

VHF Radio Telemetry Case Studies

Micronesian Kingfisher
Tuamotu Kingfisher
Red-cockaded Woodpecker
Black-backed Woodpecker
Greater Prairie Chicken

UNIVERSITY OF MISSOURI - COLUMBIA



SCHOOL OF NATURAL RESOURCES
COLLEGE OF AGRICULTURE, FOOD AND NATURAL RESOURCES



Major Considerations



QUESTION-DRIVEN RESEARCH

- Study requirements.
- Technology restrictions.
- Bird behavior.
- Bird morphology

Overview - Pacific Island Kingfishers

- *Todiramphus cinnamominus* and *Todiramphus gambieri*
 - Geographic location
 - Small island of Pohnpei
 - Island forest, coconut, and agroforest
 - Natural History
 - Cavity nest
 - Territorial species
 - 1-2 km tracking distances
 - “Pounces” on prey
 - Few predators
 - Morphology
 - ~65g (*T. c.*) ~42g (*T. g.*)
 - Strong legs
 - Annual molt(?)



Research Questions

- How do territory resources affect cooperative social structure?
- What landscape resources are important for conservation?
- How and where do juveniles disperse in a cooperatively breeding kingfisher?



Micronesian Kingfisher

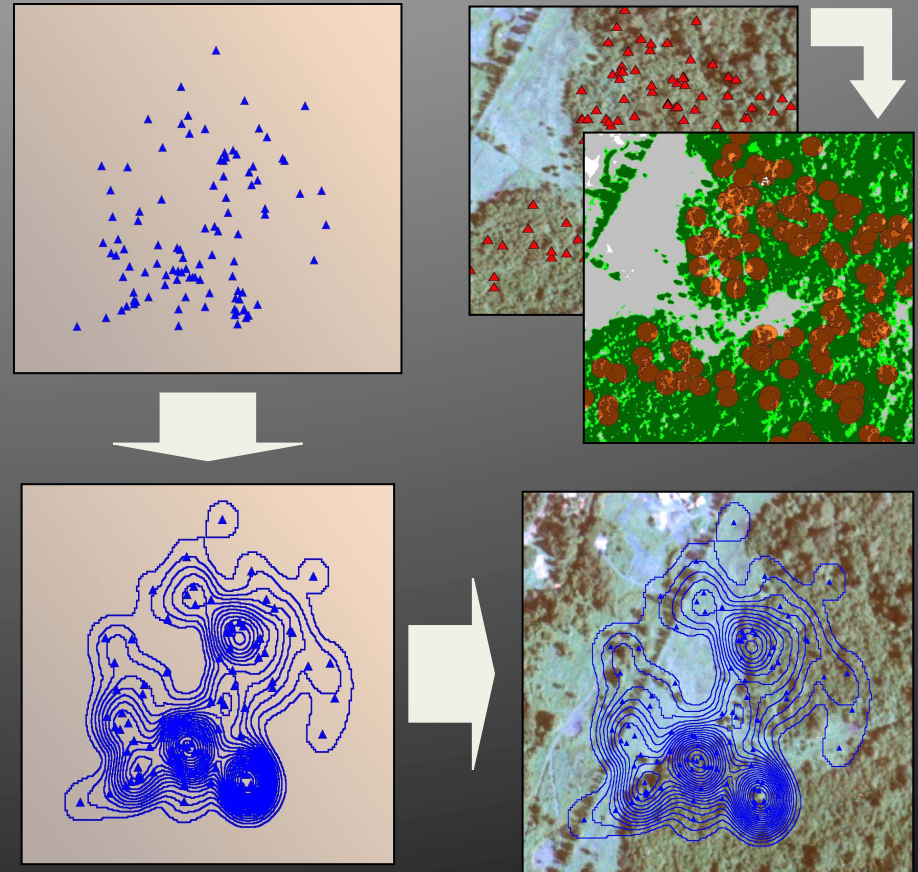
Movement and Resource Data

➤ Movement

- Daily radio telemetry.
- Home range.
- Proportional coverage.

