

**Inland Piping Plover migration
stopover sites: using birders'
reports to study migration patterns
and habitat use**

Vanessa D. Pompei

*University of Minnesota
Conservation Biology Program*

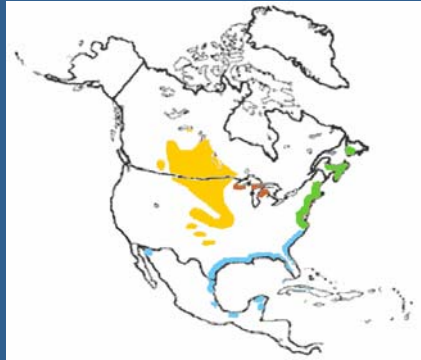
Francesca J. Cuthbert

*University of Minnesota,
Dept. of Fisheries, Wildlife & Conservation Biology*



Introduction: Background

3 breeding populations of Piping Plovers (*Charadrius melodus*)



reproduced from USFWS document

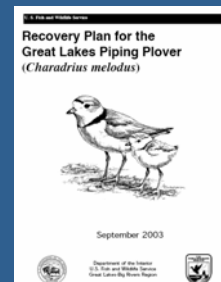
- Northern Great Plains Population
- Great Lakes Population
- Atlantic Coast Population
- Wintering Range (all populations)



Introduction: Background

- **Great Lakes pop. endangered: 1986**
(threatened on wintering grounds)
- **Conservation efforts focused on breeding grounds**
- **Recovery Plan for Great Lakes PIPL: identifying & protecting migration habitat listed as a recovery action**

(USFWS 2003)



Introduction: Objectives

- Do PIPL use migration stopover sites?
- What types of sites are they stopping at?
- Areas of higher density of stopover events?
- Do spring and fall seasons differ?
- How long do PIPL remain at stopover sites?
- Do PIPL congregate or flock at stopover sites?
- What is the habitat like at PIPL stopover sites?

Methods: Seasonal Records

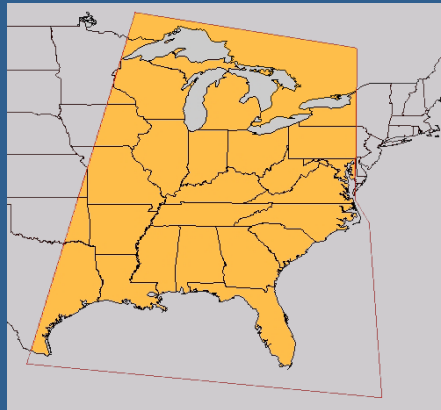
- Designate study area

26 states + Ontario

- Collect records of PIPL sightings

- State bird journals
- Books

- Spring: Mar 1 – May 31
- Fall: Aug 1 – Nov 30



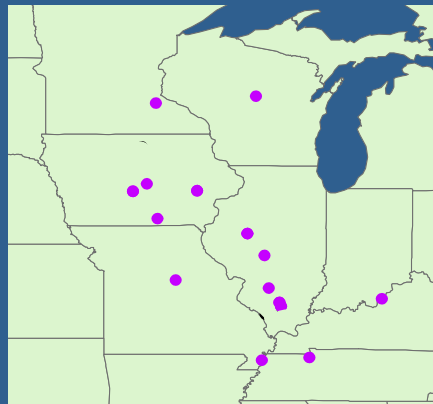
Methods: Spatial Analyses

- **Nearest Neighbor Analysis**
 - Nearest Neighbor Index
 - Nearest Neighbor Hierarchical Clustering

