation, and negatively by Z_Water. In addition, zero-inflation model showed that spraint absences were significantly affected positively by human population, and negatively by Fish_No and Altitude ($r^2$ = 0.64). However, the predicted spraint densities at 355 sites for 2017 did not highly correlated with the observed densities ($r^2$ = 0.11). The geographical analysis showed regional clusters extending to more than 50 km. Although prediction failed as otter population have been flexibly adapted, the spatial heterogeneous spraint densities related with aquatic healthy elucidated the status of otter populations.

Key words: Non-invasive monitoring; Endangered species; Conservation; Generalized Linear Mixed Model; Republic of Korea

7.1

**Molecular dietary analysis of Eurasian otter in Tangjiahe National Nature Reserve**

Author(s): Qiaoyun Wang, Jiajian Zhou, Lu Zhang, Li Yang, Pengfei Fan*

Affiliation(s): State Key Laboratory of Biocontrol, School of Life Sciences, Sun Yat-Sen University, Guangzhou, Guangdong, China

The Eurasian otter (*Lutra lutra*) is a top predator that mainly feeds on fish in many freshwater ecosystems. Dietary analysis of otters is an important way to study food webs and to understand how preys affect the ecology of otters. Conventional dietary analysis usually acquires data through microscopic examination of food remains in feces, which requires extensive knowledge of morphology of potential preys, while providing imprecise identifications. DNA barcoding combined with Second Generation Sequencing provide an alternative method to generate precise dietary information from faeces. We surveyed abundance and diversity of potential preys in Tangjiahe National Nature Reserve and collected tissue samples of each species. We designed 13 universal primers for vertebrates, and applied them on DNA extractions from tissue samples of preys and otter faeces to test their application efficiency. Our research will provide a tool to study the diet of otters, which will help to better understand the ecology of otters in China and provide essential information for effective conservation management.



7.2

**Dietary analysis of Eurasian otter (*Lutra lutra)* using Genetic markers specific to the prey species for Korean otter**

Author(s): Dae-Cheol Jeong, Han-Chan park, Mi-Sook Min and Hang Lee

Affiliation(s): Conservation Genome Resource Bank for Korean Wildlife, Research Institute for Veterinary Science and College of Veterinary Medicine, Seoul National University, Seoul 08826, South Korea

While Eurasian otter (*Lutra lutra*) is widespread species of otter, it has been decreased in the Korean peninsula because of poaching, habitat loss, etc. Here, we conducted diet analysis study for Eurasian otter using genetic marker that enable more accurate analysis of prey species than morphological identification, providing the basis for conservation research for endangered species. There have been many diet studies using genetic tools such as species-specific primer, universal primer with blocking oligonucleotide. Here, we newly designed several group specific primers in our research that amplify DNA from the targeted prey taxon and do not amplify predator's DNA by tracking down differences in gene sequences between prey group and predators. These primers were designed to partially amplify 12SrRNA, 16SrRNA and COI genes in mitochondrial DNA. And then, we performed diet analysis of Eurasian otter using fecal samples collected from Gang-won province, Korea and were able to identify several prey species through this analysis.

Keywords: Eurasian otter, Dietary analysis, Genetic marker, 12SrRNA, 16SrRNA, COI, Conservation

7.3

**Diet study on Eurasian otter in Kinmen Island using DNA information from faeces**

Author(s): Nian-Hong Jang-Liaw

Affiliation(s): Conservation and Research Center, Taipei Zoo

In Southeastern Asia, including mainland China, Hainan, Taiwan and Indochina Peninsula, Kinmen Island is currently the only area with stable population of Eurasian otters. In this study we applied the next generation sequencing technology and cocktail polymerase chain reaction assay with using the GenBank/DNA barcoding database to analyze Kinmen's Eurasian otter diet/feeding preference by collecting their faeces in the wild, to understand the species predation behavior and nutritional needs in the wild for increasing our understanding on Eurasian otter ecological information, and providing a scientific basis for the development of in situ conservation planning. Sixty-two faecal samples had been selected and analyzed in this report. At the same time, we wish to investigate the distribution of the population of the Eurasian otter in the neighboring areas, and establish a DNA barcoding database for small animals in the Kinmen Island to strengthen the accuracy of species identification both in the Kinmen and nearby mainland China regions and enhance the contribution of our biological research to global species conservation actions.



7.4

**Group and individual foraging in smooth-coated otters**

Author(s): Philip M Johns, Zhi-Yi Yeo, Chrystal Yong Yun Han, Mei-Mei Heng Yee Tan

Affiliation(s): Yale-NUS College, Science Division (Life Sciences), 28 College Ave West, Singapore 138533

Smooth-coated otters (*Lutrogale perspicillata*) returned recently to Singapore, and the viewing conditions in an urban environment provide an unparalleled opportunity to study otter behaviours. Smooth-coated otters live in family groups and sometimes engage in cooperative foraging. Other times smooth-coated otters forage individually. In other otter species, group foraging has been examined in relation to foraging efficiency. Here we present data that supports the hypothesis that group foraging, or "herding", is primarily a means by which smooth-coated otters train pups to forage. We discuss our findings in the context of other otter species as well as other mammals. We also present preliminary data on individual foraging and its relationship to optimal foraging theory. We discuss our findings in relationship to cooperative brood care in otters and other species.

7.5

**Pharmaceuticals in otters from Sweden**

Author(s): Anna Roos[1], Katarina Loso[1] and Johan Fång[2]

Affiliation(s):

[1]Dep of Contaminant Research and Monitoring, Swedish Museum of Natural History, Box 50007, SE-104 05 Stockholm Sweden

[2] IVL, Swedish Environmental Research Institute, Box 210 60, SE-100 31 Stockholm, Sweden

We have analyzed 30 different pharmaceuticals in blood and urine from otters. We found all pharmaceuticals, but not all 30 in all samples. Some were found in blood, others in urine. Several compounds were found below limit of quantification (<LOQ), which means that they were seen in the sample at such low concentrations it was not possible to quantify concentration.

The antidepressant medicine Venlafaxin was found in all ten blood samples (0,24-2,0 ng/g w.w.) but not in urine samples. Risperidone (a drug for schizophrenia) was found in measurable amounts in 7 of the ten blood samples (4,3-250 ng/g w.w.) and seven of ten urine samples (0,12-46 ng/g w.w.).

The highest number of pharmaceuticals in urine was found in an otter from Västervik, south-western Sweden. (11 pharmaceuticals + 4 <LOQ). That individual had seven measurable pharmaceuticals in the blood (+ 4 st <LOQ).

We found more measurable pharmaceuticals in urine compared to blood, with one exception (Venlafaxin). It is possible to take blood sample from most otters sent for necropsy but many of them have an empty or empty bladder so we were forced to pool samples. Therefore we will focus on blood analyses in the future.



7.6

**Investigating Microplastic Ingestion in Sea Otters Through Scat Analysis**

Author(s): Jennifer E Van Brocklin

Affiliation(s): United States, Oregon State University

The presence of microplastics in aquatic environments is becoming an increasing concern due to their potential impacts on marine and aquatic species. In order to investigate how otters may be affected by these pollutants, we will be assessing the number and type of microplastics sea otters and North American river otters are ingesting by analysing diet and scat samples in ex- and in-situ individuals. We will also be exploring the possible change in microplastic load sea and river otters have experienced over time by observing microplastic presence in archived scat samples. Methods for analysis will include passing samples through a series of sieves to collect microplastic particles and identifying the particles using a microscope and Fourier-Transform Infrared spectroscopy.

8.1

**Poo Power: non-invasive monitoring of stress-related physiological responses in African clawless otter**

Author(s): Tshepiso Lesedi Majelantle[1], Trevor McIntyre[1,2], Andre Ganswindt[1]

Affiliation(s):

[1]Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria 0028, South Africa

[2]Department of Life and Consumer Sciences, University of South Africa, Pretoria 0003, South Africa

The potential usefulness of monitoring physiological stress non-invasively specifically applies to cryptic animals such as the African clawless otter (*Aonyx capensis*), as it is feedback free and animals do not have to be monitored within sight. Thus, we aimed to establish a method for quantifying faecal glucocorticoid metabolites (fGCMs) in African clawless otters by frequently collecting faeces from one captive adult male African clawless otter prior, during, and after translocation as a form of biological validation. From the five different enzyme-immunoassays (EIAs) tested, a cortisol and oxoaetiocholanolone (measuring 11,17 dioxoandrostanes) EIA revealed the highest transport-related response (1.5 and 2 fold, respectively) three days later. The cortisol EIA was solely used for subsequent analyses due to lower fGCM baseline variability (cortisol: 1.01 ± 0.31 ug/g dry weight (DW) (mean ± SD) vs oxoaetiocholanolone: 1.36 ± 0.86 ug/g DW). There was no significant difference (p = 0.811) in fGCM concentration between fresh samples collected during the day (n = 10; 0.704 ± 0.133 ug/g DW) and night (n = 10; 0.660 ± 0.125 ug/g DW). These results provide a new scope for monitoring physiological correlates in both captive and free-ranging African clawless otters.



