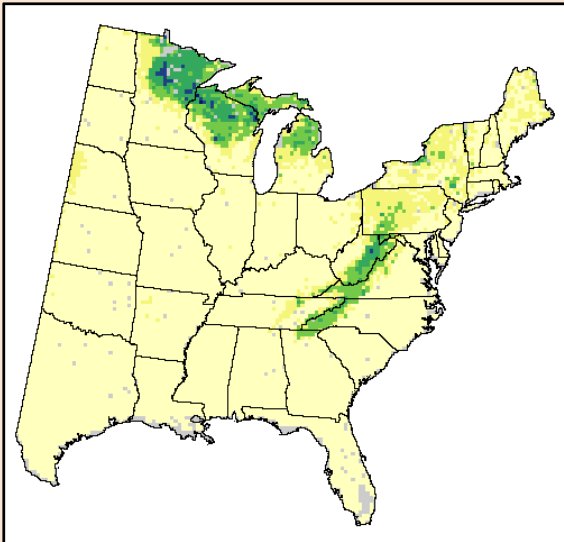


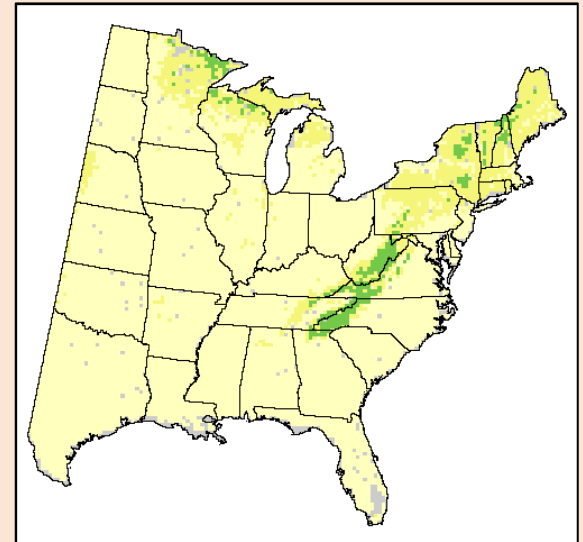


Greg Lavaty

Climate Change & 2 Forest Birds



Amber Roth
Assistant Professor
University of Maine



2 Forest Birds

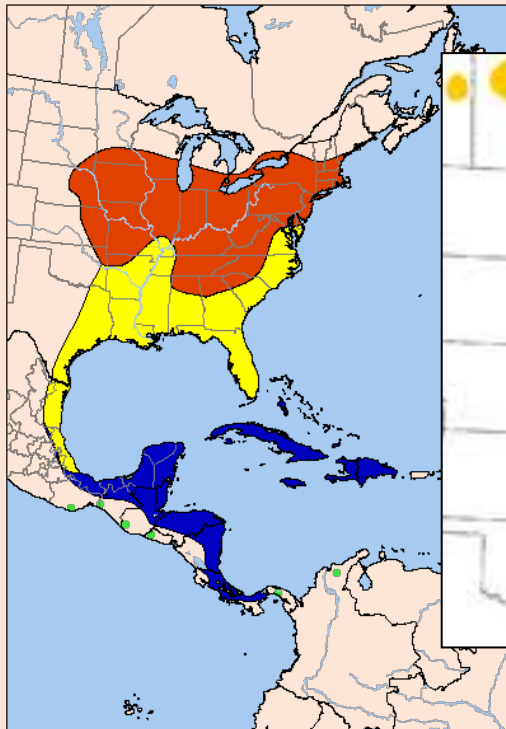
Blue-winged Warbler



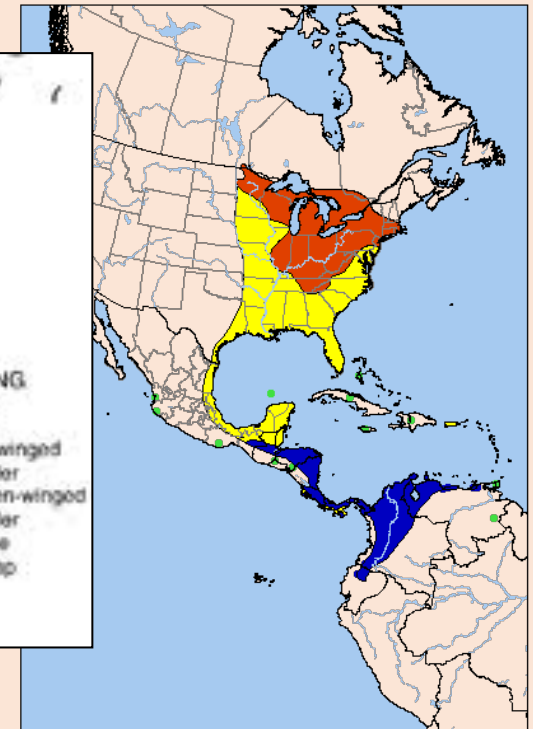
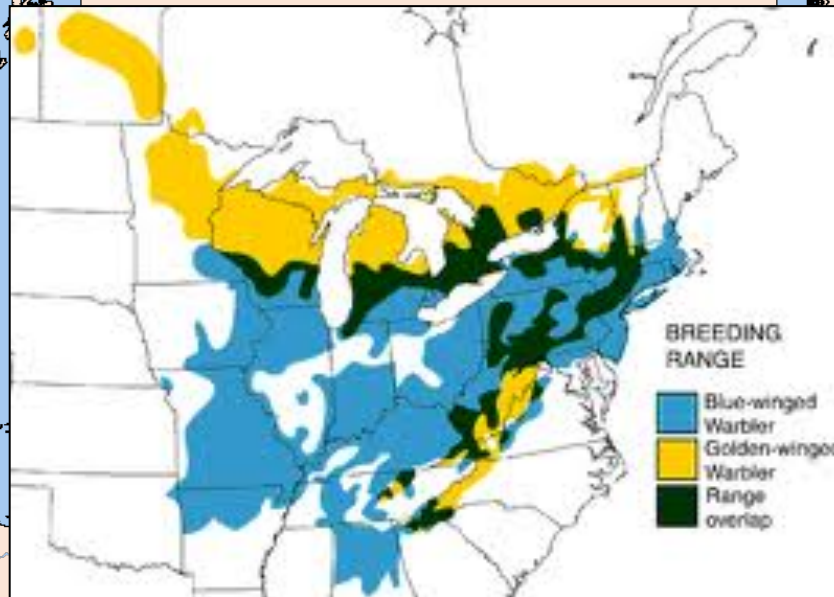
hybrid



