

Experience with Rural Wildlife Detection and Warning Systems

National Rural ITS Conference

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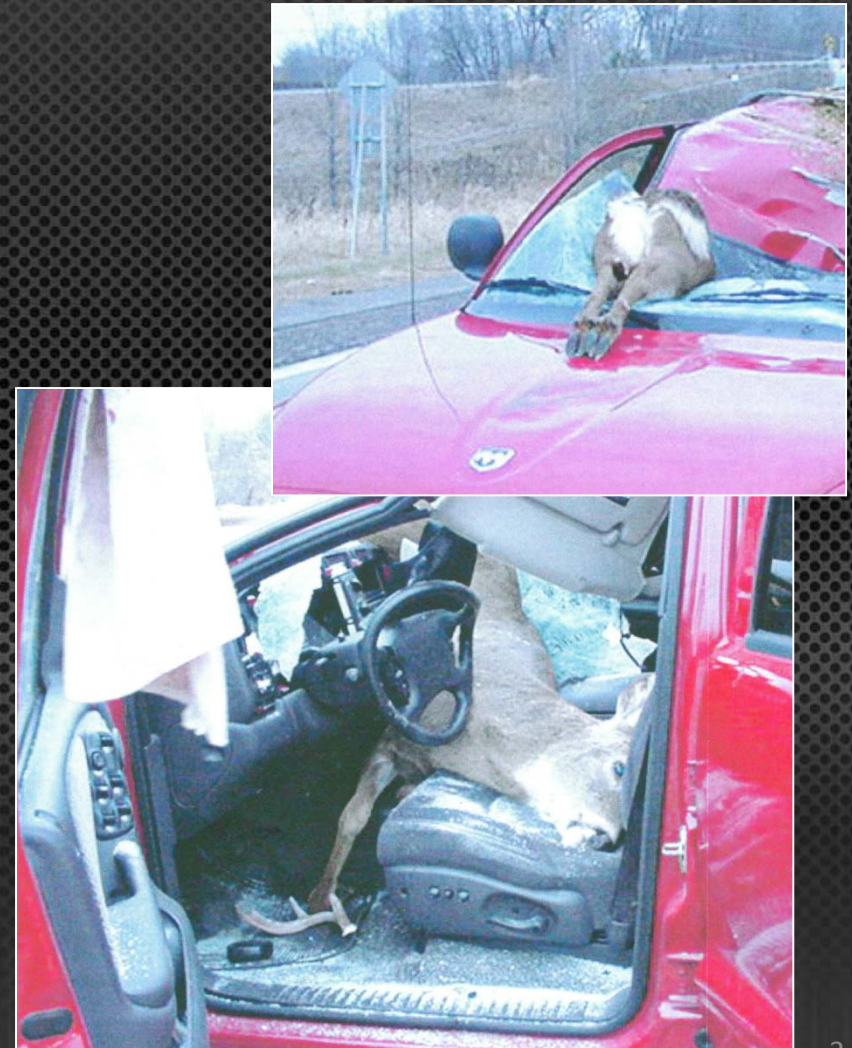


Overview

- SRF has been working on wildlife warning systems since 2006; four deployments
- Active warning systems reduce wildlife-vehicle crashes by 60-80%
- Current design incorporates a number of advances and refinements to the original concept
- First remotely monitored system has now been operational for 22 months

The Deer-Vehicle Crash (DVC) Problem

- Over **1,000,000** DVCs/year nationally
- 200 Fatalities / 26,000 injuries per year
- Total annual US cost: **\$8,388,000,000** from wildlife crashes
- Average cost of deer crash is \$1,840 (~\$3,000 for elk or moose)
- Nearly all crashes result in the animal dying immediately or shortly afterward



SRF's Approach: Active Detection and Warning

SRF's Focus has been on active detection and driver warning, instead of wildlife behavior modification

Active warning systems have been shown to reduce collisions with large hoofed animals by 82 percent (*Romer, J., and C. Mosler-Berger, 2003*)