8.2

**Otter latrines as carnivore-biodiversity hotspots?**

Author(s): Casey J. Wagnon, Kelly J. Pearce, and Thomas L. Serfass*

Affiliation(s): Department of Biology, Frostburg State University, 101 Braddock Road, Frostburg, MD 21532, USA

We evaluated the efficacy of placing camera traps at river otter (*Lontra canadensis*) latrines (discrete sites in riparian areas where otters regularly deposit scats, urine, and anal secretions) to detect other carnivores occupying Great Swamp National Wildlife Refuge, New Jersey and Grand Teton National Park, Wyoming, USA. We speculated that scents at latrines may serve as an attractant to other carnivores and evaluated this premise by using camera traps to compare carnivore detection rates (overall and by species) and richness (overall and for each survey month) between latrine and non-latrine riparian-control sites at each study location. Overall, carnivore detections at latrines were >10 times than at non-latrine sites, and overall carnivore richness and biodiversity were likewise much higher at latrines. The majority of carnivores known to occupy the study areas were detected at otter latrines. Our study provides compelling evidence that placement of camera traps at otter latrines may serve as a new and novel approach for monitoring carnivore populations in riparian areas.

*Corresponding author and presenter (tserfass@frostburg.edu)

8.3

**Regional Differences in Wild North American River Otter (*Lontra canadensis*) Communication**

Author(s): Sarah N. Walkley[1,2], Maria E. Zapetis[1,2,3], Heidi Lyn[1, 4]

Affiliation(s): 1. Comparative Cognition and Communication Lab, 2. Wild Otter Acoustics, 3. National Marine Mammal Foundation, 4. University of South Alabama

Vocalizations are a seldom studied aspect of North American river otter (*Lontra canadensis*) behavior. Their vocalizations are thought to communicate alarm, distress, safety, or to locate nearby individuals. This study examined the repertoire and context of vocalizations produced by wild river otters living in New York and California. These regions are home to distinct river otter populations as they are separated by significant distance (>4,500 kilometers). River otter vocalizations and behaviors were recorded using infrared motion activated trail cameras that were placed in areas of high river otter activity at multiple locations within each region. Recorded vocalizations were separated into categories based on their appearance on a spectrogram, and parameters including frequency (high, low, first quarter, center, third quarter, peak), power (average, max), and duration were measured for each call. To determine the behavioral context of vocalization types, analysis of associated behaviors was conducted. Results of this study elucidate the purpose and variation of vocal communication in river otters, adding to the current understanding of otter behavior and cognition.



8.4

**Smooth-coated otter behavior and presence of hairy-nosed otter in the coastal mangroves of southwest Cambodia**

Author(s): Vanessa Herranz Muñoz, Reaksmey Sophatt, Sothearen Thi, Sarady Moul, Sodavy Gnim

Affiliation(s): Centre for Biodiversity Conservation (Kla Trey | Cambodian Fishing Cat Project)

Since early 2017, our research and conservation actions have targeted fishing cat in Peam Krasop Wildlife Sanctuary (PKWS), on the southwest coast of Cambodia. PKWS covers 237.5 km2 and holds a regionally significant mangrove forest. Camera-traps were set to take both photographs and videos and provided extensive data on behaviour of smooth-coated otters. Hairy-nosed otter was recorded on a mixed mangrove stream, at a location also used by smooth-coated otters. We analysed 315 videos showing smooth-coated otter behaviour at five grooming sites recorded from February to August 2017. We found otters stayed on average 18 minutes, from two minutes to over two hours. Visits usually start with rolling and digging behaviour, then resting and finally marking by urinating and defecating while “dancing” stomping the ground with their feet and “sweeping” it with their tails. One individual could be identified by a snare injury and appeared to be the dominant male of its group; he spent most of his time “dancing” while the others were rolling and resting. Audio files with calls are being extracted to collaborate on smooth-coated otter communication research in Cambodia and Singapore. Our project also works with local communities and authorities to reduce threats to wildlife.

8.5

**Habitat selection of smooth-coated otters in a water hyacinth-invaded river system in the Deccan Plateau landscape**

Author(s) and Affiliation(s):

1. Aditya Banerjee, Post-Graduate Programme in Wildlife Biology and Conservation, Wildlife Conservation Society-India & National Centre for Biological Sciences.
2. Dr. Devcharan Jathanna, Associate Director, Conservation Science, Wildlife Conservation Society-India
3. Dr. Divya Vasudev, Associate Director, Conservation Science, Wildlife Conservation Society-India
4. Dr. Varun Goswami, Associate Director, Conservation Science, Wildlife Conservation Society-India

Water hyacinth, a ubiquitous mat-forming invasive that has spread worldwide, affects physical and chemical properties of water, and impacts population dynamics and community composition of aquatic taxa. Invasion of such macrophytes could influence habitat selection of semi-aquatic mammals, like otters. This study, conducted in the Tungabhadra river in Karnataka, attempted to assess this putative influence of hyacinth on smooth-coated otters. 64 3km-long segments, sub-divided into ten 300m spatial replicates, were sampled for fresh spraints to assess occupancy probability, which was modelled with hyacinth cover and other habitat factors. Hyacinth cover was shown to have an insignificant, yet positive effect on occupancy probability, while other habitat factors like depth, vegetation height and grazing intensity seemed to explain otter occurrence almost as well. Otter occurrence was inversely affected by vegetation height and grazing intensity, and peaked at intermediate values of depth. While it is possible that otters could be selecting for areas with high hyacinth cover, potential scale mismatches between home-range-scale habitat selection and hyacinth cover could lead to incorrect and incomplete relationships. As corroborated by *ad-libitum* behavioural data, selection at finer scales and grouped by activity states could better inform the impact of water hyacinth on otters.



9.1

**Spotted-necked otter's distribution and determining factors of habitat occurrence in the lower Ouémé valley, Southern Benin**

Author(s): Samson DOGNIMON[1], Chabi A.M.S. DJAGOUN[1], Sylvie DJEGO[1], Hugues A. AKPONA[1,2], Julien DJEGO[1], Brice SINSIN[1]

Affiliation(s):

[1]Laboratory of Applied Ecology, Faculty of Agronomic Sciences, University of Abomey-calavi, 01BP526 LEA-FSA, Cotonou, Benin

[2]Direction Générale des Forêts et des Ressources Naturelles, BP. 393 Cotonou, Bénin.

Spotted-necked otter is present in several major river systems in southern Benin, and their environmental requirements link them to food and water security issues as the region is so densely populated by humans. The lack of baseline data on their distribution and ecology is another major constraint that the species is facing in Benin. The present study aims to determine otter's distribution and factors affecting the habitat selection in a highly human impacted environment. We conducted a survey on Spotted-necked otter presence/absence in the localities in the lower Ouémé valley in Southern Benin using the non-probabilistic "snowball" sampling method. We then assess the habitat and environmental requirements of Spotted-necked otter from field observations. The spotted-necked otter has shown a wide distribution in southern Benin with the presence signs confirmed in 89% of recorded sites from local perception. According to variables explaining the presence only habitat characteristics such as vegetation cover was significant. The Spotted-necked otter did show a surprising flexibility in their environmental requirements. Our results demonstrate a high adaptability of a threatened carnivore to altered landscapes and show how this flexible behavior opens opportunities for recovery.

Keywords: Spotted-necked otter, Distribution, Habitat choice, *Ouémé* valley

9.2

**Venerable otters: Ecology and conservation of Asian-small clawed otter (*Anoyx cinerea*) in river Moyar, Western Ghats, India.**

Author(s): K.Narasimmarajan[1] and M. T. Mathai[2]

Affiliation(s):

[1-]Ph.D Student, Dept. of Zoology, Madras Christian College, Tambaram, Chennai-600059, India.

[2]- Associate Professor, Dept. of Zoology, Madras Christian College, Tambaram, Chennai-600059, India.

We studied the ecology of *Aonyx cinereus* in river Moyar, Western Ghats between 2015 and 2017, using otter signs as an indicator. Occupancy based framework was used to determine their ecology. We assessed their encounter rate, relative abundance and factor affecting the otter occupancy as a function of the habitat covariates.

However, otter distribution was highly influenced by habitat characters and disturbance therefore, seasonal occupancy was high in summer and it drastically declined in winter and post monsoon respectively. Altitude, dry leaf litter cover, river width/depth and disturbance were the best predictors of *Aonyx cinereus* occupancy in Moyar. Sampling time, therefore, indicated that otter movements only restricted above 950 masl in post monsoon and winter but, they moved up to 600 masl during summer towards downstream, whereas we found three active breeding dens. Hydro-electric projects, sand mining and invasive species are impacting the otter occupancy. Over 80% of otter spraints contained crustaceans.

