CHAPTER 20

WILDLIFE CROSSINGS

20.0 INTRODUCTION

The linear nature of surface transportation systems creates a suite of concerns for transportation and natural resource management agencies as they seek to provide safe and efficient transportation infrastructure and to reduce the impacts of their projects on environmental resources. Techniques have been developed to avoid, minimize, and mitigate these impacts. However, the avoidance, minimization, and mitigation efforts used may not always provide the greatest environmental benefit, or may do very little to promote ecosystem sustainability. This concern, along with a 1995 Memorandum of Understanding, between 14 Federal Departments and Agencies, to foster an ecosystem approach mobilized an interagency Steering Team to collaborate over a three-year period to write Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects. Eco-Logical presents a framework for achieving greater interagency cooperative conservation. Eco-Logical provides a nonprescriptive approach that enables Federal, State, tribal and local partners involved in infrastructure planning, design, review and construction to work together to make infrastructure more sensitive to wildlife and their ecosystems. Following this approach, this chapter provides guidance to the Pennsylvania Department of Transportation's (PennDOT's) District Offices in determining the appropriateness of a Wildlife Crossing or an exclusionary device associated with transportation improvements in the Commonwealth. This section provides guidance should an Engineering District elect to study and construct a crossing or exclusionary device. There is no intent to direct or mandate the use of such devices by the Engineering Districts. PennDOT reserves the discretion to deviate from this guidance if the circumstances are warranted. The construction of such devices is at the sole discretion of the Department. This guidance is for information purposes only; it is not regulatory.

This guidance is to ensure that the Department is aware that there are strategies available to avoid vehicular and wildlife conflicts. Most of the information in this guidance was derived from The Federal Highway Administration's (FHWA) Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects and Wildlife Crossing Structure Handbook Design and Evaluation in North America.

20.1 DEFINITIONS

A. **Fragmentation.** Splitting up or separation of a habitat, landscape or ecosystem into smaller parcels.

B. **Habitat Connectivity.** The state of structural landscape features being connected, enabling access between places via a continuous route.

C. **Target Species.** A species that has been identified as the subject of conservation or monitoring actions.

D. **Travel Corridors.** Features that connect two or more otherwise isolated patches of habitat that allow animals to travel safely from one area to another, but may also provide food or other necessities as well.

E. **Ungulates.** A large group of mammals all of which have hooves (e.g., Deer and Elk).

F. **Wildlife Crossing.** Structures that allow animals to cross human-made barriers safely.

G. **Wildlife Fencing.** Fence designed and built to keep animals from accessing right-of-way habitat and road surface, or to funnel animal movement to safe crossing locations (e.g., wildlife crossing structures).
20.2 BACKGROUND

Wildlife crossings are structures that allow animals to cross human-made barriers safely. Wildlife crossings may include underpass tunnels, viaducts, and overpasses (mainly for large or herd-type animals); amphibian tunnels; culverts (for small mammals such as otters, mink, and porcupine). Wildlife crossings are a practice allowing connections or reconnections between habitats and assist in avoiding collisions between vehicles and animal.

Each year in the United States, an estimated 200 human deaths and 29,000 injuries result from crashes involving animals (i.e., deaths from a direct motor vehicle (MV) animal collision or from a crash in which a driver tried to avoid an animal and ran off the roadway) (National Highway Traffic Safety Administration, 2002). Accidents from drivers trying to avoid animals are especially true for the low mobility mammals, amphibians and reptiles (groundhog, river otter, salamander and turtles). Additionally, 1.5 million traffic accidents involving deer in the United States cause an estimated $1.1 billion in vehicle damage each year (Donaldson, 2005). Pennsylvania ranks third in the nation, behind only Texas and Wisconsin in fatalities resulting from deer accidents. From 2006 to 2010 Pennsylvania has seen an average of over 4,200 deer collisions and 12 fatalities a year and this number is expected to keep rising. In 2010 alone, there were 4,668 collisions and 10 fatalities. The costs of these incidents to Pennsylvania are rising as well. Repairs due to deer collisions cost the state $14,484,804. When you factor in the fatalities that number soars to $58,168,480.

