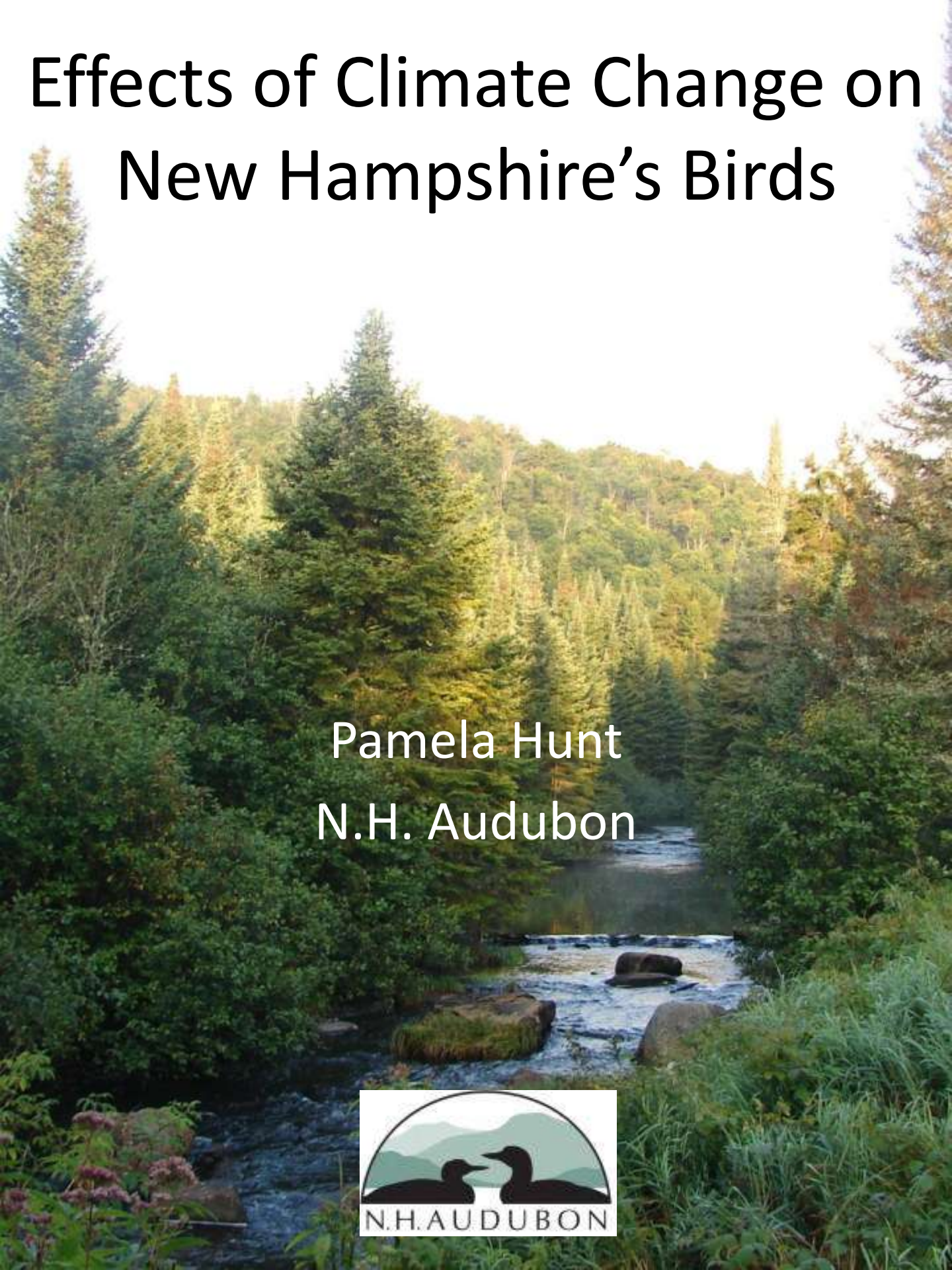
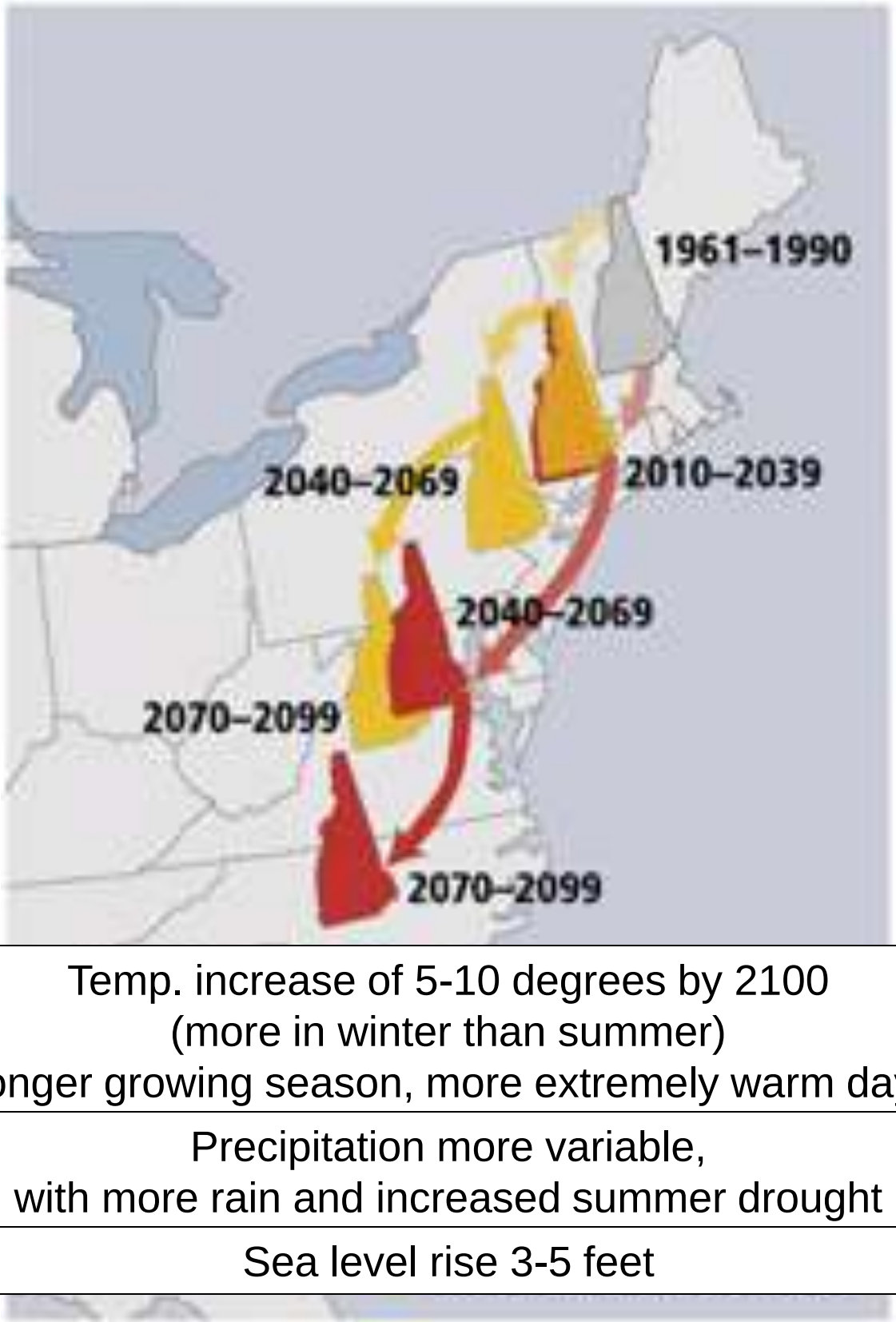
Effects of Climate Change on New Hampshire's Birds



