

Committee on Ecology and Transportation Newsletter

Transportation Research Board Committee ADC30

December 2015



View from the Chair

*Alex Levy, Senior Ecologist, Arcadis US Inc.
and Esteemed Chair Chair*

A CELEBRATION OF SERVICE

Stimulating research in transportation ecology and communicating the results of recent and ongoing research to and throughout the transportation community is the foundational mission of the TRB Committee on Ecology and Transportation. With a goal of showcasing timely innovation and information each January at the TRB annual meeting, the committee routinely seeks to spotlight both perennial and emerging themes at the nexus of the living and mobile worlds.

On a triennial basis, all TRB committees are challenged to revisit and refresh strategic planning. Moreover, committee members are limited to serving three-consecutive, three-year terms. So, in an alternate triennial cycle, TRB committees are required to rotate one-third of their membership to refresh the pool of those serving with new personalities and ideas, while compelling ardent participants to avoid burn-out, while continuing to serve in the even-larger community of committee friends. Such induced change helps buoy the evolution of themes from merely mitigating linear transportation's incidental impacts and landscape-level fragmentation on fish and wildlife resources, to realizing the greatest potential of our transportation facilities by seeking to leverage the public's investment in the infrastructure of our mobile civilization for the value-added conservation of fauna and flora; from rare species to common pollinators.

It is this pursuit of making ours a better, more-mobile world that results in the pages that follow and gives our committee an honorable mention by the TRB Technical Activities Council for the Communications category among the 2016 Blue Ribbon Committee award win-

ners. Having served as the facilitator and editor of our newsletter, since its inception, is the humble and devoted attention of one of our outgoing and founding committee members (and steadfast advocate for excellence), Marcia Bowen, of Normandeau Associates. Not only has Marcia crafted our unique and engaging newsletter with contributions from throughout the community of our committee's friends and members, but she has served as our communications coordinator, which includes administration of our website with the help of long-time committee friend, Chris Gesing, of Michael Baker International. Marcia has also been meticulous in keeping the minutes of all committee meetings.

While improving the quality of transportation for both two- and four-legged stakeholders is the bedrock of my-own philosophy, it is the honor of working with dedicated people like Marcia that humble and inspire me as a conservation advocate in service to our community-of-practice.

I would also like to acknowledge the dedication of the following friends and members of our committee for their participation in preparing for the TRB 95th Annual Meeting: Joseph Burns, US Forest Service; Bridget Donaldson, Virginia (DOT) Center for Transportation Innovation and Research; Kris Gade, Ph.D., Arizona DOT; Julianne Schwarzer, USDOT Volpe National Transportation Systems Center; Fraser Shilling, Ph.D., University of California, Davis; and Daniel Smith, Ph.D., University of Central Florida. It's also important to acknowledge that our committee could not function as-smoothly (and this committee chair might not wear matching socks at meetings) were it not for the devoted and

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■ SERVICE continued from page 1

affirmative guidance of our TRB Senior Program Officer, Christine Gerencher, and Administrative Coordinator, Rosa Allen.

Although 2016 will begin a bit solemn, as we see the rotation of our remaining committee founders, it will also be an exciting time with the appointment of new members

who will lead us in our second decade. Moreover, the committee will hold our mid-year meeting in Salt Lake City, Utah, where we will collaborate on the development of a robust workshop, led by our companions in the Committee on Environmental Analysis in Transportation (ADC10) and the Committee on Historic and Archaeological Preservation in Transportation (ADC50). Details are coming soon.

Pooled Fund Study: Impact of Storm Water Culvert Rehabilitation Technologies on Water Quality and Long-Term Material Integrity

By Bridget Donaldson, Senior Research Scientist, Virginia Department of Transportation Virginia Transportation Research Council and Andrew Whelton, Assistant Professor of Civil Engineering and Environmental and Ecological Engineering, Purdue University

Storm water culverts are critical roadway safety assets that divert water from thoroughfares. In the next five years alone, more than \$3.6 trillion must be invested in U.S. transportation infrastructure. Annually, DOTs install more than 12 million feet of storm water culverts and more than 1 million existing culverts require repair. Aging culverts pose several risks because unexpected failures can cause traffic disruption, environmental and property damages, and loss of life.