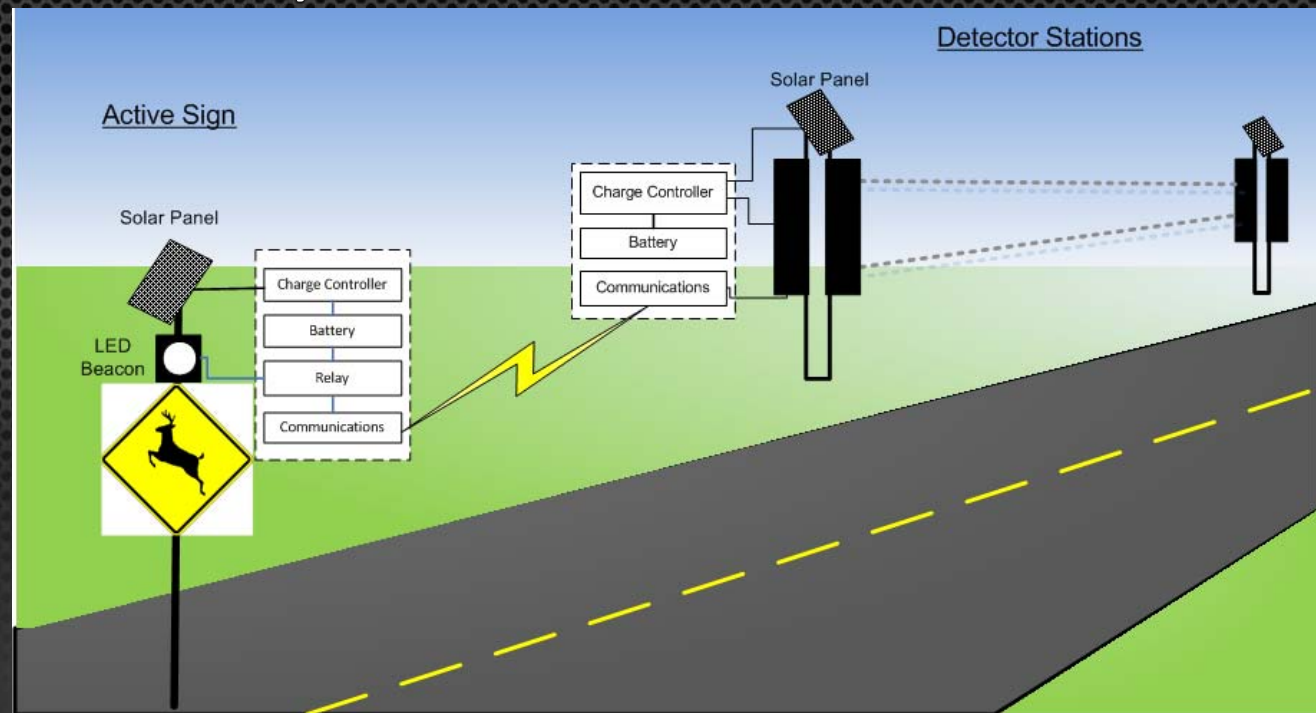
System Details

- Three main components at the roadside:
 - Signs
 - Detectors
 - Management Station (for remote monitoring)
- Designed to be small, crash worthy and use renewable energy



How It Works

- Deer break dual infrared beams between detectors
- Detections are wirelessly transmitted to signs
- Signs flash for a user-defined time – long enough for deer to clear roadway