Pamela Hunt
N.H. Audubon

N.H. AUDUBON

Climate Change in New Hampshire



Temp. increase of 5-10 degrees by 2100 (more in winter than summer) Longer growing season, more extremely warm days
Precipitation more variable, with more rain and increased summer drought
Sea level rise 3-5 feet

What are the likely effects of these changes on NH's bird populations?

1) Increasing Temperature?

Habitat shifts
Bird range shifts
Migration and breeding timing

2) Variable Precipitation?

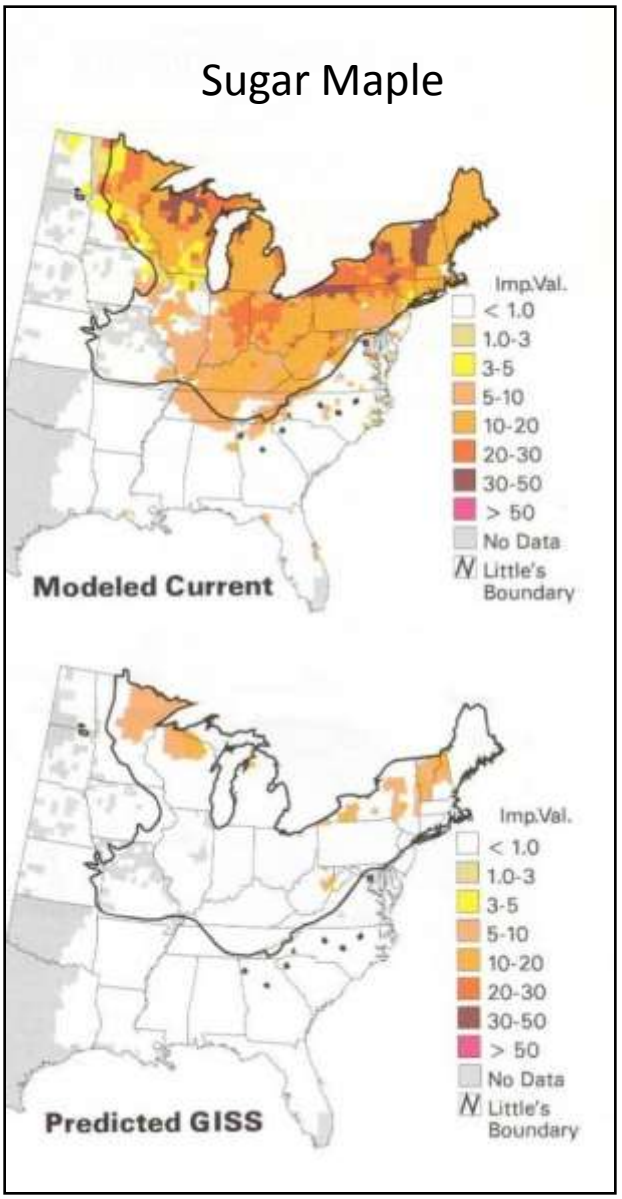
Drought and fire?
Timing and frequency of storms
Drought in Caribbean

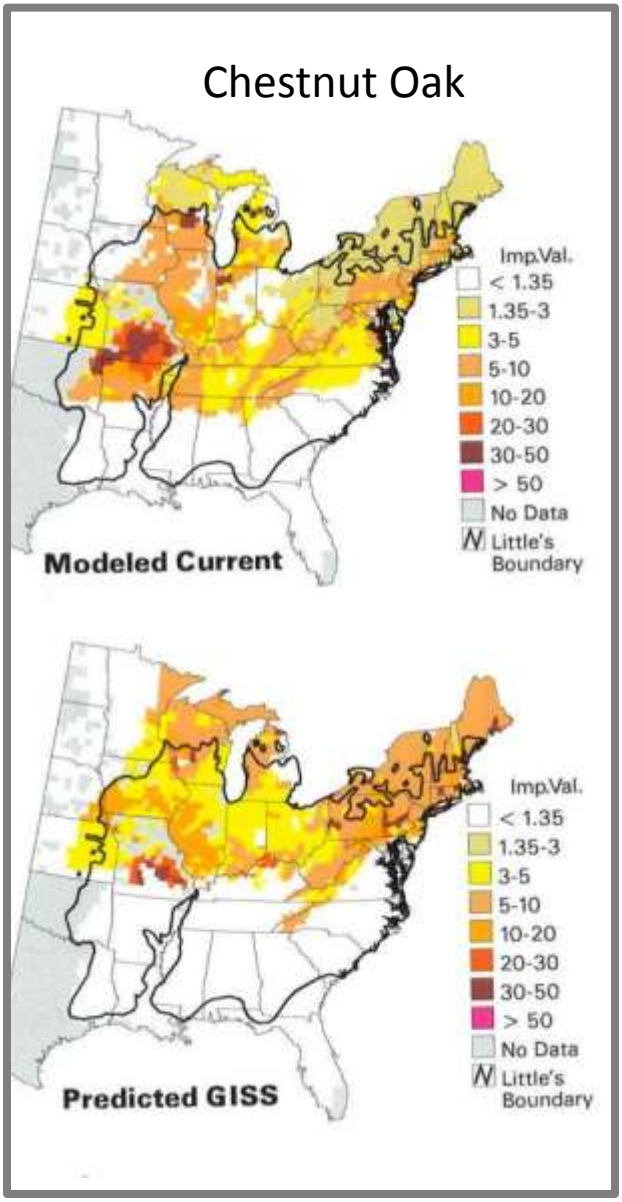
3) Sea Level Rise?