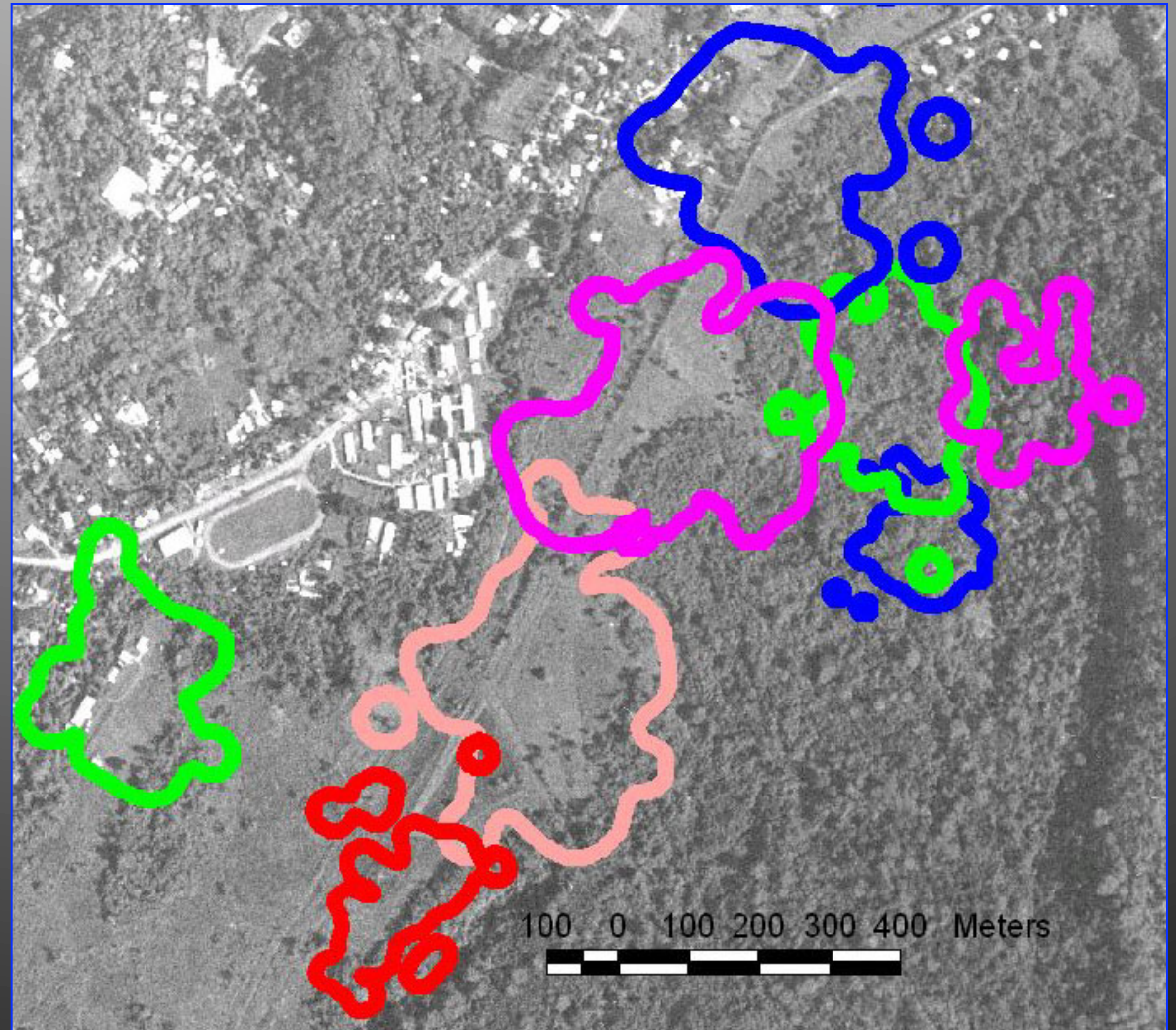
➤ Resources

- Visual spectrum aerial photographs.
- ERDAS imagine.
- Habitat coverage.