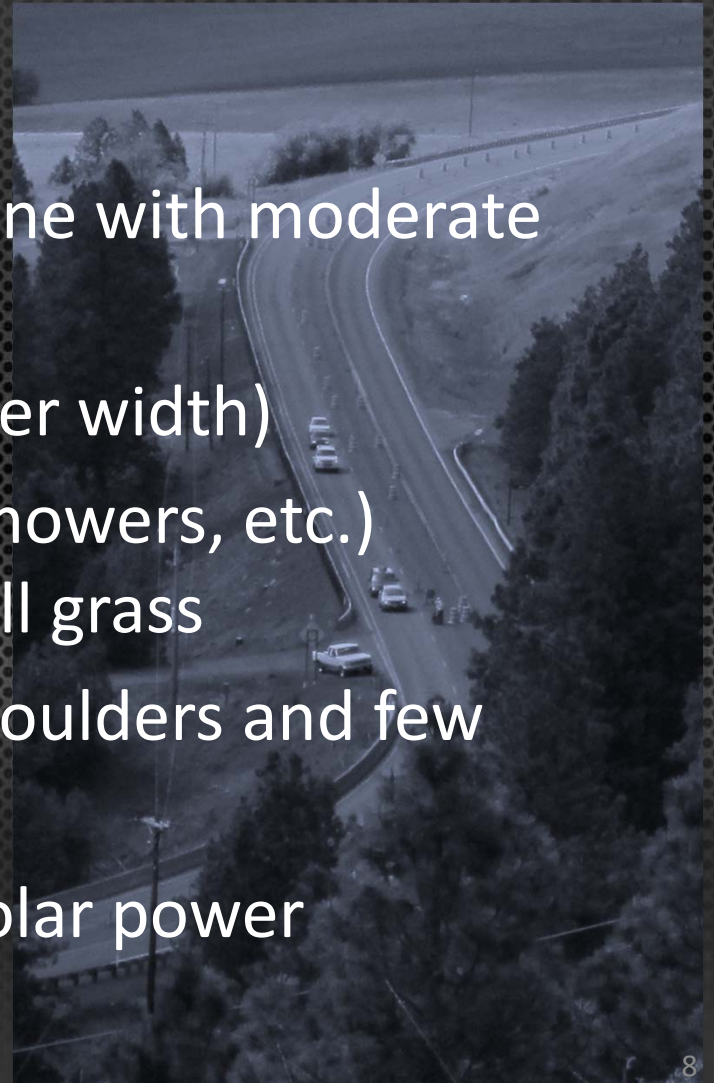


Monitoring and Data Collection

- Per detector logging
- Battery/solar panel output monitoring
- Alarms/alerts can be sent via e-mail/text
- System “dashboard” web page gives at-a-glance operating info, alarm history and raw data retrieval tools

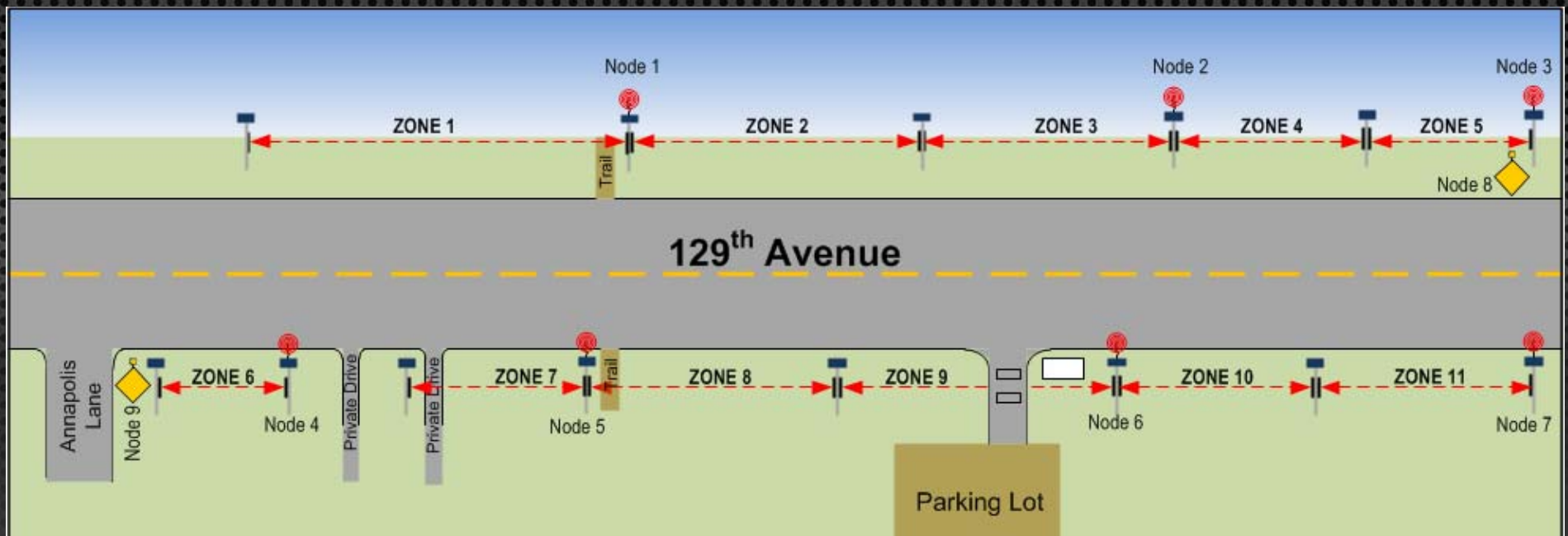
Site Selection

- Desirable characteristics include:
 - Two-Lane or undivided four lane with moderate ADT (5,000-15,000)
 - Full shoulders (6-foot or greater width)
 - Maintainable clear zone (for mowers, etc.) without small trees/shrubs/tall grass
 - Minimal slopes adjacent to shoulders and few driveways or other accesses
 - Good exposure to south for solar power applications