Direct habitat loss

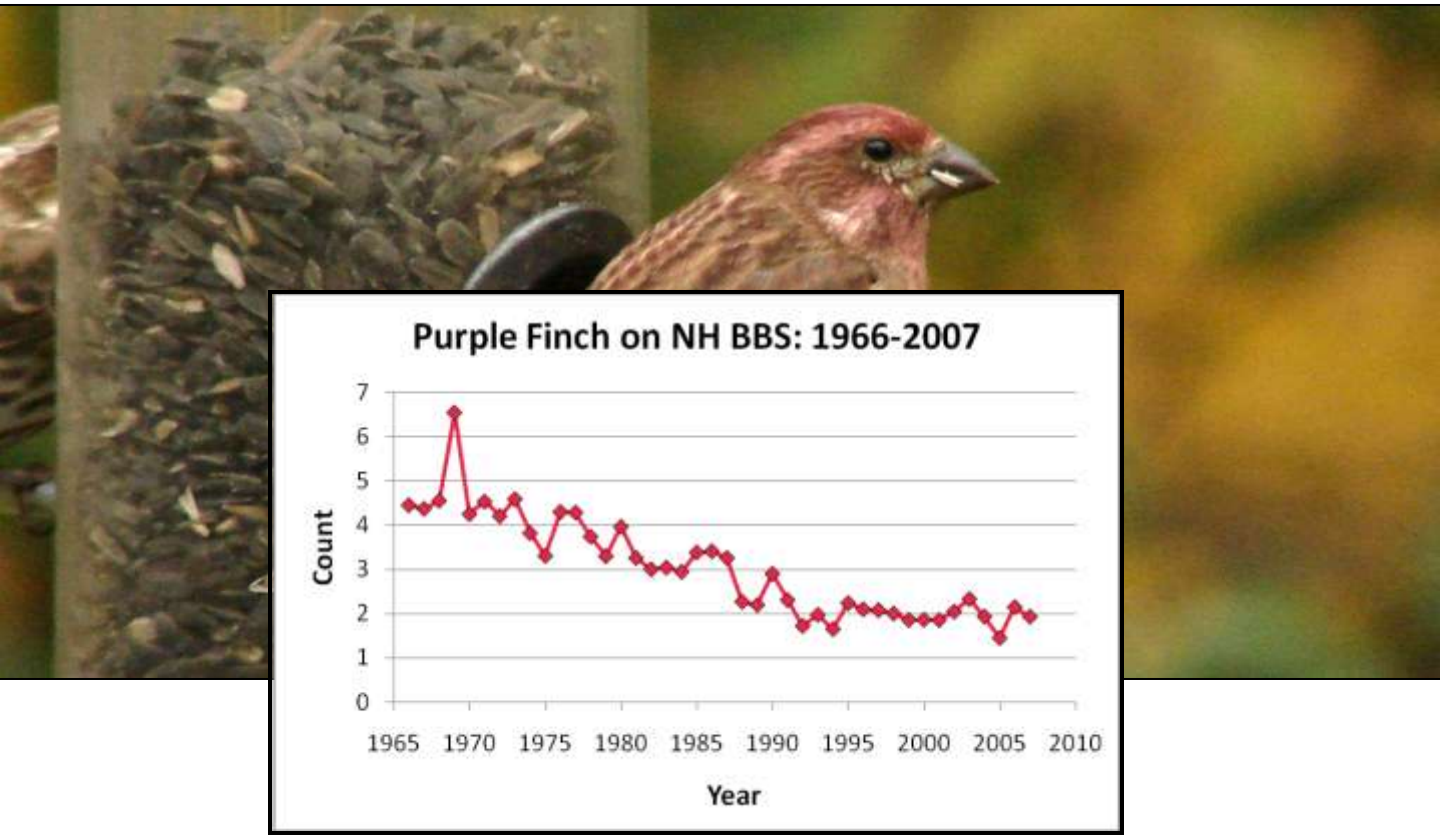
Habitat Shifts

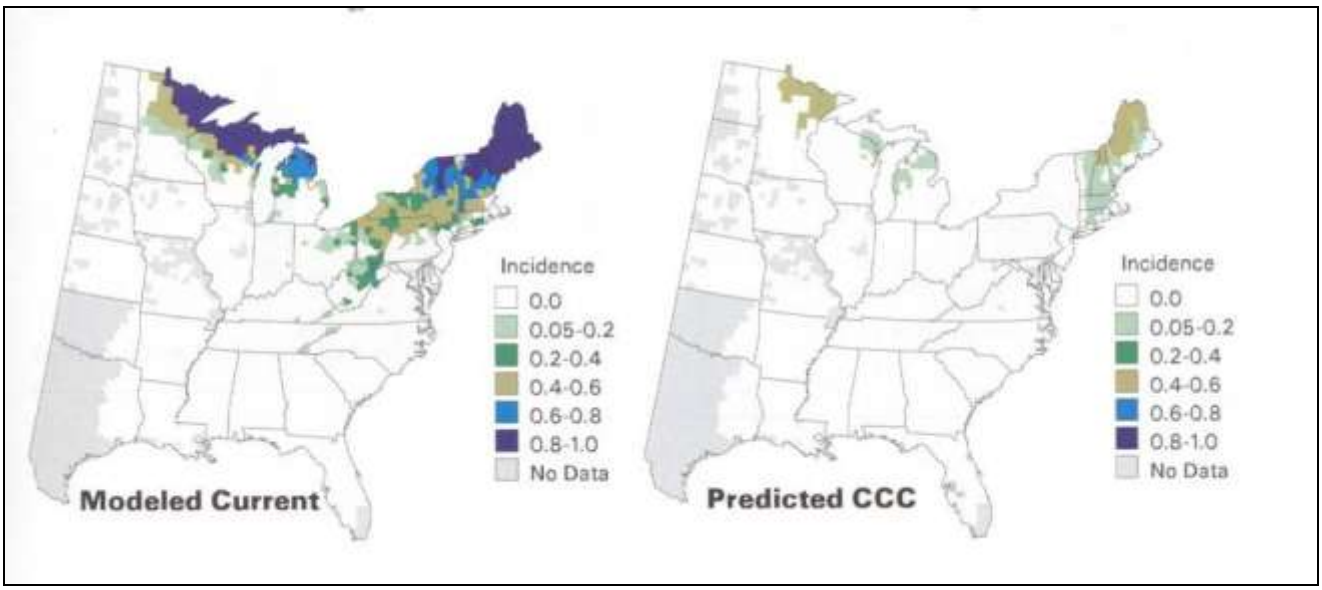
Plants are often adapted to specific climate regimes, and over time will track these conditions over the landscape. Some species will decline in extent and others will increase.