Golden-winged Warbler



750 0 750 Kilometers

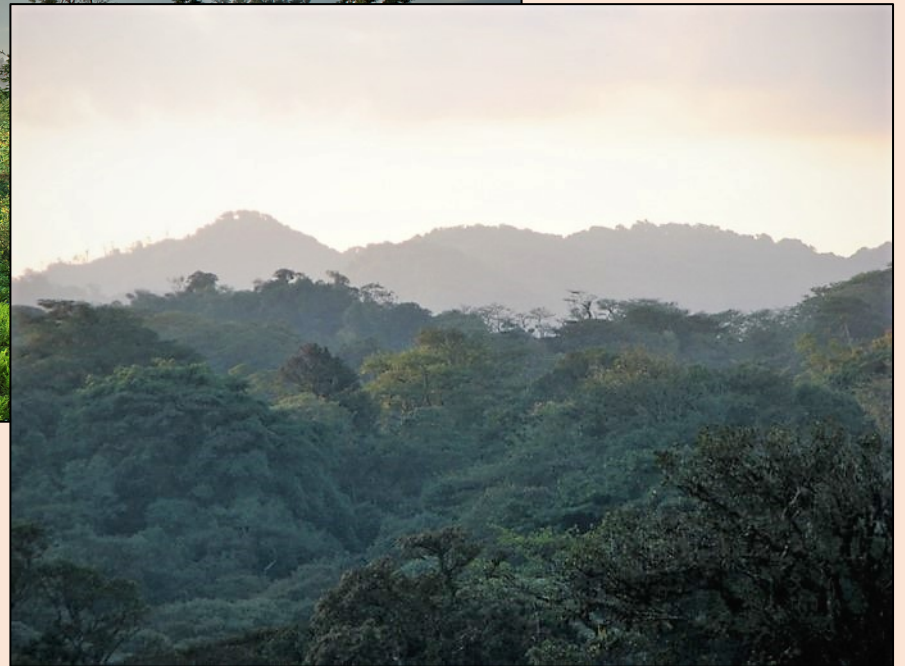


750 0 750 Kilometers

Habitat Associations

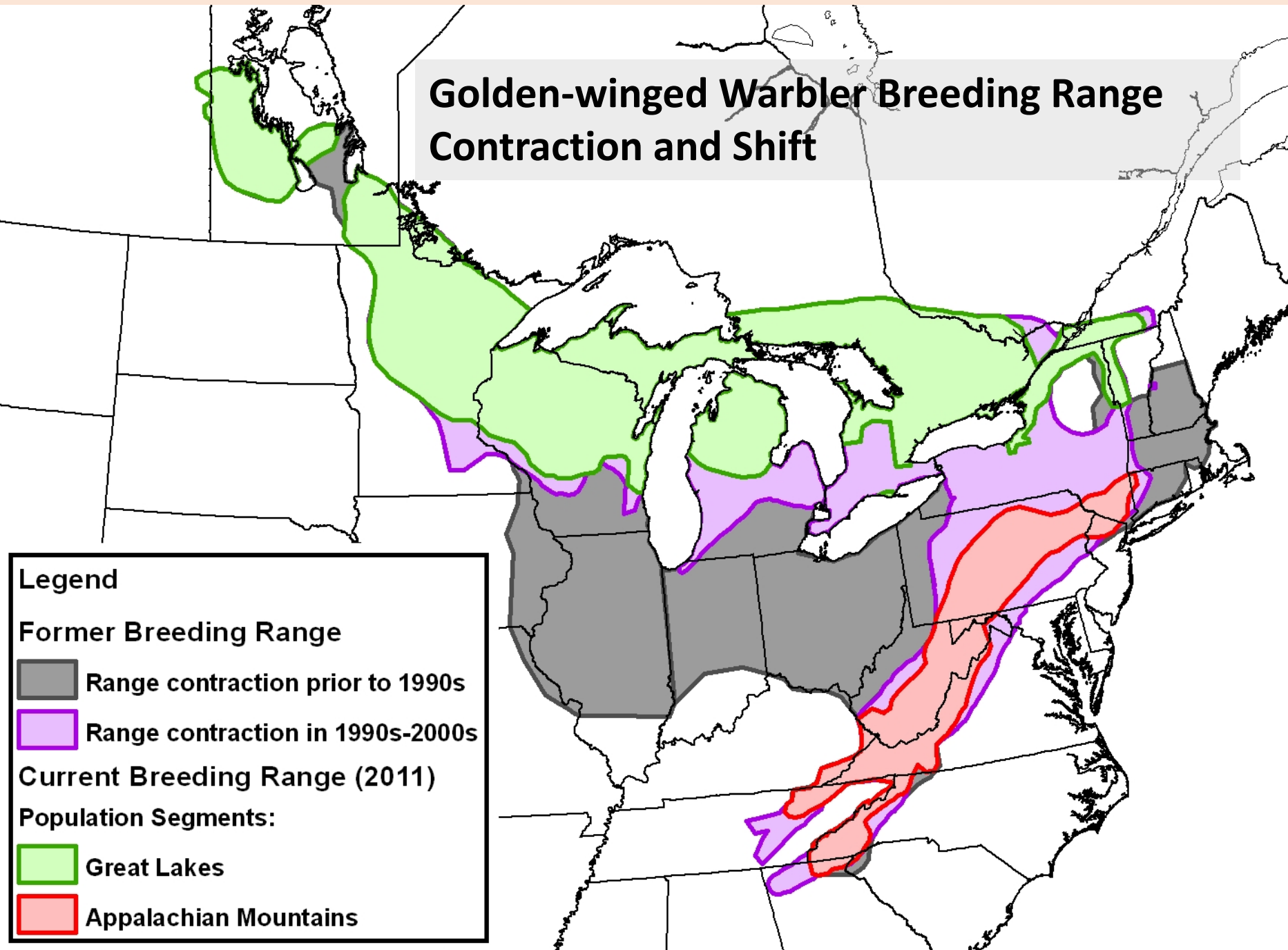


Breeding: Young deciduous to mixedwood forests (e.g. aspen-birch) for nesting; a broader range of forests used for post-fledging habitat and foraging.



Winter: cloud forest, mid-elevation humid forest, pine-oak forest, and lowland semi-deciduous forest

Golden-winged Warbler Breeding Range Contraction and Shift



Legend

Former Breeding Range

- Grey: Range contraction prior to 1990s
- Purple: Range contraction in 1990s-2000s

Current Breeding Range (2011)

Population Segments:

- Light Green: Great Lakes
- Red: Appalachian Mountains

Study 1: What is driving distribution changes?

- Golden-winged Warbler and Blue-winged Warbler historical, current, and future distributions
- Modeled as a function of 16 variables related to temperature and precipitation, two climate scenarios (for 2050), and two general circulation models using both maximum entropy and ensemble modeling approaches.