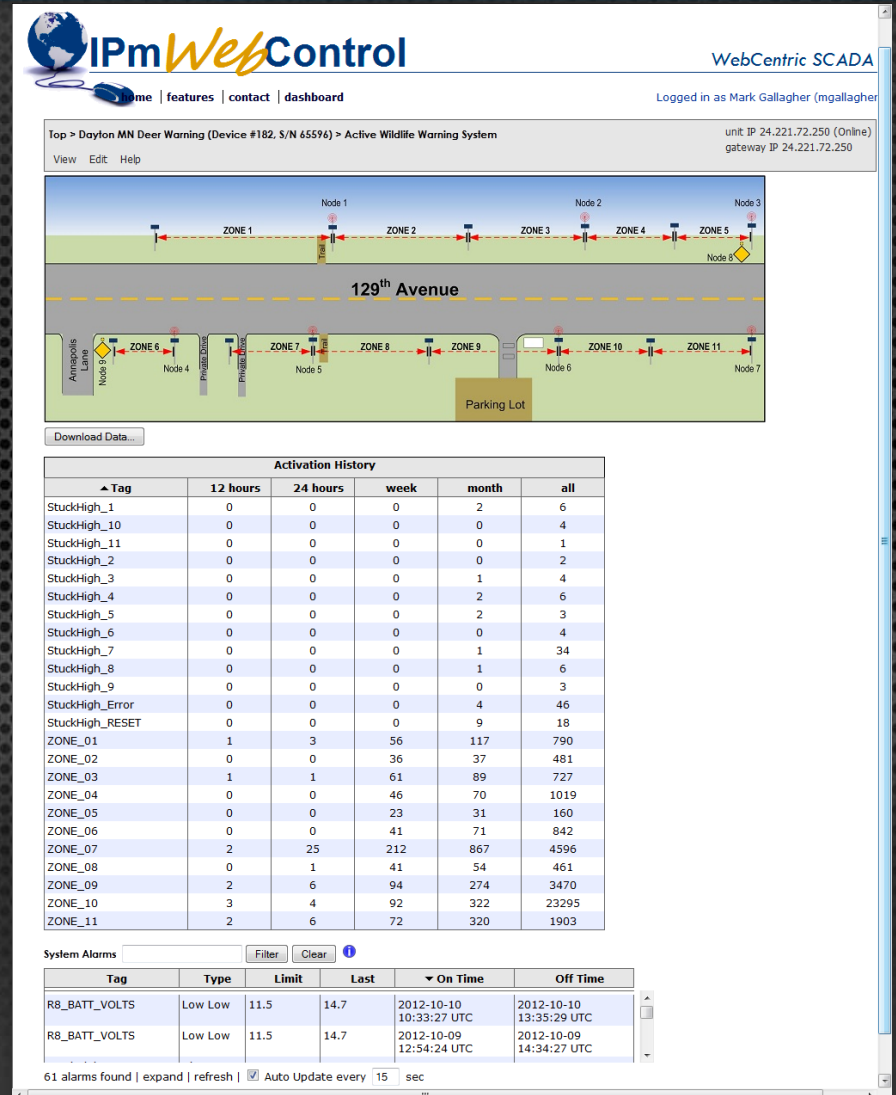
Dayton, MN System Layout (1/2 mile covered)

- 14 detector stations, two signs.
- 13 detectors stations and both signs are solar powered
- Vehicle detection at parking lot to prevent “false” activations



