



A Roadway Wildlife Crossing Structure Designed for State-threatened Wood Turtles in New Jersey, United States



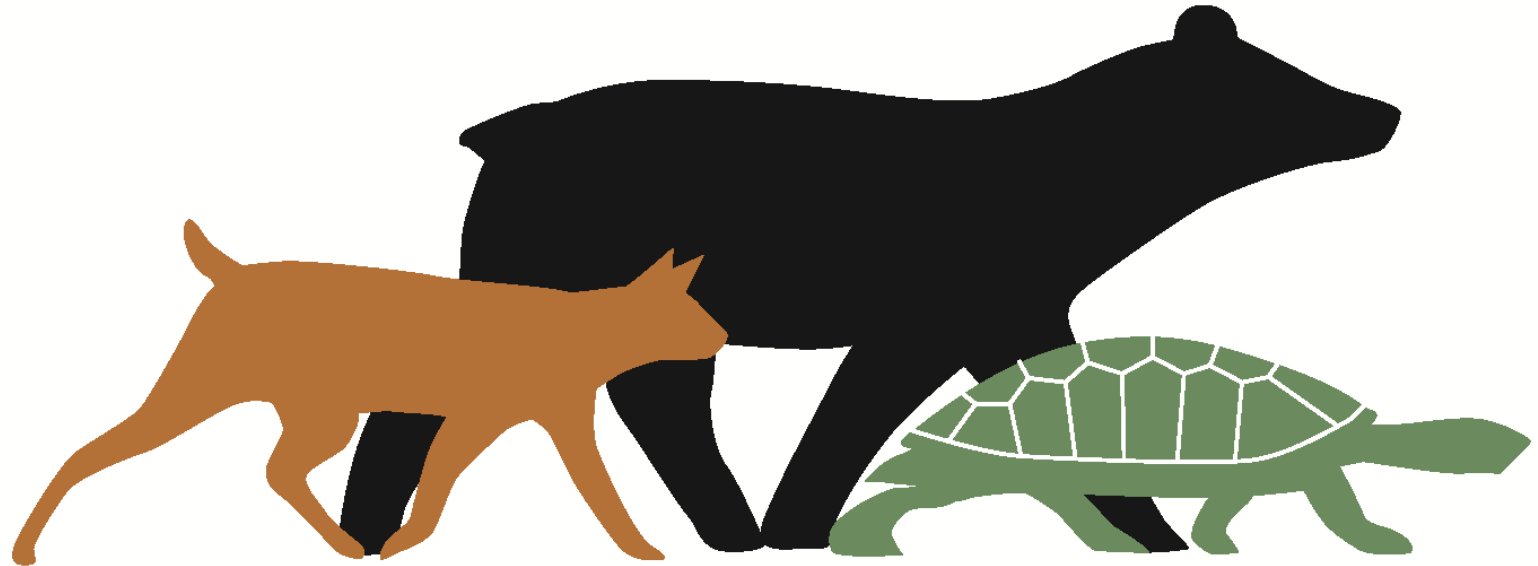
MONTCLAIR STATE
UNIVERSITY

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Endangered and Nongame Species Program
and Montclair State University