Conservation initiatives were implemented in association with communities and other stakeholders to support otter conservation efforts in Moyar region. Further, we recommend that the river Moyar ecosystem conservation plan, should be drafted to preserve the thriving Moyar ecosystem, inhabiting many enigmatic species.



9.3

**Evidence for seasonality in scat marking by North American River Otters**

Author(s): Thomas L. Serfass

Affiliation(s):Thomas L. Serfass, Department of Biology, Frostburg State University, 101 Braddock Road, Frostburg, MD 21532, USA (tserfass@frostburg.edu)

Monthly variation in scat marking by river otters (*Lontra canadensis*) was examined in riverine habitats at various study sites in Pennsylvania and Maryland, USA. The assessment was based on walking surveys to detect otter latrines and monitoring otter activity at latrines with remotes cameras. Scat-marking frequency and intensity fluctuated on a monthly basis. Peak periods of scat deposition occurred during March-April (spring) and September-November (fall), with much lower rates of marking and latrines visits during June-August. Increased marking in March-April coincided with increased visitation rates, often by a single otter, whereas increased marking in September-November was the result of latrine visits by larger groups of otters. I believe the peaks in scat deposition are related to increased marking by adult males during the spring breeding seasons and increased marking by family groups (mother and her cubs) in the fall. The efficiency of conducting riparian surveys to detect evidence of river otters will be greatly enhanced by conducting riparian surveys during increased periods of otter marking in spring and fall.

9.4

**Aquatic Habitat Classifications: Implications for Otter Conservation**

Author(s): Robert P. Brooks

Affiliation(s): Riparia, Department of Geography, Pennsylvania State University, University Park, PA, 16802, USA; rpb2@psu.edu

Otters, as flagship species in aquatic habitats, are essential members of faunal communities in wetland, riverine, riparian, estuarine, and marine ecosystems. The ecological niches of each species define which aquatic habitats are used to meet foraging, reproduction, and spatial requirements. Understanding the full range of habitats used can influence how conservation protections are implemented. The distributional ranges of some species are restricted to geographic regions contained within defined political boundaries (e.g., states, provinces, nations) or management units (e.g., river basins, watersheds, conservation reserves), which can facilitate how conservation strategies are applied. For species distributed more widely, the conservation challenges become more complex. Additional factors, such as a species' population status, extent and enforcement of legal protections, and local environmental threats and harvesting practices, also influence how conservation strategies should be and can be implemented effectively. Several aquatic habitat classification systems are examined and matched to known species requirements to illustrate the importance of merging and communicating conservation concerns for otter species with other water-based protections that either carry greater weight or have greater visibility.



9.5

**Habitat of Otters in Peninsular Malaysia**

Author(s): Pazil Abdul-Patah [(1)], Tukimat Lihan [(2)], Badrul Munir Md-Zain [(2)],

Hiroshi Sasaki [(3)], Shukor Md-Nor [(2)] *

Affiliation(s):

[1]Department of Wildlife and National Parks (PERHILITAN), Peninsular Malaysia, Kuala Lumpur, Malaysia

[2]School of Environmental Science and Natural Resource, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Selangor, 43600 Bangi, Malaysia

[3]Chikushi Jogakuen University Junior College, Dazaifu, Japan

A study was conducted to examine habitat preference of three species of otters in Peninsular Malaysia. The locations of otters were gathered in the field and species identification were based on DNA isolated from faeces and tissue samples. Habitat of otters were estimated using GIS by clipping at each location, 5000 m diameter of the land use map. A total of 15 land use types (or habitats) were identified namely agriculture, river, lake, aquaculture, dam, sea, coastal, mangrove, peat swamp, paddy field, ideal grassland, cleared land, forest, settlements, and animal husbandry. Principle Component Analysis (PCA) was conducted to differentiate the habitat preference for each species. *A. cinereus* preferred paddy field, mangrove, coastal and sea, and among these habitats, paddy field is considered exclusive habitat for the species. *L. perspicillata* however preferred lake, dam, and river, and among these habitats, lake and dam are considered exclusive for the species. Although, *L. sumatrana* adapting to many habitat types and overlapping with other species, this is the only species found at peat swamp. Finally, it can be concluded that the otter species in Peninsular Malaysia do have preference for specific habitat although greatly overlapped at certain habitat types such as river and mangrove.

# 10.1

**Visibility of otter activities for zoo visitors**

Author(s): Motokazu ANDO, Mizuki SASAOKA, Asuka DATE

Affiliation(s): Yamazaki University of Animal Health Technologies

To improve understandings of zoo visitors on otters, otter behaviors as well as responses of visitors were investigated at four zoos around Tokyo that had either *Aonyx cinereus* or *Lutra lutra.* In all zoos, otters showed bimodal activity pattern during opening hours. Individuals of *A. cinereus* spent 25-30% of their time sleeping and 10% swimming. In *L.lutra*, they were 50% and 10-30% respectively. Mean sojourn time of visitors at otter enclosures were 110 - 170 sec. for *A. cinereus.* and 30-50 sec. for *L. lutra*. Sojourn time became longest when otters were swimming. When otters were invisible, most visitors left the enclosure within 20 sec. Analysis of visitors' conversation contents indicated that about half of conversations were on otter behaviors, followed by otter ecology and morphology. Questionnaire survey to visitors of *A.cinereus.* enclosures indicated that their interest were mainly in little things that otters did rather than ecology and behavior. Above findings indicate that observing otters at a close distance is important in enclosure design and that more attempts are necessary to direct visitors' interest to otter ecology and conservation.



# 10.2

**Data Saving Species: How Global, Shared Data from Ex-situ Populations Can Help Save Wild Otters**

Author(s): Meredith Knott

Affiliation(s): Species360, Bloomington, Minnesota, USA

Institutions managing captive populations of animals, including zoos, aquariums and wildlife rehabilitation centers, have the ability to help wild populations well-beyond more traditional methods such as public education and locally-based conservation projects. The 1100+ zoos and aquariums contributing data to ZIMS, a global, shared database, are providing standardized data that can be used to help assess data deficient populations, support the fight against illegal wildlife trafficking, and provide invaluable welfare, medical and animal care tools for captive populations that may one day help replenish wild populations. Species360 is actively partnering with conservation organizations to increasingly make this data available to research partners, and this presentation will review some of the potential ways global, shared data may be used to help support otter conservation and research.

10.3

**Characterization of non-invasive monitoring reproductive endocrine profiles from the captive and field Eurasian otters (*Lutra lutra*) in Taiwan.**

Author(s): Jane-Fang Yu, Yu-Chia Chang

Affiliation(s): *Taipei Zoo,* Taiwan

Eurasian otter *(Lutra lutra)* has been categorized as endangered animal in “Wildlife conservation Act” of Taiwan. in the Taiwan area Kinmen island is the only left area with stable population of this species. However Eurasian otter did not breed well in captivity. The Reproductive profile in Eurasian otter is difficult to quantify because little is known about the complex endocrine interactions controlling the reproductive cycle. Our main objectives were to characterize endocrine parameters by longitudinal monitoring of faecal hormone metabolites. In this study, we attempted to identify seasonality breeding, estrus cycle and pregnancy states, sexual maturity, and predict the date of birth in Eurasian otters by examining fecal hormones and behavior both on captive and field animals. Faecal samples were collected from 3 captive Eurasian otters (1 female and 2 male) housed at Taipei zoo (from sub-adults to adulthood) and field samples were collected from Kinmen Qionglin Reservoir and Tai Lake (2017-2018). Non-invasive methods were validated for monitoring fecal metabolites of reproductive hormone (Estrogen, Progesterone and Testosterone) by EIA.

In captivity, faecal estrogens and progesterone in females did not vary by season or month, nor did faecal testosterone in males. During this study, the female one became pseudopregnant one time and pregnant two times. Her sexual maturity age is at 3 years old, total gestation length was 56 and 58 days, and without delayed implantation. Pseudopregnancy exhibited a similar progesterone peak of 55 days which could not be differentiated from pregnancy. Both pregnancy were characterized by a moderate rise in fecal progesterone for 5days post ovulation followed by a marked increase. Due to insufficient study size in the field sample, we could not see significant changes in the reproductive cycle during different seasons. These findings represent the first comprehensive information on normative endocrine of the Eurasian otter in Taiwan. However due to difficulty fecal collection in the wild field, more survey is necessary in the future study.