Aged culverts are increasingly being rehabilitated using in-situ methods, where advanced polymeric materials such as spray-on coatings and cured-in-place pipe (CIPP) lining processes are created and installed in the field. CIPP is considered the most widely used trenchless pipeline rehabilitation method in the world, and has become a common method for rehabilitating storm water culverts maintained by DOTs. In-situ methods are attractive because they avoid open-trench excavation, traffic disruption, and work zone safety issues.

Today, DOTs face two major culvert rehabilitation challenges due to the absence of data.

Virginia Department of Transportation (VDOT) and its research division, the Virginia Transportation Research Council, discovered that the installation of advanced polymeric materials such as spray-on coatings and cured-in-place lining (CIPP) processes can release toxic chemicals into the water conveyed by the culverts. Studies from other DOTs confirmed these findings, and fish kills from CIPP projects have been documented in the U.S. and Canada. Numerous additional anecdotal accounts from the U.S. and other countries have been reported regarding adverse effects to the environment. While several DOTs have moved to upgrade

their specifications, the performance of individual specification construction controls remains unknown. DOTs do not have the information needed to select from a field-validated set of culvert rehabilitation construction controls. Moreover, DOTs cannot strategically identify construction controls for culvert rehabilitation technologies that enter the marketplace in the future.

Second, DOTs lack information on the degree that chemical leaching affects polymeric material's long-term structural performance. Recent studies have shown some of the chemicals released into the environment by culvert rehabilitation polymeric materials are product ingredients intended to promote material strength and durability. Evidence from other polymeric material—water infrastructure applications clearly demonstrates that polymer composition is largely responsible for material longevity. The impact of losing these compounds on the long-term performance of culvert rehabilitation materials remains unknown. DOTs need information on how newly installed polymeric materials age in storm water applications, particularly when some degree of chemical leaching occurs.

To confront these challenges, VDOT is leading a pooled fund study that will begin in early 2016. Research will be conducted by the Purdue University researchers. The primary project objectives are to determine the following:

1. the scope of the problem across DOTs (i.e., the extent of use of these technologies and the scale of their impacts to water quality);
2. the effectiveness of existing construction specifications at minimizing contaminant release from rehabilitated culverts; and
3. the degree to which the structural integrity and longevity of rehabilitated culverts are compromised by chemical leaching.

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The findings from this study will be used to provide DOTs two forms of guidance: (1) a final report that will include recommended construction specifications to minimize water quality impacts and maximize performance, and (2) a hands-on training workshop about current and emerging culvert rehabilitation technologies, specification considerations, and factors to consider for environmental and structural performance.

Participating DOTs currently include those in Virginia, New York, California, North Carolina, Ohio, and Kansas. The pooled fund solicitation can be found here: <http://www.pooledfund.org/Details/Solicitation/1399>

If your state wishes to join, contact Bridget Donaldson at Bridget.Donaldson@VDOT.Virginia.gov.



A cured-in-place pipe installation with white uncured resin escaping from the liner.

Update on NETC 14-2 Investigation of Northern Long-Eared Bat Roosting Sites on Bridges

By Scott A. Civjan, Ph.D., P.E., Associate Professor, Dept. of Civil and Environmental Engineering, University of Massachusetts at Amherst

Populations of bat species have declined significantly in New England due to White-nose Syndrome, resulting in several species being listed as threatened or endangered at the federal or state level. This has significant implications for bridge construction. If bats are using bridges for roosting, significant effort is required to ensure that they are not disturbed or harmed, especially during construction or maintenance work. This project is evaluating the potential of bridges throughout New England for bat roosting, with a focus on Northern Long-Eared Bat, though other species are also being investigated.

