


Justification

Limited research on shorebird feeding ecology in the interior U.S. (Brown et al 2001, Loesch et al 2000)

Need to understand what food items shorebirds are selecting in habitats at interior stopover sites

Estimate food availability
Set habitat objectives



These data will be fundamental in documenting the importance of TRV mudflats to fall migrating waterbirds


Objectives

- 1) Determine diet composition, and
- 2) Determine food item preference of shorebirds in the Tennessee River Valley.

Least sandpiper (*Calidris minutilla*)

- 1) Most widely distributed shorebird in NA
- 2) Most abundant shorebird in TRV
- 3) Occur throughout the sampling period


Study Site



Collected up to 30 birds per month
August → December, 2006 and 2007


Field Methods

Birds were observed feeding for ≥ 5 minutes



12 gauge shotgun, #9, steel shot

USFWS and TWRA permits, UT- IACUC protocol



Methods

Core Sample
(Availability)

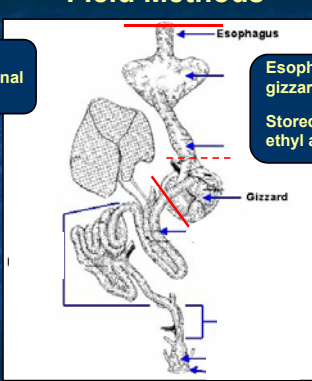


Upper
GI Tract
(Selection)




Field Methods

Upper gastrointestinal (GI) tract



Esophagus and gizzard separated
Stored in 95% ethyl alcohol

Field Methods



Weighed to nearest 0.25g, Pesola® scale



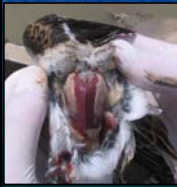
Categorized fat content
(Page and Salvadori 1969)

Sexed by internal examination

Aged by plumage characteristics

Morphological measurements

- Tarsus
- Culmen
- Wing chord




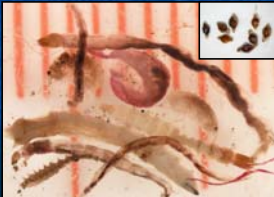
Laboratory Methods

GI Tracts dissected by section Core Samples were sorted ≤3 days

Food items were separated and counted

Invertebrates were identified to family or lowest possible taxa and classified to life stage (Merritt and Cummins 1996)

Seeds from GI tracts were identified to genus or lowest possible taxa



Food item abundance was converted to mean dry biomass

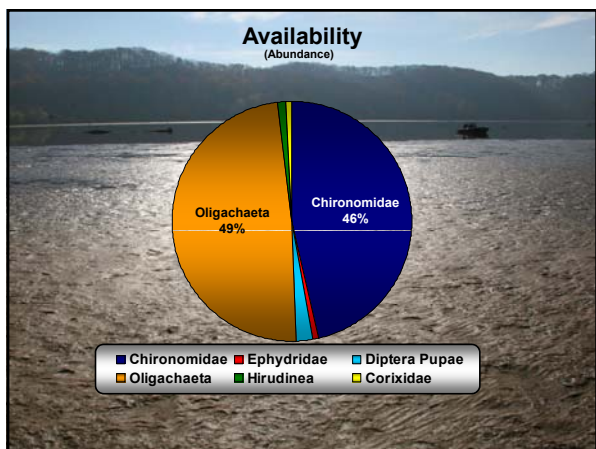
Statistical Analysis

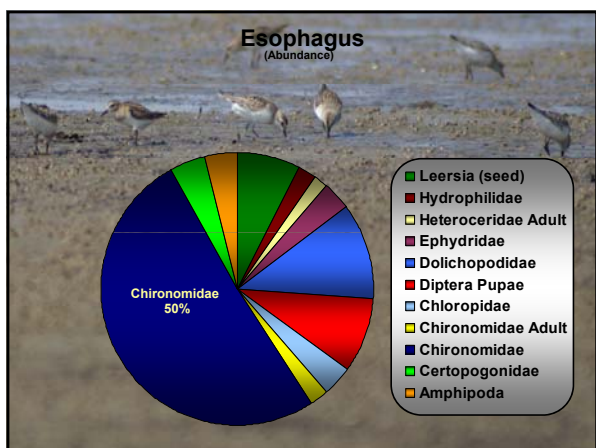
Mean Biomass of Invertebrates → Among Taxa
Test: One-way ANOVA