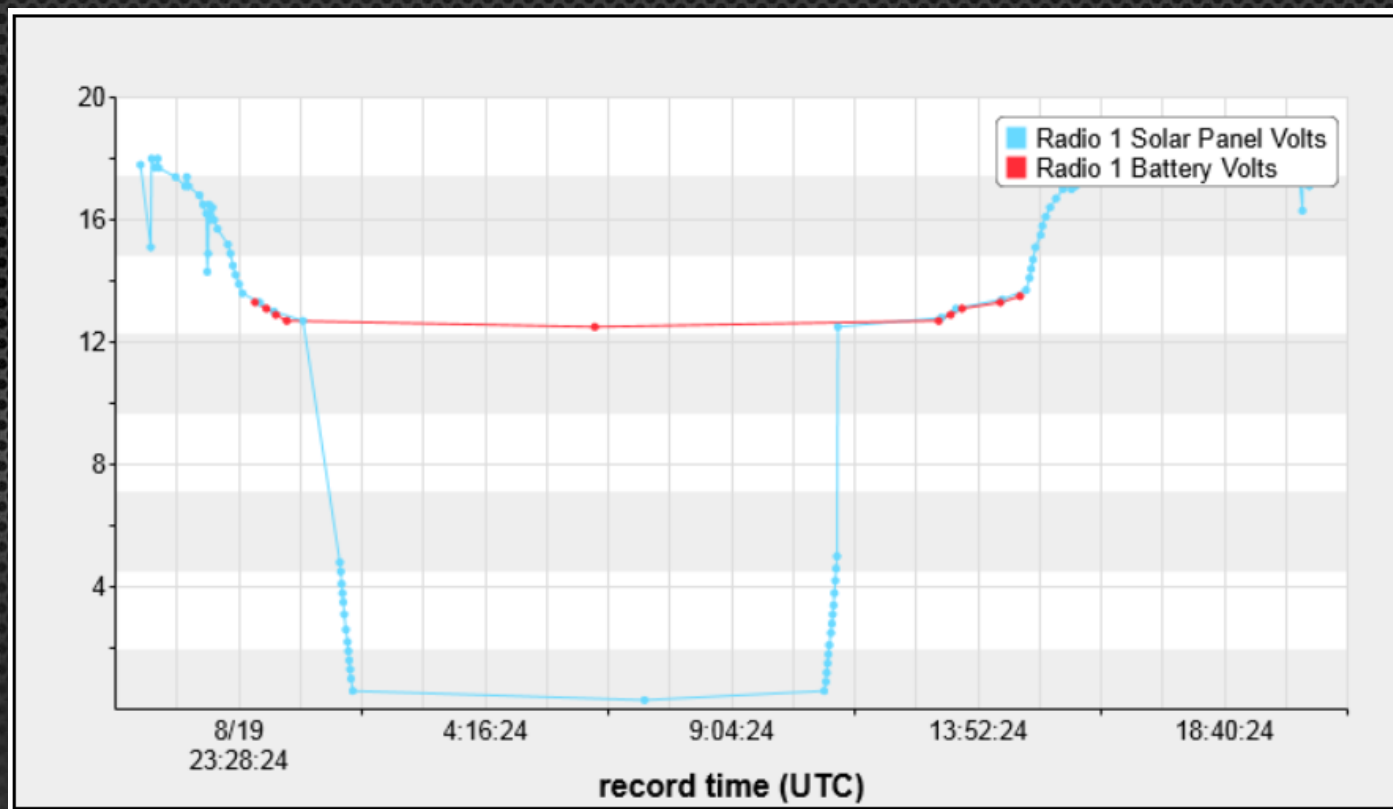
Remote Interface Features

- Summary of Activations by Zone
- Log of battery level/solar charging history
- Log of alarms



Remote Interface Features

- Power System Monitoring Example



Remote Interface Features

- Data Archiving and Download

Download Data...