Exclusive Territories

- Area Needs.
- Individual Overlap.
- Resources encompasses within territories.



Resource Selection – Home Range Scale

- Compared home ranges with randomly placed polygons.
 - Used
 - Available in immediate area



- Selection against grassy
 - Less grassy areas used than available.
- Selection for forest
 - More forest used than randomly available.
 - All forests within territories.
- Forest resources may limit dispersal.

	short grass	tall grass	early forest	late forest
Juveniles	—	—	0	+
Helpers	—	—	0	+
Dominants	—	0	0	+
<i>All Kingfishers</i>	—	—	0	+

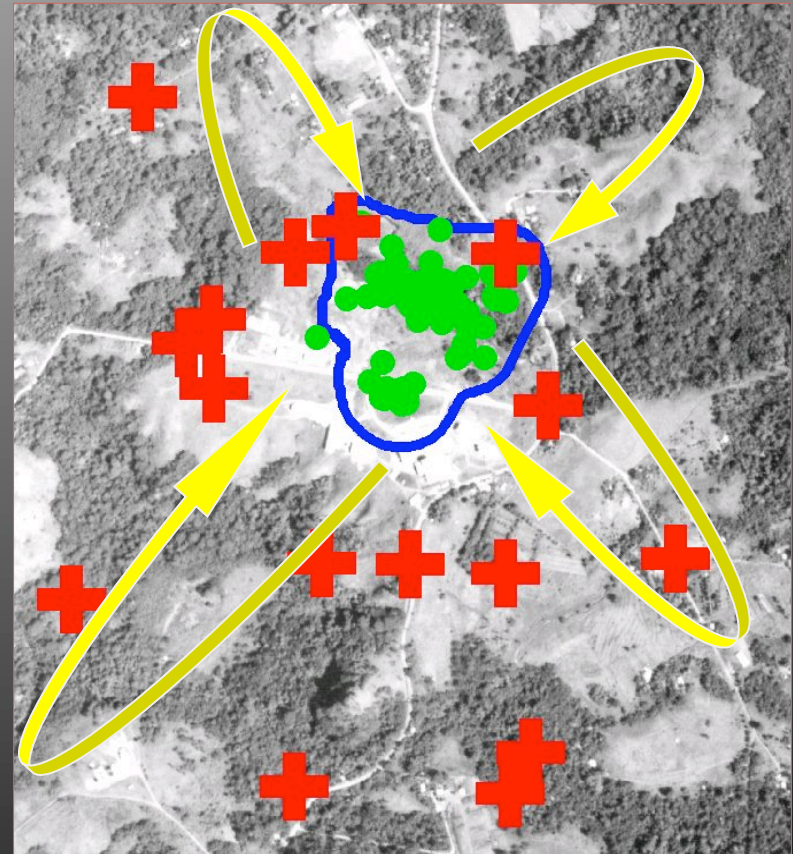
Resource Implications

- Cooperative groups of kingfishers occurred on territories with more old growth forest.
- Conversion of late succession forests to modified vegetation may underlie decline in Pohnpei kingfisher populations.
- Base estimates for territories and home ranges were provided for reintroduction planning.
- Reintroduction site selection on Guam should include areas with highly structured forest.