The New England Transportation Consortium (NETC) Project 14-2 has completed a literature review and interviews with a wide variety of personnel involved in tracking bat populations, inspecting bridges and researching bridge roost-



Figure 1: Guano at VT Bridge

ing. It was found that very little information exists on bats roosting in bridges in the region, and published information may be region- and species-specific.



Figure 2: Staining of unspecified causation similar to bat staining.

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The project team has conducted rapid visual screenings of 182 bridges throughout New England and conducted acoustic monitoring on 15 bridges. The research team is developing information to identify signs of active bat roosting (Figures 1, 2), potential for a bridge to

be used as a roosting site and monitoring methods to positively identify roosting in bridges (Figure 3). This information is being compared to recent bridge survey studies and will be used to modify these surveys for use in New England. This information can be used as guidance for Transportation Agencies developing protocols for construction at potential roosting sites.



Figure 3: Monitoring methods, Acoustic, Infrared, Visual

New Paper Published On Roadkill in Tanzania

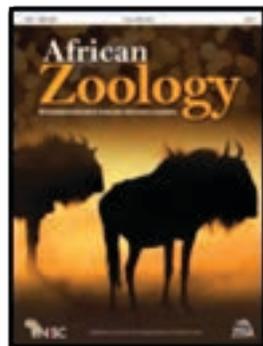
Submitted by Wendy Collinson, Wildlife and Roads Project, Endangered Wildlife Trust

The Endangered Wildlife Trust is very excited about their recent collaboration with the School for Field Studies in Karatu, Tanzania, and the Department of Environmental Studies, Davidson College, Davidson, NC, USA on a the publication of scientific paper in the journal, African Zoology, that documents roadkill in Tanzania.

Kioko, J., Kiffner, C., Jenkins, N., & Collinson, W. J. (2015). Wildlife roadkill patterns on a major highway in northern Tanzania. *African Zoology* 50:1, 17-22.

Abstract

Despite expanding road networks, there is limited understanding of the effects of roads on wildlife in East Africa. This paper presents a baseline survey and describes the patterns of roadkill in the Tarangire–Manyara ecosys-



tem of Tanzania. A 75 km stretch of the Arusha Highway that passes adjacent to Manyara Ranch and Lake Manyara National Park was studied for 10 consecutive days in November 2013 (the rainy season). Wildlife species killed on the road, roadkill frequency and road characteristics were determined. A total of 101 roadkill were recorded (0.13 roadkill km⁻¹) comprising 37 species from all terrestrial vertebrate groups, of which two species, house cat (*Felis catus*) and domestic dog (*Canis lupus*), were domesticated species. Birds were the most-frequently killed taxon (50%), followed by mammals (30%), reptiles (17%) and amphibians (3%). Excluding birds, roadkill primarily consisted of nocturnal species (65%) versus diurnal species (35%). Most roadkill (77.3%) were encountered on road stretches adjacent to protected areas of Manyara Ranch and Lake Manyara National Park compared with 22.7% on the road stretches adjacent to non-protected areas. These findings highlight that roads are a potential threat to wildlife in East Africa and serve as a baseline for future comparisons.

A further collaboration is underway with colleagues in Tanzania that examines the attitudes of drivers towards wildlife on roads.

African Civets and Roads

By Pamela Amiard, University of Reims Champagne-Ardenne, France. Submitted by Wendy Collinson, Wildlife and Roads Project, Endangered Wildlife Trust

