White-tailed Deer Habitat Use and Movements Integrated with Factors Influencing Vehicle Collisions in Middle Tennessee

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Introduction

Cook and Daggett 1995

Odocoileus virginianus

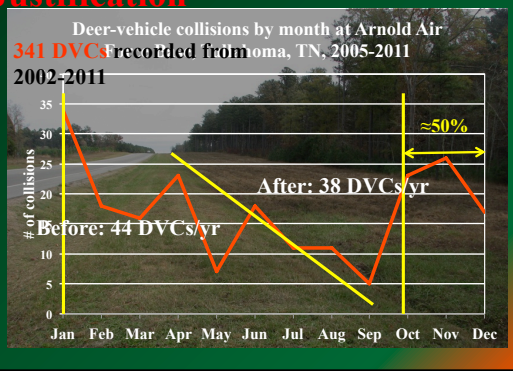
Deadliest Game

Deer-vehicle collisions (DVCs)

- Danger to humans
  - > 1 million accidents
  - > $1 billion worth of property damage
  - > 200 human fatalities
- Danger to wildlife
  - fragmentation or isolation
  - alter the structure of a population
  - fatality

Conover et al. 1995, Forman and Alexander 1998

Justification



The Concept(ion) of Rut

Karns et al. 2011

Holzenbein and Schwede 1989

Kolodzinski et al. 2010

Habitat Use

- Important information for AAFB
  - See how deer are reacting to management
- Selection vs. avoidance
  - Potential roadside management implications

Goal

Provide AAFB with information regarding deer behavior and ways to mitigate DVCs

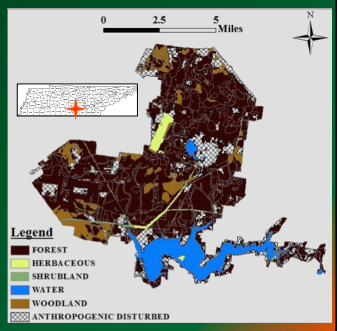
Objectives

1. Monitor and compare white-tailed deer reproductive efforts during pre-, peak, and post-rut periods
2. Investigate habitat use during fall/winter
3. Evaluate habitat and transportation factors associated with DVCs

Study Area

Arnold Air Force Base & AEDC WMA

- 39,000 acres dominated by mature hardwood forests and loblolly pine plantations
- 70 miles SE of Nashville in Coffee and Franklin counties
- Eastern Highland Rim physiographic province
- Infrared Camera Survey 2010: ≈20 deer/mile^2



Methods

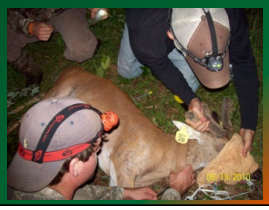
1. Monitor and compare white-tailed deer reproductive efforts during pre-, peak, and post-rut periods
2. Investigate habitat use during fall/winter

Deployed 20 GPS collars (3/30/2010 – 7/20/2010)
- 10 does, 10 mature bucks (≥2 yr old)

<u>Immobilization (UT-IACUC #1887)</u>

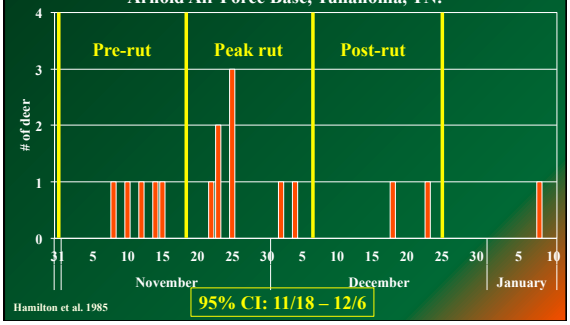
MKT mixture
- medetomidine (150 ug/kg)
- ketamine (1.5 mg/kg)
- telazol (1.0 mg/ml)

XT mixture
- xylazine (2.3 mg/kg)
- telazol (5.0 mg/kg)



Methods – Objective #1

Conception dates of does from fetal scale measurements, Arnold Air Force Base, Tullahoma, TN.



Hamilton et al. 1985

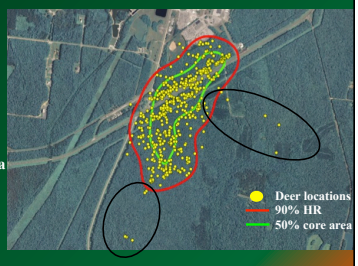
95% CI: 11/18 – 12/6

Methods – Objective #1

The Rut

Home Range Tools – ArcGIS

- Identify and investigate "excursions" outside fixed kernel 90% fall/winter home ranges (HR)
- Compare HR and core area size and overlap during pre-, peak, and post-rut periods (30 location min.)
- Evaluate intensity of movement during these periods



Burt 1943, Girard et al. 2002, Rodgers et al. 2007

Methods – Objective #2

Habitat Use – Design III

- Compositional Analysis (Aebischer et al. 1993) & ArcGIS
- Rank vegetation types

