Improvements in Wildlife Detection and Warning Systems

National Rural ITS Conference

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Deer Crashes Continue to Be a Problem

Injuries and Fatalities

- Over 1,000,000 DVCs/year nationally
- 200 fatalities per year
- 26,000 injuries per year

Property and Wildlife

- Average cost of deer crash is $1,840 (~$3,000 for elk or moose
- Total annual US cost: $8,388,000,000 from wildlife crashes

Research Continues

- Wildlife-Vehicle Collision and Crossing Mitigation Measures: a Toolbox for the Montana Department of Transportation (*WTI 2007*)
- Wildlife-Vehicle Collision Reduction Study: Report to Congress (*WTI 2008*)
- The Comparison of Animal Detection Systems in a Test-Bed: A Quantitative Comparison of System Reliability and Experiences with Operation and Maintenance (*WTI 2009*)

Warning Systems Continue to Advance

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

- SRF's focus has been on active detection and driver warning instead of wildlife behavior modification (acoustic or visual "beacons")

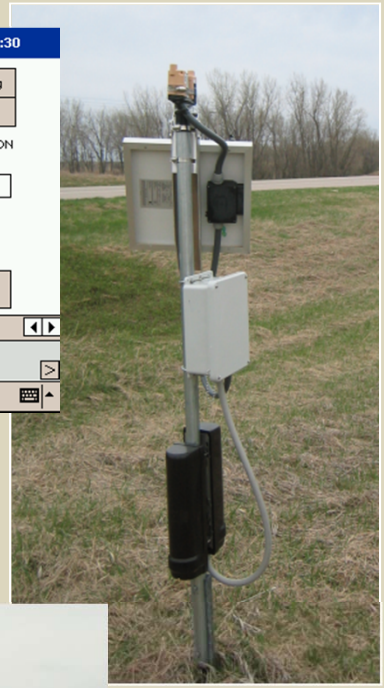
Efforts in Minnesota

Highway 23 – Marshall

- First active warning system in Minnesota
- Installed in 2000
- Had reliability issues due to reliance on rechargeable batteries
- Dormant until 2006
- Installed a suite of new equipment in 2007

Marshall System Key Features

- Reduce power consumption by 85%
- Install solar recharging system for batteries
- Use RF communication to eliminate in-ground wires
- Software-driven control allows for flexible operation of signs (flash times/detector associations, etc.)



Marshall System Experience

- Crashes reduced (based on weekly carcass counts) between 60 to 80%

BUT…

- Detector mounts weren't stable – causing alignment issues and increased power consumption
- Local conditions produced less solar power than calculated
- Self-contained communications/control devices failed in six to seven – not the 36 months advertised by manufacturer
- Very long lead times in getting replacement devices

Upgrades and Modifications at Marshall

- Upgraded solar panels and batteries (2008)
- Modified connections between detectors and communications devices (2008)
- Replaced several detectors and re-aligned all (2008)
- New communications devices (2011)
  - Use rechargeable, external battery
  - Have an external reset switch
  - System back on-line in spring 2011

