MAINE AUDUBON

Wildlife Monitoring at Road Crossings in the Western Maine Mountains
Final Report - March 2016

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I. Introduction

Road infrastructure such as culverts and bridges are sometimes retrofitted or designed as wildlife road crossings. Keeping wildlife off of roads and preventing collisions with vehicles is important for wildlife and human safety. Wildlife must move on the landscape to find food, shelter, mates and new territories, and successful movement across roads is necessary for healthy populations.

Starting in December 2014, Maine Audubon, with support from the Nature Conservancy, the Maine Department of Inland Fisheries and Wildlife and the Maine Department of Transportation, placed wildlife cameras at ten bridge and culvert locations to determine whether wildlife were using existing road infrastructure.

The project goal was to document the use of culverts and bridges of different sizes and materials by terrestrial and semi-aquatic wildlife species in locations that had not been designed as wildlife crossings. Particularly in a landscape without significant development pressure or high volumes of road traffic which make the roads difficult for wildlife to cross. Questions included:

- Are wildlife using the structures?
- What species are using them?
- Which types of structures are being used?

Results from this study can then inform potential retrofit actions for existing structures both in these locations and elsewhere to enhance wildlife movement.

Photographs of each road crossing structure and associated wildlife observations can be viewed on the web at wildlifeobserver.net/ by going to the "Maine Audubon Project" under the "Projects" tab.

II. Study Area

The majority of the camera locations were in the northwestern Maine Mountains in rural areas ranging from no development to some rural development. Eight of the structures were previously surveyed for retrofit potential for terrestrial wildlife using the "Permeability of Existing Structures for Terrestrial Wildlife: A Passage Assessment System (PAS)" developed for the Washington State Department of Transportation in cooperation with the U.S. Department of Transportation, Federal Highway Administration (*Kintsch and Cramer 2011*). Survey results can be reviewed in the Maine Audubon "Maine Terrestrial Wildlife Crossings Survey Report: *Potential for Retrofitting Transportation Infrastructure to Benefit Movement of Terrestrial Wildlife".* (See maineaudubon.org/publications-resources/) The road segments where the

selected structures occur were identified as potential habitat connectors needed to be maintained to proactively preserve wildlife movement in the Staying Connected Initiative's *Northeast Kingdom Vermont to Western Maine Linkage* (stayingconnectedinitiative.org/).

Two of the sites were chosen because they are newly constructed Stream Smart road crossings which are intended to include stream banks and pass semi-aquatic and potentially some terrestrial wildlife. The Phillips site is a Stream Smart embedded box culvert and is in the northwestern Maine Mountains. The Bremen site is a Stream Smart GRS-IBS bridge construction. Videos of the construction of both these structures can be found at: maineaudubon.org/streamsmart/videos/.

III. Cameras & Sites

Cameras and Equipment Used:

- Bushnell 8MP Trophy Cam HD LED Trail Cameras with night vision
- Bushnell Trophy Cam HD Security boxes
- Spartan Mobile Cam – HCO GoCam Model: GC-ATTb (and matching security box)
- Python Trailer Camera Adjustable Camouflage Cable Locks
- SanDisk 16GB Ultra Class 10 SDHC up to 40MB/s
- Energizer L91BP-8 Ultimate Lithium AA Batteries

Sites:

Sandy River PLT: 5 sites (10 cameras) on Route 4
- 1230 Average Annual Daily Traffic (AADT) in 2014

Carrabassett Valley: 3 sites (6 cameras) on Route 16/27
- 2450-3140 AADT in 2014

Phillips: 1 site (2 cameras) on Reed Mills Road
- No AADT available on this lightly traveled town road

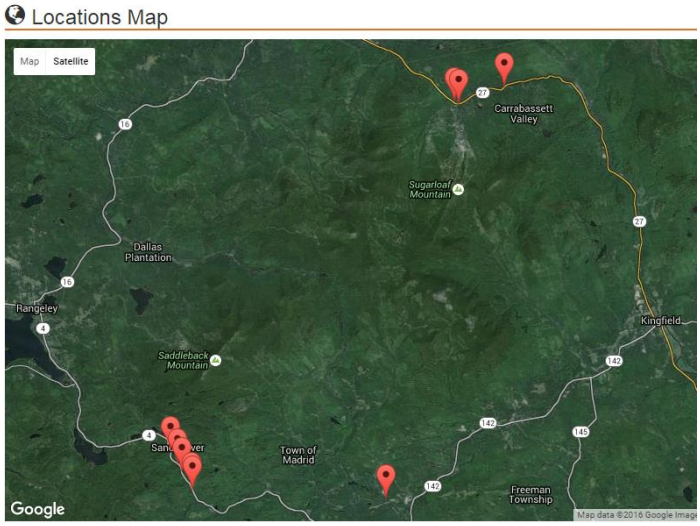
Bremen: 1 site (2 cameras) on Route 32
- 710 AADT in 2013