10.4

**Vocal Communication of the Neotropical River Otter**

Author(s): S. Bettoni [1], C. Rodríguez [1], W. T. Fitch [1], A. S. Stoeger [1]

Affiliation(s): 1 - Department of Cognitive Biology, University of Vienna, Vienna, Austria

Most aquatic mammals have complex social and communication systems. Interestingly, very little is known about otters’ vocal communication compared to other aquatic mammals. Here, for the first time we acoustically describe vocalizations of *Lontra longicaudis*, a solitary and endangered otter species. We recorded vocalizations and behavioural context from seven captive neotropical otters at Projeto Lontra, Santa Catarina Island, Brazil. Analysis of source and filter related acoustics parameters were used to classify the vocalizations according to structure and context. We describe 7 vocalization types emitted in different behavioural contexts. We found highly tonal as well as chaotic vocalisations ranging from 90 to 2500 Hz. Additionally we identified sex difference on the usage of calls. Results suggest that the neotropical river otter has a rich vocal repertoire similar in complexity to other solitary otter species but less complex than that of the social giant otter. This supports the correlation between vocal complexity and sociability found in other species. Despite differences in habitat and sociality, *L. longicaudis* seems to possess vocalizations also found in other otters (e.g. hah or whistle), suggesting phylogenetic inertia in their communicative repertoire. Otters thus offer an interesting but neglected group to explore the evolution of communication systems.

# Poster A1

**Artificial Shelter for the Eurasian Otter *Lutra lutra* in the Yushu City, China**

Author(s): Xuesong Han[1], Xiang Zhao[1], Ge Zhao[1], Zhi Lv[1]

Affiliation(s): [1.] Shanshui Conservation Center, Beijing 100871, China

On the Tibetan Plateau, Eurasian Otter *Lutra lutra* have been through a time of population decline. With the joint efforts of the Chinese Government and several native religion leaders, the otter population prosper in past decade. Under the rapid urbanization in recent years, however, we noticed that otters are losing their natural cavities, especially those used as temporary shelters. Yushu City, among the biggest settlements in the Sanjiangyuan Region with the population over 200,000 people, is located at a T-shaped cross of three rivers, which are all inhabited by the Eurasian Otter. In Nov. 2018, with our self-designed artificial shelters, we made a habitat restoration attempt in the Yushu to help otters safely cross the city. After two months' trial, two of the four shelters we set were used nine times by the Eurasian Otter, and beyond that, Leopard Cats *Prionailurus bengalensis* were also captured for many times, which may suggest that artificial shelters we designed could be an effective way to help otters endure the negative influence from urbanization.



# Poster A2

**Conservation management of Eurasian Otters (*Lutra Lutra chinensis*) in Mai Po Nature Reserve, Hong Kong**

Author(s): Carmen K.M. Or

Affiliation(s): Hong Kong SAR, China, WWF-Hong Kong

The Inner Deep Bay area is one of the few remaining sites with Eurasian Otters in South China. In the Mai Po Nature Reserve, which is a part of Mai Po Inner Deep Bay Ramsar Site actively managed by WWF-Hong Kong in cooperation with Agricultural, Fisheries and Conservation Department of Hong Kong SAR, conservation effort of the Eurasian Otters began in the early 2000s and has included research on the ecology of the species and construction of artificial holts, involving collaboration with local authority and academic institute. To facilitate management, infra-red cameras have been set up by our Reserve staff since 2015 to investigate its distribution, habitat usage and behavioural patterns. Our data revealed a regular use of artificial platforms in both shallow and deep freshwater ponds as resting site and pathway. Breeding in the area is supported by the photo-capture of adult with young in the Reserve on our cameras. Our case highlights the importance of monitoring different habitats, including artificial structures, in the search of otters and the need of collaborative efforts in managing such elusive species. Its population size and trend is unclear, and more research is needed for its conservation in Mai Po and the Deep Bay.

# Poster A3

**Impacts of Aquatic and Riparian Environmental Factors on Eurasian Otter Presence Characteristics in the Nakdong River Basin**

Author(s) and Affiliation(s):

Gee-Hoon Shin, Paikho Rho, Won-Cheol Lee, Department of Environmental Planning, Keimyung University, Daegu 42601, Korea.

Sung-Yong Han, Hyeung-Hoo Kim, Korean Otter Research Center, 578 Gorye, Hanam, Hwacheon, Gangwom 24142, Korea.

Nakdong river basin is a dynamic space where biological communities and abiotic environment elements interact. Although the water environment is suitable for the water environment, the industrial complex and the development of the waterside cause the water pollution to deepen and the living environment of the otter is getting worse. This study aimed to identify the aquatic and riparian factors associated with the presence/absence of the Eurasian otter in the Nakdong river basin, where the species is relatively more abundant than other otter species. Arc-Gis10.x program and chi-square test were used to compare environmental gradients in aquatic and riparian factors between presence and absence sites. Compared to the aquatic attributes, riparian attributes were highly significant when assessing otter presence and absence sites, suggesting that conservation of suitable riparian areas to provide maternity and resting areas for otter species is essential in the Nakdong river basin. None of the aquatic attributes examined were statistically significant when evaluating otter presence or absence. These results indicate that the presence of suitable riparian area for resting and reproduction habitats is more critical to the presence of Eurasian otter than food availability in aquatic areas.



# Poster A4

**Fecal DNA Analysis for Individual Identification of Eurasian Otters (*Lutra lutra*) Living in Naerincheon**

Author(s): Han-Chan Park[1], Gwang-Bae Yoon[2], Dae-Cheol Jeong[1], Mi-Sook Min[1] and Hang Lee[1*]

Affiliation(s):

1. Conservation Genome Resource Bank for Korean Wildlife, Research Institute for Veterinary Science and College of Veterinary Medicine, Seoul National University, Seoul 08826, South Korea
2. Inje County Government, Inje-gun, Gangwon-do 24631, South Korea

The Eurasian otter, *Lutra lutra*, is an endangered species in South Korea that experienced rapid population decrease due to the poaching and industrialization until the 1980's. On the contrary, the otter habitat in Inje County, located in Northern part of South Korea, has been well preserved, so that Eurasian otter individuals have been often observed there. Despite the confirmation of otters in Inje, there has been a lack of otter researches in this area. To evaluate the genetic diversity and the existing number of otters distributed in Inje, 50 fecal samples collected from the Naerincheon stream were subjected to DNA extraction for sex determination and genetic analysis using nuclear genetic markers. Individual identification and relatedness between individuals were determined by genotypic data using seven microsatellite loci, and sex identification was also determined based on sequence variation of the zinc finger protein gene on sex chromosomes. Our results showed that at least nine otter individuals were identified and the kinship relationships between several individuals were confirmed. In conclusion, otters distributed widely in Naerincheon have moderate levels of genetic diversity, and close monitoring of otter population is necessary for conservation of the otters in the area.

# Poster A5

**Seasonal differences in diet and activity of the Eurasian Otter (*Lutra lutra*)**

Author(s): Jee-Hyun Kim[1], Jong-In Choe[2], Sung-Yong Han[3], Hang Lee[1] and Woo-Shin Lee[4*]

Affiliation(s):

1. Conservation Genome Resource Bank for Korean Wildlife, Research Institute for Veterinary Science and College of Veterinary Medicine, Seoul National University, Seoul 08826, South Korea

2. Environment Policy Division, Ansan City Hall, Ansan 15335, South Korea

3. Korean Otter Research Center, Hwacheon 209-821, South Korea

4. Department of Forest Sciences, Seoul National University, Seoul 08826, South Korea

Studies on changes in a wildlife's prey and activity can provide information about condition of the species' habitat. To understand the differences in the otter's diet and activity, potential prey and spraints were collected and camera traps were installed in summer and winter at Ansan Reed Wetlands. The results showed common carp (*Cyprinus carpio*) was the most important prey, and the diet composition did not show significant difference between seasons, probably because the composition of fish community of the wetland do not change significantly. The standardized food niche breadth was higher in summer because many prey animals are more active. The amount of otter activity was significantly lower in winter than summer; they seemed to minimize activity in order to reduce energy loss during winter. The activity pattern was crepuscular in both seasons and the activity level was 48% in summer and 50% in winter. The active time in a day were different between the seasons depending on the change of photoperiod. In conclusion, prey availability was not a limiting factor to the activity regardless of the season, when the high level of prey availability is maintained throughout season.



