

ADAPTING TO THE HIGH-TECH WORLD OF TRACKING WILD ANIMALS – 3 YEARS OF USING GPS COLLARS AND HARNESSES IN MISSOURI.

Joel Sartwell

**Missouri Department of
Conservation**

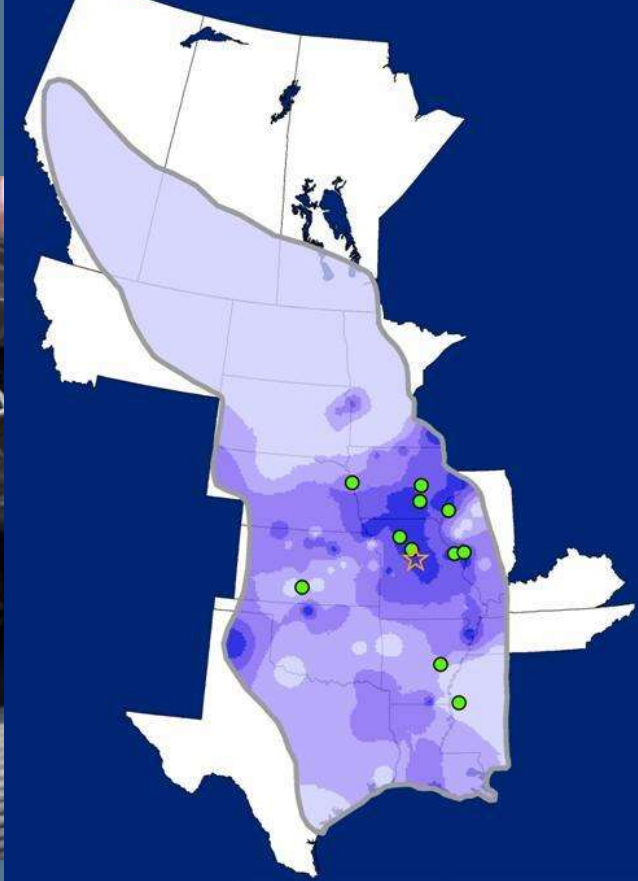


Introduction

- ▣ **Four Studies**
 - **Mallards (AGFC – MDC is a partner) *****
 - **Feral Hogs (MDC)**
 - **Black Bears (MDC & MSU)**
 - **ELK (MDC & MU)**
- ▣ **Provided data management for Black Bears & Elk**
- ▣ **Looking at the Data...**
- ▣ **4 – 5 different vendors – I will not name them!**

Mallards (AGFC)

Pilot study
to
determine
feasibility of
using GPS
on Mallards



- 22 - 30g solar powered GPS
- 4 locations per day
- 36 month lifespan
- 15m accuracy
- Data retrieval: ARGOS relay
 - Significant fall mortality
 - Poor winter performance
 - Remains in pilot status

Feral Hogs

- Eradication effort
- Resource selection & movement patterns
- Survival & fecundity



- 4 - 5 lb GPS (collar-harness)
 - 3 locations per day (24/day recorded)
 - 18 month battery life
 - 5 - 15m precision
 - Data retrieval: Globalstar satellite phone
- 1 year delay - Bad Initial Vendor ...
 - Avg. 2 locations per day (85% success)
 - Overall very successful

Black Bears

Population
&
Density
Estimate

GPS & DNA
Study



09-01 4:36:07 PM M 2/3



- 4 - 5 lb GPS
- 1 - 144 locations per day (144/day recorded)
- 18 month battery life
- 5 - 15m precision
- Data retrieval: Globalstar satellite phone
 - 1.5 years of tracking results
 - Blow-off mechanism unreliable
 - Overall very successful

ELK Restoration

Movement & Resource Selection

- Conflict prediction
- Efficient habitat management
- Herd growth monitoring



- 4 - 5 lb GPS
- 3 - 4 locations per day (12/day recorded)
- 24 month battery life
- 5 - 15m precision
- Data retrieval: Globalstar satellite phone
- 4 months of operation so far
- VHF backup interfered with GPS
- Blow-off mechanism may not be reliable
- Overall very successful

Precision

- ▣ VHF: 10 - 1500+ meters observed!
- ▣ Average bearing count: 3 Very hard to get more!
- ▣ Not good enough for habitat analysis.

Study	Location	Bearing Error (degrees)	Spatial Error (hectares)
Urban deer VHF	Town and Country	6.4	0.001 - 42
Raccoons VHF	St. Louis Zoo	10.4	0.15 - 100+
Alligator Gar VHF	SE MO	12.77	0.001 - 100+
Black Bears GPS	Ozarks	-	0.00001 - 0.17

GPS: 5 - 15m manufacturer

0.4 - 23m observed

Average satellite count: 5 - 6

Money

GPS Base Collar Costs: \$3200.00 - \$3600.00 per collar (or harness).

Airtime costs: \$30.00 - \$120.00 per collar per month.

Study	Budget	\$ per Animal	Animals	\$ per Location	Locations	Duration
Urban Deer VHF	\$324,059	\$1261	257	\$11.55	28,063	1996-2000
Black Bear GPS	\$76,949	\$2564	30	\$1.48	52,000+	2010-ongoing
Feral Hogs GPS	\$78,100	\$3124	25	\$3.00	26,000+	2010-ongoing
Elk GPS	\$125,724	\$3592	35	\$6.98	18,000+	2011-ongoing

Data Ownership & Responsibility

Source: Project Leader



Database Administration



QC



Authority (PI)



Policy & Management Rules (PI)

Data Ownership & Responsibility

Private Cloud

```
graph TD; PC([Private Cloud]) --> A[Policy & Mgmt Rules (Administrator A)]; PC --> B[Policy & Mgmt Rules (Administrator B)]; PC --> C[Policy & Mgmt Rules (Manager C)]; PC --> D[Policy & Mgmt Rules (Manager D)];
```

Policy & Mgmt Rules (Administrator A)

Policy & Mgmt Rules (Administrator B)

Policy & Mgmt Rules (Manager C)

Policy & Mgmt Rules (Manager D)

Liability

**DO NOT USE ANIMAL LOCATION
DATA FOR ANY PURPOSE OF
PUBLIC SAFETY...**

Jim Odenkirk, Arizona Assistant Attorney General

Do not establish a “Duty of Care”
which if broken may make you guilty
of negligence.

Future

- ▣ **Probably always going to be expensive but...**
- ▣ **Exempting Federal and State Agencies from liability...**
- ▣ **LightSquared!**