Micronesian Kingfisher Dispersal

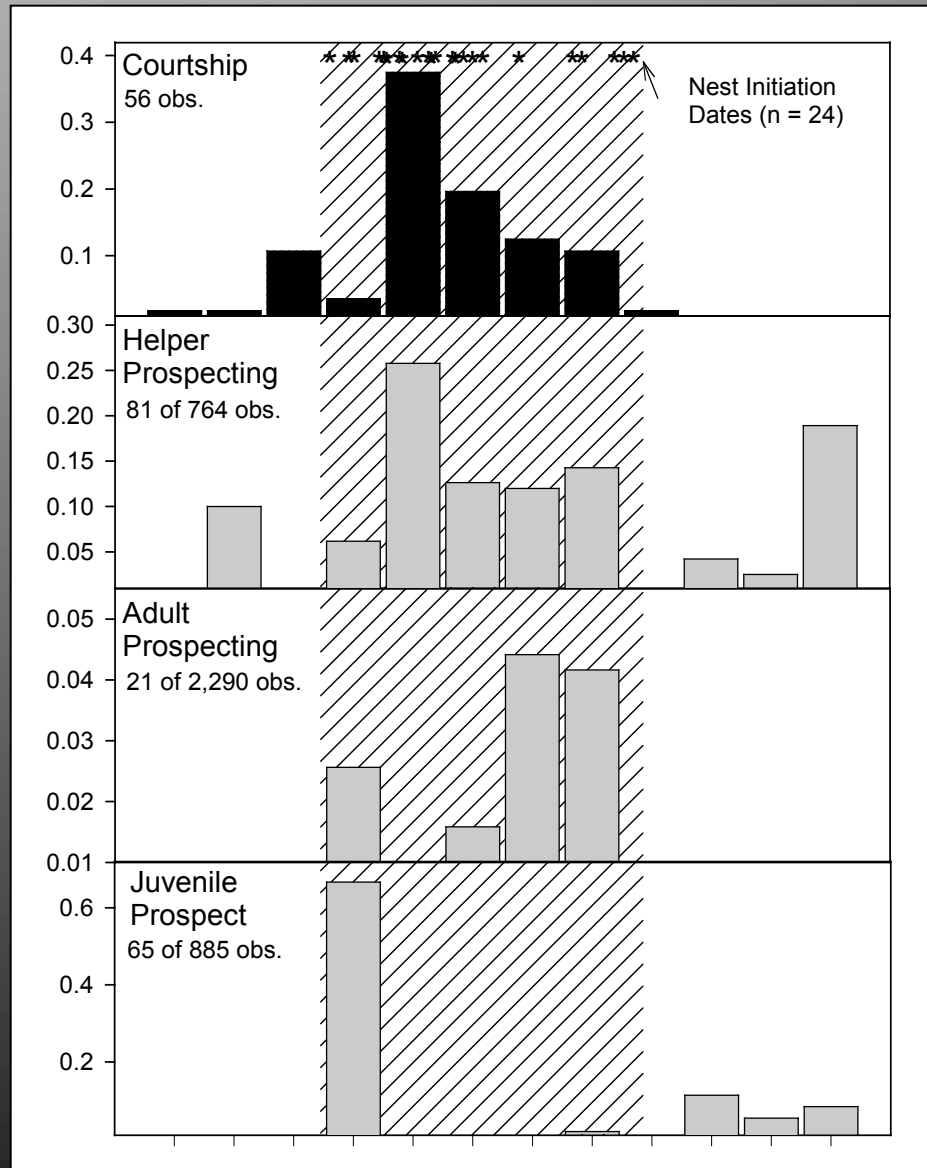
Prospecting Behavior

- Deliberate forays off territory and back.
- Proximity to neighboring birds.
- Apparent interest in nest sites on neighboring territories.
- Covert reproduction?
- Dispersal after repeated homesteading movements.