Mounting cameras on trees and bridge abutments

Table 1: Camera Sites

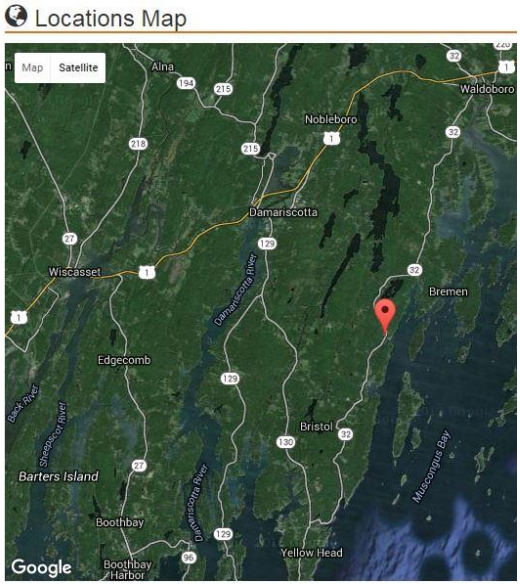
Camera Sites	**Structure type**	**Size**	**Development Level**	**Date Camera Deployed**
Sandy 1	Plastic pipe culvert	2’ to <5’	Undeveloped	12/2/2014 – 10/14/2015
Sandy 2	Bridge	20’ to 40’ wide by 12’ to <20’ high	Undeveloped	12/2/2014 – 10/14/2015
Sandy 4	Concrete box culvert	2’ to <5’	Undeveloped	12/2/2014 – 10/14/2015
Sandy 5	Concrete box culvert	5’ to <8’ wide by 2’ to <5’ high	Undeveloped	12/2/2014 – 10/14/2015
Sandy E	Concrete pipe culvert	N/A	Undeveloped	12/2/2014 – 10/14/2015
Carrabassett 8	Bridge	≥40’ wide by ≥20’ high	Mostly undeveloped - Parking area	6/18/2015 – 10/14/2015
Carrabassett 9	Bridge	≥40’ wide by 12 to <20’ high by >65’ long	Some development	6/18/2015 – 10/14/2015
Carrabassett 10	Concrete box culvert	8 to <20’ wide by 5 to <8’ high	Mostly undeveloped – some residential	6/18/2015 – 10/14/2015
Phillips	Embedded concrete box culvert	19.5’ wide by 8’ high	Undeveloped	9/1/2015 – 10/14/2015
Bremen	GRS-IBS Bridge	N/A	Mostly undeveloped – some residential and agricultural fields	9/21/2015 – 11/11/2015

Western Maine Mountain Camera Locations



Route 4 Culvert – Sandy River PLT

MidCoast Maine Camera Location



Route 32 GRS-IBS Bridge - Bremen

IV. Findings

Between December 2014 and October 2015, 404 photographs of 454 individual animals (22 species) were recorded at all sites combined. This includes 160 possible trips through structures by all animals (118 definite trips and 42 possible trips through structures). A total of 18 species were potentially using the structures (6 species definitely going through structures; 5 species maybe entering/exiting structure; 7 species uncertain). Three species, wild turkey, eastern coyote, and moose, were only recorded spending time outside structures.

Table 2: Number of Wildlife Trips by Structure Type

Structure type	1 - Number of trips through structure by ALL animals	2 - # possible trips by ALL animals
Plastic pipe culvert	12	15
Concrete box culvert	27	20
Concrete pipe culvert	14	4
Bridge	65	3
Total Trips	118	42

All structure types had wildlife moving through them (Table 3). One bridge had the greatest number of wildlife trips and the Carrabassett 8 Bridge had no recorded wildlife trips. This bridge has very steep heavily riprapped banks and no vegetative cover for thousands of feet on either side of the structure.

Carrabassett 8 Bridge

Great-Blue Heron in Sandy 2 Bridge

The plastic and concrete pipe culverts and concrete box culvert had similar numbers of wildlife trips. Raccoons used all structure types. Ermine mostly used the concrete pipe but was also recorded using the plastic pipe. Mink were only found using bridges and concrete box culverts. Deer were only recorded walking through shallow water under bridges. Great-blue herons were frequently recorded flying through and using habitat under bridges for foraging. (Tables 4 & 5)

Table 3: Number of Wildlife Trips per Each Structure

Camera Site	Structure type	1 - Number of trips through structure by ALL animals	2 - # possible trips by ALL animals
Sandy 1	Plastic pipe culvert	12	15
Sandy 2	Bridge	57	0
Sandy 4	Concrete box culvert	6	7
Sandy 5	Concrete box culvert	8	6
Sandy E	Concrete pipe culvert	14	4
Carrabassett 8	Bridge	0	0
Carrabassett 9	Bridge	8	2
Carrabassett 10	Concrete box culvert	13	7
Phillips	Bridge	0	1
Bremen	Bridge	(no data)	(no data)

Table 4: Confirmed Trips through Each Structure Type by Individual Species

Species observed	# confirmed trips through structure (Category 1)			
	Plastic pipe culvert	Concrete pipe culvert	Concrete box culvert	Bridge
Birds:				
American crow				
American robin				
Blue jay				
Common grackle				
Common merganser				
Eastern pheobe				
Great blue heron				27
Wild turkey				
Wood duck				
Mammals:				
American beaver				1
American mink			5	15
Common porcupine				
Eastern chipmunk				
Eastern coyote				
Eastern grey squirrel				
Ermine (short-tailed weasel)		11		
Moose				
Raccoon	13	4	21	30
Red fox				
Red squirrel				
Snowshoe hare				
White-tailed deer				5