# Poster A6

**The complete mitochondrial genome sequence and the preliminary assessment of population genetic variability for Eurasian otter *Lutra lutra* (Carnivora, Mustelidae) on Kinmen island, Taiwan**

Author(s): Chung-Hao Juan [1] · *Nian-Hong Jang-Liaw [1] · Ling-Ling Lee [2]

Affiliation(s):

1 Conservation and Research Center, Taipei Zoo, Taipei 11656, Taiwan

2 Institute of Ecology and Evolutionary Biology, National Taiwan University, Taipei 10617, Taiwan

*Correspondence: Nian-Hong Jang-Liaw

Genetic information is essential to reveal the phylogenetic relationship and population viability of a protected species, especially for those species with relatively small and possibly isolated populations. Eurasian otter (*Lutra lutra*) is listed as a near-threatened species in IUCN Red list and is facing many threats to its survival during past decades. Though many studies in Europe have revealed a sign of recovery in population distribution and genetic diversity, the recent status of most Asian populations remains uncertain. In this study, we present the results of a preliminary genetic analysis with tissue samples collected from a small population in Kinmen island (near southeastern mainland China) in 1996-2018. The results indicated a single haplotype in this population. In addition, we described a complete mitochondrial genome of Eurasian otter *Lutra lutra* in this population. The entire genome is 16,536 bp in length. The results can contribute to comparative phylogenetic study in Lutrinae and conservation management in this and other small otter populations.

# Poster A7

**The Otter Boom in Japan**

Author(s): Yumiko Okamoto

Affiliation(s): Hsinchu Zoo, Taiwan / IUCN-SSC OSG Member

In 2012, it was officially declared that the otter in Japan is extinct after the last individual was seen in 1979. Currently, otters, especially Asian small-clawed otters (*Aonyx cinereus*), are becoming very popular in Japan because many media featured their cuteness on TV, magazine and social networking services. Also, one Eurasian otter (*Lutra lutra*) originates from South Korea was found in Tsushima Island, Japan in 2017 after 38-year disappearance and this big otter news grabbed many people's attention. It is good that Japanese people recognize this animal, but too much attention and cute images are triggering big problems in Japan, like poaching, illegal pet trades and otter business. For these years, many people have been arrested due to attempts on poaching otters from South East Asian countries and otters have been sold at the very high prices. Therefore, I will introduce the details of these problems occurring in Japan and discuss solutions for the conservation of otters.



# Poster A8

**Smooth-coated otter population and activity in the coastal mangroves of southwest Cambodia**

Author(s): Reaksmey Sophatt, Sothearen Thi, Sarady Moul, Sodavy Gnim, Vanessa Herranz Muñoz

Affiliation(s): Centre for Biodiversity Conservation (Kla Trey | Cambodian Fishing Cat Project)

Peam Krasop Wildlife Sanctuary (PKWS) is situated in the southwest coast of Cambodia and holds one of the largest and densest mangrove forests in Southeast Asia. The fishing cat population in PKWS has been the focus of our research and conservation actions since early 2017. Camera-traps have also provided extensive data on smooth-coated otters and revealed the presence of hairy-nosed otter at one mixed mangrove stream. Data gathered during 2017 at 39 locations over a total of 4558 trap-days showed presence of smooth-coated otters at 41% of sites. Out of 331 independent capture events (at least 60 minutes apart), 50% were of a single individual and only 10% were of large groups of 6 to 9. Most captures were obtained at grooming/latrine sites which were visited every three days on average, most frequently around noon and 4 PM. Otter pups were photo-captured between May and July. One individual could be identified by a snare injury and its group was captured at two locations 5 km apart. Our social research confirmed that snaring is the main threat to otters in PKWS. We also conduct awareness raising activities throughout local communities and collaborate with authorities to tackle threats to wildlife.

# Poster B1

**Investigating the distribution of the Smooth-coated otter (*Lutrogale perspicillata*) using environmental DNA**

Author(s): Alexandra Kahler[1] and Dr. Caren Goldberg[2]

Affiliation(s):

[1.] Wild Otters Research Private Limited, House NO B001, Island Views Belbata- Chorao, Tiswadi, Panjim, Goa 403102

[2.] School of the Environment, Washington State University, 100 Dairy Rd., Pullman, WA 99164, U.S.A.

The detection of environmental DNA (eDNA) can be an effective tool for the determination of presence of elusive or low-density organisms. While this technique has been utilized in many other ecosystems, it has yet to be used in mangrove ecosystems for mammals. The ability to detect eDNA in mangroves is unclear due to extreme environmental conditions. The 'vulnerable' listed Smooth-coated otter (*Lutrogale perspicillata*), utilizing mangrove ecosystems in India, can be difficult to monitor due to their elusiveness and the associated challenges of working in these habitats. A pilot study was conducted to test the sensitivity of detection of eDNA for detecting this species in this area. 30 water samples were collected where positive signs of *L. perspicillata* were noted around Chorao Island in Goa, India, filtering on-site immediately after collection. A species-specific probe-based quantitative PCR assay was developed for this species and used to detect DNA of *L. perspicillata* in the filtered samples. This method could provide a sensitive, efficient way to detect elusive semi aquatic or aquatic species in mangrove systems.



# Poster B2

**Patterns of resource use and distribution of Smooth-coated otter (*Lutrogale perspicillata*) in the sub-Himalayan river systems of Uttarakhand, India**

Author(s): Sayanti Basak [1] and S.A. Hussain [1]

Affiliation(s): [1]Wildlife Institute of India, Post Box No. 18, Chandrabani, Dehra Dun – 248 001, Uttaranchal, India

Populations of species are limited by the variability in resources such as habitat and prey. Otters being apex carnivores of the ecosystems they inhabit manifest dynamism in the usage of such resources subject to the variability. In light of the current land use pattern and increase in anthropogenic pressure in India, it becomes important to study the ecology of such a vulnerable and narrow-niche species such as the Smooth-coated otter (*Lutrogale perspicillata*) for designing better policies and management plans for the protection of the species and its habitat.

This study entails the understanding of patterns of distribution, habitat use and diet of *L. perspicillata* in areas subjected to different disturbance regimes in the sub-Himalayan river systems of Uttarakhand. Occupancy framework is being used to assess otter habitat use. Indirect signs such as spraints, tracks, holts, and grooming sites, with associated habitat covariates are used to assess habitat use. Spraints are collected for diet analysis and prey abundance is estimated by various fishing techniques. An inductive approach to model species distribution and habitat suitability will be followed using MaxEnt. The overarching principle of the study involving resource use for understanding the distribution of *L. perspicillata* in the landscape will aid in a multi-faceted conservation approach for the species.

# Poster B3

**Preliminary results on the visitation pattern of the artificial tidal lagoon by the otters in the Kuala Selangor Nature Park**

Author(s): Woo Chee Yoong[1] and Michael Isthyben[2]

Affiliation(s):

[1] Malaysian Nature Society, Malaysia

[2] Kuala Selangor Nature Park, Malaysia

West coast of Peninsular Malaysia, rich with wetlands could serve as potential habitats for the globally threatened otters species categorized under IUCN. This study examines the usage of the artificial tidal lagoon by the otters in the Kuala Selangor Nature Park, KSNP. Three latrine sites have been identified with camera traps setting up to monitor the otters' movements from June 2018 until March 2019. The preliminary results had confirmed the presences of the Asian Small-clawed Otter, *Aonyx cinereus*, ASCO (25 independent events, IE), Smooth Coated Otter, *Lutrogale perspicillata*, SCO (57 IE) and strong possibility of Hairy-nosed Otter, *Lutra sumatrana* (2 IE) which is supported by the IUCN SSC Otter Specialist Group experts. The peak periods whereby crossing into and leaving the lagoon for ASCO are 0600-0659 (4 occasions); 2300-2359 and 0200-0259 (2 occasions each), whereas SCO are 0700-0759 (8 occasions); 0100-0159 (5 occasions). Results continue with the activity patterns for ASCO and SCO with 88% and 51% nocturnality respectively. ASCO actively involves in scanning (33 occasions) meanwhile SCO prefers crossing in and out from the lagoon (74 occasions). In conclusion, the lagoon acts as an essential feeding site with more protection is needed to become a stronghold for the otters.

Keywords: wetland, otter, KSNP, artificial tidal lagoon, latrine, camera trap



# Poster B4

**Volunteering for Otter Conservation in Nepal Communication with Local Communities**

Author(s): Sanjan Thapa[1,2]

Affiliation(s):

[1]Small Mammals Conservation and Research Foundation, Kathmandu, Nepal

[2] Key Laboratory of Conservation and Application in Biodiversity of South China, School of Life Sciences, Guangzhou University, Guangzhou 510006, China

It's ironic that otter species has not been recorded from most of the eastern and central parts of Nepal since a long time. Amongst three species listed in the checklist of mammals, Asian Small-clawed Otter has not been reported yet since 1839. In addition, otters have not been observed from the Narayani River and Chitwan National Park since 2010. It seems otter distribution has been confined to south western parts of Nepal. In this background Small Mammals Conservation and Research Foundation has initiated a volunteering project to communicate with local communities on presence of otters, threats to otters and to aware them about the current status of otters and their role for the conservation of these species. Since 2017, the conservation initiative is conducted in different localities of Dolakha, Gorkha including Manaslu Conservation Area, Bara and Rautahat Districts. There is a little hope in occurrence of the species in Tamakoshi and Budhigandaki Rivers although local people in the study area admit seeing of otters 20 years ago. Altogether 1000 copies conservation poster were published and disseminated in the local communities. Awareness for the conservation of otters was raised amongst about 1000 local people including farmers, schoolchildren and vendors. This volunteering conservation initiative will be continued in other parts of the country.

