NATIONAL RURAL ITS CONFERENCE
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Roadkill Observation Collection System

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Roadkill Observation Collection System (ROCS)

“A Tool to Gather Standardized and Spatially Explicit Road Kill Data”

by

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Roadkill Observation Collection System (ROCS): A multi-phased solution for accurate carcass and collision data collection

Phase 1: Proof of Concept
Phase 2: Field Test of Rugged Units
Phase 3: System Development
Phase 4: Cell Phone Application

Amanda Hardy/WTI
What’s the problem?

- Annual estimates in the U.S.:
  - 1-2 million animal-vehicle collisions (AVCs)
  - >200 human fatalities & 29,000 injuries
  - ~$ 8.8 billion in property damage
What are chances of hitting a deer?
(per vehicle)

<table>
<thead>
<tr>
<th>State</th>
<th>Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Virginia</td>
<td>1 in 39</td>
</tr>
<tr>
<td>Michigan</td>
<td>1 in 78</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1 in 94</td>
</tr>
<tr>
<td>Iowa</td>
<td>1 in 104</td>
</tr>
<tr>
<td>Montana</td>
<td>1 in 104</td>
</tr>
</tbody>
</table>

Source: State Farm Insurance

By Anne R. Carey and Alejandro Gonzalez, USA TODAY
WVCs Increasing Nationwide

Summary of overall crashes and WVCs in US for 15 years (Huisjer et. al. 2007.)
Summary of estimated costs for each deer-, elk-, and moose-vehicle collision

<table>
<thead>
<tr>
<th>Description</th>
<th>Deer</th>
<th>Elk</th>
<th>Moose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle repair costs per collision</td>
<td>$2,622</td>
<td>$4,550</td>
<td>$5,600</td>
</tr>
<tr>
<td>Human injuries per collision</td>
<td>$2,702</td>
<td>$5,403</td>
<td>$10,807</td>
</tr>
<tr>
<td>Human fatalities per collision</td>
<td>$1,002</td>
<td>$6,683</td>
<td>$13,366</td>
</tr>
<tr>
<td>Towing, accident attendance and investigation</td>
<td>$125</td>
<td>$375</td>
<td>$500</td>
</tr>
<tr>
<td>Hunting value animal per collision</td>
<td>$116</td>
<td>$397</td>
<td>$387</td>
</tr>
<tr>
<td>Carcass removal and disposal per collision</td>
<td>$50</td>
<td>$75</td>
<td>$100</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$6,617</td>
<td>$17,483</td>
<td>$30,760</td>
</tr>
</tbody>
</table>

What do we need to identify?

- Hwy. safety areas of concern
- Identify wildlife mortality sinks
- Identify potential barriers

Marcel Huijser/WTI
Roadkill Observation Collection System (ROCS)

Goal: Improve and standardize AVC and AC data collection methods to reliably identify & prioritize wildlife-transportation conflict areas for mitigation efforts
Proof of Concept Model
ROCS Phase 2 data collection

- Field-rugged pocket PC with integrated GPS
- Standardized data collection software
- ActiveSync to download data files
- 3 Excel file outputs:
  - Monitoring session information
  - GPS log of all points
  - Log of observations
- Data comma delimited (easily imported into software programs)
ROCS Hand-Held Data Collector

Benefits

• Standardized, spatially-precise data
• User-friendly data entry in the field
• Paperless
• Digital comma-delimited output files can be imported into other programs
• Tracks monitoring route and time of effort
ROCS: Phase 3 Objectives

• Desktop PC Software Applications
  – Analyses
  – Display on maps, Google Earth, etc.

• Development of On-line Server
  – Central repository for ROCS data
  – Create interface with desktop PC applications
  – Access ROCS data across jurisdictions

• On-line Data Center
  - Develop protocols, firewalls, and controlled access

• System Test
ROCS: Phase 3

Observations are recorded in the field on ROCS units.

Observations are then uploaded to the WTI server when the ROCs unit is cradled.