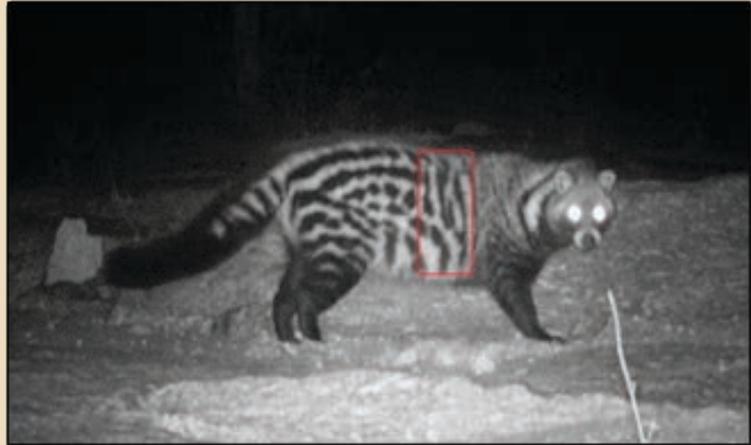
As part of her Master's thesis in Wildlife Management, Ms. Amiard had the opportunity to come to South Africa to study the ecology of a small carnivore, the African Civet (*Civettictis civetta*).

The African Civet is fairly common in Sub-Saharan Africa. In South Africa, populations seem to be healthy. For example, she found more than ten African Civet/100 km² at Mogalakwena Game Reserve, near Alldays, Limpopo. However, despite the relative abundance across their range, little is known about this elusive species. Therefore, the aim of the project is to collect data on the habitat use, movement pattern, home range and diet of the African Civet in order to better understand this species.

The study site will be based at Mogalakwena Game Reserve, where camera traps will be used to assist in identifying individuals, which are easily recognizable based on individual coat patterns, as well as the use of sign surveys to investigate the populations' demography as well as African Civet behavior. The researchers will also attempt to deploy the use of two radio-collars.

African Civet are omnivorous and opportunistic foragers and take advantage of resource abundance. During the previous study of African Civet, the researchers observed that African Civet fed exclusively on fruit trees and ingested high quantities at a time during the fruiting season (up to 60% of the diet). Due to this behavior, African Civet are ideal candidates for seed dispersal and, through the use of scat collection, the researchers will further investigate their role in seed dispersal.

Further, African Civet appear to have evolved their opportunistic foraging to raid crops. With little research done to verify this, scat analysis and sign surveys in crop lands may help determine how much Civet rely on crops for their diet. This in turn will help minimize potential conflict between humans and African Civet.



Camera trap picture of an African Civet showing the unique coat patterning
© Mogalakwena Research Centre



Details of a civetry (communal latrine used by African Civet) where we can see the large amount of seeds

Although there is no major threat as yet to the species, road collisions, fences between private reserves and persecution by farmers may impact local populations. African Civets are one of the three most-common mammal species killed on the roads in the Limpopo Province, and little is known why this species are at such threat from roads and road users. Through the use of track-plots along roadsides and roadkill transect surveys, the parameters that potentially influence the presence and behavior of this species on roads will be assessed.

For further information please contact Pamela Amiard on pamela.amiard@gmail.com

Staying Connected—New York State’s Wildlife Culvert Shelf Pilot Project

By Alissa Rafferty, Wildlife Monitoring Program Manager, Adirondack Chapter of The Nature Conservancy and Deb Nelson Strategic Policy Advisor, NYS Department of Transportation

Staying Connected Initiative (SCI) is an international partnership working to restore and enhance landscape linkages for the benefit of nature and people across the 80-million-acre forested Northern Appalachian/Acadian region of the eastern U.S. and Canada (<http://stayingconnectedinitiative.org/>). SCI partners including The Nature Conservancy (TNC) and New York State Department of Transportation (NYSDOT) have been working to improve wildlife passage for wide-ranging mammals in the Black River Valley since 2007.

Habitat connectivity work is increasingly important in allowing species to move freely in response to climate change. The 650,000-acre Black River Valley, a patchwork of forests, farms, and residential communities, lies between the core forests of the Tug Hill Plateau and the Adirondack Mountains in New York. In addition to being one of nine high-priority wildlife linkages identified by SCI, the Black River Valley also scored highly in a Nature Conservancy analysis of promising refuges for terrestrial wildlife in a changing world, led by Mark Anderson, TNC’s director of conservation science for the Eastern United States.

