ROaDS: Roadkill Observation and Data System

Standardizing and streamlining wildlife-vehicle collision data collection on federal lands roads

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Overview

Over 2 million miles of public roads crisscross America; as a result, many of these traverse through important wildlife habitats and movement corridors.

When and where wildlife and vehicle movements intersect, wildlife-vehicle collisions (WVCs) may occur, raising both human safety and wildlife conservation concerns.

The implications of WVCs on roads throughout our public lands are often unclear due to inconsistent and variable methods used to document these incidents across different jurisdictions and agencies.

Rigorous, standardized WVC data are key to implementing effective measures to reduce conflicts between vehicles and wildlife.

To address this safety and conservation issue, the National Park Service and US Fish and Wildlife Service have partnered with the Western Transportation Institute at Montana State University to develop a standardized data collection system that will improve assessments of wildlife-transportation conflict areas and planning for WVC mitigation investments on roads in National Parks and National Wildlife Refuges.

The goal of this project is to develop a system of user-friendly tools to collect and manage data identifying specific areas where measures may be imlemented to reduce WVCs and improve connectivity on federal land management agency (FLMA) roads.

Key Words: Transportation, roads, wildlife-vehicle collisions, data system, data standards, federal lands, mobile device application

Phase I: Develop a Pilot System and Mobile Device App

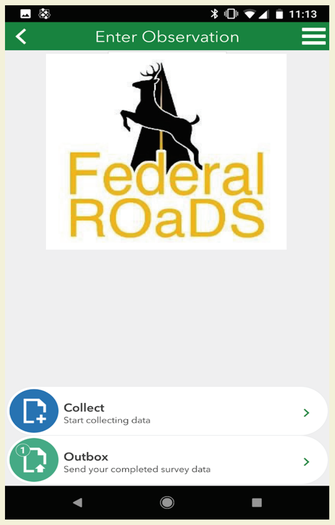
Phase 1 of the project entailed developing "ROaDS" (Roadkill Observation and Data System) as a mobile device application (an "app") for collecting WVC data in the field using smart phones or tablets. The application was developed using the ESRI[tm] Survey 123 platform, currently available to all Department of Interior (DOI) agency and bureau employees.

The system is designed to collect information on large animal-vehicle crashes to address motorist safety concerns on FLMA roads, as well as carcass data of medium- and smaller-sized fauna relevant to FLMAs' conservation missions.

The app is used for collecting observations of roadkill carcasses in the field enabling FLMAs to:

- Collect basic, standardized WVC data with or without data connectivity in the field.
- Record observations opportunistically or conduct systematic monitoring surveys.
- Document large animals, the focus of motorist safety, as well as smaller mammals, reptiles, birds, and amphibians for conservation purposes.
- Document observer confidence in the identification of the species.
- Take a photo of the observed carcass.

For users' safety, the data collector can push a button to confirm and lock in the location of the roadkill observation on a map, allowing the observer to move to a safe location away from traffic to enter additional information for that given observation.

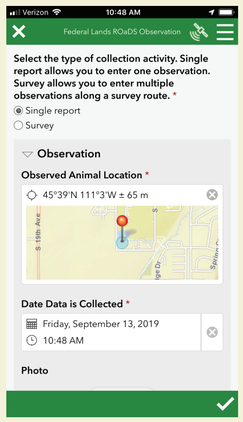


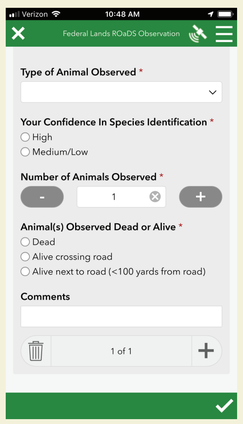
Users of the app on mobiles devices with connectivity via the internet or cellular phone data coverage can upload observations to a cloud-based data storage provided by Esritm. If a phone or tablet is dis-connected, the app stores the information in the mobile device's memory until connectivity is restored.

Phase 2: Refine the Data Collection Process

Recommendations were made to modify the ROaDS survey from Phase 1 so it is shorter, easier to use and more efficient. Also, to add a function that simultaneously captures the observers survey route and the time they spent searching for roadside carcasses.

Phase 2 began to engage other agencies and organizations to jointly develop national standards for WVC data collection systems via meetings, presentations and workshops at national conferences that will be continued in Phase 3.





Phase 2 of the project also developed three rec-ommendations for preliminary national standards for WVC data collection systems

1. **Location Accuracy Standard:** data collection shall be made in the field, at the time of the car-cass observation, using a reliable GPS system.
2. **Expert Review Standard:** The identification of the species present in each observation must be reviewable by an expert.
3. **Standardized National Species List**: A relatively short species list of the most frequently observed animals of interest from across the U.S. using their common names will be provided. In addition, the WVC data collection system will provide a text box to record species not on the list.