Key-words: Nepal, volunteering conservation initiative, local communities, conservation posters, awareness

# Poster B5

**Conservation status survey and awareness of smooth-coated otters in Babai River of Bardia National Park, Nepal**

Author(s): Dhruba Bijaya GC and Jyoti Bhandari

Affiliation(s): Tribhuvan University, Institute of Forestry, Pokhara Campus, Pokhara, Nepal.

Otters play an important role in maintaining aquatic ecosystems in nature. A major threat to otters is the loss of wetland habitats. As human population is growing, poverty in Nepal is leading to increased dependency of people on natural resources, particularly affecting wetland ecosystems in Nepal. Maintaining an adequate prey base is likely to be an important otter conservation issue in Nepal. Otters are rare, semi-aquatic animals for which we have little information in Nepal, due to lack of research and conservation programs. In fresh water ecosystems, otters play an important role in structuring food webs, but other mega species such as crocodile, dolphin and turtle are given more priority as compared to otters. To address both research and awareness issues for otter conservation in Babai River, this project was conducted.

Social survey was conducted to measure the level of conflict between the fishermen and the otter. 200 households were surveyed. Also otter distribution map was prepared by using GPS. The data is on the process of analysis. But the field visit shows that there is an urgent need for the conservation and protection of otter in Bardiya National Park.

Keywords: otter, conservation, habitat destruction



# Poster B6

**Behavior Adaptations Of Otter *Lutra lutra* To Winter Conditions Of Northern Latitudes**

Author(s): Oleynikov A. Yu.

Affiliation(s): Institute of Water and Ecological Problems of the Far East Branch of the Russian Academy of Sciences, Khabarovsk, Russia

What allows the species to survive in harsh climatic conditions and live north of the polar circle? Undoubtedly, it is a complex of morpho-anatomical, physiological and behavioural adaptations to the harsh environmental conditions. The physiological and morpho-anatomical adaptations of the otter to the reduction of heat losses are known: the shape and size of the body, fur cover and fat storage. Less is known about the otter's behavioral adaptations that include mobility. An otter is well adapted to walking in deep snow and under ice. There is a shift of daily activity on the surface of ice and snow during the warm time of the day. An important feature of the adaptation behaviuor of the otter, is the use of under-ice and under-snow hollows with a characteristic microclimate. The under-ice hollows formed in winter provide a favorable microclimate, free access to water and safety. The temperature under the ice varies slightly in the range of -1°C to +1°C, regardless of the outside temperature. Snow cover is the major factor and, to a lesser extent, ice, the thermal conductivity of which is much higher. These are used by an otter for safe movement in search of food and as shelters. It is known that, in winter 76% of otter movement, in its habitat region, passes under ice.

Otter behavioural adaptations are important for mitigating winter stress in a specialized ecological niche. Even at very low ambient temperatures, under-ice habitat reduces energy costs and permits survival of the studied group of animals in northern latitudes, up to and including the tundra zone.

## 14th International Otter Congress Organization

**ORGANIZING COMMITTEE**

Dr. Nicole DUPLAIX, OSG Co-Chair (Co-Chair of Organizing Committee)
Ms. Xingna SHEN, Director, Tangjiahe NNR (Co-Chair of Organizing Committee)
Mr. Fei LI, Senior Conservation Officer, KFBG (Congress Coordinator)
Dr. Ziyu MA, Conservation Officer, KFBG (Event Team Coordinator)
Ms. Joyee CHAN, Project Officer, KFBG (Event Team Coordinator)
Mr. Xuesong HAN, Scientific Consultant, Shan Shui Nature Conservation Center
Mr. Jiawei WU, CEO, Swild Studio (Volunteer Team Coordinator, Event Team)
Ms. Airani, Singapore (Congress Team, Finance)
Mr. Sanjan THAPA, Small Mammals Conservation and Research Foundation, Nepal
Ms. Margherita BANDINI (Website organizer & Multimedia and Outreach Coordinator)

**SCIENTIFIC COMMITTEE**

Dr. Nicole DUPLAIX, OSG Co-Chair
Prof. Anna LOY, OSG Co-Chair
Dr. Bosco CHAN, Head of Kadoorie Conservation China, KFBG
Prof. Zhigang JIANG, Professor, Institute of Zoology, Chinese Academy of Sciences
Dr. Melissa SAVAGE, UCLA, USA
Dr. N. SIVASOTHI, National University of Singapore
Dr. Will DUCKWORTH, IUCN/SSC Red List Authority Focal Point for Small Carnivores
Dr. Syed Ainul HUSSAIN, Wildlife Institute of India
Mr. Daniel WILLCOX, Save Vietnam's Wildlife
Dr. Katrina FERNANDEZ, Wild Otters Research PTV Ltd., India
Dr. Lu ZHANG, post-doctoral researcher, Sun Yat-sen University

**CO-HOSTS**

International Union for Conservation of Nature Species Survival Commission Otter Specialist Group
Tangjiahe National Nature Reserve
Kadoorie Farm and Botanic Garden

**SUPPORTING PARTNERS**

Swild.cn
Fondation Segré
National Aquatic Wildlife Conservation Association
Wildlife Reserves Singapore Group



## Contact List

| ***Participant*** | ***Country*** | ***Affliation*** | ***E-mail*** |
|---|---|---|---|
| Ms. Sarah Walkley | United States | University of Southern Mississippi | sarahnwalkley@gmail.com |
| Ms. Carol Bennetto | United Kingdom | IUCN SSC OSG | glencairn3@gmail.com |
| Dr. Shawn Larson | United States | Seattle Aquarium | s.larson@seattleaquarium.org |
| Ms. Margherita Bandini | Italy | IUCN SSC OSG | marghottera@yahoo.it |
| Prof. Arno C Gutleb | Luxembourg | Luxembourg Institute of Science and Technology | arno.gutleb@list.lu |
| Dr. Hanne Christensen | Luxembourg | | arno.gutleb@list.lu |
| J. W Duckworth | United Kingdom | IUCN SSC Asian Species Action Partnership | will.duckworth@ssc.iucn.org |
| Dr. Nicole Duplaix | United States | IUCN SSC OSG | Nicole.Duplaix@oregonstate.edu |
| Ms. Okamoto Yumiko | Taiwan, China | Hsinchu Zoo | yumikohaku88@gmail.com |
| Ms. Sysay Chounnavanh | Lao PDR | | will.duckworth@ssc.iucn.org |
| Mr. Ricardo G Correa | Chile | ONG Lafken | rcorread@gmail.com |
| Ms. Sharne McMillan | Hong Kong SAR, China | University of Hong Kong | sharne_mcmillan@hotmail.com |
| Dr. Nian-Hong Jang-Liaw | Taiwan, China | Conservation and Research Center, Taipei Zoo | taco.tw@gmail.com |
| Mr. Kannathasan Narasimmarajan | India | Madras Christian College, Chennai | wildlife9protect@gmail.com |
| Dr. Anna Loy | Italy | University of Molise | a.loy@unimol.it |
| Ms. Camille NZ Coudrat | Lao PDR | Project Anoulak | camillecoudrat@gmail.com |
| Mr. Sanjan B Thapa | Nepal | Guangzhou University | thapasanjan@gmail.com |
| Mr. Daniel Willcox | Vietnam | Save Vietnam's Wildlife | daniel@svw.vn |
| Mr. Van Dung Le | Vietnam | Save Vietnam's Wildlife | dung@svw.vn |
| Mr. Dustin Isop | United States | Wild Otter Acoustics | sarahnwalkley@gmail.com |