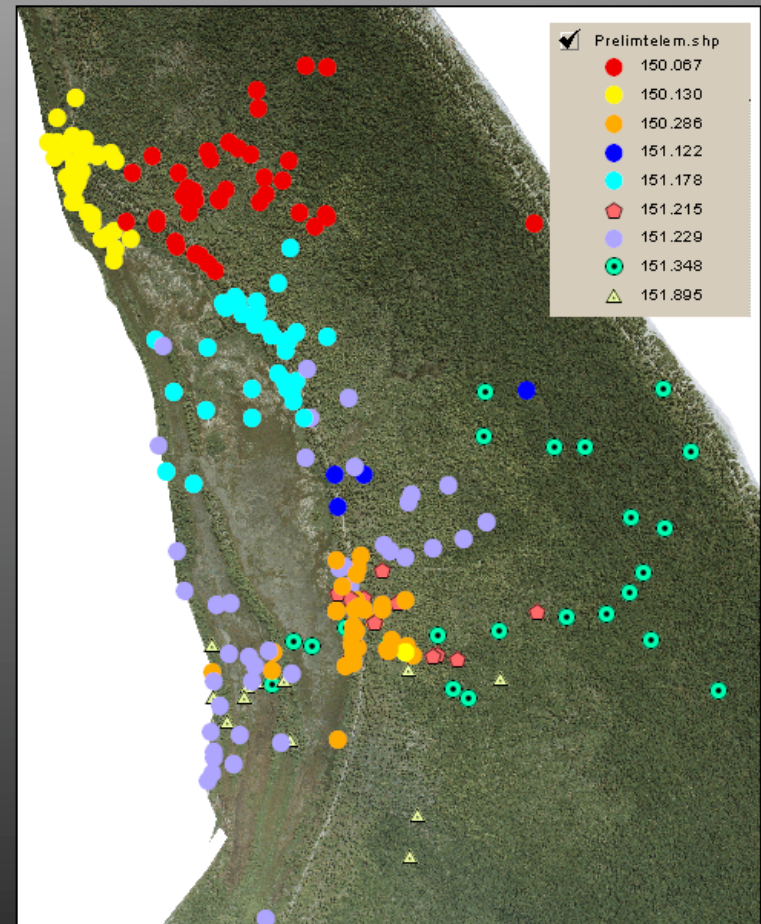
Prospecting

- Temporal characteristics.
- Suggests extraterritorial movements provide opportunity for extra-pair copulations.
- Change distribution of reproduction among cooperatively groups.



Tuamotu Kingfisher

1. Which habitat characteristics are associated with kingfisher occurrence.
2. Is the population declining? If so, in what life history stage are TK most vulnerable?



Red-cockaded Woodpecker

- Research questions
 - How do landscape resources influence dispersal?
 - How do birds gather information before dispersal?
 - How does foraging relate to dispersal?