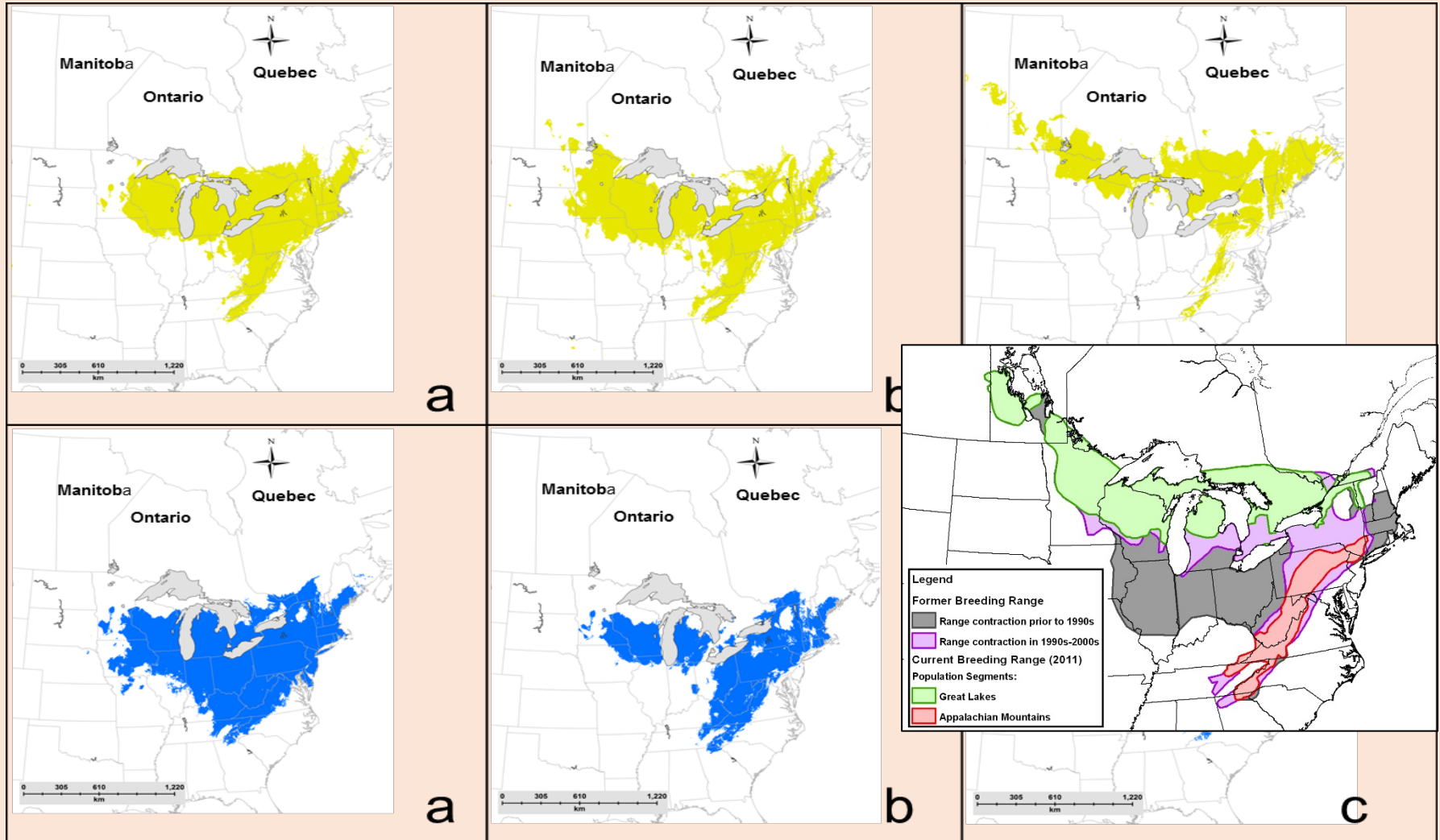


Golden-winged Warbler (yellow) and Blue-winged Warbler (blue) Distribution

Historical (a)

Modern (b)

Future (c)



Courtesy of Dolly Crawford with funding from Cornell University (Lovette Lab).

What is the mechanism for distribution change?

Role of Physiology

- Temperature plays a strong role in limiting breeding distributions of many migratory birds (Price and Root 2005).