| | | | |
|---|---|---|---|
| Mr. N. Sivasothi | Singapore | National University of Singapore | sivasothi@nus.edu.sg |
| Dr. Andreas Kranz | Austria | IUCN SSC OSG / ALKA-KRANZ | andreas.kranz@alka-kranz.eu |
| Mr. Purna M Shrestha | Nepal | Resources Himalaya Foundation | affiliatepurna@gmail.com |
| Mr. Subarna R Ghimire | Nepal | Himalayan Research and Conservation | ghimire.subarna@gmail.com |
| Ms. Sabrina G Bettoni | Austria | University of Vienna | sabriguib@gmail.com |
| Dr. Dhruba B G.C. | Nepal | Tribhuvan University | dbgchhetri@iofpc.edu.np |
| Dr. Bhandari Jyoti | Nepal | Tribhuvan University | angeljb7@gmail.com |
| Ms. Jennifer E Van Brocklin | United States | Oregon State University | jvanbro@gmail.com |
| Prof. Rajesh Jha | Nepal | Nepal Nature Conservation and Development | jha.rajesh17@yahoo.com |
| Ms. Li Mengjiao | China | Pacific Environment | mengjiao5728@gmail.com |
| Mr. Philip M Johns | Singapore | Yale-NUS College | philip.m.johns@gmail.com |
| Mr. Bing He | China | WWF | bhe@wwfchina.org |
| Dr. Anna Roos | Sweden | Swedish National Museum of Natural History | anna.roos@nrm.se |
| Mr. Aleksei Y Oleinikov | Russian Federation | Department ecology of animals Institute of water and ecological problems FEB RAS | shivki@yandex.ru |
| Dr. Katrina Fernandez | India | Wild Otters Research Private Limited | katrina@wildotters.com |
| Ms. Alexandra C Kahler | India | Wild Otters Research Private Limited | alexandra.c.kahler@gmail.com |
| Dr. Jane F YU | Taiwan, China | Taipei Zoo | beagle6090@gmail.com |
| Ms. Meredith O Knott | United States | Species360 | meredith.knott@species360.org |
| Mr. Aditya Banerjee | India | National Centre for Biological Sciences | adiban22@gmail.com |
| Mr. Nobuhiro Ohnishi | Japan | Kyoto University of Advanced Science | ohnishin@kyotogakuen.ac.jp |



| | | | |
|---|---|---|---|
| Mr. Sagar Dahal | Nepal | Small Mammals Conservation and Research Foundation | sagardahalinktm@gmail.com |
| Ms. Leona Wai | Malaysia | Danau Girang Field Centre | leonawai22@gmail.com |
| Mr. Pushpinder S Jamwal | India | University of Molise | pushpindersjamwal@gmail.com |
| Dr. Sungwon Hong | Korea, Rep. | Pusan National University | nanhsw10@gmail.com |
| Prof. Hiroshi Sasaki | Japan | Chikushi Jogakuen University | hsasakii@chikushi-u.ac.jp |
| Dr. Syed A Hussain | India | Wildlife Institute of India | hussain@wii.gov.in |
| Dr. Molly K Grace | United Kingdom | University of Oxford | molly.grace@zoo.ox.ac.uk |
| Dr. Marcelo L Rheingantz | Brazil | Universidade Federal do Rio de Janeiro | mlrheingantz@gmail.com |
| Ms. Vania Fonseca da Silva | Brazil | Durham University | vaniacfs@gmail.com |
| Wanlop Chutipong | Thailand | King Mongkut's University of Technology Thonburi | wanlop.chutipong2012@gmail.com |
| Dr. Thomas L Serfass | United States | Frostburg State University | tserfass@frostburg.edu |
| Dr. Robert P Brooks | United States | Pennsylvania State University | rpb2@psu.edu |
| Mr. Mike Bottini | United States | Long Island Nature Organization | mike@mikebottini.com |
| Shirley Ng | Singapore | Otterwatch | shirls.ng@gmail.com |
| Dr. Lu Zhang | China | Sun Yat-sen University | zhanglu38@mail.sysu.edu.cn |
| Prof. Pengfei Fan | China | Sun Yat-sen University | fanpf@mail.sysu.edu.cn |
| Ms. Qiaoyun Wang | China | Sun Yat-sen University | sunner1bear@163.com |
| Dr. Li Yang | China | Sun Yat-sen University | yangli53@mail.sysu.edu.cn |
| Ms. Astrid Kiendl | Germany | Aktion Fischotterschutz e.V. | a.kiendl@otterzentrum.de |
| Dr. Trevor McIntyre | South Africa | University of South Africa | trevmcnt@gmail.com |
| Ms. Hannah Krupa | India | Univerity of Molise | h.krupa@studenti.unimol.it |
| Mr. Thomas DR Morton | United Kingdom | | sabriguib@gmail.com |

| | | | |
|---|---|---|---|
| Ms. Tshepiso L Majelantle | Botswana | University of Pretoria | tshepiso.majelantle@zoology.up.ac.za |
| Ms. Mariia I Vernoslova | Russian Federation | | mvernoslova@mail.ru |
| Mr. Chee Yoong Woo | Malaysia | Malaysian Nature Society | woocheeyoong@gmail.com |
| Ms. Annabel T Pianzin | Malaysia | Universiti Malaysia Sabah | criikey.mate@yahoo.com |
| Ms. Mai Nakakihara | Japan | Regional Environmental Planning Inc. | mai.ggirl@gmail.com |
| Mr. Zhuo Tang | China | Wolong Nature reserve, Sichuan | 84039005@163.com |
| Mr. Gen Sun | China | Forestry Bureau of Muli Tibetan Autonomous County | 505829827@qq.com |
| Ms. Vanessa Herranz Muñoz | Cambodia | Centre for Biodiversity Conservation | vanessa_herr@outlook.com |
| Mr. Simon Rohner | Germany | University of Veterinay Medicine Hanover, Foundation | simon.rohner@tiho-hannover.de |
| Mr. Reaksmey Sophatt | Cambodia | Centre for Biodiversity Conservation | sophattreaksmey@gmail.com |
| Ms. Anna YM Wong | Malaysia | Universiti Malaysia Sabah | anna888@ums.edu.my |
| Mr. Hyeong-hoo Kim | Korea, Rep. | Kangwon National University | heart@akoc.org |
| Mr. Geehoon Shin | Korea, Rep. | Keimyoung University | gotohoon@naver.com |
| Mr. Mohan B Shrestha | Nepal | Free lancing Wildlife Researcher | shrmohan5@gmail.com |
| Dr. Adi Barocas | Israel | San Diego Zoo's Institute for Conservation Research | adibarocas@gmail.com |
| Mr. Chung-Hao Juan | Taiwan, China | Taipei Zoo | rparus25@gmail.com |
| Mr. Changsheng Zuo | China | Tongbiguan Nature Reserve, Yunnan | 1002728393@qq.com |
| Mr. Qiangbang Gong | China | Tongbiguan Nature Reserve, Yunnan | 1002728393@qq.com |
| Mr. Max Khoo | Singapore | National Parks Board Singapore (NParks) | max_khoo@nparks.gov.sg |



| | | | |
|---|---|---|---|
| Mr. Jeffery Teo | Singapore | Otter Working Group, Singapore | jefferyteo@wildasiaacademy.com |
| Prof. Motokazu Ando | Japan | Yamazaki University of Animal Health Technologies | motokazu.ando@nifty.com |
| Ms. Tanaki Ando | Japan | | motokazu.ando@nifty.com |
| Mr. Yuto Oguchi | Japan | Osaka University | u176174i@ecs.osaka-u.ac.jp |
| Ms. Marjorie Chong | Singapore | Otter Working Group, Singapore | marjoriechong@gmail.com |
| Mr. Xuesong Han | China | SHANSHUI Conservation Center | xuesong@shanshui.org |
| Mr. Han-Chan Park | Korea, Rep. | Seoul National University | hanchanee@gmail.com |
| Mr. Seung Woo Han | Korea, Rep. | Seoul National University | hsw5034@naver.com |
| Ms. Jee Hyun Kim | Korea, Rep. | Seoul National University | kjhsonic@hanmail.net |
| Mr. Daecheol Jeong | Korea, Rep. | Seoul National University | eocjfwkd369@naver.com |
| Dr. Chabi Djagoun | Benin | University of Abomey-calavi | dchabi@gmail.com |
| Prof. Xiaofeng Luan | China | Beijing Forestry University | luanxiaofeng@bjfu.edu.cn |
| Kaiqi Xie | China | Shenzhen Mangrove Wetlands Conservation Foundation | xiekaiqi@mcf.org.cn |
| Prof. Shukor Md-Nor | Malaysia | Universiti Kebangsaan Malaysia | shukormn63@gmail.com |
| Mr. Fanqiang Luo | China | Hainan Diaoluoshan National Nature Reserve | 236699350@qq.com |
| Ms. Annabelle Yan | China | Chinese Felid Conservation Alliance | Annabelle.yan1117@outlook.com |
| Ms. Rekha Mohan | Singapore | National Parks Board Singapore (NParks) | Rekha_MOHAN@nparks.gov.sg |
| Prof. Xiaomei Wang | China | Chinese Academy of Fishery Sciences | wangxiaom@cafs.ac.cn |
| Mr. Atul Arun Sinai Borker | India | IUCN/SSC Otter Specialist Group | borker.atul@gmail.com |