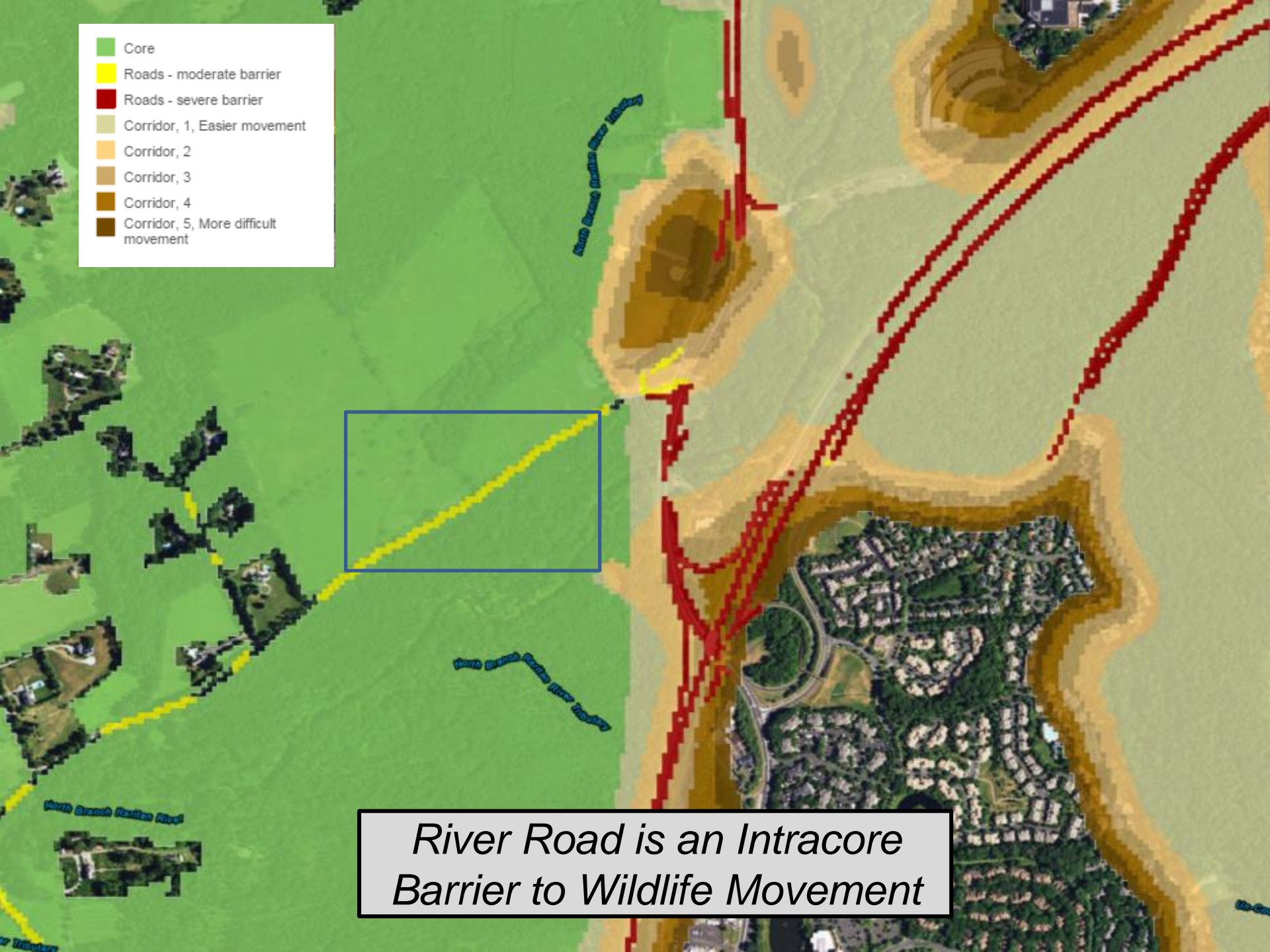


*Turtle Nesting Habitat &
Amphibian Breeding Ponds*



CHANJ

Connecting Habitat Across New Jersey

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- A map showing wildlife corridors and barriers. The map is overlaid on an aerial photograph. A legend in the top-left corner defines the colors: green for Core, yellow for Roads - moderate barrier, red for Roads - severe barrier, light tan for Corridor 1 (Easier movement), orange for Corridor 2, medium tan for Corridor 3, dark tan for Corridor 4, and brown for Corridor 5 (More difficult movement). The map shows a network of corridors and barriers. A blue rectangle highlights a specific area on a yellow line (moderate barrier) within a green area (Core). The highlighted area is a diagonal line crossing a green field. To the right, a red line (severe barrier) runs diagonally across the map, separating a green area from a residential area. The residential area is surrounded by tan and brown corridors. Labels on the map include 'North Branch Harlan River' in two locations and 'River Road' near the highlighted area.
- Core
 - Roads - moderate barrier
 - Roads - severe barrier
 - Corridor, 1, Easier movement
 - Corridor, 2
 - Corridor, 3
 - Corridor, 4
 - Corridor, 5, More difficult movement