In the winter of 2011, TNC conducted a season of tracking on select roads to learn more about the movement of SCI’s wide-ranging focal species such as bobcat, fisher, marten and otter, as well as more common species like deer, coyote and fox. Based on TNC’s findings, the partners identified a pilot mitigation project site on NYS Route 12, the busiest road in the area and most significant barrier to wildlife (Figure 1). A round corrugated steel culvert 4 m wide, 4.4 m tall, and approximately 51 m long runs under NYS Route 12, connecting forested habitat on both sides (Figure 2). A stream, several feet deep, flows through the culvert year-round, making it difficult or impossible for mammals to move through as an alternative to crossing the busy road above (Figures 3, 4).

Though the existing culvert currently does not serve as a terrestrial crossing, it is adequately sized for stream flow and aquatic organism passage and is in good condition; thus, culvert replacement is not warranted. In researching options to mitigate the wildlife barrier, the partners explored the potential for wildlife shelving in the culvert.

Through TRB and ICOET, the partners were aware of wildlife shelving projects undertaken by Montana Department of Transportation (MDT) and sought their

advice. MDT, in collaboration with biologist Kerry Foresman at the University of Montana and a local steel manufacturer, designed, tested, and implemented a unique steel mesh shelf that can be attached inside a culvert, along its length, above water level (Figure 5). The shelf is installed in removable sections with bolts and hanging wire cables without impeding water flow or compromising structural integrity. This dry passage shelf, available through Critter Crossing™ Technology, has been widely used with great success in Montana and is gaining traction in other areas of the country. Based on a fall 2015 field evaluation of the Route 12 site that involved maintenance engineers, hydraulics engineers and biologists, NYSDOT and TNC agreed to install a wildlife shelf at this location as a pilot project.

The Nature Conservancy and New York State Department of Transportation deployed wildlife cameras at the structure for pre-installation monitoring in fall 2015. NYSDOT plans to install the shelf in summer 2016, and TNC will conduct post-installation monitoring with wildlife cameras for at least a year to gauge effectiveness of the structure in providing passage for wildlife.

In addition to TNC’s modeling and wildlife tracking data, several other factors were considered in assessing the suitability of this particular site, including data on the watershed and the likelihood of debris snags. The partners determined:

1. The structure size is adequate, allowing ample room to install the shelf even during high water.
2. The streambed is predominantly sandy/gravel substrate, which is preferable because it indicates that the stream in this location generally moves sand and rock but not a great deal of woody debris.
3. The watershed is fairly small and there is minimal drop in elevation from the headwater to the culvert.
4. The watershed is well buffered, with over 90% natural cover.

A major added advantage is that this site combines habitat connectivity strategies both “inside and outside of the right-of-way.” TNC has strong connections with a key landowner on both sides of the culvert, and a conservation easement already protects habitat on one side, increasing the effectiveness of investment in this site. This joint effort is a great opportunity to demonstrate a mitigation approach new to the Northeast that could potentially inform habitat connectivity work throughout the region.

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Figure 1: Aerial photo of culvert location (red arrow).
Watershed outlined in yellow.



Figure 3 : Downstream view



Figure 2: The culvert



Figure 4: Upstream view



Figure 5: Example Shelf Picture from MT

2015 Acoustic Survey Results for Northern Long-eared Bats around Maine Transportation Projects.

By Richard Bostwick and Eric Ham, Environmental Specialists, MaineDOT Environmental Office

When the northern long-eared bat (NLEB) was proposed for endangered species listing in October of 2013, MaineDOT began to evaluate the effects of listing the species would have on upcoming transportation projects. New England State Departments of Transportation met with federal and state agencies in several forums, including the Northeastern Bat Working Group (NEBWG) annual meeting in Portland, ME in 2015.

MaineDOT had not had to address effects to any bat species prior to the listing NLEB. NLEB were once a common species in Maine, but numbers have been recently decimated by White Nose Syndrome. NLEB are known to roost primarily in trees as well as human-made structures. Most MaineDOT projects involve some amount of tree clearing. Factors such as staff availability and timing of right of way acquisition meant that the MaineDOT could not always commit to clearing when the NLEB are expected to be hibernating (winter). MaineDOT made the decision that an aggressive acoustic presence/absence survey schedule was the best path to limiting the effect of listing on project schedules. Current NLEB presence in Maine was largely unknown, so surveys also ensured that project restrictions were placed appropriately on projects with NLEB in the project areas.