| | | | |
|---|---|---|---|
| Mr. Zheng Bi | China | Tengchong Bureau of Gaoligongshan National Nature Reserve, Yunnan | baohuqu_hxy@163.com |
| Mr. Liwen He | China | Baishuijiang Nature Reserve, Wenxian, Guansu | 30488308@qq.com |
| Dr. Irwansyah R Lubis | Indonesia | Wetlands International | rezalubis@wetlands.or.id |
| Ms. Sayanti Basak | India | Wildlife Institute of India | basak.sayanti@yahoo.com |
| Dr. Carmen Or | Hong Kong SAR, China | WWF-Hong Kong | cor@wwf.org.hk |
| Mr. Woncheol Lee | Korea, Rep. | Keimyung University | lwc989@naver.com |
| Ms. Haein Kim | Korea, Rep. | Busan University | heee9709@naver.com |
| Dr. Carmen Or | Hong Kong SAR, China | WWF-Hong Kong | cor@wwf.org.hk |
| Dr. Xiaoge Ping | China | Endangered Species Scientific Commission (SA of CITES in China) | pingxg@ioz.ac.cn |
| Mr. Kang Sun | China | YIANWS R&D CENTER | xg.huang@yianws.com |
| Mr. Xingang Huang | China | YIANWS R&D CENTER | xg.huang@yianws.com |
| Mr. Fei Li | China | Kadoorie Farm & Botanic Garden Hong Kong | lifei@kfbg.org |
| Dr. Bosco PL Chan | Hong Kong SAR, China | Kadoorie Farm & Botanic Garden Hong Kong | boscokf@kfbg.org |



# APPENDIX I

**Introduction to Tangjiahe National Nature Reserve**

Tangjiahe (literally "River of the Tang family", pronounced roughly as Tang-Jia-huh) is a mountainous area in northern Sichuan Province, Southwest China. The Tangjiahe National Nature Reserve was established for panda conservation in 1978 and is proud to be named one of the IUCN Green List areas, which include the best managed protected areas in China.

Covering an area of more than 40,000 ha with a forest coverage of 94.7% and an elevation range of 1,150m to 3,864 m, Tangjiahe NNR supports diverse mammal and bird life in its different habitats. As many as 1,069 were recorded here including iconic species such as Giant Panda (Ailuropoda melanoleuca), Golden Snub-nosed Monkey (*Rhinopithecus roxellana*), Golden Pheasant (*Chrysolophus pictus*) and Temminck's Tragopan (*Tragopan temminckii*). Moreover, Tangjiahe is one of the very few locations in China where the Eurasian Otter (*Lutra lutra*) can still be regularly seen. Wildlife is plentiful and can be seen roaming freely around Tangjiahe Hotel, with sightings of Sichuan Takin (*Budorcas taxicolor tibetana*), Chinese Muntjac (*Muntiacus reevesi*), Tufted Deer (*Elaphodus cephalophus*), Tibetan Macaque (*Macaca thibetana*) and Golden Pheasant almost guaranteed if one takes a stroll around Tangjiahe Hotel.

If you are lucky, otters can be sighted too!

**Qingchuan County**

Tangjiahe National Nature Reserve is located inside Qingchuan County (its name means a river with crystal clear waters). With only 11 towns and a total population of 25,000 residents, the county is famous for Donghekou Earthquake Site Park, Qingxi Old Town, and White Dragon Lake. Its forests are home to 1,900 plant species including Ginkgo (*Ginkgo biloba*) and Handkerchief Tree (*Davidia involucrata*). Locals grow black fungus, mushrooms, tea, walnut and some valuable traditional Chinese medicinal plants; and farm the famous Tangjiahe Honey.

# APPENDIX II

**An incomplete checklist of bird and mammal species in Tangjiahe**

**BIRDS**

| Scientific Name | Common Name |
|---|---|
| *Pernis ptilorhynchus* | Crested Honey Buzzard |
| *Buteo buteo* | Common Buzzard |
| *Aquila chrysaetos* | Golden Eagle |
| *Falco tinnunculus* | Common Kestrel |
| *Ithaginis cruentus* | Blood Pheasant |
| *Tragopan temminckii* | Temminck's Tragopan |
| *Pucrasia macrolopha* | Koklass Pheasant |
| *Chrysolophus pictus* | Golden Pheasant |
| *Spilopelia chinensis* | Spotted Dove |
| *Cuculus micropterus* | Indian Cuckoo |
| *Cuculus canorus* | Common Cuckoo |
| *Ketupa flavipes* | Tawny Fish Owl |
| *Alcedo atthis* | Common Kingfisher |
| *Megaceryle lugubris* | Crested Kingfisher |
| *Upupa epops* | Eurasian Hoopoe |
| *Picumnus innominatus* | Speckled Piculet |
| *Dendrocopos canicapillus* | Grey-capped Pygmy Woodpecker |
| *Dendrocopos cathpharius* | Crimson-breasted Woodpecker |
| *Dendrocopos leucotos* | White-backed Woodpecker |
| *Dendrocopos major* | Great Spotted Woodpecker |
| *Picus canus* | Grey-headed Woodpecker |
| *Hirundo rustica* | Barn Swallow |
| *Cecropis daurica* | Red-rumped Swallow |
| *Motacilla alba* | White Wagtail |
| *Motacilla flava* | Western Yellow Wagtail |
| *Motacilla cinerea* | Grey Wagtail |
| *Anthus hodgsoni* | Olive-backed Pipit |
| *Coracina melaschistos* | Black-winged Cuckooshrike |
| *Pycnonotus sinensis* | Light-vented Bulbul |
| *Ixos mcclellandii* | Mountain Bulbul |
| *Hypsipetes leucocephalus* | Black Bulbul |
| *Lanius cristatus* | Brown Shrike |
| *Dicrurus macrocercus* | Black Drongo |
| *Garrulus glandarius* | Eurasian Jay |
| *Urocissa erythroryncha* | Red-billed Blue Magpie |
| *Pica pica* | Eurasian Magpie |
| *Nucifraga caryocatactes* | Spotted Nutcracker |
| *Corvus corone* | Carrion Crow |
| *Corvus macrorhynchos* | Large-billed Crow |
| *Corvus pectoralis* | Collared Crow |
| *Cinclus cinclus* | White-throated Dipper |
| *Cinclus pallasii* | Brown Dipper |
| *Prunella collaris* | Alpine Accentor |
| *Prunella strophiata* | Rufous-breasted Accentor |
| *Tarsiger cyanurus* | Red-flanked Bluetail |
| *Copsychus saularis* | Oriental Magpie-Robin |
| *Phoenicurus auroreus* | Daurian Redstart |
| *Phoenicurus frontalis* | Blue-fronted Redstart |
| *Rhyacornis fuliginosa* | Plumbeous Water Redstart |
| *Chaimarrornis leucocephalus* | White-capped Redstart |
| *Enicurus scouleri* | Little Forktail |
| *Enicurus leschenaulti* | White-crowned Forktail |
| *Saxicola ferreus* | Grey Bush Chat |
| *Monticola solitarius* | Blue Rock Thrush |
| *Myophonus caeruleus* | Blue Whistling Thrush |
| *Turdus merula* | Common Blackbird |
| *Culicicapa ceylonensis* | Grey-headed Canary-flycatcher |
| *Parus monticolus* | Green-backed Tit |
| *Passer montanus* | Eurasian Tree Sparrow |
| *Emberiza siemsseni* | Slaty Bunting |
| *Emberiza pusilla* | Little Bunting |

MAMMALS

| Scientific Name | Common Name |
|---|---|
| *Macaca thibetana* | Tibetan Macaque |
| *Rhinopithecus roxellana* | Sichuan Golden Snub-nosed Monkey |
| *Ursus thibetanus* | Asiatic Black Bear |
| *Ailuropoda melanoleuca* | Giant Panda |
| *Martes flavigula* | Yellow-throated Marten |
| *Meles meles* | Eurasian Badger |
| *Arctonyx collaris* | Hog Badger |
| *Melogale moschata* | Chinese Ferret-badger |
| *Lutra lutra* | Eurasian Otter |
| *Catopuma temminckii* | Asiatic Golden Cat |
| *Prionailurus bengalensis* | Leopard Cat |
| *Sus scrofa* | Wild Boar |
| *Moschus berezovskii* | Chinese Forest Musk Deer |
| *Elaphodus cephalophus* | Tufted Deer |
| *Muntiacus reevesi* | Reeves' Muntjac |
| *Budorcas taxicolor* | Takin |
| *Capricornis milneedwardsii* | Chinese Serow |
| *Naemorhedus griseus* | Chinese Goral |
| *Tamiops swinhoei* | Swinhoe's Striped Squirrel |
| *Sciurotamias davidanus* | Père David's Rock Squirrel |
| *Petaurista caniceps* | Grey-headed Flying Squirrel |
| *Hystrix brachyura* | Malayan Porcupine |

**For a complete list based on the species inventory data of the Reserve, please check these online guides powered by iNaturalist:**

Birds

Mammals