*River Road is an Intracore
Barrier to Wildlife Movement*



Total Project Cost -- \$116,175



Construction Timeline & State Regulations

Timeline: September 2014 – April 2015; Approximately 15 work days.

Regulations & Permits: Flood Hazard Area Control Act Rules (N.J.A.C. 7:13) and the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A); Permit 1801-03-0007.



“Turtle Tunnels” – Five in total

- Tunnel = Three 10' Trench Boxes & two 20' Grate Tops
- Internal dimension with substrate 2' x 2'
- Spacing: ~160 meters

Cost Breakdown

- Trench Boxes & Grates: \$28.5K
- Headwalls: \$1500





Finished Headwalls



Light & Substrate



Grate Tops after Winter

Design Specifications

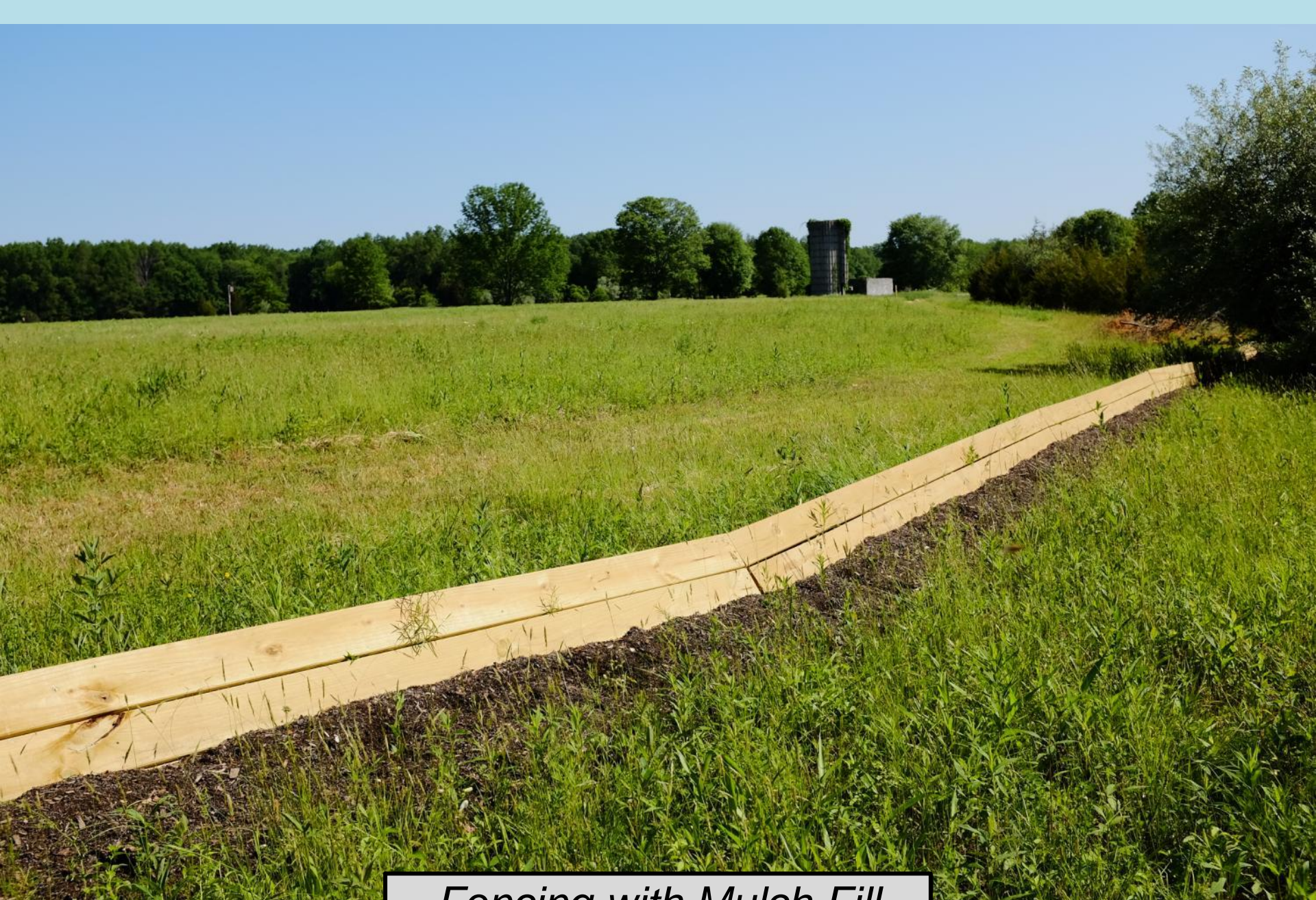
Angled Fencing – 1350 meters

- Three 1" x 6" pieces Wolmanized wood
- Braced in ground every 4' with 2" x 4" Wolmanized wood
- Braced in ground every 8' with 2' U-Channel post

Cost Breakdown

- Fencing: \$14.5K





Fencing with Mulch Fill



Angled Fencing



Step-Overs



Fence Ends



Connecting with Headwalls

Cost Breakdown

- Trench Boxes & Grates: \$28.5K
- Fencing: \$14.5K
- Headwalls: \$1500
- Signage: \$1375
- Blacktop: \$7300
- Equipment Rental: \$3000
- Labor (with fringe): \$60K

Total Project Cost -- \$116,175

Measuring Effectiveness

- Pre-Monitoring
 - Montclair State University 2010 study
- Post-Monitoring
 - Montclair State University 2015 study
 - Wildlife Cameras



Pitfall Trap Monitoring



Montclair State University Studies

- 2010 (Pre-construction)