Phase II System:
First Example on US 95 in Idaho

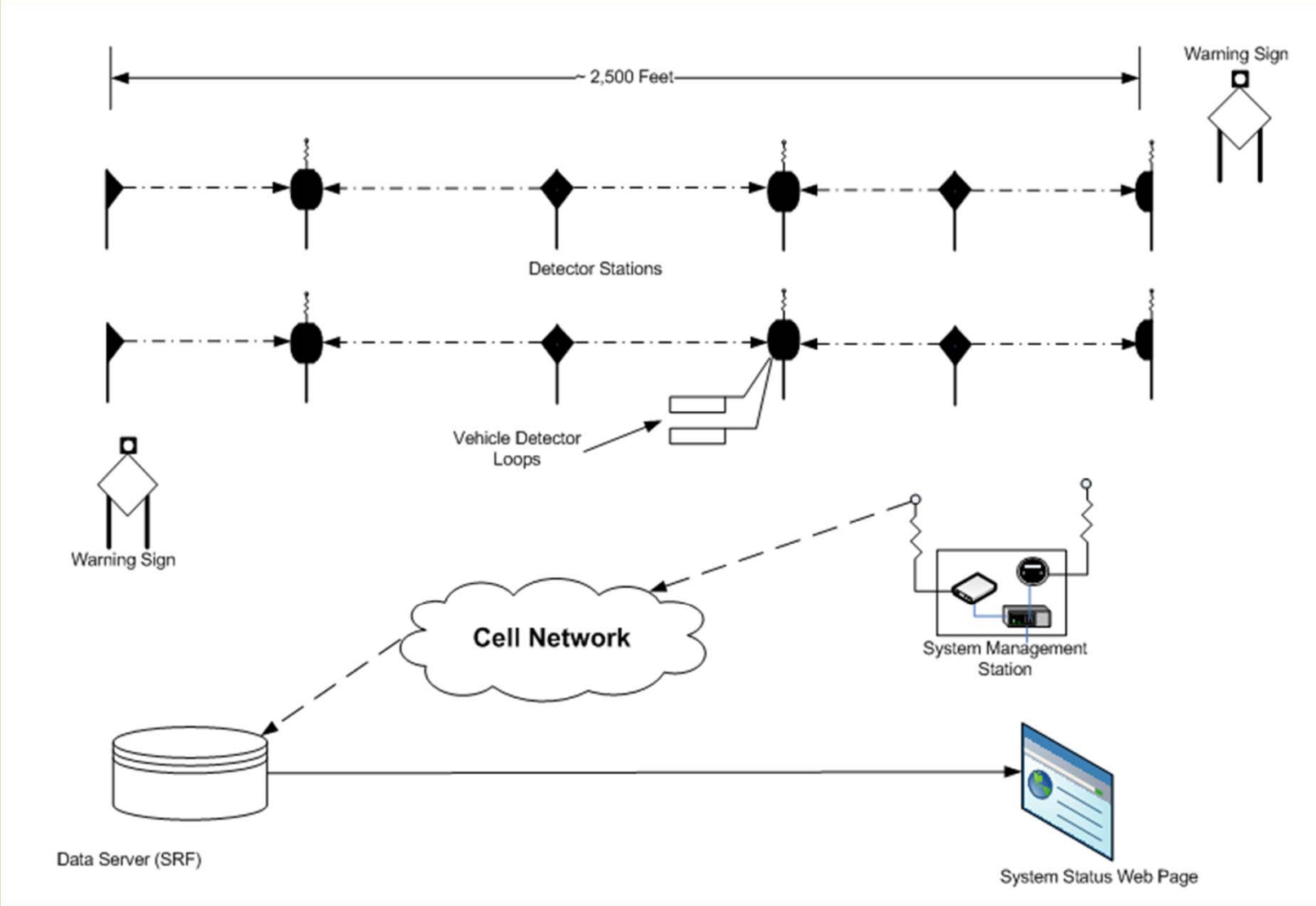
- Major New Features
  - New mechanical designs ensure much greater device stability
  - New power system with ~ 3X original generating and storage capacity
  - New communications devices have greater flexibility for inputs and on-device status displays
  - Vehicle discrimination to prevent false activations
  - AC power options for heavily shaded areas