Observations are then available to all users via the ROCs web interface.
ROCS CENTRAL DATA SERVER
Database Diagram

- **State**
  - State_Abbr
  - State_Name
  - LastUpdate_DT

- **DataUploadStatus**
  - ROCS_ID
  - SuccessStatus
  - Message
  - UploadTime

- **ObserverInfo**
  - Observer_ID
  - ROCS_ID
  - StartDateTime
  - State_Abbr
  - Organization_Name
  - District
  - Person_Name
  - SearchEffort
  - RoadName
  - SidesInspected
  - Notes
  - EndDateTime
  - Upload_DT

- **ROCSUnit**
  - ROCS_ID
  - Approved
  - OrganizationName
  - Address1
  - City
  - State_Abbr
  - ZipCode
  - PName
  - Phone
  - Email
  - Active
  - DateRegistered

- **GPSObservation**
  - ROCS_ID
  - Observer_ID
  - Latitude
  - Longitude
  - Elevation
  - Speed
  - Heading
  - Fix
  - Species_AKA
  - Sex
  - Carcass_Removed
  - Human_Death
  - Property_Damage
  - Reported
  - Notes
  - TestData
  - Record_DT
  - Record_DT.UTC

- **MasterSpeciesList**
  - Species_ID
  - SpeciesName
  - LastUpdatedBy
  - LastUpdate_DT

- **SpeciesAlias**
  - Species_ID
  - Species_AKA
  - LastUpdate_DT

- **SpeciesSubList**
  - Species_AKA
  - Organization_Name
Options for viewing the observation records displayed at ROCS website are:

- The All observations.
- Last week’s observations.
- Last month’s observations.
- A particular year of observations (e.g., 2009, 2010, 2011).
- All species observations.
- Deer only observations.
Example of an information bubble at ROCS Roadkill Report website
An Individual Observation

Green markers indicate multiple observations. Red markers indicate individual observations. Click on markers for further detail. Zoom in to view individual observations.

ROCS Roadkill Report

Observation
Species: Bear, Black
Sex: Female
Date and Time: 8/27/2008 4:39:19 PM
Latitude: 47.39435
Longitude: -121.46277
ROCS Roadkill Report website viewing data under "terrain" mode in the Catskill Mountains of New York.
ROCS Roadkill Report website, viewing data under "satellite" mode for the Long Island Sound area of New York
EXAMPLE: USING ROCS DATA

Iowa roadkill data viewed via Google Maps® at ROCS Roadkill Report website
Export Iowa ROCS Data for Analysis
Number of white-tailed deer carcasses per month for the highways monitored around Iowa City, Iowa.
Deer mortality clusters and buffer zones along the five road sections in and around Iowa City
The costs (in 2007 US$) per year (2010) associated with deer–vehicle collisions along the 26.0 km (16.2 mile) long section of US Hwy 218, from the junction with I-80 to the junction with Hwy 22. Figure includes the threshold values (at 3% discount rate) that need to be met in order to have the benefits of individual mitigation measures exceed the costs over a 75-year time period. Note that the costs at each 100 m (0.062 mile) long road section included each 100 m unit on either side ("the running average") to estimate the costs per kilometer for each 100 m unit.
ROCS Phase 3 Recommendations

• While Phase III PDA-GPS units are viable, consideration should be given to alternate, less-expensive options such as cellular smart phones.

• There could be further improvements to the visualization functions of the ROCS Roadkill Report website: geographical filtering and zoom options, time period filtering options. Icons could be improved in ways that make ROCS more user friendly, including icons that better represent the species commonly found as roadkill.

• The ROCS Roadkill Report website could include analysis algorithms. They were not developed for Phase 3, since it was assumed individual users would best be able to select and apply their own analysis on data downloaded from the ROCS.

• If a national standard for roadkill data analysis were developed, it could be incorporated into the ROCS Roadkill Report website.
ROCS Phase 4: Smart Cell Phone Applications

AVERAGE COST: $1500/PDA-GPS unit

AVERAGE COST OF APPLICATION: FREE

Amanda Hardy/WTI
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