Studies have also shown that mortality from vehicles is a threat to wildlife populations when population numbers are already low or when vital habitats occur near roadways due to fragmentation. PennDOT recognizes the importance of reducing impacts to wildlife and improving, or at the very least, maintaining habitat connectivity. However, the emphasis on public safety is paramount and cannot be overstated. As a transportation agency, the function of PennDOT is first and foremost to provide a safe and efficient transportation infrastructure for the traveling public.

20.3 WILDLIFE CROSSING TYPES (for descriptive purposes only.)

Follow PennDOT design guidelines when choosing the appropriate type.

A. Overpass Design. See Figure 20.1 for an example of an overpass design.

1. Landscape Bridge. Designed exclusively for wildlife use. Due to their large size they are used by the greatest diversity of wildlife and can be adapted for amphibian and reptile passage.

2. Wildlife Overpass. Smaller than landscape bridges, these overpass structures are designed exclusively to meet needs of a wide range of wildlife from small to large.

3. Multi-use Overpass. Generally the smallest of the wildlife overpasses. Designed for mixed wildlife-human use. This wildlife crossing type is best adapted in human disturbed environments and will benefit generalist type species adapted to regular amounts of human activity and disturbance.

![Figure 20.1 Example of Overpass Design](image-url)
B. Underpass Design.

1. Viaduct or Flyover. This underpass design is the largest of underpass structures. The large span and vertical clearance of viaducts allow for use by a wide range of wildlife. Structures can be adapted for amphibian and reptiles, semi-aquatic and semi-arboreal species. These work well because of the large open natural areas. This design should not be constructed exclusively for wildlife movement. The Viaduct or Flyover will be included in the design of a transportation project if warranted to meet the project needs based on the topography of the area. Figure 20.2 provides an example of an underpass, viaduct design.

![Figure 20.2](image2)

**Figure 20.2**
**Example of Underpass, Viaduct Design**

2. Large Mammal Underpass. Not as large as most viaducts, but the largest of underpass structures designed specifically for wildlife use. Designed for large mammals but small- and medium-sized mammals use readily as well. The large mammal underpass should be included in the design of a transportation project if warranted to meet the project needs based on the topography of the area. Figure 20.3 provides an example of an underpass, viaduct design.

![Figure 20.3](image2)

**Figure 20.3**
**Example of Large Mammal Underpass**

3. Multi-Use Underpass. Design similar to large mammal underpass; however, management objective is co-use between wildlife and humans. Design is generally smaller than a large mammal underpass because of type of wildlife using the structures along with human use. These structures may not be adequate for all wildlife but usually results in use by generalist species common in human-dominated environments (e.g., urban or peri-urban habitats). Large structures may be constructed to accommodate the need for more physical space for humans and habitat generalist species.

4. Underpass with Water Flow. An underpass structure designed to accommodate the needs of moving water and wildlife. These underpass structures are frequently used by some large mammal species, but their use depends largely on how it is adapted for their specific crossing needs. Small- and medium-sized mammals generally utilize these structures, particularly if riparian habitat or cover is retained within the underpass. Figure 20.4 provides an example of an underpass with water flow design.
5. Small- to Medium-Sized Mammal Underpass. One of the smaller wildlife crossing structures. Primarily designed for small- and medium-sized mammals, but species use will depend largely on how it may be adapted for their specific crossing needs. Figure 20.5 provides an example of a small- to medium-sized mammal underpass.

6. Amphibian and Reptile Tunnels. Crossing designed specifically for passage by amphibians and reptiles, although other small- and medium-sized vertebrates may use as well. Many different amphibian and reptile designs have been used to meet the specific requirements of each species or taxonomic group. Figure 20.6 provides an example of amphibian and reptile tunnels designs.
20.4 WILDLIFE DESIGN GROUPS

Planning and designing wildlife crossings will often be focused on a certain species of conservation interest (e.g., threatened or endangered species), a specific species group (e.g., amphibians) or abundant species that pose a threat to motorist safety (e.g., Deer, Elk).

This guidance looks at wildlife and species groups when discussing the appropriate wildlife crossing designs. The eight groups mentioned below are general in composition. However, recommendations will be provided, if it is available, for species-specific design requirements (See Tables 20.1, 20.2 and 20.3). Their ecological requirements and how roads affect them are described along with some sample wildlife species for each group.

