

**GENETIC ASSESSMENT OF
WILD CANIDS IN SOUTH
TEXAS TO DETERMINE
EVIDENCE OF ENDANGERED
RED WOLF ANCESTRY**

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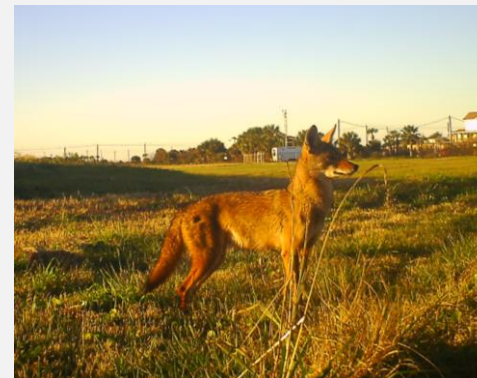
Director of the Office of Student Research and Inquiry

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NON-INVASIVE TECHNIQUES



Alexander Kopatz, NIBIO



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PREVIOUS WORK: RED WOLF

- Extinct in the wild
- Captive breeding and reintroduction (1987)
 - Only 14 founders (will return to this)
- Failed reintroduction (1991-1999)
- Hybridization, human conflicts, land use
- Additional reintroductions and management



PREVIOUS WORK: RED WOLF



Mammal Study 41: 87–95 (2016)
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Original paper

Habitat use by adult red wolves, *Canis rufus*, in an agricultural landscape, North Carolina, USA

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Red wolf natal dispersal characteristics: comparing periods of population increase and stability

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Keywords

Canis rufus; dispersal; endangered species; red wolf.

Abstract

We analyzed natal dispersal characteristics for 79 red wolves in the first long-term dispersal analysis for this species. Variables analyzed included straight-line dis-

2010

SOUTHEASTERN NATURALIST

9(2):303–316

Effectiveness of GPS-based Telemetry to Determine Temporal Changes in Habitat Use and Home-range Sizes of Red Wolves

John Chadwick^{1,*}, Bud Fazio², and Melissa Karlin¹

Abstract - Four adult male *Canis lupus rufus* (Red Wolf) were monitored with GPS collars in 2006–2008 on the Albemarle peninsula of North Carolina in the first high temporal resolution (4 locations/day) study of this endangered species in the wild. The wolves occupied home ranges during 11–18 month observation periods, and the GPS



Mammal Study 36: 147–153 (2011)
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Short comm

Measures of space use and association of two unrelated male red wolves in a shared area

Melissa Karlin* and John Chadwick

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Methods

The red wolf reintroduction area encompassed approximately 688,000 ha in 5 counties on the Albemarle Peninsula in northeastern North Carolina, in the eastern U.S.A. (Fig. 1). This area includes the ARNWR and Pocosin Lakes National Wildlife Refuges and private lands (USFWS 2007). Land cover in the refuges in-

The United States Fish and Wildlife Service (USFWS) listed the red wolf (*Canis rufus*) as an endangered species in 1967 and began a recovery program in 1973 (USFWS 1989). By that time, however, the red wolf had already been extirpated from most of its range (McCarley and Carley 1979). Only 1 wild population of red wolves currently exists, reintroduced in 1987 to the Albemarle Peninsula National Wildlife Refuge (ARNWR) in



PREVIOUS WORK: COYOTE

RESEARCH ARTICLE

Home range size, vegetation density, and season influences prey use by coyotes (*Canis latrans*)

Jennifer N. Ward¹, Joseph W. Hinton^{1*}, Kristina L. Johannsen², Melissa L. Karlin³, Karl V. Miller¹, Michael J. Chamberlain¹

