**A Standardized Framework for Using Camera Traps to Monitor Wildlife Crossing Structures**

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**THE HISTORY**

Terrestrial Wildlife Crossings Built in Colorado from 1970’s to 2015

Over 50 structures built as designated wildlife passages or retrofit to improve passage (e.g., adding wildlife fencing or, for small mammals, culvert shelving).

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**THE CHALLENGE**

Inconsistent Monitoring

Wildlife crossing structures are increasingly being planned and constructed in Colorado to mitigate the negative impacts of roads on wildlife and to reduce incidence of wildlife-vehicle collisions. Yet the few monitoring efforts deployed have not followed standardized protocols and some have only captured species presence at structures.

Several studies have been conducted at select locations (e.g., Singer et al. 2011) and/or for select species (e.g., Crooks et al. 2008). Recently, CDOT’s Southwest Region, (e.g., Singer et al. 2011) and/or for select species (e.g., Crooks et al. 2008). Recently, CDOT’s Southwest Region, has committed to placing camera traps at all new crossing locations in the region for 3 years.

Colorado would benefit from standardized protocols in wildlife crossing structures monitoring.

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**CROSSING STRUCTURE PERFORMANCE MONITORING FRAMEWORK**

<table>
<thead>
<tr>
<th>Define Study Objectives</th>
<th>Design the Study to Answer Questions, Such As:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Determine through-passage rate by species, i.e., the number of successful passages divided by the total number of approaches.</td>
<td>❖ Which species are using the structure, and what are their usage patterns (e.g., season, time of day, frequency)?</td>
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<tr>
<td>• Determine changes in successful passage rates over time.</td>
<td>❖ Which species are nearby, but not using the crossing structure?</td>
</tr>
<tr>
<td>• Determine non-use by species, i.e., the species and numbers of each that do not approach the structure.</td>
<td>❖ What are the structure dimensions and characteristics that work best for different species of wildlife?</td>
</tr>
<tr>
<td>• Select camera type based on the need to census animal approaches vs. sampling a portion of the activity.</td>
<td>❖ What adaptations may be needed to enhance structure use by the target species?</td>
</tr>
<tr>
<td>• Select camera settings (i.e., trigger frequency, pictures per trigger, sensitivity).</td>
<td></td>
</tr>
<tr>
<td>• Optimize camera placement to maximize capture rates, and ensure continuous functioning during key timeframes.</td>
<td></td>
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</tbody>
</table>

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**THE FRAMEWORK**

**Design and Implement Monitoring Approach**

- Define Study Objectives
- Monitoring Approach
- Compile and Analyze Photographic Data
- Design the Study to Answer Questions, Such As:
- Determine through-passage rate by species, i.e., the number of successful passages divided by the total number of approaches.
- Determine changes in successful passage rates over time.
- Determine non-use by species, i.e., the species and numbers of each that do not approach the structure.
- Select camera type based on the need to census animal approaches vs. sampling a portion of the activity.
- Select camera settings (i.e., trigger frequency, pictures per trigger, sensitivity).
- Optimize camera placement to maximize capture rates, and ensure continuous functioning during key timeframes.

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**THE BENEFITS**

Statewide standardized crossing structure performance monitoring allows for comparison among sites, and places Colorado within the context of others using the same methods: Utah (Cramer 2014), Montana (Cramer et al. 2015), Idaho (Schwender and Cramer 2012), Oregon (Cramer 2012), and Washington (Kintsch and Cramer 2011).

Further, a standardized framework will:
- Support analysis of many structures and assist in identifying design features that work best for different species.
- Combine data collected in the same manner enabling correlations of crossing structure activity with collar data, where available.
- Promote further collaboration between local CPW and CDOT biologists to conduct monitoring at new or retrofit wildlife crossing structures.

Similar protocols may be implemented to evaluate the performance of associated mitigation, including wildlife barrier fencing, escape ramps and wildlife guards.

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**Citations**

Cramer, P. 2014. Wildlife crossings in Utah: Determining what works and helping to create the best and most cost-effective structure designs. Report to Utah Division of Wildlife Resources, Salt lake City, UT.