Export Date Range

Start time/date: 09-01-2012 00:01 -0500 End time/date: 09-30-2012 23:59 -0500

Filters

☐ All Data
☐ Alarms
☒ Detections
☐ Voltages

Download File Cancel



Date	Time	Timestamp	Tag Name	I/O Type	Raw Data	Scaled Data	Engineering Units	Description
9/1/2012	13:27:29	1.34651E+12	ZONE_07	DO	1	ON		Zone 7 Active
9/1/2012	13:27:29	1.34651E+12	Counter_Zone7	AO	3806	3806		Zone 7 Counter
9/1/2012	13:27:31	1.34651E+12	ZONE_07	DO	0	OFF		Zone 7 Active
9/1/2012	13:52:15	1.34651E+12	ZONE_07	DO	1	ON		Zone 7 Active
9/1/2012	13:52:18	1.34651E+12	ZONE_07	DO	0	OFF		Zone 7 Active
9/1/2012	14:52:28	1.34651E+12	Counter_Zone7	AO	3808	3808		Zone 7 Counter
9/1/2012	14:52:28	1.34651E+12	ZONE_07	DO	1	ON		Zone 7 Active
9/1/2012	14:52:31	1.34651E+12	ZONE_07	DO	0	OFF		Zone 7 Active
9/1/2012	14:56:53	1.34651E+12	ZONE_09	DO	1	ON		Zone 9 Active
9/1/2012	14:56:55	1.34651E+12	ZONE_09	DO	0	OFF		Zone 9 Active
9/1/2012	15:04:05	1.34651E+12	Counter_Zone9	AO	3260	3260		Zone 9 Counter

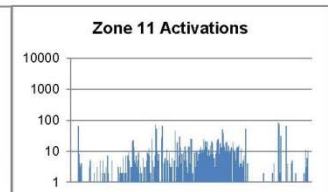
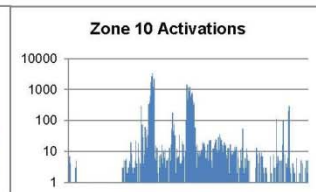
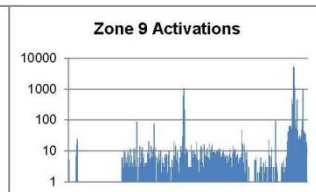
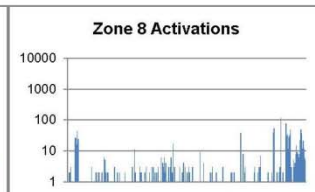
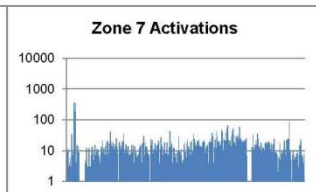
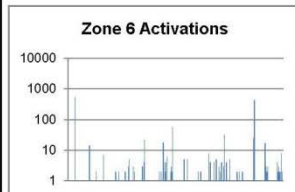
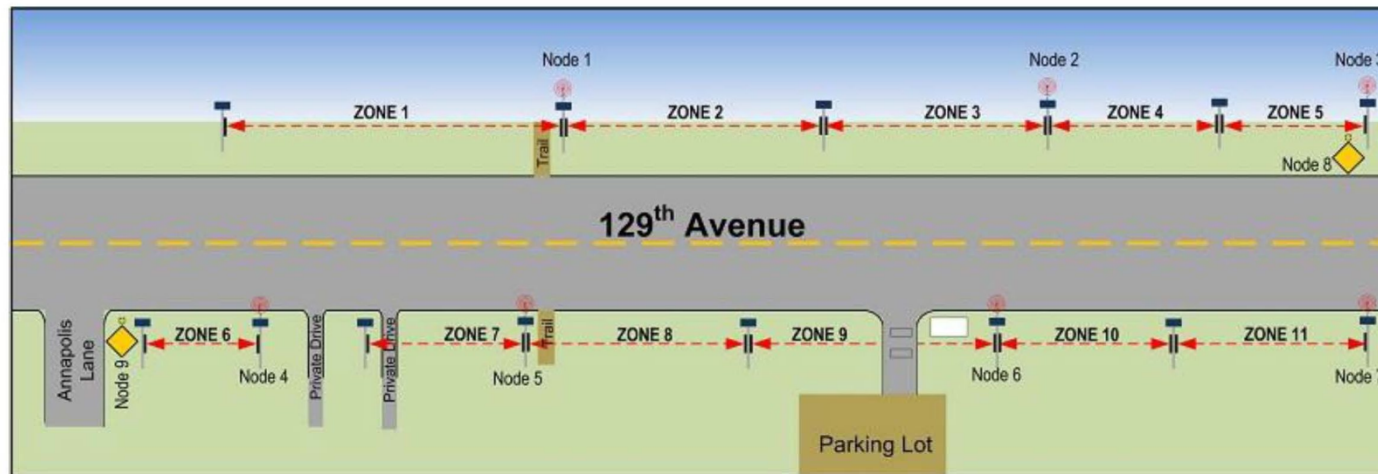
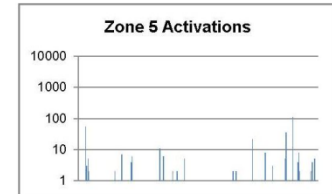
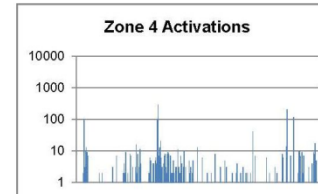
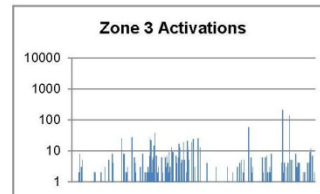
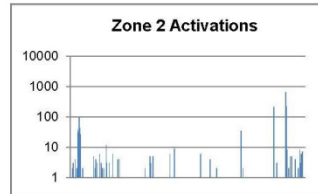
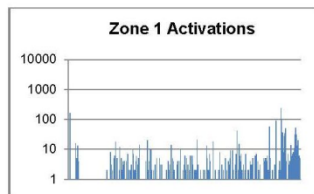
Operational Data