The results of this effort are bulleted below:

- 200 different detector deployment locations (85 different projects) were surveyed this past season (May 15-August 15). These sites included anything from projects that were under construction to those that are being planned for 2016-2017 construction.

- 20 of the total projects were completed by consultants working for MaineDOT, for a total of 112 consultant detector deployment sites. (One project had 24 sites)
- Northern long-eared bats (NLEB) were detected at 18 projects. 67 sites without NLEB presence could go on without restriction (Figure 1).
- MaineDOT spent ~1300 hours staff time on completing surveys and analyzing collected data.
- As a result of the effort, only two planned construction projects have required formal consultation under Section 7 of the Endangered Species Act.
 - Without these surveys-consultation timeframes could be anywhere from 30 to 270 days per project.
 - Consultation could potentially result in additional project restrictions where NLEB were not present.

In April of 2015, Federal Highway Administration (FHWA) and the Federal Railroad Administration completed a biological assessment for transportation projects that were not likely to adversely affect Indiana bat and northern long-eared bat range wide. This programmatic biological assessment and letter of concurrence were described in the TRB ADC30 Summer 2015 newsletter. This has allowed FHWA-funded projects with a negative presence survey to complete consultation in 14 days or less. Projects with positive NLEB detections that clear in the winter period when NLEB are inactive in Maine are also processed through consultation in 14 days or less.

MaineDOT has started to plan for acoustic surveys in the 2016 survey period.

