

Waterbird and Food Resource Response to Drawdown of Kentucky Reservoir

A Proposal Submitted to the University
of Tennessee-Knoxville







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Wetland Loss

Pre-settlement: 77 to 90 million hectares (200 million acres)
Current: 42 million hectares (100 million acres)


>50% LOSS





Shorebird Conservation






Southward Migration



**>1/2 may be
in decline**

**United States Shorebird Conservation Plan
(Brown et al. 2001)**

**North American Waterfowl Management Plan
(USFWS et al. 2004)**

Goal: Provide quality habitat for these waterbirds throughout their annual cycle

Factors influencing shorebird habitat:

- ✓ water depth
- ✓ invertebrate density and biomass
- ✓ soil compaction, moisture, temperature
- ✓ vegetation presence and structure

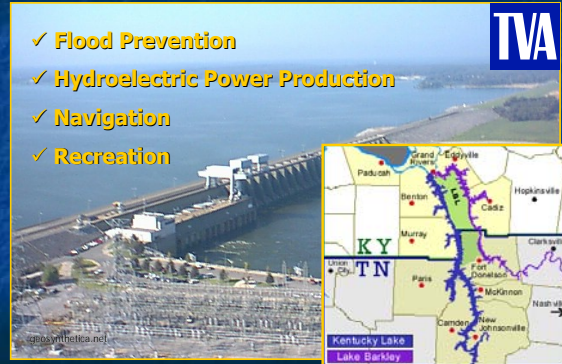
Kentucky Reservoir

INVERTEBRATES AND MOIST-SOIL SEEDS



Kentucky Reservoir

- ✓ Flood Prevention
- ✓ Hydroelectric Power Production
- ✓ Navigation
- ✓ Recreation



Reservoir Management

Prior to 1980 – drawdown initiated in June; mudflats exposed mid-July
 1980 – drawdown delayed until July 5, mudflats exposed mid-August



August



September



October

Recent legislation – delay drawdown until after Labor Day

Reservoir Operations Study (ROS)

TVA ROS

Matthew Smith, 2006
 Rankin Bottoms WMA, Douglas Reservoir

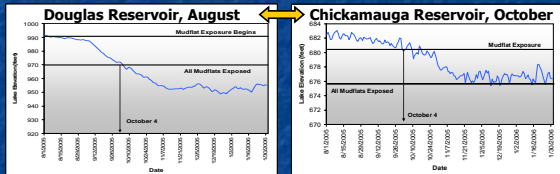
Developed simulation model that predicted acreage of suitable mudflats

No documentation of shorebird use



TVA ROS

John Laux, 2008
 Comparison of two east Tennessee reservoirs at different drawdown dates



- ✓ waterbird use
- ✓ soil moisture, compaction, temperature
- ✓ aquatic invertebrate density and biomass
- ✓ vegetation composition and structure

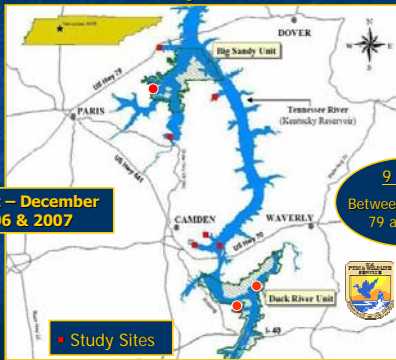
Preliminary Results → shorebird use and vegetation response are significantly affected by drawdown date

Goal: Determine the impacts of drawdown on waterbird use of mudflats in Kentucky Reservoir

Objectives:

- 1.) Determine dates and acreages of exposure on nine mudflats
- 2.) Quantify use and activities of waterbirds on these mudflats
- 3.) Quantify food resource abundance
- 4.) Quantify shorebird habitat characteristics

Study Site Kentucky Reservoir

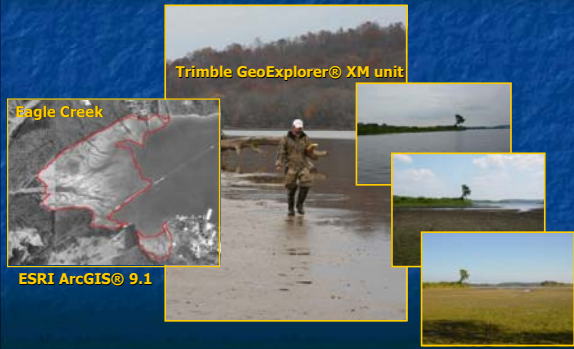


August – December
2006 & 2007

9 Sites
Between US Hwy-
79 and I-40

Methods


- 1.) Determine dates and exposure of mudflats



Methods

2.) Quantify use and activities of waterbirds on mudflats

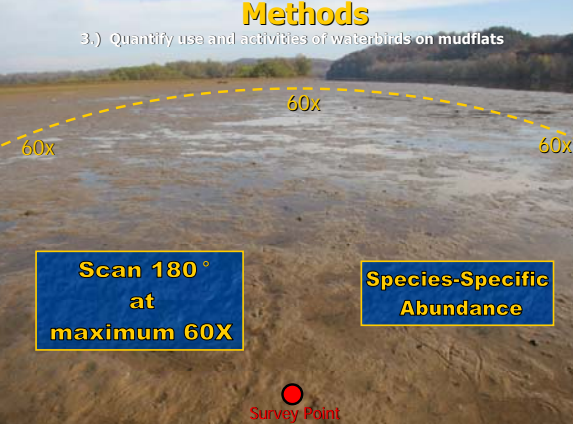
- Scan each mudflat 2X/week
- Permanent survey point
- Between sunrise and 5 hrs after sunrise