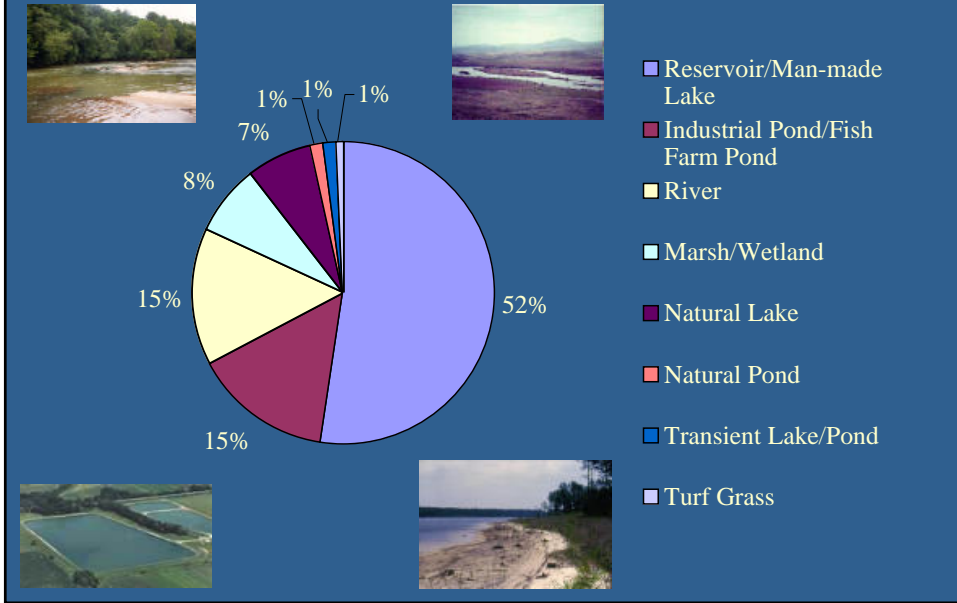


Methods: Habitat Assessment

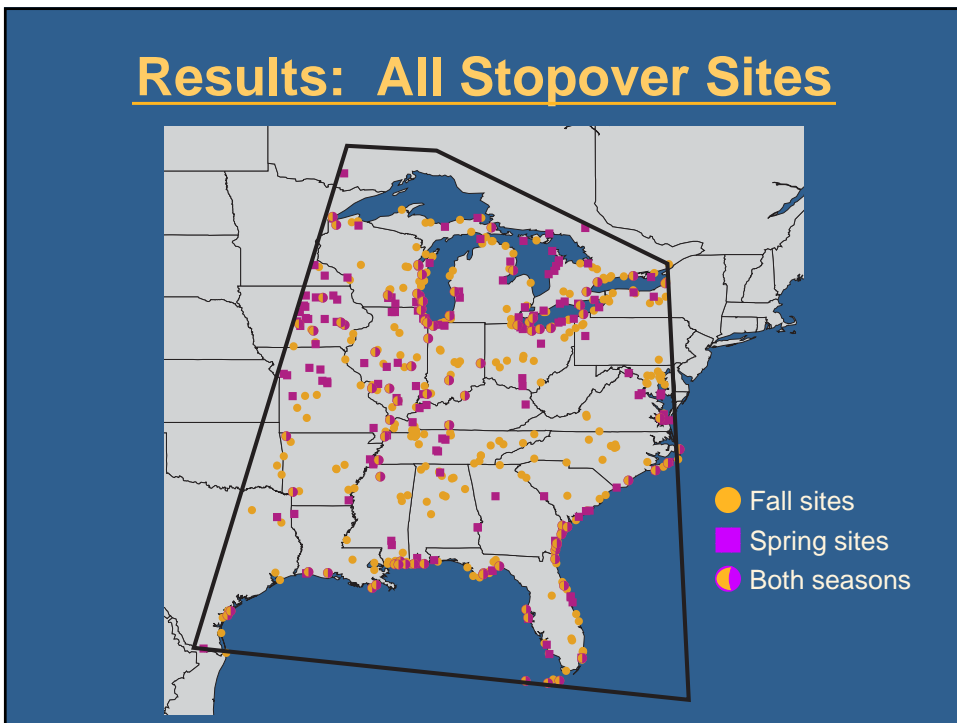
- **Habitat variables measured**
 - Shoreline width
 - Substrate type (categorical)
 - % vegetation cover
 - % rock cover