A. Large Mammals (Ungulates [Deer and Elk], Carnivores [Bears, Bobcat]). Species with large area requirements and potential migratory behavior; large enough to be a motorist safety concern; traffic related mortality may cause substantial impacts to local populations; susceptible to habitat fragmentation by roads.

B. High Mobility Medium-Sized Mammals (Fisher, Coyote, Fox). Species that range widely; fragmentation effects of roads may impact local populations.

C. Low Mobility Medium-Sized Mammals (Raccoon, Skunk, Hare, Groundhog). Species with smaller area requirements; common road related mortality; relatively abundant populations.

D. Semi-arboreal Mammals (Marten, Red Squirrel, Flying Squirrel). Species that are dependent on forested habitats for movement and meeting life requisites; common road-related mortality.

E. Semi-aquatic Mammals (River Otter, Mink, Muskrat). Species that are associated with riparian habitats for movement and life requisites; common road-related mortality.

F. Small Mammals (Ground Squirrels, Voles, Mice). Species that are common road-related mortality; relatively abundant populations.

G. Amphibians (Frogs, Toads, Salamanders). Species with special habitat requirement; relatively abundant populations at the local scale; populations are highly susceptible to road mortality.

H. Reptiles (Snakes, Lizards, Turtles). Species with special habitat requirement; road environment tends to attract individuals; relatively abundant populations.

Table 20.1
General guidelines for minimum and recommended dimensions of wildlife overpass designs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
<th>Species and Group</th>
<th>Dimensions Minimum</th>
<th>Dimensions Recommended¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape Bridge</td>
<td>Wildlife Only</td>
<td>All wildlife species</td>
<td>W: 230 ft (70 m)</td>
<td>W: &gt;330 ft (&gt;100 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amphibians (if adapted)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife Overpass</td>
<td>Wildlife Only</td>
<td>Large mammals</td>
<td>W: 130-165 ft (40-50 m)</td>
<td>W: 165-230 ft (50-70 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-mobility medium-sized mammals</td>
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<tr>
<td></td>
<td></td>
<td>Low mobility medium-sized mammals</td>
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<td></td>
<td></td>
<td>Small mammals</td>
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<td></td>
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<td>Reptiles</td>
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<tr>
<td></td>
<td></td>
<td>Amphibians (if adapted)</td>
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</tbody>
</table>
## Table 20.2
General guidelines for minimum and recommended dimensions of wildlife underpass designs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
<th>Species and Group</th>
<th>Dimensions Minimum</th>
<th>Dimensions Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-use Overpass</td>
<td>Mixed Use: Wildlife &amp; Human activities</td>
<td>Large mammals High-mobility medium-sized mammals Low mobility medium-sized mammals Small mammals Amphibians (if adapted) Reptiles</td>
<td>W: 32 ft (10 m)</td>
<td>W: 50-130 ft (15-40 m)</td>
</tr>
</tbody>
</table>

1 These dimensions are recommendations and may vary depending on site conditions and species needs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
<th>Species and Group</th>
<th>Dimensions Minimum</th>
<th>Dimensions Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viaduct or Flyover</td>
<td>Multi-purpose</td>
<td>All wildlife species</td>
<td>There are no minimum dimensions. Structures are generally larger than the largest wildlife underpass structures.</td>
<td>There are no minimum dimensions. Structures are generally larger than the largest wildlife underpass structures.</td>
</tr>
<tr>
<td>Large Mammal Underpass</td>
<td>Wildlife only</td>
<td>Large mammals High-mobility medium-sized mammals Low mobility medium-sized mammals Semi-arboreal &amp; semi-aquatic Mammals (adapted) Small mammals Amphibians (adapted) Reptiles</td>
<td>W: 23 ft (7 m) Ht: 13 ft (4 m)</td>
<td>W: &gt;32 ft (&gt;10 m) Ht: &gt;13 ft (&gt;4 m)</td>
</tr>
<tr>
<td>Multi-Use Underpass</td>
<td>Mixed use: Wildlife &amp; Human activities</td>
<td>Large mammals High-mobility medium-sized mammals Low mobility medium-sized mammals Semi-arboreal &amp; semi-aquatic Mammals (adapted) Small mammals Amphibians (adapted) Reptiles</td>
<td>W: 16.5 ft (5 m) Ht: 8.2 ft (2.5 m)</td>
<td>W: &gt;23 ft (&gt;7 m) Ht: &gt;11.5 ft (&gt;3.5 m)</td>
</tr>
</tbody>
</table>
### Wildlife Crossings

#### Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
<th>Species and Group</th>
<th>Dimensions Minimum</th>
<th>Dimensions Recommended&lt;br&gt;2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underpass With Water Flow</td>
<td>Wildlife and drainage</td>
<td>Large mammals&lt;br&gt;High-mobility medium-sized mammals&lt;br&gt;Low mobility medium-sized mammals&lt;br&gt;Semi-arboreal mammals (adapted)&lt;br&gt;Semi-aquatic mammals&lt;br&gt;Small mammals &amp; amphibians&lt;br&gt;Semi-arboreal mammals &amp; reptiles (adapted)</td>
<td>W*: 6.5 ft dry pathway (2 m)&lt;br&gt;Ht: 10 ft (3 m)</td>
<td>W*: &gt;10 ft dry pathway (&gt;3 m)&lt;br&gt;Ht: &gt;13 ft (&gt;4 m)&lt;br&gt;*Width will be dependent on width of hydrologic channel in crossing.</td>
</tr>
<tr>
<td>Small to Medium-Sized Mammal Underpass</td>
<td>Wildlife and seasonal drainage</td>
<td>High-mobility medium-sized mammals (adapted)&lt;br&gt;Low mobility medium-sized mammals&lt;br&gt;Semi-aquatic mammals (adapted)&lt;br&gt;Small mammals&lt;br&gt;Amphibians (adapted)&lt;br&gt;Reptiles</td>
<td>Same as recommended dimensions.&lt;br&gt;Size selection is based on the target species needs or connectivity objective at the site.</td>
<td>W: 1–4 ft (0.3–1.2 m)&lt;br&gt;Ht: 1–4 ft (0.3–1.2 m)&lt;br&gt;OR&lt;br&gt;1–4 ft dia. (0.3–1.2 m)</td>
</tr>
<tr>
<td>Amphibian and Reptile Tunnel</td>
<td>Wildlife only</td>
<td>Amphibians&lt;br&gt;Low mobility medium-sized mammals (adapted)&lt;br&gt;Semi-aquatic (adapted)&lt;br&gt;Small mammals &amp; reptiles (adapted)</td>
<td>Dimensions vary depending on target species or taxa or local conditions.&lt;br&gt;Tunnels range from 1–3 ft (0.35–1 m) in diameter.</td>
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</tr>
</tbody>
</table>

2 These dimensions are recommendations and may vary depending on site conditions and species needs.

#### 20.5 POLICY/GUIDANCE

The decision to incorporate wildlife crossings, exclusionary fencing, etc. into the highway design is not a straightforward and simple formula but a combination of these three factors: Public Safety, Cost Factors (e.g., design, construction and maintenance) and Environmental Benefits. These three areas are interrelated when it comes to wildlife crossings and the weight assigned to each is a moving target. Factors such as public opinion, ADT, crash data, future land use and species concerns can shift the values one way or the other. The value of each factor varies from project to project and must be looked at according to the circumstances present. Data collected or provided to address the above guidelines should serve as the basis of decision for determining whether or not a wildlife crossing and/or exclusionary devices are appropriate. The criteria below take this into account and Figure 20.7 can assist in making that determination. The specific design (type, size and location) of the crossing should be determined by the District with coordination from the Pennsylvania Game Commission (PGC), Pennsylvania Fish and Boat Commission (PF&BC) and/or U.S. Fish and Wildlife Service (USFWS).