■ NLEB continued on page 9

■ NLEB continued from page 8

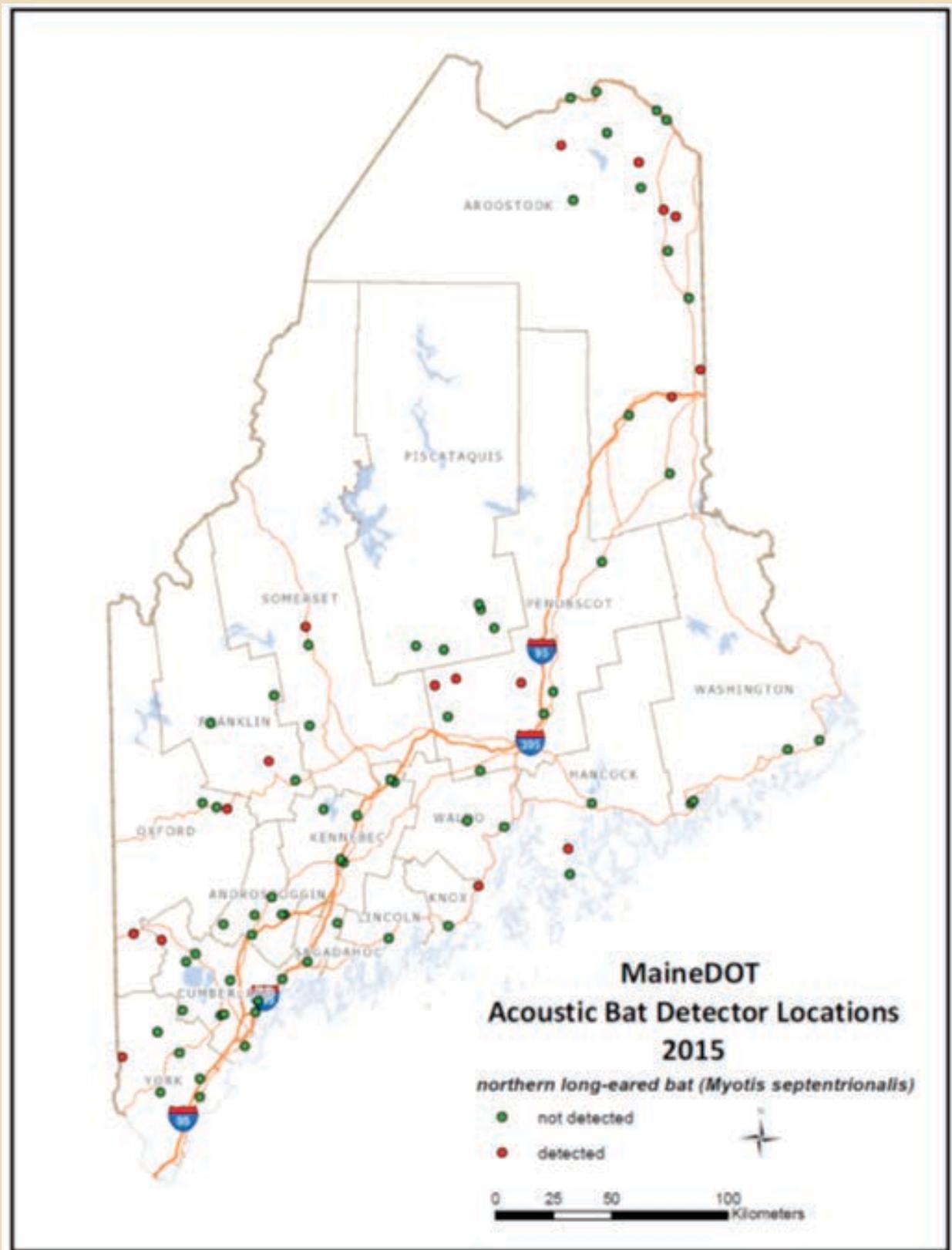


Figure 1- Location Map

Forthcoming Handbook of Chinese Wildlife Crossing Structure

By Xinjun Wang, Yun Wang and Yaping Kong, China Academy of Transportation Sciences



Figure 1. *Vipera berus* (European viper)



Figure 2. *Mustela sibirica* (Siberian weasel)

Copyright by Yun Wang

Roadkill is not a widespread problem in China, but it does occur, especially in the vicinity of nature preserves (Figure 1, 2). Not enough attention is paid to this problem, and there is little known about mitigation measures, such as wildlife crossing structures. However, with the rapid development of highway construction and the improvement of environmental quality, China will be confronted with this problem in the near future.

A team engaged in road ecology research from the Chinese Academy of Transportation Sciences (CATS) decided to translate the handbook published by Federal Highway Administration (FHWA). Authorized by FHWA and the authors, it will be published by the China Communication Press in 2016 (Figure 3).

This book offers key background information on defining the overall wildlife-vehicle interaction problem and the needs to be addressed. It offers a multitude of tangible solutions to plan, design, construct, monitor and maintain effective critter crossings. This book is for all transportation, envi-

ronmental, wildlife resource, and management officials and researchers who strive to preserve and create safe corridor passages for animals and vehicle travelers. The team hopes it will contribute to wildlife protection on China's highways.