Table 5: Possible Trips through Each Structure type by Individual Species

Species observed	# possible trips through structure (Category 2)			
	Plastic pipe culvert	Concrete pipe culvert	Concrete box culvert	Bridge
Birds:				
American crow				1
American robin				
Blue jay				
Common grackle				
Common merganser				2
Eastern pheobe			1	
Great blue heron				1
Wild turkey				
Wood duck			2	
Mammals:				
American beaver				
American mink			5	
Common porcupine				
Eastern chipmunk		1		
Eastern coyote				
Eastern grey squirrel	2			
Ermine (short-tailed weasel)	1	2		
Moose				
Raccoon	15	2	16	
Red fox				
Red squirrel				
Snowshoe hare				
White-tailed deer				

Table 6: Observations by Species

Species observed	**Number of individual animal sightings/trips (per type of occurrence)**				**Total individuals sighted**
	1 - definitely traveling through structure	*2 - Maybe entering/ exiting structure*	*3 - Uncertain*	*4 - Definitely only spending time outside structure*	
Birds:					
American crow		1	5		6
American robin			6		6
Blue jay			2		2
Common grackle			1		1
Common merganser		1			1
Eastern pheobe					0
Great blue heron	27	1	1	1	30
Wild turkey				11	11
Wood duck		1			1
Mammals:					
American beaver	1				1
American mink	20	5	17		42
Common porcupine			1		1
Eastern chipmunk		1	6		7
Eastern coyote				8	8
Eastern grey squirrel		2	3		5
Ermine (short-tailed weasel)	11	3	2		16
Moose				40	40
Raccoon	68	34	56	9	167
Red fox			6	29	35
Red squirrel			8	15	23
Snowshoe hare			2		2
White-tailed deer	5		1	20	26

V. Discussion and Lessons Learned

Many wildlife species are using road infrastructure culverts and bridges that were not built specifically for wildlife movement. They are using these structures in landscapes with little to no pressure from development and large volumes of traffic which might otherwise funnel them to the structures. Given this use, it seems likely that with some enhancements such as funnel fencing, more wildlife would successfully use culverts and bridges for movement, keeping animals off the road and preventing collisions with vehicles. All structure types had some use by wildlife including the smallest culvert (between 2'-5'). Therefore, depending on the targeted species, all of these structure types should be considered for enhancements as possible wildlife crossings.

Camera set-up and placement

- Set up head-on or at slight angle to structure (to look through structure)
- Do not set up too close or photos will be too dark
- **Vegetation trimming is critical!** Cards fill up quickly if vegetation is in the field of view. Cutting vegetation is much less time consuming than going through 30,000+ photos per card
    - Where vegetation was an issue, some cards filled up in 2 weeks
    - When vegetation was trimmed effectively, cameras only took 200 +/- photos in 6 weeks
- Shoot one photo with meter stick or other length reference in field of view as a size reference to refer to when identifying animals
- Use small level for orienting cameras to minimize crooked pictures
- Use laser pointer from camera lens to structure to ensure camera is set at proper angle
- No cameras were tampered with or stolen. Cameras where in camouflage security box with python cable lock and labelled "Wildlife Project Maine IFW & Maine Audubon. WARNING! This camera just sent your picture to a computer and has an anti-theft tracking chip installed."
- Significant difficulties arise when cameras deployed in winter:
    - Snowflakes triggers cameras to take pictures – fills up SD card very quickly
    - Snowdrifts can bury the camera – install camera as high up as possible
- Always use Lithium batteries (lose approx. 0.1 V every six weeks)
- Batteries should only need to be replaced once per year
- Test all batteries with hand-held tester on every camera check

Photo collection

- When re-visiting site to check camera, mark exact position of camera on tree with flagging tape so it can be re-installed at same height and angle before unlocking
- Install new (empty) SD card every time cameras are checked

- Check sites every three months
- Wireless cameras:
    - If camera is set up to send photos via wireless connection, this will drain the batteries very quickly.
    - It is possible to connect Spartan GoCams to portable solar panel to charge a Lithium battery ($40 per panel, comes with 3-foot cord to connect to jack).

Best practices for managing and reviewing photos

- 10 volunteers spent 195 hours cataloging approximately 245,000 photos (the majority were false triggers and were deleted)
- Volunteers create new folders for each individual animal for each site/camera
- Save ALL animal photos; Delete photos with no animals after careful review
- View photos on full-screen – Must click through all photos one-by-one (no scanning thumbnails)
- Pay close attention to nighttime photos (watch for eye shine)
- Look carefully in stream, on banks, and around culvert entrance
- Remember, sensitivity cone is wider than field of view, so an animal can trigger the camera to take a picture and not appear in the photo
- When there are multiple photos of an animal, view photos in sequence to determine the type of movement near or through the structure.

VI. Acknowledgements

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