- On-Line Nov. 1, 2011
- Four batteries have needed replacement
- One system reset has been needed
- Single hardware failure due to corrosion from water intrusion.
- Only downtimes due to planned changes to software, usually only a few hours

Operational Data

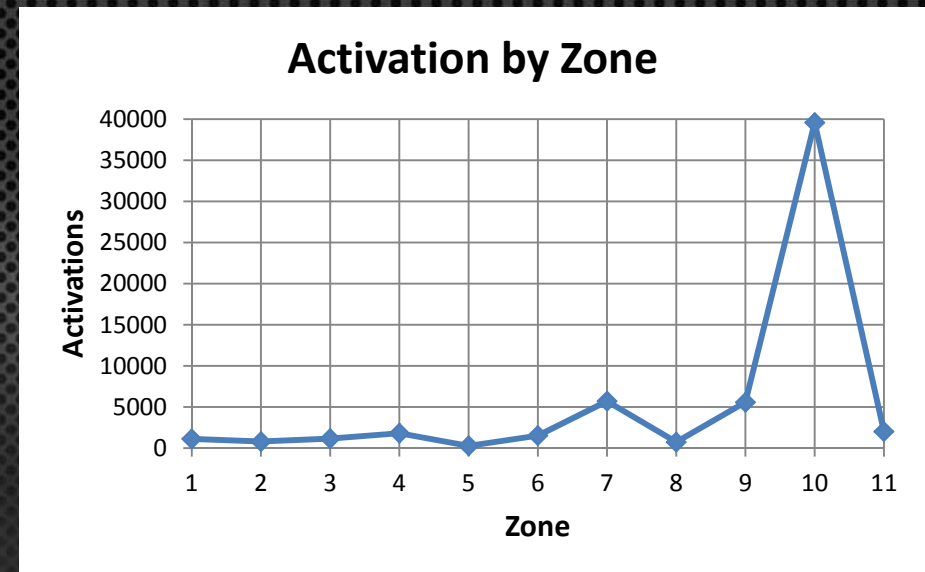
- Detection zones show distinct patterns relating to wildlife and other movements:
 - Zone 1 includes a trail used by horseback riders
 - Zone 7 spans a private driveway
 - Zone 9 spans the entry to a parking lot (but does not detect vehicle)
 - Zone 10 includes a trail that is part of an archery course

Operational Data



Operational Data

- Diagnostics can be derived from detector data
- “Spikes” in detection counts indicate grass growth between detectors



Where are we now?

- System functions have been reliable over nearly two years
- Weather events, particularly freezing rain, will cause system alarms if ice accumulates on detectors
- Ground maintenance is important to prevent false activations
- Remote diagnostics have prevented most field service trips

Future Developments

- Existing system in Moscow, ID will be retrofitted with the remote monitoring system
- Numerous small changes to system software and user interface will be made in next revision to the system
- Continuing to examine new detection methods for improvements in performance