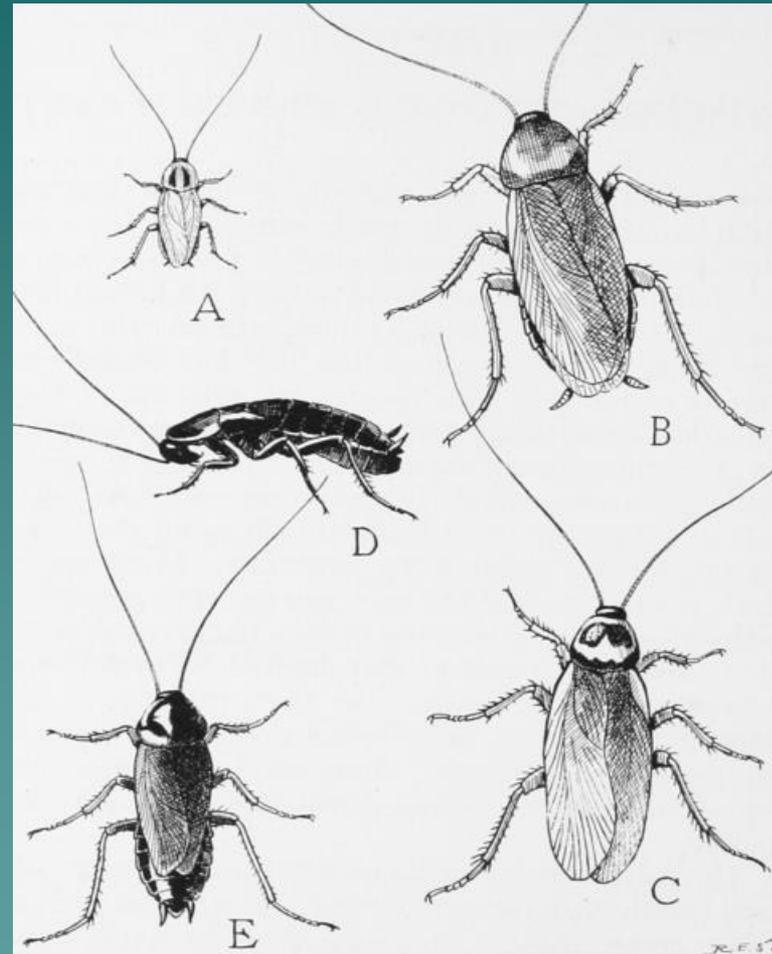


THE CHALLENGE OF SCALE



RED KNOT - SUPERMIGRANTS



RED KNOT MIGRATION AND STOPOVER SITES



RED KNOT – WHERE ARE THE VULNERABILITIES?

- ◆ Tierra del Fuego?
- ◆ Argentina coast?
- ◆ Brazil?
- ◆ Mid-Atlantic states?
- ◆ Hudson's Bay?
- ◆ High Arctic?
- ◆ Fall or spring?
- ◆ Wind patterns?
- ◆ Synchronicities?

Comprehensive VA
needed



MIGRATORY WILDLIFE VULNERABILITY ASSESSMENT

- ◆ Migratory wildlife introduce difficult challenges for VA:
 - Highly extravagant lifestyles
 - Where? Breeding range, wintering range, stopover sites, migration itself, all of above?
 - Synchronicity?
 - Data sparse from parts of range

Vulnerabilities of Shorebirds to Climate Change

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A stylized, teal-colored silhouette of a mountain range is located in the bottom right corner of the slide, extending from the right edge towards the center.