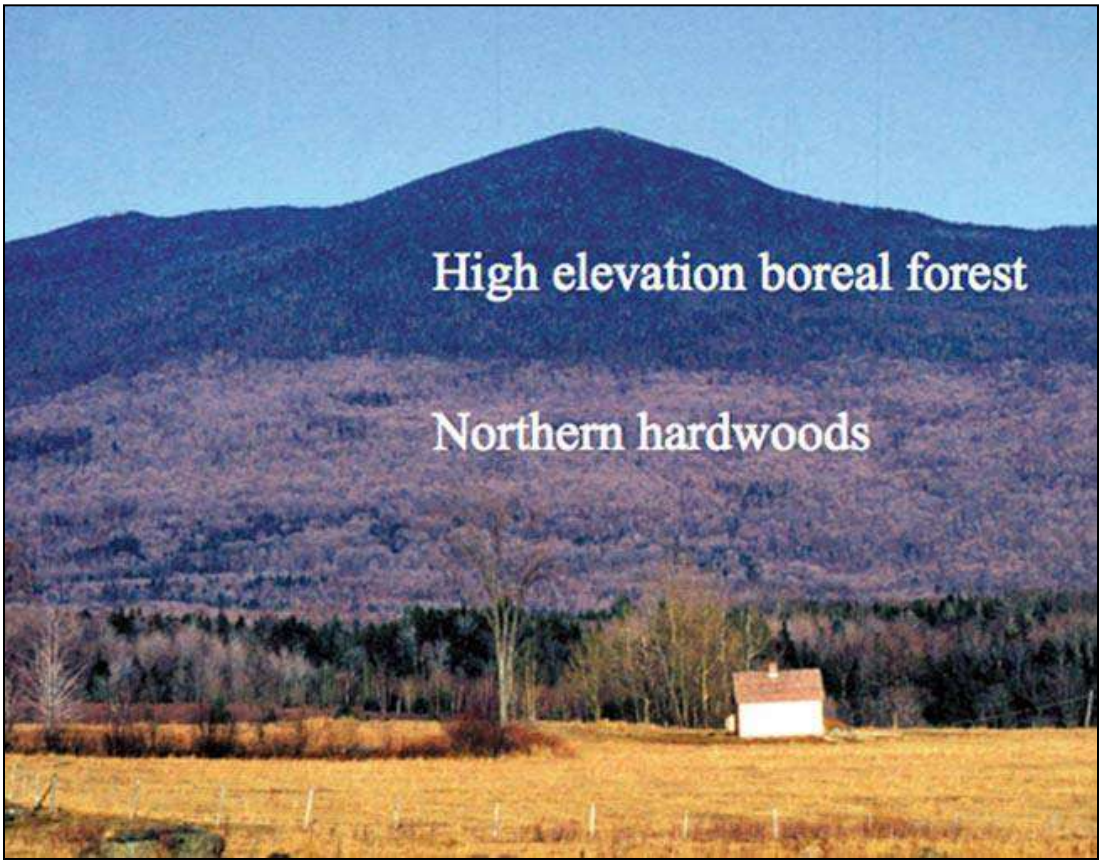


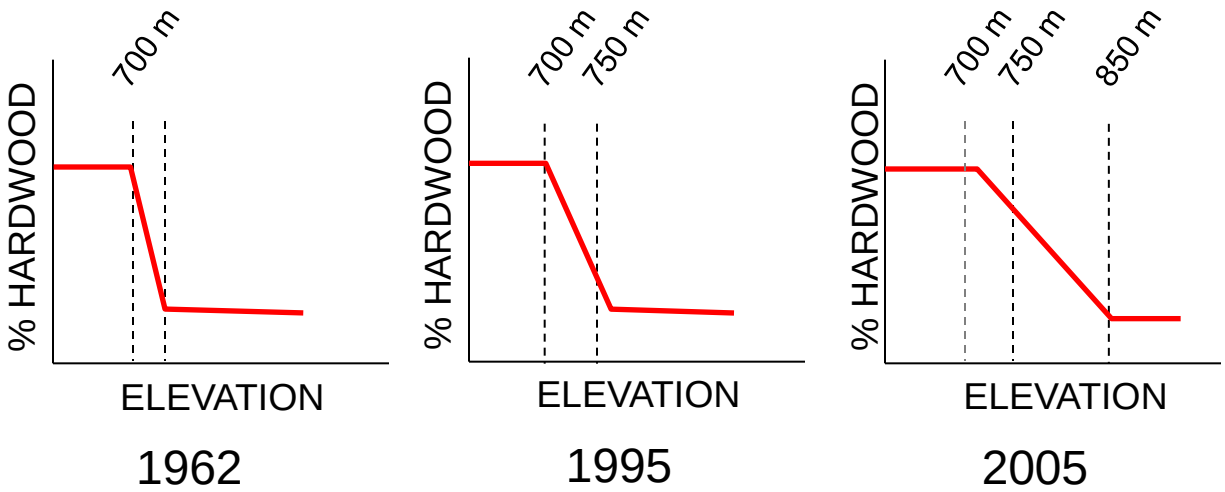
As forests change, many birds may need to adapt by shifting their ranges. For example, our state bird, the Purple Finch:





These changes may be most profound along elevation gradients, and have already been documented in the Green Mountains