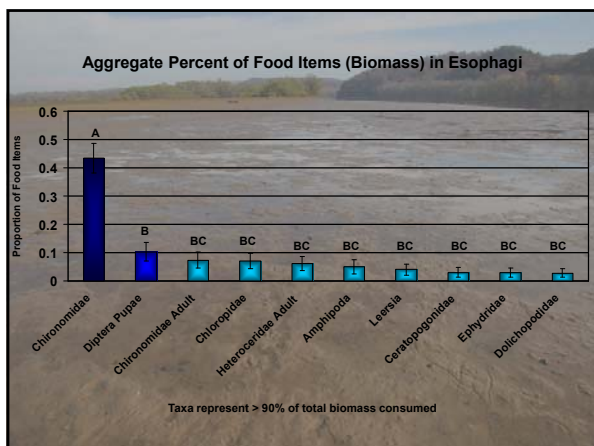
Food Preference → Invertebrates in Core vs. Consumed
Test: Paired T-test

Both Tests Performed at $\alpha = 0.05$, using SAS® System









Food Item Preference (Biomass)

Taxa	Consumed	Available	D	SE	P
Invertebrates					
Amphipoda	0.050	0.004	0.046	0.023	0.046
Dolichopodidae	0.028	0	0.028	0.015	0.072
Ephydriidae	0.029	0.005	0.024	0.015	0.108
Ceratopogonidae	0.030	0.002	0.028	0.017	0.107
Heteroceridae Adult	0.062	0.001	0.061	0.026	0.020
Chloropidae	0.070	0.001	0.069	0.027	0.012
Chironomidae Adult	0.074	0.009	0.065	0.027	0.017
Diptera Pupae	0.103	0.005	0.099	0.032	0.003
Chironomidae	0.434	0.671	-0.236	0.058	<0.001
Seeds					
Leersia	0.040	0	0.040	0.020	0.052

Taxa represent > 90% of total biomass consumed

Discussion

Consumed most prey items according to their availability
 Of 21 taxa, 13 taxa selected in proportion to availability
 Davis and Smith (1998), Andrei et al. (in press)

Exceptions: Oligochaetes and Chironomids - 43% (Avoided) (Not Avoided)

5 food items selected in greater proportion to their availability

Chloropidae	Diptera	Skagen and Omen (1996)	Diptera
Chironomidae Adult	Coleoptera		Coleoptera
Diptera Pupae			
Heteroceridae	Amphipoda		Amphipoda
Amphipoda			

Opportunistic foragers, but prefer some food items



Discussion

Seeds:
9 seed taxa were found in GI tracts, 3 were found in esophagus

43 GI tracts (30%) contained seeds
Moist-soil seeds are an important component of diet



Implications

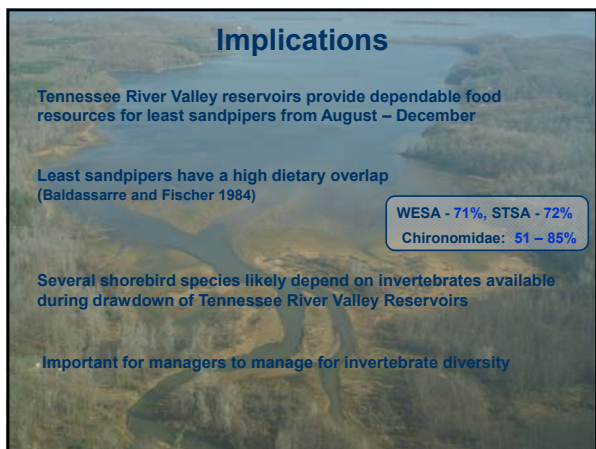
Tennessee River Valley reservoirs provide dependable food resources for least sandpipers from August – December

Least sandpipers have a high dietary overlap (Baldassarre and Fischer 1984)

WESA - 71%, STSA - 72%
Chironomidae: 51 – 85%

Several shorebird species likely depend on invertebrates available during drawdown of Tennessee River Valley Reservoirs

Important for managers to manage for invertebrate diversity



Acknowledgements

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<u>Field Technicians</u> Matthew Carroll John Campbell Ed Conrad	<u>Invertebrate and Seed ID</u> Jason Robinson Aaron Floden

Questions?