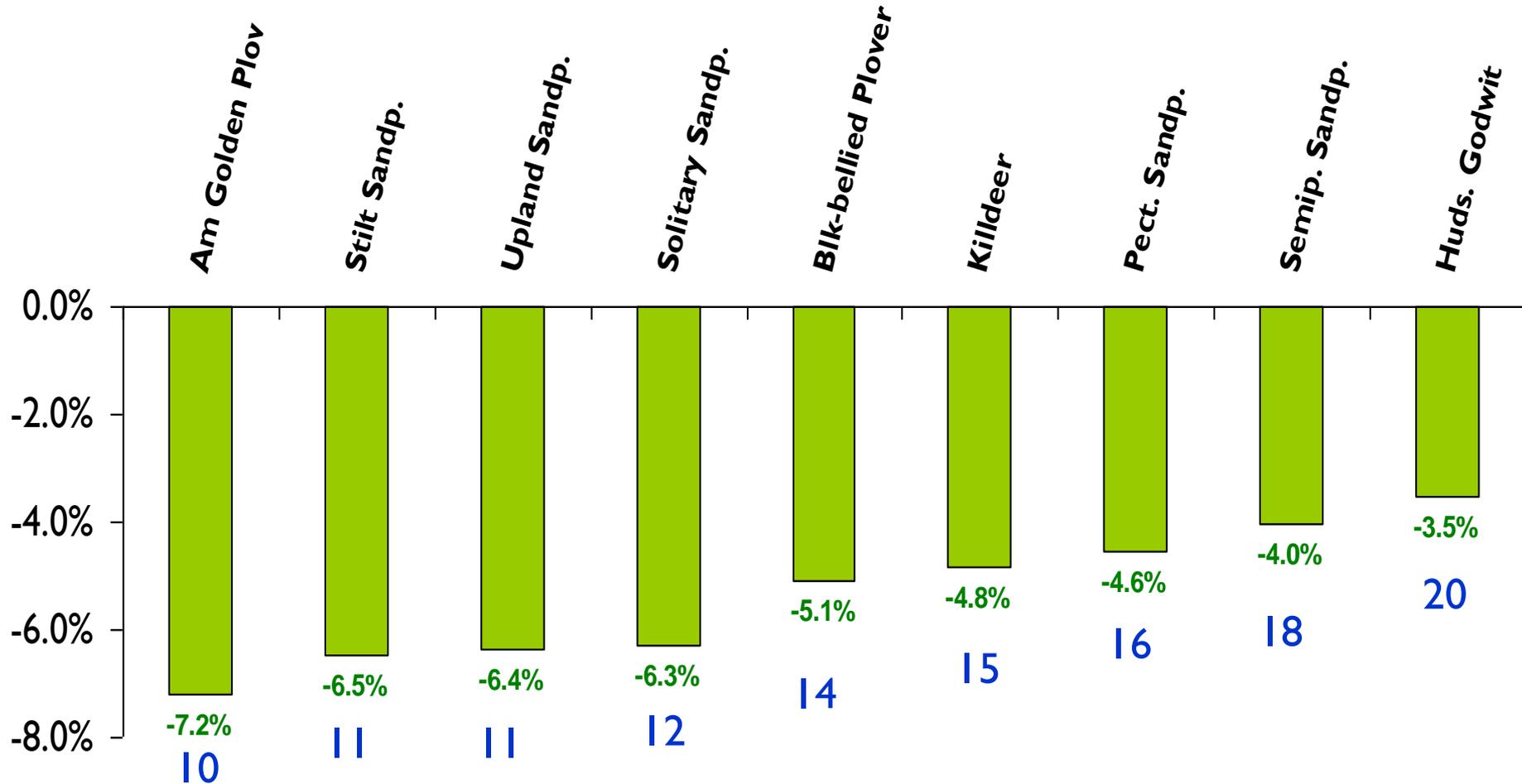
Objectives

- ◆ Evaluate potential change in extinction risk of North American shorebirds due to climate change
 - directly due to effects of climate change
 - not those due to changed human activities associated with climate change

Why Shorebirds?

- ◆ Reported widespread declines
- ◆ Proposed to be sentinels of global environmental change – particularly because of their hemispheric ecosystem use during life cycle (Brown et al. 2001; Piersma & Lindström 2004)
- ◆ Migratory aggregations of some species are a spectacular biological phenomenon
- ◆ Iconic species valued by public?

SHOREBIRDS ARE IN TROUBLE



Based on migration counts in eastern N.America; Bart et al 2007. *J Av. Biol*

Our Approach

- ◆ Evaluates threats to shorebirds by species
- ◆ Works within the context of the Partners-in-Flight & U.S. Shorebird Conservation Plan risk systems
 - based on population size & trend, breeding & non-breeding distributions, threats to breeding & non-breeding sites



MAIN QUESTIONS ASKED

- ◆ How much does climate change move the needle on the existing vulnerability categories of SCP/PIF?



U.S. Shorebird Conservation Plan Risk Categories

- 1) Not at Risk
- 2) Low Concern
- 3) Moderate Concern
- 4) High Concern
- 5) Highly Imperiled
- 6) ~~Holy Smokes!~~
~~Really, highly~~
~~imperiled~~—Critical





Vulnerability Factors

	Score	Arrow
1) Loss/gain in breeding habitat under climate change	3	↑
2) Loss/gain in wintering habitat under climate change	5	↑↑
3) Loss/gain in migration habitat under climate change	3	↑
4) Degree of dependence on ecological synchronicities	5	↑↑
5) Migration distance	4	↑
6) Degree of breeding, wintering, or migration habitat specialization	4	↑↑

Application

- ◆ Evaluated 49 species of shorebirds breeding in North America north of Mexico
- ◆ For each factor, included confidence level
- ◆ **Determined shifts in risk category**

Results for 50 North Am. Shorebirds

- ◆ 43 species (86%) predicted to ↑ risk level due to climate change
 - 34 increased by 1 level
 - 9 increased by 2 levels
- ◆ 3 species at lower risk
 - ◆ Solitary sandpiper – more breeding habitat
 - ◆ Bristle-thighed curlew – more breeding & wintering habitat
 - ◆ White-rumped sandpiper – more wintering habitat



U.S. Shorebird Conservation Plan

Risk Category	Current	Expected with climate change
Not at risk	0	0
Low concern	7	2
Moderate concern	15	7
High concern	23	13
Highly imperiled	4	17
Critical	–	10

Species in New 'Critical' Category

- ◆ Snowy Plover
- ◆ Wilson's Plover
- ◆ Piping Plover
- ◆ Mountain Plover
- ◆ Am. Oystercatcher
- ◆ Long-billed curlew
- ◆ Bar-tailed godwit
- ◆ Ruddy turnstone
- ◆ Sanderling
- ◆ Short-billed dowitcher



TAKE HOME MESSAGES

- ◆ For complex spp. We need complex, comprehensive VA
 - ◆ They are doable
 - ◆ Build off of existing structures if possible (PIF, USSCP, etc.)
 - ◆ Must be resilient to lack of data
- 