New Detector and Sign Designs

Features to be Added for Phase III

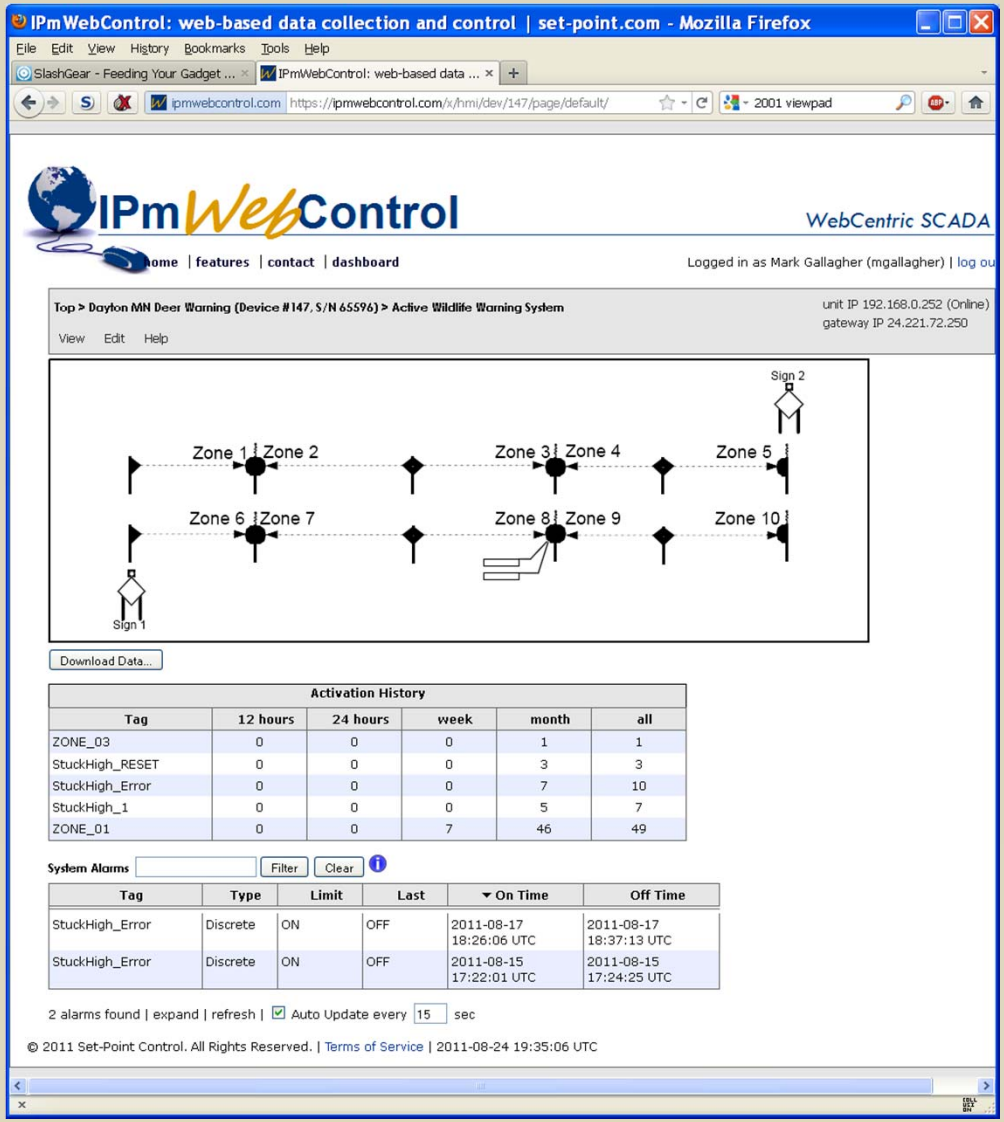
- Proof of concept for passive infrared (area) detectors
- Remote data logging and system monitoring
  - System activations (by detector)
  - Power system “health” checks
- Test integration with University of Minnesota prototype wildlife detector

System Schematic



Phase III Web Monitoring Features

- "Dashboard" includes information on system activations
- System can download logged data to Excel (csv)
- System alarms are shown in chronological order



Detection Characteristics

- Must be reliable
- Must be cost-effective
- False negatives are less desirable than false positives
- Each detector must work over long distances
- Power consumption must be low

Detector Approaches

Long-range “perimeter”

- Dual-infrared “beam break”
- Requires TX/RX pair
- Suitable when path is uncertain or variable
- Line of sight must be clear

Short-range “spot”

- Passive infrared detection
- Single-ended sensing
- Suitable when path is known and constrained
- Does not require clear line of sight, but other moving objects can trigger

Phase III Schedule Targets

• Marshall System Assessment	March 2011
• Marshall System Upgrade	May 2011
• Phase III Site Selection	February 2011
• Phase III Pre-Design	March 2011
• Software Completed	August 2011
• System Installation	Sept. 2011

Thank You!

Questions?

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