 - March - May 2010
 - 24 pitfall traps and silt fencing
 - 782 organisms representing 13 species
- 2015 (Post-construction)
 - April - July 2015
 - 10 pitfall traps
 - 2,515 organisms representing 15 species
 - Road mortality counts

2015 SPECIES
Wood Frog
American Toad
Green Frog
Mole/vole
Spring Peeper
Snapping Turtle
Painted Turtle
Garter Snake
Four-toed Salamander
Red Spotted Newt
Bull Frog
Two-lined salamander
Box Turtle
Water Snake
Northern Brown Snake

Most Active Traps



Tunnels by number

Trap #	# of individuals
1	347
2	340
3	774
4	798
5	256

Road Mortality

Species	#	Percentage
Northern Gray Treefrog	37	75.51%
Garter Snake	2	4.08%
American Toad	1	2.04%
Spring Peeper	1	2.04%
Unknown	8	16.32%

- Most road mortality occurred between tunnels 3 and 4



Northern Gray Treefrog

Wildlife Cameras

- 5 wildlife cameras were placed on the south side of River Rd to monitor the use of the tunnels
- Cameras were deployed in September 2015
- Culvert users:
 - Red Fox
 - Opossum
 - Skunk
 - Raccoon
 - Feral Cat
 - Chipmunk



Wildlife Camera Setup



Red Fox
Vulpes vulpes



Raccoon
Procyon lotor



Opposum
Didelphia virginiana



Striped Skunk
Mephitis mephitis

Lessons So Far

- Network of partners is critical
- Construction less expensive in-house than using FHWA \$\$
- On-site engineering should be expected
- Maintenance of structure necessary



Bedminster Township, Montclair State University, Volunteers



Thank you!

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