Species or Taxonomic Category

1. Whitetail deer	**6. Pronghorn antelope**	**11. Black bear**	**16. DOMESTIC: Dog**
2. Mule deer	**7. Raccoon**	**12. Mountain lion**	**17. DOMESTIC: Livestock (TEXT BOX)**
3. Unknown deer species	**8. Striped skunk**	**13. Coyote**	**18. OTHER: Mammal (TEXT BOX)**
4. Moose	**9. Opossum**	**14. Red fox**	**19. OTHER: Reptile/amphibian (TEXT BOX)**
5. Elk	**10. Armadillo**	**15. DOMESTIC: Cat**	**20. OTHER: Bird (TEXT BOX)**

Table 1: Recommended national standard data fields for DOI agencies for use in the ROaDS Survey.

			Type of Data Field		
Data Field No.	Data Field	Type of Data Field	Button (Y/N/other)	Pull Down List	Comments
1	Location of observed animal	Map with locator flag	x map pin		Compass button or map pin
2	Species observed	Pull-down menu		x	Most frequently observed WVC species and/or text box
3	Take a photo*	1 button			Geo-synched photo(s)
4	Confidence in spp. identification	2 buttons	x		High; Medium/Low
5	Animal status	3 buttons	x		Dead; Alive Crossing Road; Alive Near Road (< 100 yards from road)
6	Number of animals observed	2 buttons	x		1; More than 1 --> drop-down scroll with numbers
7	Comments*	Text box		x	Allow 140 characters

System Applications

The WVC Data Collection System Database features map-based viewing and query capabilities that enable analyses to:

- Quantify mortality of species of special concern;
- Identify factors, at local to landscape scales, associated with areas of high WVC incidents;
- Identify optimal sites for & evaluate the effectiveness of WVC mitigation investments; and
- Support transportation planning, programming and budgeting decisions.

Figure 2. Screenshot of a heat map clustering function using ROaDS data collected in Oregon & Montana in Phase I beta testing of the system.

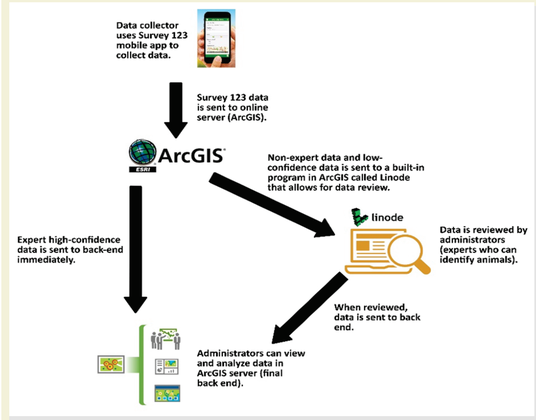


Figure 1. Schematic of the flow of data collected by observers in the pilot phase of this project using the existing DOI's Esri[tm] Survey 123 for ArcGIS system.

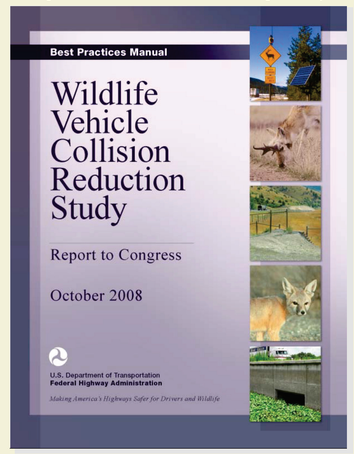


Figure 3. ROaDS data may be analyzed to identify where and what types of mitigation measures may be integrated into transportation projects to reduce wildlife vehicle collisions.

Next Steps: Phase 3

- Develop, support and lead meetings/workshops at key locations to convene experts to develop a common national standard for WVC data collection.
- The new ROaDS survey modifications made in Phase 2 will be beta-tested by DOI users and its partners – State DOTs, tribes and/or NGOs.
- WTI Team will develop the necessary communications and outreach materials needed (i.e., manuals, protocols, guidance, trainings, workshops, webinars).
- The Project will coordinate with ARC (Animal Road Crossings) Solutions and members of its partner network to encourage the parallel use of ROaDS by non-profit organizations and tribes.
- Explore the possibility for the ROaDS survey to be placed on a different platform, other than ESRI-based Survey 123.

If you work for a U.S Federal Land Management Agency and are interested in beta-testing ROaDS during Phase 3, please leave your contact information below.

Early Adoption

Early adopters of ROaDS in 2018 for projects have been the Blackfeet Tribe in Montana and the non-profit conservation group Aaranyak in Assam, India whose research is supported by a USFWS grant.

Project Team Affiliations

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