Swarovski@ 20-60x

Methods

3.) Quantify use and activities of waterbirds on mudflats



**Scan 180°
at
maximum 60X**

**Species-Specific
Abundance**

Survey Point

Methods

3.) Quantify use and activities of waterbirds on mudflats

- Instantaneous activity of 5 individuals/species
- Two individuals/species monitored for one continuous minute



Activities

- food acquisition
- preening
- inactive
- alert
- sleeping
- courtship
- stretching
- locomotion
- antagonistic

Methods

4.) Quantify food resource abundance

Food resources include:

- aquatic macroinvertebrates
- moist-soil seeds
- vegetation browse

Food resources will be quantified every 2 weeks, alternating between invertebrate and seed collection, and vegetation sampling

Methods

Quantify food resource abundance

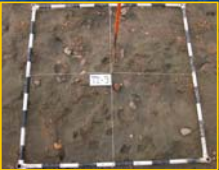

Vegetation

1-m² plot:

- species composition
- average height
- % horizontal cover
- aboveground standing crop
- % vertical cover
- seed yield

Collected ≥ 30 random plants per seed producing species

avg. seed yield/1-m² plot = stem density * avg. seed yield/plant


Methods

Quantify food resource abundance


Invertebrates and Seeds

Core samples:


20-m transect centered on waterline, perpendicular to shoreline




5 samples: 1 upper end, 1 lower end; 3 concentrated at waterline





8.8-cm diameter
10-cm depth





Methods



4.) Quantify shorebird habitat characteristics

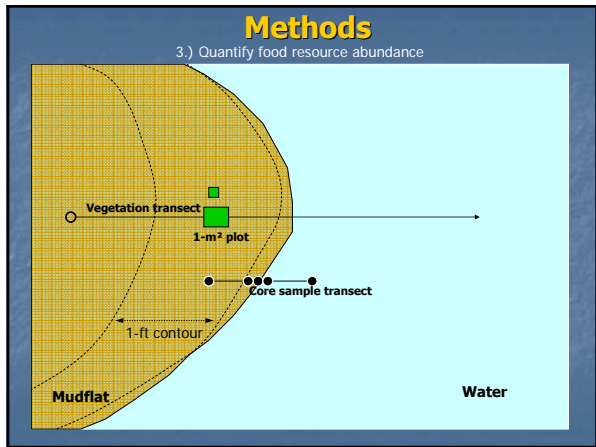



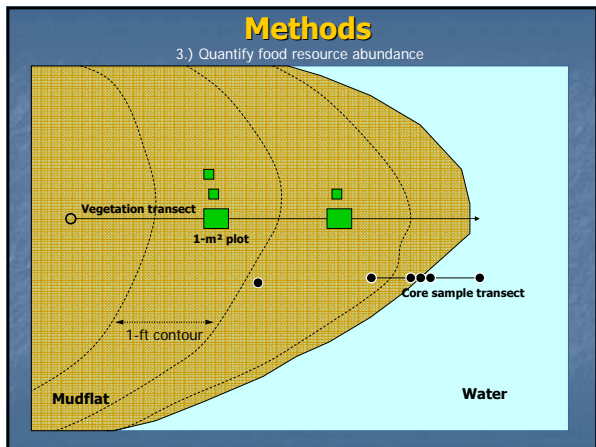
Invertebrates and Seeds

Each core sampling site:

- Soil Moisture
- Soil Temperature
- Soil Compaction
- Water Depth





Methods

3.) Quantify food resource abundance

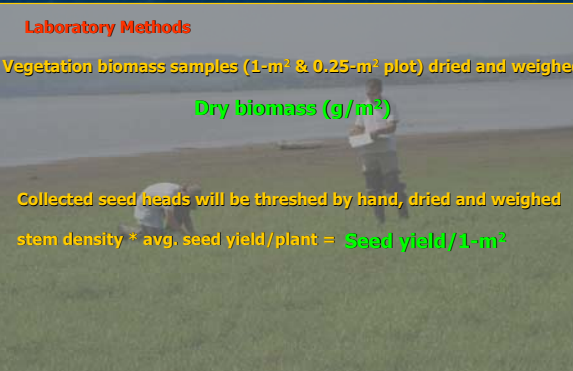
Laboratory Methods

Vegetation biomass samples (1-m² & 0.25-m² plot) dried and weighed

Dry biomass (g/m²)

Collected seed heads will be threshed by hand, dried and weighed

stem density * avg. seed yield/plant = **Seed yield/1-m²**





Methods

3.) Quantify food resource abundance

Laboratory Methods

Core samples will be thawed and stained with rose bengal solution

<p>Invertebrates will be counted and represented as individuals/m²</p> <p>Individuals/m² * avg. dry weights = biomass (g/m²)</p>	<p>Seeds will be sorted into 4 categories: moist soil seeds, tree seeds, tubers, and cocklebur</p> <p>Seeds will be dried and weighed = biomass (g/m²)</p>
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