<u>Vegetation Types</u>

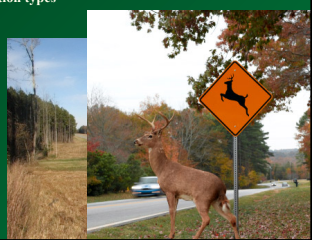
- Immature pine
- Mature pine
- Early succession
- Young hardwood
- Woodlands
- Mature hardwoods
- Open
- Anthropogenic (excluded)

Thomas and Taylor 1990

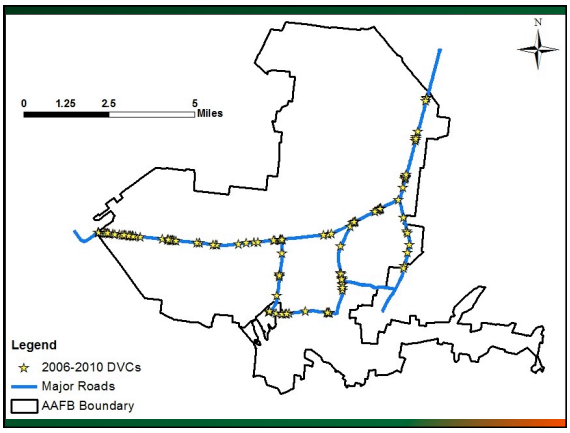
Methods – Objective #3

Factors impacting DVCs…2 sides to every story

- Why did the deer cross the road?
  - Habitat characteristics
    - presence of certain vegetation types
    - streams
    - concealment distance
- Why it didn't make it
  - Transportation factors
    - traffic volume
    - traffic speed
    - road density
    - lack of visibility



Finder et al. 1999, Clevenger et al. 2003

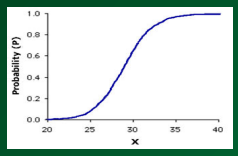


Methods – Objective #3

We know where…but WHY?

Logistic Regression (SAS, PROC LOGISTIC) & ArcGIS

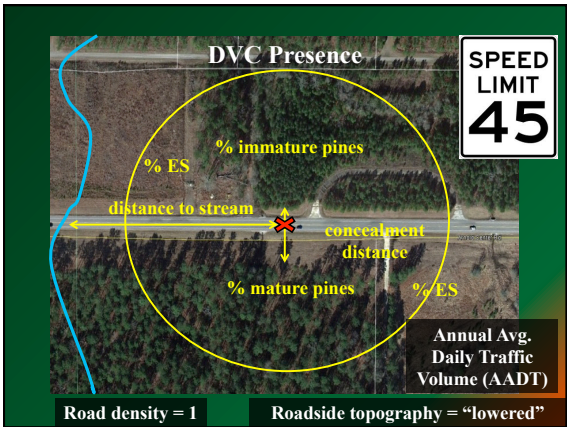
- Test importance of variables in DVC locations
- Model presences vs. absences
- Evaluate variables based on AIC weights

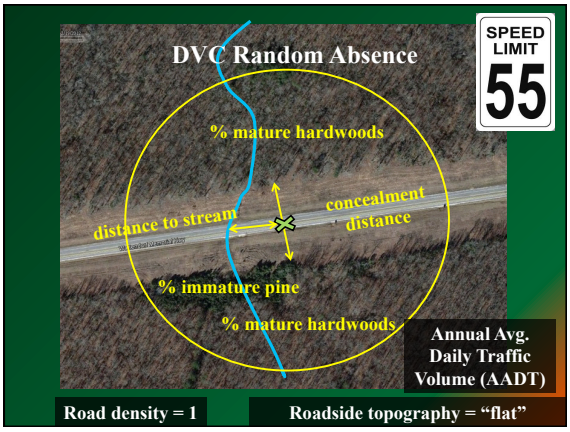


Explanatory Variables

- Concealment distance
- Stream distance
- Roadside topography
- Adjacent habitat characteristics
- Traffic volume
- Traffic speed
- Road density

Hosmer and Lemeshow 1989, Finder et al. 1999, Clevenger et al. 2003





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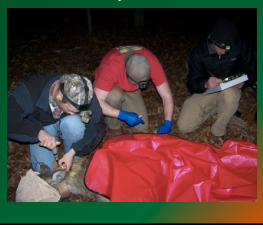

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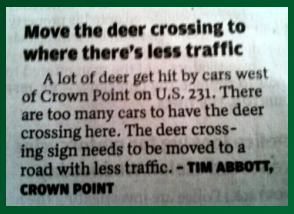
Questions???



Move the deer crossing to where there's less traffic

A lot of deer get hit by cars west of Crown Point on U.S. 231. There are too many cars to have the deer crossing here. The deer crossing sign needs to be moved to a road with less traffic. – TIM ABBOTT, CROWN POINT