Role of Demographics

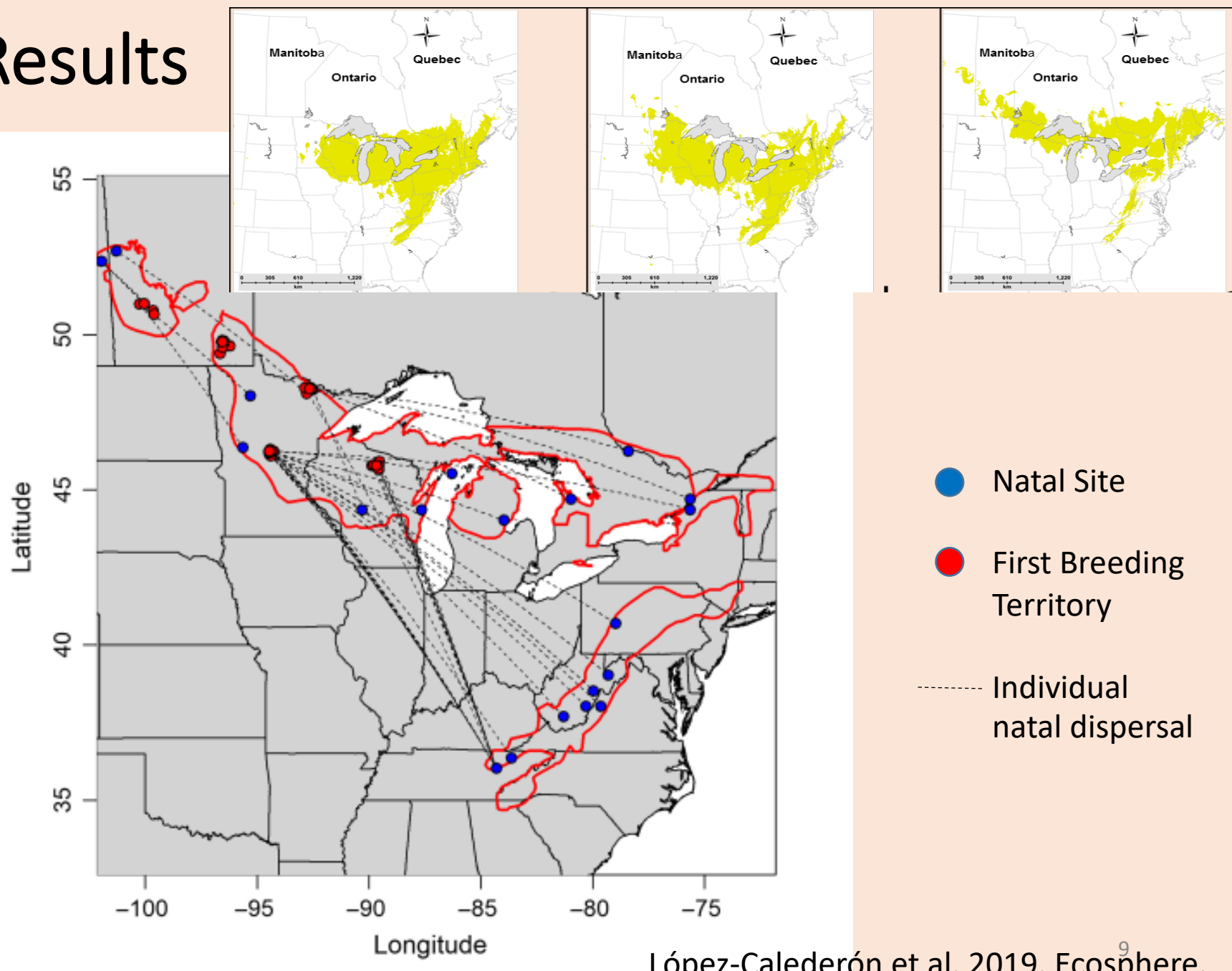
- High site fidelity on both breeding and wintering grounds = once an adult (esp. males) chooses a territory, it is chosen for life.
- This suggests that distribution change is being driven by a demographic process earlier in the life-cycle.

Study 2: Is natal dispersal the mechanism for distribution change?

