Habitat Use and Availability of Wintering Waterfowl in Western Tennessee

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Waterfowl and Conservation

Declines:
• Overharvesting (market hunting)
• Habitat loss

Wetland Losses:
• >50% in the US
• Direct loss
• Alteration
• Degradation

The North American Waterfowl Management Plan (NAWMP)
1986-2012

Research:
• Understand ecology
• Identify limiting factors

Planning:
• Population/Habitat Goals (Joint Ventures)

Implement:
• Collaborate with managers
• Outreach interests
Flyway Management

Historic breeding focus

Winter is important!
- Cross-seasonal effects

Mississippi Flyway:
- Important wintering area
- 40% of North America's waterfowl

Mississippi Flyway:
- Important wintering area

The Lower Tennessee-Cumberland Ecosystem (LTCE)

LTCE important area for waterfowl

Extensive Human Use:
- Damming/Reservoirs
- Public influence
- TVA/USACE

LTCE Waterfowl Management:
- American black duck focus
- Other species poorly understood

Research Justification

- Waterfowl habitat use/selection poorly understood in LTCE
- Identify important habitats for conservation
- Understand functional roles of habitats (insights on selection)
- Direct management to priority areas

- Assist NAWMP Joint Ventures
- New info on an important wintering region
- Refine conservation goals
Research Objectives

- Estimate use of 6 wetland types by waterfowl communities in two national wildlife refuges in western Tennessee during winter, and make inferences on selection based on availability
- Investigate functional roles of habitats based on behavioral observations
- Relate dabbling duck use to trends in food availability
- Investigate effects of summer disking and millet planting on habitat quality and waterfowl use in winter (side study)

Study Areas

Cross Creeks National Wildlife Refuge (CCNWR)
- 3,586 ha
- Winters app. 60,000 ducks annually

Tennessee National Wildlife Refuge (TNWR): Duck River Unit (DRU)
- 10,822 ha
- Winters app. 100,000-125,000 ducks
- Winters the most ducks among NWRs in TN

Research Methods:
Habitat Use, Selection, & Availability
Waterfowl Sampling Sites

- 6 Habitat types
- 4 sites/habitat (24/refuge)
- Patch size ≥ 0.5 ha
- >200 m apart

Moist-Soil Wetlands

Flooded Croplands
Waterfowl Surveys

- Late Nov 2011-Feb 2012
- Late Nov 2012-Feb 2013
- Survey 1x/week
- Sunrise-10am
- Concealed tree stands/ground blinds

Dabbling Ducks (Anatini)

- Mallard
  - Anas platyrhynchos
- Gadwall
  - A. strepera
- Green-winged Teal
  - A. carolinensis
- Northern Pintail
  - A. acuta
- American Wigeon
  - A. americana
- American Black Duck
  - A. rubripes
- Northern Shoveler
  - A. olivacea

Diving Ducks (Aythyini)

- Ring-necked Duck
  - Aythya collaris

Abundant species on both refuges
Scan/Distance Sampling

Counts:
- Species
- Instantaneous behavior
- Distance:
  - PVC markers
  - 200 m

Behaviors:
- Foraging
- Locomotion
- Inactive
- Maintenance
- Antagonistic
- Courtship
- Alert

Use/Selection

Bird Density Estimates (Distance 6.0)
- Factors: abundance and distance
- Probability of detectability density function (area)
- Birds/ha and result
- Monthly estimates per habitat/refuge

Habitat Availability/Selection

Habitat Availability (ArcGIS 10)
- Habitat shapefiles
- Aerial imagery
- Wetted areas

Selection Inference:
- Scale bird densities (infer selection)
Research Methods: Food Availability

Food Sampling
- 5 samples/site
- 1x/month
- 70% ethanol added
- Stored/frozen

Kross et al. 2008, Plattner et al. 2010

Sample Processing
- Thawed
- Stained (Rose bengal 1%)
- Washing: Sieves (x3)
- Macroinvertebrates/SAV:
  - ID
  - Oven dry
  - Weigh ±0.1 mg

Sample Processing

- Air dry sieve contents (> 48 hrs)
- Seeds and tubers (duck foods)
- ID (Genus), oven dry
- Weigh 0.1 mg

Duck Energy Days

Available Food x Available Energy

\[ \text{FA} \times \text{E} \]

\[ \text{DED} = \frac{\text{FA} \times \text{E}}{\text{DER}} \]

kg/ha

kg/ha

Daily energetic requirement

Reinecke et al. 1989

Analyses

Hypothesis #1

Do waterfowl select certain habitats over others during winter?

Analysis: Mixed repeated measures ANOVA (SAS Proc MIXED)

Fixed = Habitat type
Random = Year
Repeat = Month

Hypothesis #2

What are the functional roles of available habitats during winter?

Analysis: Logistic regression/Repeated measures ANOVA (MANOVA)

Hypothesis #3

Is there a relationship between habitat use and food availability?

Analysis: Multivariate ordinations

Effect Variables:
Fixed = Habitat type
Random = Year
Repeat = Month

Response Variable:
Behavioral percentages within species flocks
Websites Cited


Waterfowl Habitat Selection in Tennessee

I knew we should've picked a different pond.