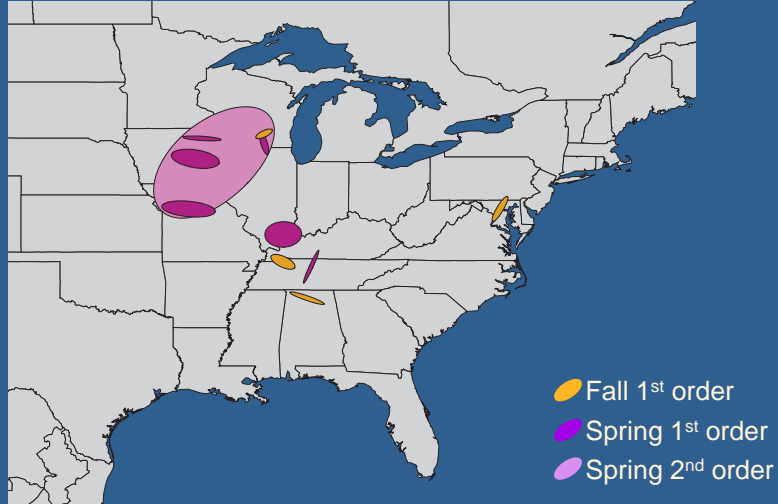
Results: Types of Sites



Results: All Stopover Sites

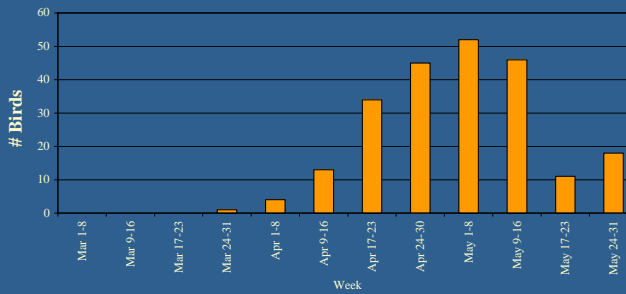


Results: Cluster Analysis

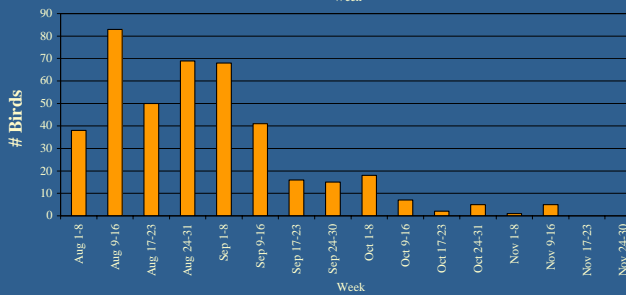


Results: Chronology

Spring



Fall



Results

- **Duration of Stay**

- most birds seen for 1 day only



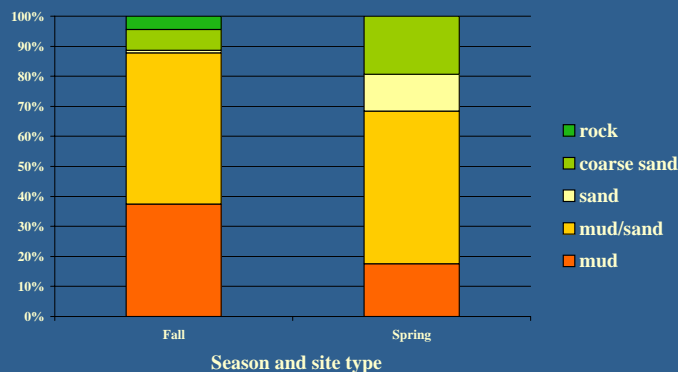
- **Congregation**

- 77% of sightings were of a single bird
- \bar{x} at inland sites = 1.34 birds

Results: Habitat Assessment

- **Fall vs. Spring, Piping Plover stopover sites**

- fall sites had more mud substrate than spring
($\chi^2=23.28$, $df=5$, $p<0.0005$)
- fall sites had more veg than spring sites
($t=7.72$, $df=165$, $p=1.07 \times 10^{-12}$)



Discussion

- **PIPL do use stopover sites**
 - inland and coastal
 - spring and fall
- **Various types of water bodies used**
 - reservoirs
- **Differences between spring and fall migration**
 - temporal, spatial, habitat
- **Duration of stay is short**
 - often only 1 day
- **PIPL do not flock at stopover sites**
 - 1 individual or very small groups



Discussion

- **Opportunistic use of stopover sites**
 - no sites used in many consecutive years
 - conditions variable at inland sites due to water levels
- **Formal protection of sites for PIPL not currently warranted**
- **Future work – expand to all of North America**



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