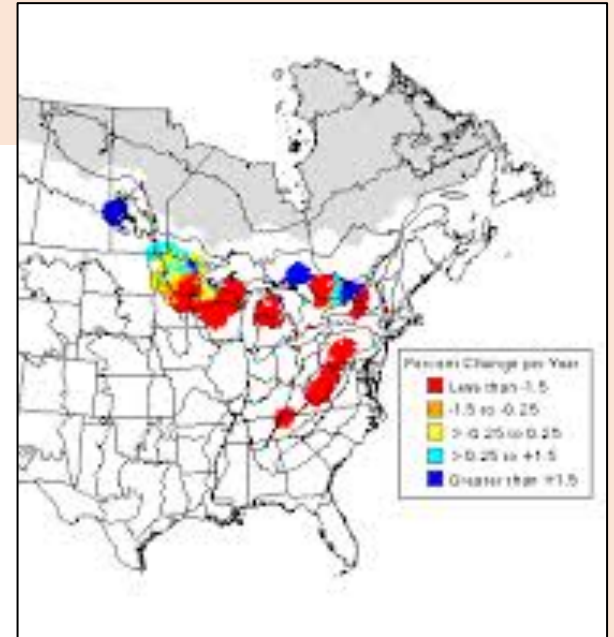
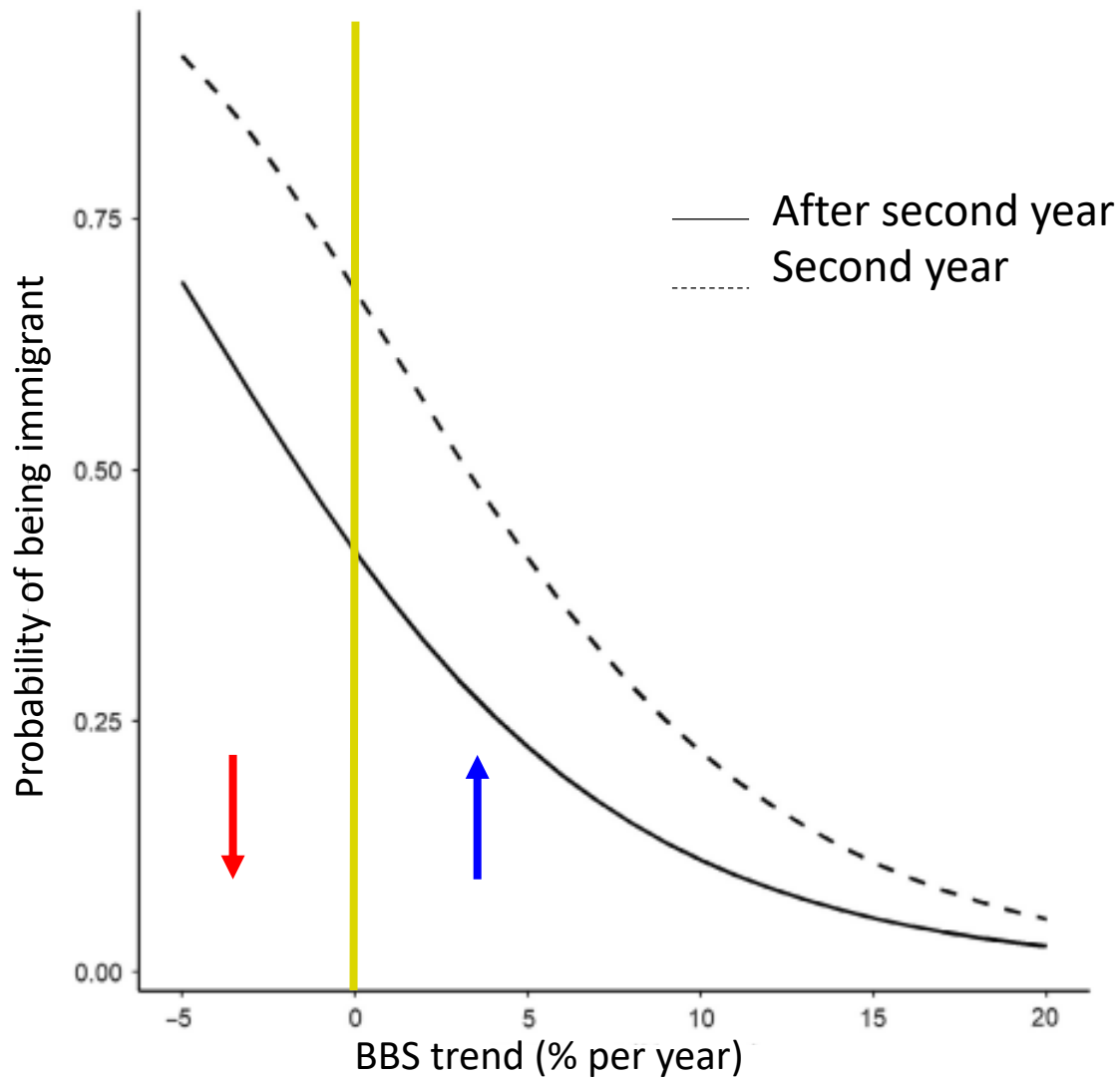
- Compare 4 different methods to estimate natal dispersal using stable (hydrogen) isotope methods. April 2019
- Infer natal dispersal for Golden-winged Warbler.