The following criteria should be used in determining whether a wildlife crossing may be included in a transportation project:
1. Wildlife crossings and exclusionary devices should be considered when the project is a new roadway or bridge or a new alignment where the centerline deviates from the existing one enough that vertical and horizontal design controls for new construction are used to at least some degree, and meets all of the following conditions:

- Traffic volumes are ≥ 4,000 ADT and the target species is subject to high mortality when crossing the road (if applicable).
- The project crosses areas where drainage ways are present.
- The project crosses areas that present minimal grade separations requiring little cut or fill to install the crossing.
- Target species have been documented to utilize habitat impacted by the project to fulfill life requisite values.
- The project is within the primary or secondary range of a listed species.
- The project has the potential to inhibit movement of target species between critical life requisite habitats or prohibits movement of target species along documented travel corridors.
- Habitat exists on both sides of the roadway.
- Public lands or lands under conservation easement are present in sufficient amounts, on both sides of the road, where the crossing will be located in order to ensure future land use is compatible with the target species' needs.
- On projects where multiple locations meet these requirements the number and spacing of wildlife crossings will be determined by PennDOT after consultation with the natural resource agencies.

2. Wildlife crossings and exclusionary devices may, at PennDOT’s discretion, be considered when the project is a bridge replacement, drainage improvement, or reconstruction project if the following conditions are met:

- The project meets the above requirements.
- The project is within a known area of wildlife/vehicle strikes (motorist safety).
- There are documented recent road kills of targeted species within the project area.
- The requesting organization/agency is prepared to participate as a funding partner and adequate funding is available (when applicable).

3. PennDOT will consider the need for a wildlife crossing or exclusionary devise when the PGC, PF&BC or USFWS have expressed a science-based need for a wildlife crossing, in conjunction with the Department, for a target species. A target species being a species that has been identified as the subject of a conservation or monitoring action.

- All requests for wildlife crossings and/or exclusionary devices will be made in accordance with the Pennsylvania Department of Transportation Natural Resources Assessment and Mitigation Agency Partnering Policy (Publication 346, Threatened and Endangered Species Desk Reference, Appendix KK). This policy requires the requesting entity to provide documentation or studies to substantiate their requests and it requires an analysis to determine whether the resource is a Natural Resource Meriting Compensation and further whether the compensation is a reasonable expenditure of public funds. In cases where supporting data does not exist, PennDOT will not conduct studies nor will it generate data for such purposes.

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## Table 20.3

**Suitability of wildlife crossing design types for distinct wildlife species and taxa.**

<table>
<thead>
<tr>
<th>Wildlife Species and Taxa</th>
<th>Landscape bridge</th>
<th>Wildlife overpass</th>
<th>Multi-use overpass</th>
<th>Viaduct or flyover</th>
<th>Large mammal underpass</th>
<th>Multi-use underpass</th>
<th>Underpass with water flow</th>
<th>Small- to medium-sized mammal underpass</th>
<th>Amphibian and reptile tunnel</th>
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<tbody>
<tr>
<td><strong>Ungulates</strong></td>
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<td><strong>Carnivores</strong></td>
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<td>Weasel</td>
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<td>River Otter</td>
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<td><strong>Low mobility medium-sized mammals</strong></td>
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<td>● (⊕)</td>
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<tr>
<td>Semi-arboreal mammals</td>
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<td>Small mammals</td>
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<td>Amphibians</td>
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<tr>
<td>Reptiles</td>
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</tbody>
</table>

- ● Recommended/Optimum solution;
- ○ Possible if adapted to local conditions;
- ⊕ Not recommended;
- – Not applicable


A current list of wild amphibians and reptiles in Pennsylvania can be found at: [fishandboat.com/water/amprep/native.htm](http://fishandboat.com/water/amprep/native.htm).
Figure 20.7
Wildlife Accommodation Scenarios
20.6 DESIGN

Each project site has different conditions that require consideration in the design of a crossing system or exclusionary device. During the project development process, direct coordination is recommended between the Department and PGC, PF&BC and/or USFWS, to establish the design considerations for each specific crossing and site. This coordination should occur as early as practical during the design phase to ensure that all project objectives are met.

Criteria which should be utilized in the determination of a crossing design should include but are not limited to:

- The crossing cannot compromise safety or state or federal design criteria.
- The crossing cannot restrict access by adjacent property owners.
- The crossing cannot negatively impact adjacent properties (e.g., provide direct access for wildlife to private properties where none presently exist).
- The crossing cannot have the potential to negatively impact existing drainage patterns or flood off-site properties.
- The crossing utilizes the most cost-feasible design for the target species.
- Significant additional habitat impacts cannot result from the construction of the crossing.
- The addition of the crossing cannot result in significant modifications to the proposed project (e.g., excessive increases in roadway grades, increases in required right-of-way).