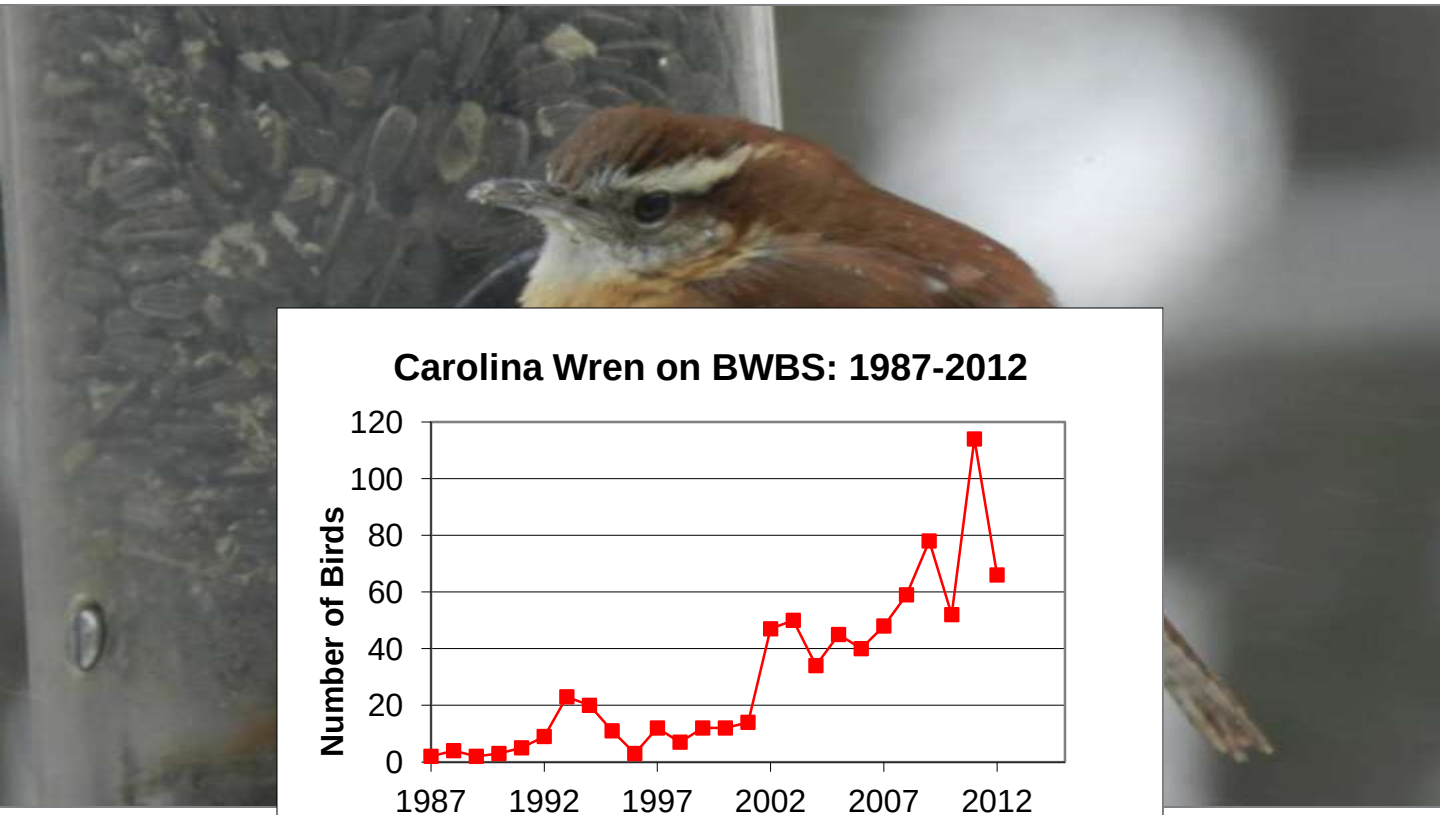


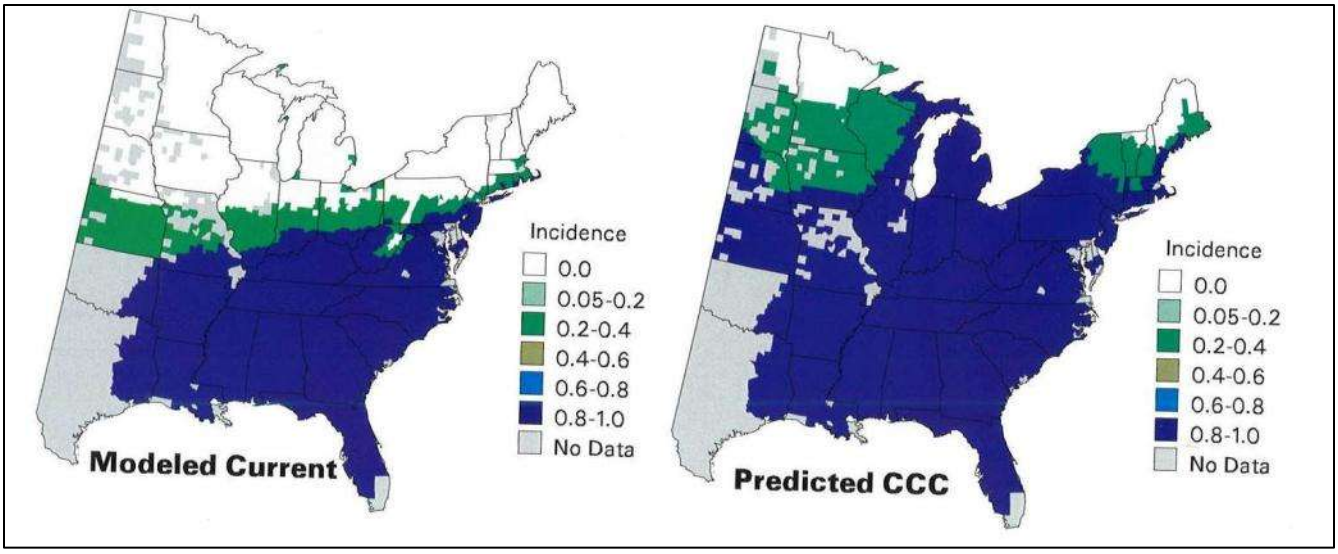


From Beckage et al. 2008 - PNAS 105 : 4197–4202

The future of Bicknell's Thrush…

Increasing temperatures alone may be behind northward range expansions by species like the Carolina Wren.