Results



Results



Conclusions



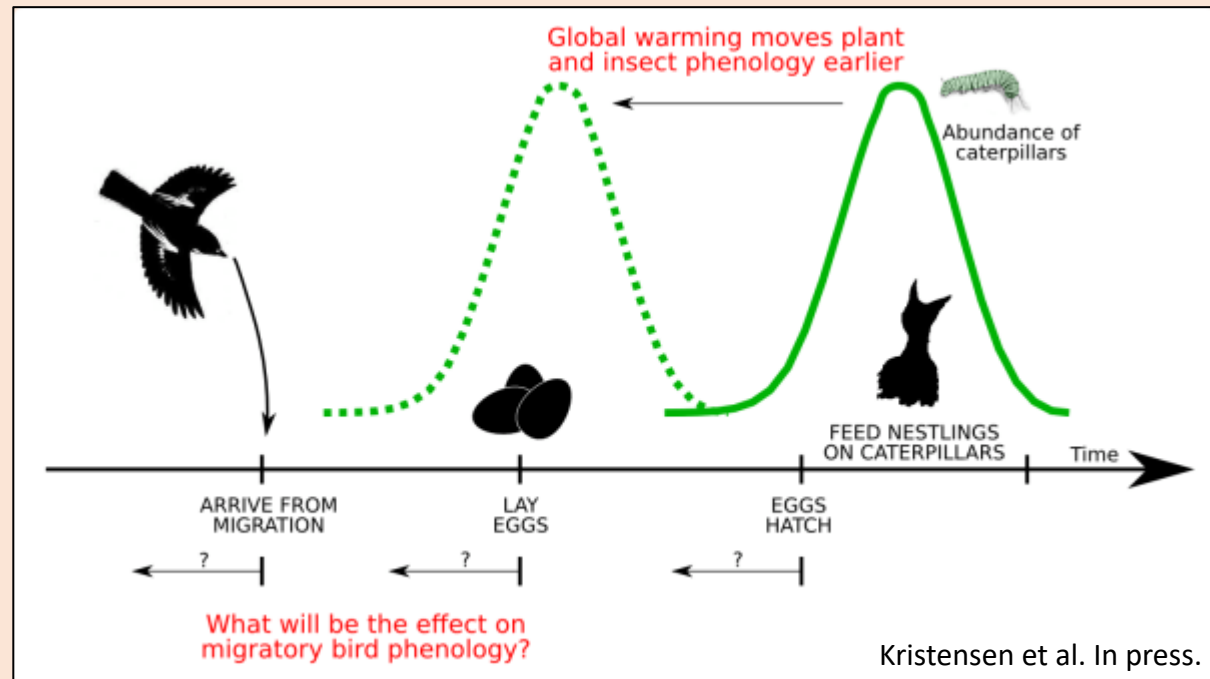
Mark Peck

- Distribution shifts for both species are likely due to climate change, esp. warming.
- Declining Golden-winged Warbler populations are being supplemented by immigrants (esp. SY birds).
- Golden-winged Warblers fledging from the southern portion of the range are dispersing northward to mid-latitudes (MN and WI).
- Future concerns about habitat mismatches (i.e., the birds shifting faster than their habitat esp. forest types and common tree associates).

Future Mismatches

Phenological Mismatches

- Food availability—insect prey not reaching high abundance when needed for migration and breeding (esp. feeding young).