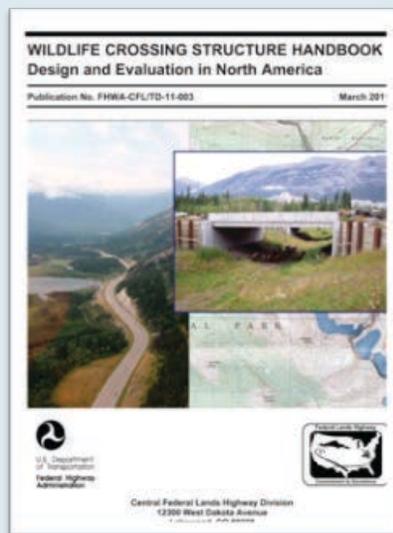


Figure 3. Chinese Version of FHWA Handbook

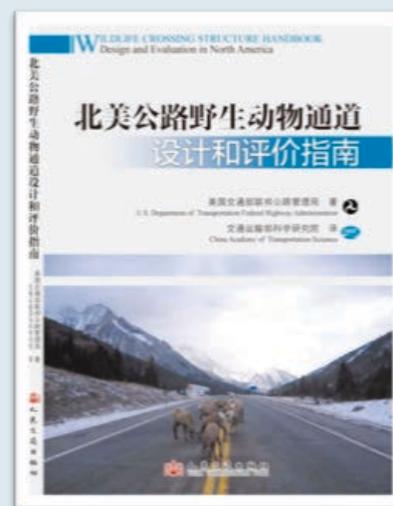


Figure 4. English Edition of the FHWA Handbook

2016 Innovative Approaches to Wildlife and Highway Interactions, a new Advanced Course

By Sandra L. Jacobson, Wildlife Biologist, Conservation of Biodiversity, US Forest Service
Forest Service Pacific Southwest Research Station

The US Forest Service is proud to offer its first Advanced version of the popular Innovative Approaches to Wildlife and Highway Interactions course! First developed as a one-day course in 2003, the course has grown as the science and practice of transportation ecology has blossomed. The 2016 course will be the 20th session taught by the author, a wildlife biologist and transportation ecologist at the Pacific Southwest Research Station, and Terry Brennan, P.E., Tahoe National Forest. The courses have been held in 10 states across the country, often in collaboration with other state or federal agencies. Instructors are award-winning ecologists, engineers, transportation specialists, landscape architects and other disciplines. The author notes that it has been very rewarding to see the number of past participants who have amassed an impressive list of national awards themselves, and with the roll-out of the Advanced Course, recognizing the progress that the science of transportation ecology has made. When the course was first offered, relatively little was known about how to identify highway impacts to wildlife and how to design effective and appropriate mitigation. Nobody in the first sessions had had any experience with the novel idea of wildlife crossing structures. Now, the course regularly has participants who have planned and designed projects with innovative wildlife mitigation measures, and so are responding to requests for a more in-depth treatment for professionals beyond a beginning understanding of transporta-

tion ecology. The target audience includes transportation specialists, engineers, wildlife biologists and other disciplines tasked with planning and mitigating highway projects. The 4.5 day course includes 3 field trips. For more information, and to register, contact Sandra Jacobson at sjacobson@fs.fed.us. (Note: A transportation ecology basics course will be offered every other year, or on request in collaboration with other agencies.)



United States Department of Agriculture

Innovative Approaches to Wildlife and Highway Interactions: *Advanced Session*

July 25-29, 2016

Sagehen Creek Field Station* (north of Truckee, CA)

Stay in the Sierra Nevada with catered food and comfortable lodging. Learn from experienced transportation ecologists and engineers. See examples of effective mitigation and research.



Advanced Topics include:

- Wildlife behavior and highway effects
- Effective and ineffective mitigation measures
- Economics of mitigation
- Planning, policy, and funding
- Engineering plan reading for biologists
- Monitoring techniques
- Current research

For more information and registration:

Sandra Jacobson, US Forest Service
sjacobson@fs.fed.us 530-759-1707

*Sagehen Creek Field Station and the Sagehen Experimental Forest are research and teaching facilities of the University of California at Berkeley in collaboration with the USDA Forest Service



Registration deadline:
June 30, 2016
Tuition: \$950 includes lodging, food, materials, field trip transportation



Forest Service

Pacific Southwest Research Station

November 2015

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FARE THEE WELL!

It is with sadness that I prepare this last newsletter. One of the great benefits of collating the newsletter is the interactions, albeit mostly electronic, I've had with so many members and friends. It's also exciting to get a preview of all the interesting work that is taking place across the globe.

Thanks to Linda Cable, who takes your articles and turns them into a beautiful format. I'm turning the newsletter reins over to my very capable colleague- and fellow Mainer- Jeff Simmons. You will be in good hands.



Marcia Bowen



Linda Cable



TRANSPORTATION RESEARCH BOARD

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Editor: Marcia Bowen, Design: Linda Cable
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