20.7 WILDLIFE FENCING

The use of fencing in conjunction with wildlife crossings is critical. Most wildlife is extremely wary and will avoid confinement or unnatural situations. Given the choice between going through unfamiliar wildlife crossing structures and crossing highway pavement, many will choose the latter. Fencing forces the wildlife to use the crossing and over time will become comfortable. Without fence most wildlife would not use the structure.

When designing a wildlife passage the fencing should be designed to minimize the corral or chute effect. This is done by constructing fencing to the top of the wildlife crossings, rather than the bottom, making approach to the wildlife crossing as wide as possible.

For large mammals, a 1.8 m to 2.4 m (6 ft to 8 ft) woven-wire fence presents a formidable barrier when properly constructed and maintained (Figure 20.8). The 20-year life span of a well-built fence can justify its cost. Major materials include sturdy, rot-resistant wooden corner posts set in concrete (optional), wooden or studded steel T line posts, woven-wire fencing, and gates. If needed, extensions can be attached to the top of the fence to prevent deer or elk from jumping over. Bears, coyotes and other carnivores may try to dig under or climb over. Burying fencing underground reduces the possibility of wildlife digging under the fence and also increases the lifetime of the fencing reducing maintenance costs. Fencing is also important for medium to small mammals, reptiles and amphibians as well. For many of these species, Type 2 right-of-way highway fencing (1.2 m (4 ft) wire mesh) should be adequate. Variable mesh fencing that has small-sized mesh openings at the bottom and the standard mesh size at the top should be used where small mammals, reptile and amphibians are anticipated.

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If wildlife becomes trapped inside the fenced area, they need to be able to safely exit the highway area. The most effective means of escape are through earthen ramps (or "jump-out" structures) as shown in Figure 20.9. Earthen ramps or jump-outs allow wildlife (large and small) to safely exit right-of-ways by jumping down to the opposite side of the fence. Earthen escape ramps are mounds of dirt placed against a smooth backing material and constructed on the right-of-way side of the fence. The landing spot around the outside wall must consist of loose soil, sand or other soft material to prevent injury to animals.

20.8 DETERMINING EFFECTIVENESS

Monitoring of wildlife crossings may be conducted by PennDOT, the agency with jurisdiction of the species, and/or any partnering organization to determine the success of the accommodation and to help in the improved design and placement of future crossings. Measures of effectiveness should be developed during the design phase and monitored post-construction. "Effectiveness" may be defined as:

- Reduced animal-vehicle collisions (AVCs)
- Number of crossings by target species
- Adequate number of crossings (how many?)
• Connectivity maintained to sustain populations, communities, ecosystem functions
• Population increases of the species

20.9 MAINTENANCE

Existing and newly-installed wildlife crossing structures must be periodically maintained to continue to provide safe passage as, in the absence of routine maintenance, these structures may be avoided or become unusable by the species that they were intended to benefit. Maintenance staff should be involved in the wildlife crossings planning to provide input on design considerations and their impacts on maintenance needs as well as in post-project assessments to consult on any maintenance concerns that may have arisen. It cannot be assumed that crossing structures, once in place, will remain effective without periodic maintenance, and maintenance crews must be informed of the procedures necessary to keep crossing structures accessible and to function as intended.

Maintenance activities may include but are not limited to:

• Clearing of vegetation and maintenance of aprons of culverts. If scouring following storms prevents access, the scoured rocks or soil should be replaced with like materials to eliminate "hanging culverts" and not replaced with boulders, rip-rap or other substrates unsuited to the animal species the culvert was intended to benefit.
• Maintaining cover material for smaller species (including but not limited to: pipes, rocks, and root balls).
• Fences should be cleared of accumulated debris and repaired if they are torn or displaced from their original positions.

Vegetation over and under-crossings should be kept free of weeds that inhibit passage of all but the largest animals while native plants are encouraged to provide cover or forage.

20.10 REFERENCES


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