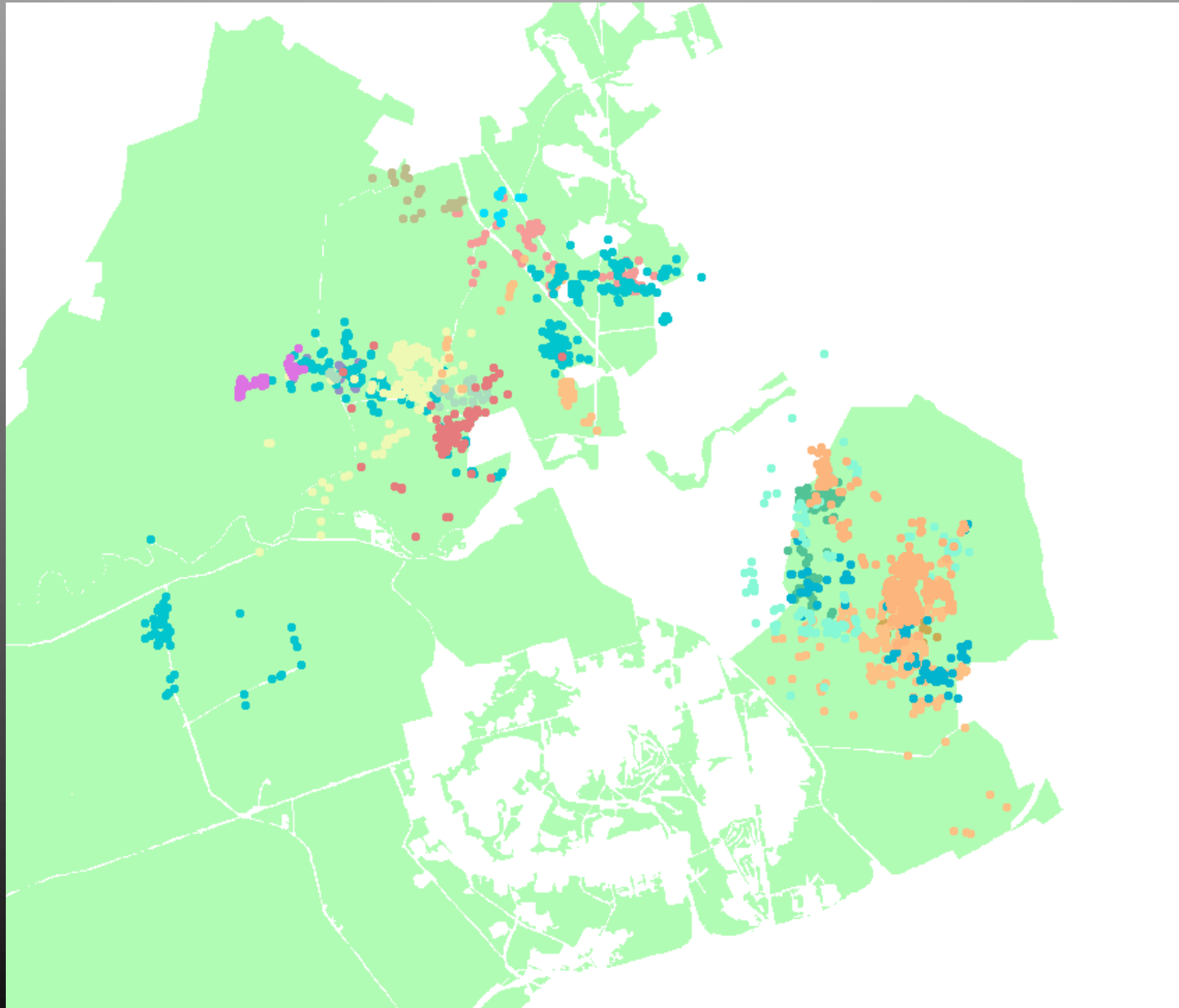
Research Considerations

Red-cockaded Woodpecker

- Data Needs
 - Movement paths!
 - Movement frequency.
 - Landscape resources.
 - Information about other birds.
- Challenges
 - Cavity nest.
 - Long distance detections.
 - Fast movements.
 - Small birds.
- Equipment
 - Holohil PD2 (~1.6g).
 - High power, shorter life.
- Sampling
 - Set observation schedule.
 - Territory visit rotations.
 - Foray follows.

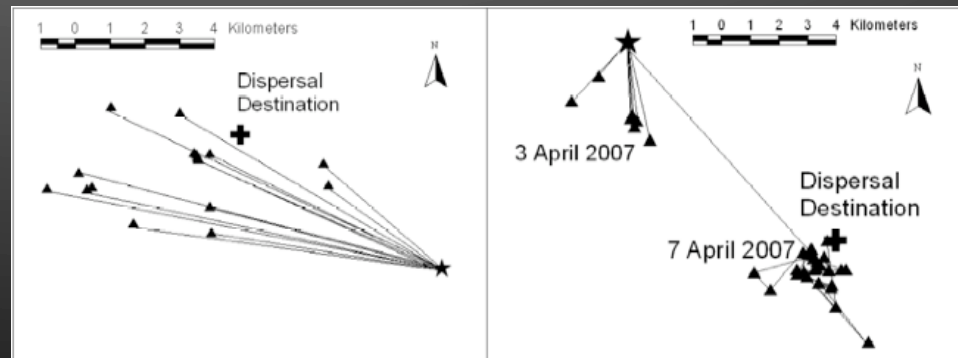
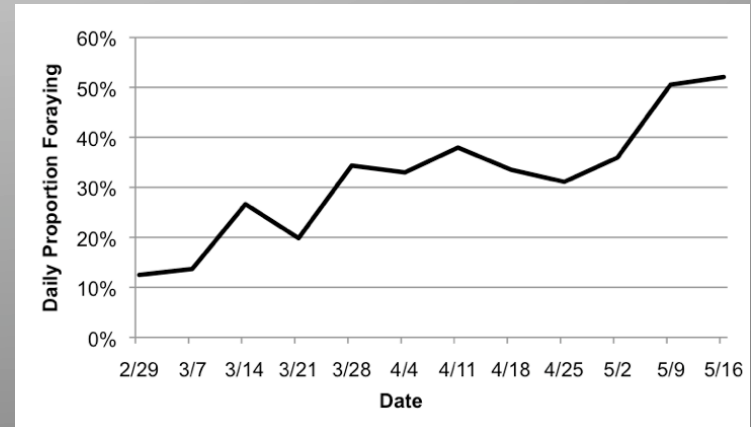