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ORIGINAL RESEARCH

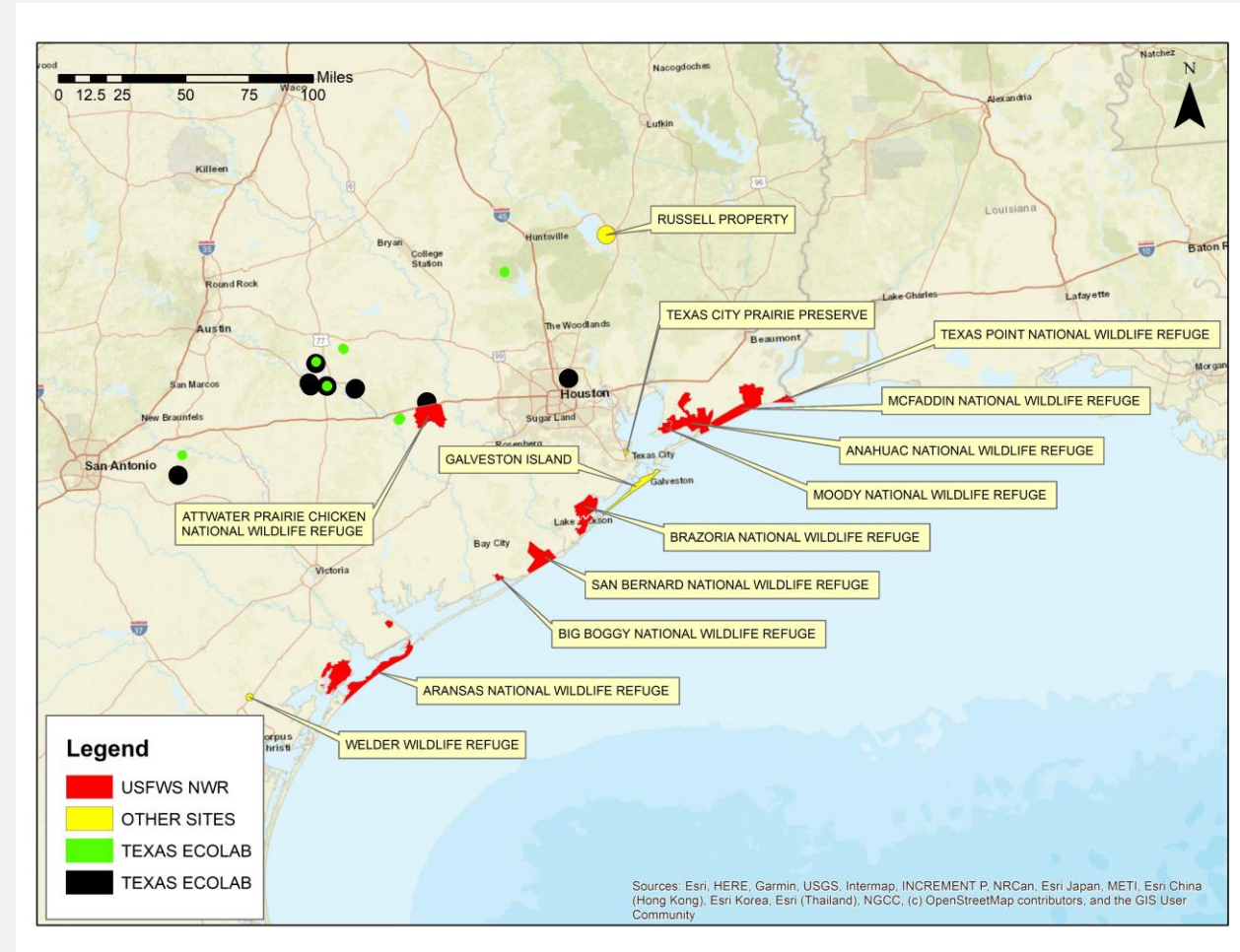
WILEY *Ecology and Evolution*

Geographic patterns in morphometric and genetic variation for coyote populations with emphasis on southeastern coyotes

Joseph W. Hinton¹ | Elizabeth Heppenheimer² | Kyla M. West³ | Danny Caudill⁴ |
Melissa L. Karlin⁵ | John C. Kilgo⁶ | John Joseph Mayer⁷ | Karl V. Miller¹ |
Margaret Walch⁸ | Bridgett vonHoldt² | Michael J. Chamberlain¹

CONSERVATION GENETICS RESEARCH

- Coyote/Red wolf introgression early results
 - >10% red wolf ancestry for many samples
 - Red wolf mitochondrial DNA (mtDNA) haplotype present
- DNA extractions on 70 additional samples
 - 49 successful amplifications
 - 53 sequenced for haplotype
 - DNA metabarcoding for diet May 2022



CONSERVATION GENETICS RESEARCH

- Continued work at StMU
- 50+ additional samples
- Mitochondrial DNA (mtDNA) analysis for haplotype assignment
 - Red wolf, coyote, gray wolf, new Galveston haplotype
- Microsatellite marker genotyping for red wolf/coyote hybridization analysis
 - Expanded study area outside of Galveston
- Hybridization as source of genetic material
- ESA policy lacking for admixed individuals
- Genetic diversity of wild population

CONSERVATION GENETICS RESEARCH

- Diet analysis:
 - Pair mechanical sorting and Frequency of Occurrence (FO) of prey items with DNA metabarcoding analysis
 - 3 StMU students assisting
- Morphology from trail cameras



MORPHOLOGY ESTIMATES



| | Hinton and Chamberlain (2014) | | | | | | Present study | |
|---------------------|-------------------------------|------------------------------|--------|-----------------------------|--------|-----------------------------|------------------|---------------------------------|
| | Red wolf | | Coyote | | Hybrid | | Galveston canids | |
| | n | mean & SE (min - max) | n | mean & SE (min - max) | n | mean & SE (min - max) | n | mean & SE (min - max) |
| Ear length (cm) | 458 | 11.0 & 0.03 (9.0–12.9) | 254 | 9.9 & 0.04 (8.0–12.8) | 153 | 10.5 & 0.05 (8.5–12.5) | 22 | 8.71 & 0.29 (6.42–11.7) |
| Tail length (cm) | 45 | 36.4 & 0.15 (25.8–48) | 241 | 33.9 & 0.20 (20.5–44.7) | 151 | 35.7 & 0.25 (24.5–43.5) | 23 | 30.71 & 1.31 (21.64–43.98) |
| Body length (cm) | 454 | 106.4 & 0.33 (75.0–125.0) | 24 | 90.0 & 0.30 (64.0–105.0) | 13 | 97.7 & 0.60 (78.0–122.0) | 7 | 100.71 & 3.98 (87.83–111.71) |
| Length of head (cm) | 183 | 22.2 & 0.11 (19.0–26.0) | 14 | 19.9 & 0.08 (17.5–24.0) | 50 | 21.0 & 0.24 (17.5–24.5) | 25 | 19.66 & 0.74 (12.56–25.89) |
| Width of head (cm) | 182 | 11.9 & 0.08 (9.5–14.5) | 14 | 10.4 & 0.05 (9.0–12.5) | 51 | 11.1 & 0.11 (9.5–12.5) | 4 | 11.52 & 1.03 (9.69–14.15) |



NEXT STEPS

- Returning to MTU
- Additional field work and samples
- Microsatellite sequencing in house
- Refine morphology methodology
- Completion of Applied Conservation Genetics and Wildlife Forensics program
- Design and launch of new environmental science elective course, environmental forensics, for spring 2023