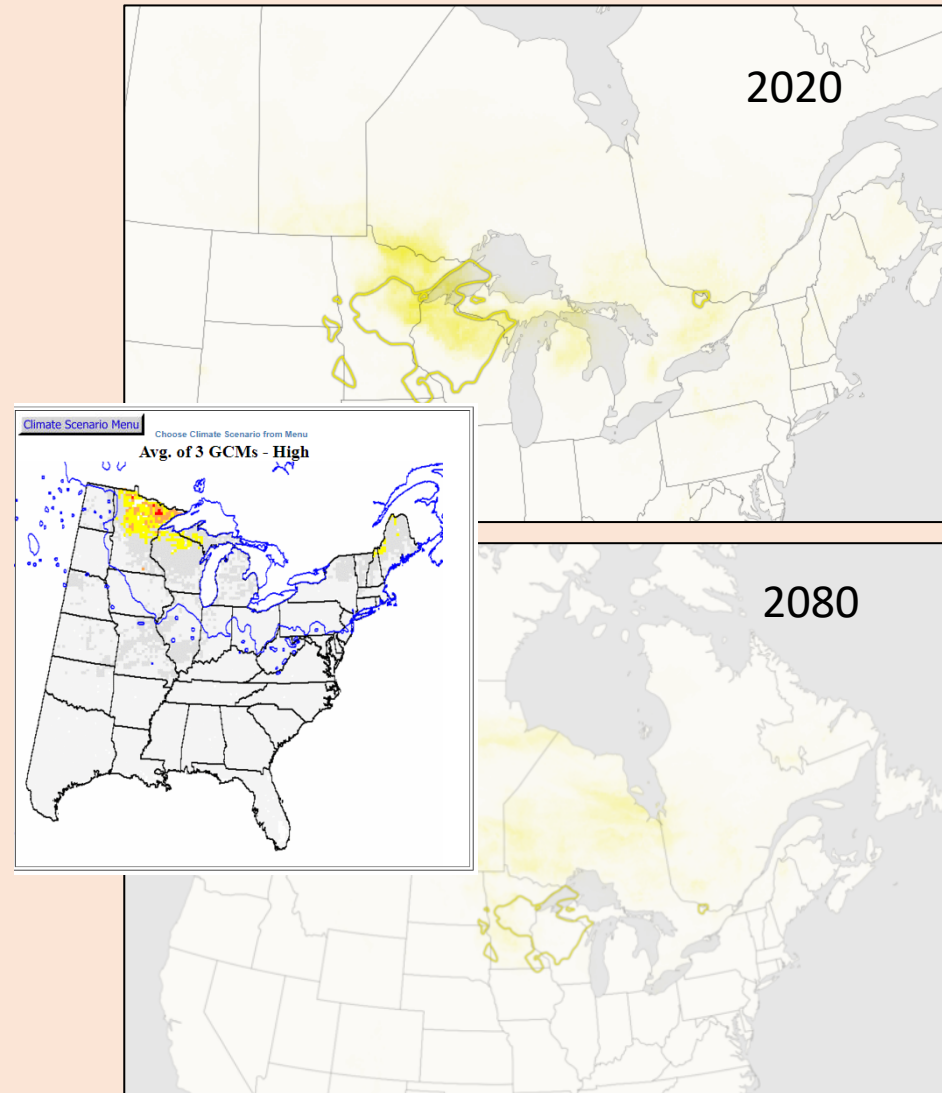


Future Mismatches

Habitat Mismatches

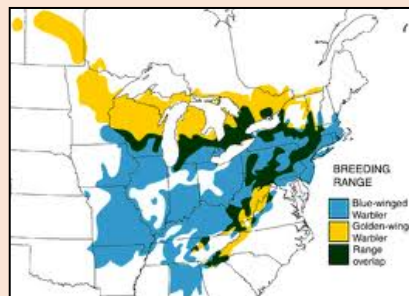
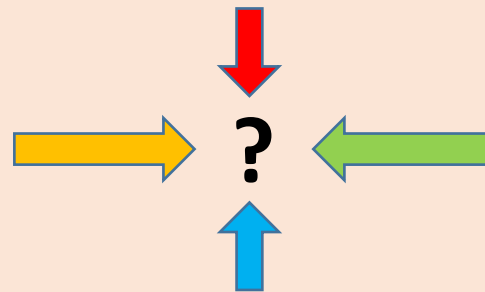
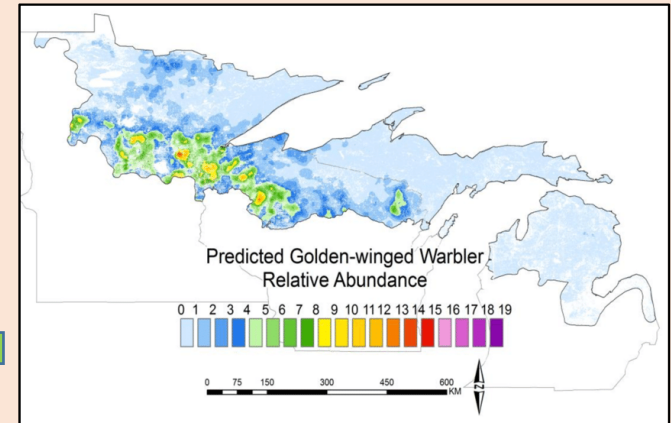
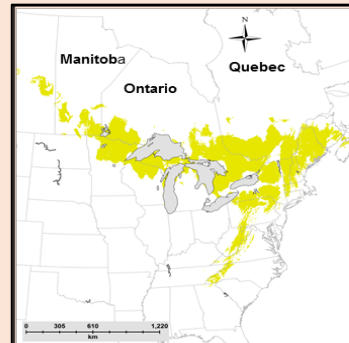
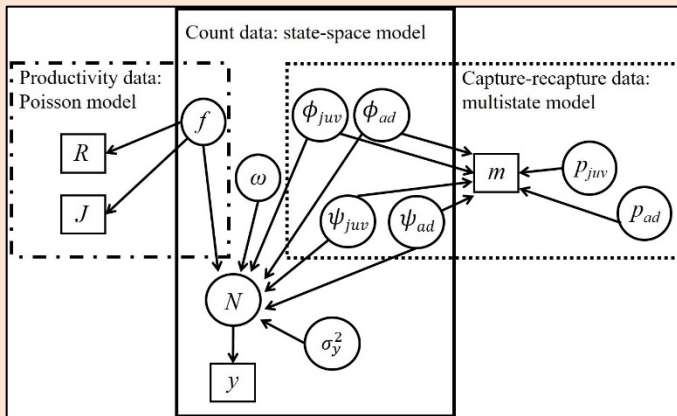
As bird distribution shifts rapidly, will there be appropriate habitat in the expansion region? This includes:

- Appropriate forest types at landscape and stand scales (composition, structure, and age-classes)
- Recognized food resources (esp. insects) and their abundance



Future Research

- Predict future population viability and distribution of Golden-winged Warbler to inform ESA review.



Questions?

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