Red-cockaded Woodpecker



Red-cockaded Woodpecker

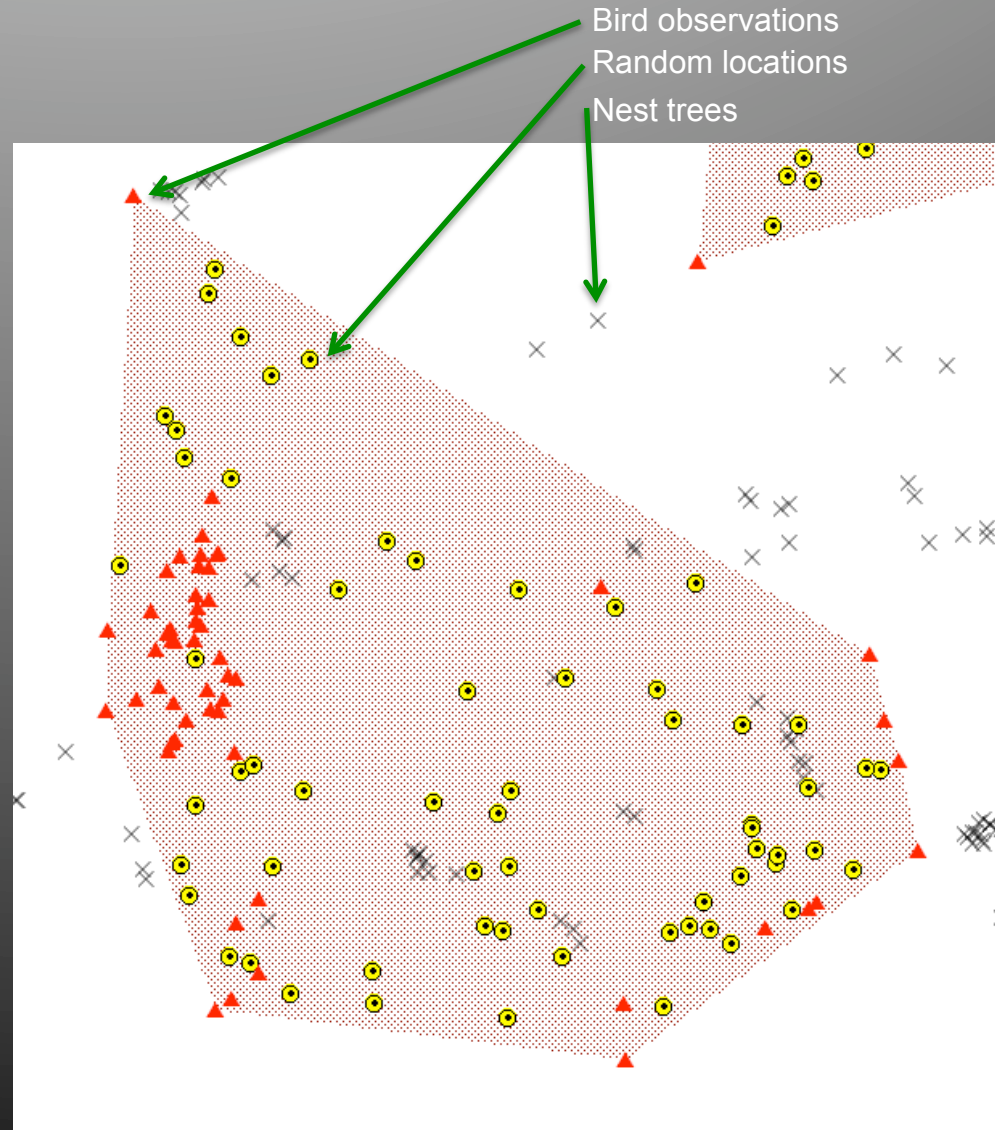
1. Prospecting area
mean MCP = 416
ha.
2. Territory visits
mean = 1 to 7
3. Prospecting
distance
daily max = 2.03
km.
4. Frequency
daily prob.



Red-cockaded Woodpecker

Additional Questions

1. Is movement random?
 - Direction not random.
 - Distance not random.
2. Is movement associated with forest?
3. Is movement associated with nesting resources?
 - Prospecting birds near nest trees.



Black-backed Woodpecker

Picoides arcticus

- Geographic location
 - Mountain U.S. and Canada
 - *Pinus* spp. Forests
 - Burned forests
 - Insect compromised forest
- Natural History
 - Pine woodpecker
 - Territorial species
 - Pairs
 - Cavity nest
- Morphology
 - ~60-80g
 - Large *Picoides* woodpecker
 - Tree climbing
 - Strong retraces
 - Strong legs



Black-backed Woodpecker Investigation



- Long distance dispersal.
10-30 miles.
Highly mobile.
Male and female strategies differ.
High survival.
- STAY TUNED!

Greater Prairie Chicken

Tympanuchus cupido

- Geographic location
 - Central U.S.
 - Prairie grasslands
- Natural History
 - Open prairie species
 - Leking species
 - Great movements
 - Forages on ground
 - Ground nester
- Morphology
 - ~700-1200g
 - Galliform/grouse figure
 - Males display with wings out
 - Large frontal crop



Greater Prairie Chicken

- Research Questions
 - How much area do birds use (non territorial)?
 - Which landscape resources do the birds select for?
 - Do those resources affect survival?
 - Does translocation work to augment populations?
- Challenges
 - Very long range detections
 - Large search areas
 - Large species
 - Ground transmission
 - Displaying species



Greater Prairie Chicken

- Challenges

- Very long range detections.
- Large search areas.
- Ground transmission.
- Displaying species.

- Design

- ATS Transmitters (~16 g).
- Neck harness.
- Very high power.
- 1.5 year battery life.

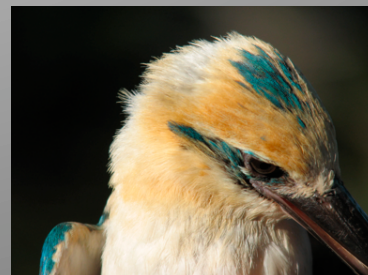
- Sampling

- Search vehicles.
- Computerized real-time triangulation.
- Flight surveys.



Major Considerations

- Study requirements
 - Resource use
 - Prospecting
 - Dispersal
 - Demography
- Technology restrictions
 - Radio package size
 - Radio transmission power
 - Radio attachment
- Bird behavior
 - Flight requirements
 - Display requirements
 - Movement distances
 - Nesting and foraging locations
- Bird morphology
 - Bird size
 - Body shape



THE END

Red-cockaded Woodpecker

Picoides borealis

- Geographic location
 - Southeastern U.S.
 - Eastern *Pinus* spp. forests
- Natural History
 - Pine woodpecker
 - Territorial species
 - Family groups
 - Picks food from trees
 - Cavity nester
 - Hole size
- Morphology
 - ~42g
 - Small *Picoides* woodpecker
 - Tree climbing
 - Strong retraces



Black-backed Woodpecker Investigation

- Research Questions
 - Importance of burn habitat and beetle infestations?
 - Dispersal distances?
 - Landscape effects on dispersal?
- Challenges
 - Cavity nest.
 - Long movements.
 - Study area access.
 - Topography inhibiting telemetry.
- Design
 - ATS/Lotek (~2.6g)
 - R&T leg harness
 - ??% body weight
 - High power radios
 - Flight surveys
- Sampling
 - Flight survey
 - Ground survey