Another habitat shift could occur along New Hampshire's seacoast, where dunes, salt marshes, and coastal islands could be inundated by sea level rises of 3-5 feet in the next century.

Species that depend on these coastal habitats could find themselves without suitable nesting habitat, since heavy coastal development prevents habitats such as salt marsh from migrating inland.

One example is the Saltmarsh Sparrow, found only in salt marshes in the heavily urbanized corridor from Portland to Chesapeake Bay

And shorebirds that stop to feed at coastal mudflats during their migratory journeys might not be able to obtain sufficient resources to reach their wintering grounds.

Also along the coast and offshore, shifting weather patterns and rising temperatures will potentially affect ocean currents and the distribution of birds' food supplies.

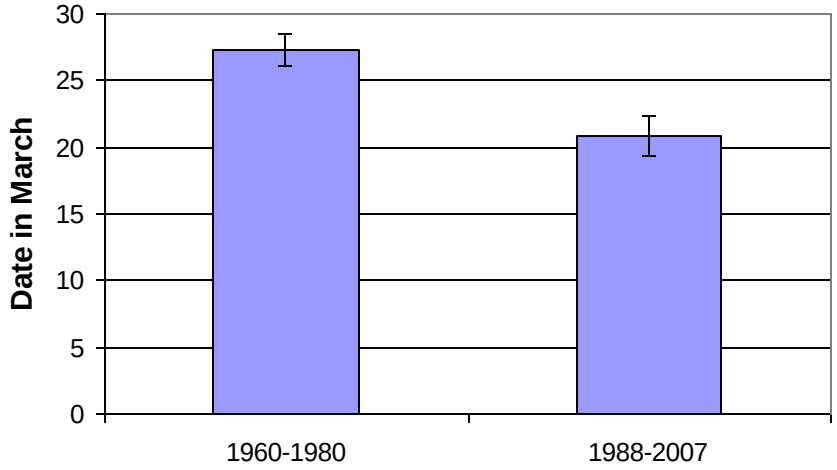
In the Bay of Fundy, fall concentrations of 20,000 or more Red-necked Phalaropes have all but disappeared, possibly because their plankton prey have moved elsewhere. No one knows where the birds have gone.

And in 2012-13, Atlantic Puffins suffered high mortality, possibly as a result of reduced availability of preferred food.

A warming climate also has the potential to alter the migratory schedules of birds.

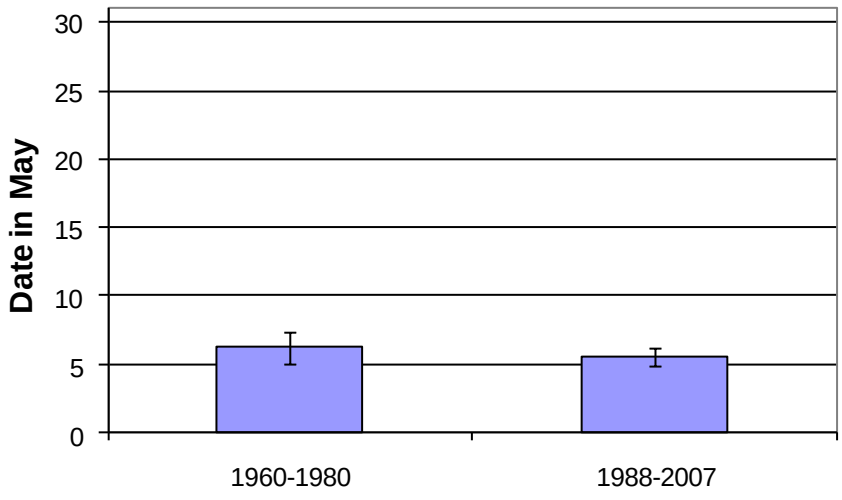
Some species may start migrating earlier, and thus stay in synch with local resources.

Spring Arrival Dates of Eastern Phoebe in New Hampshire

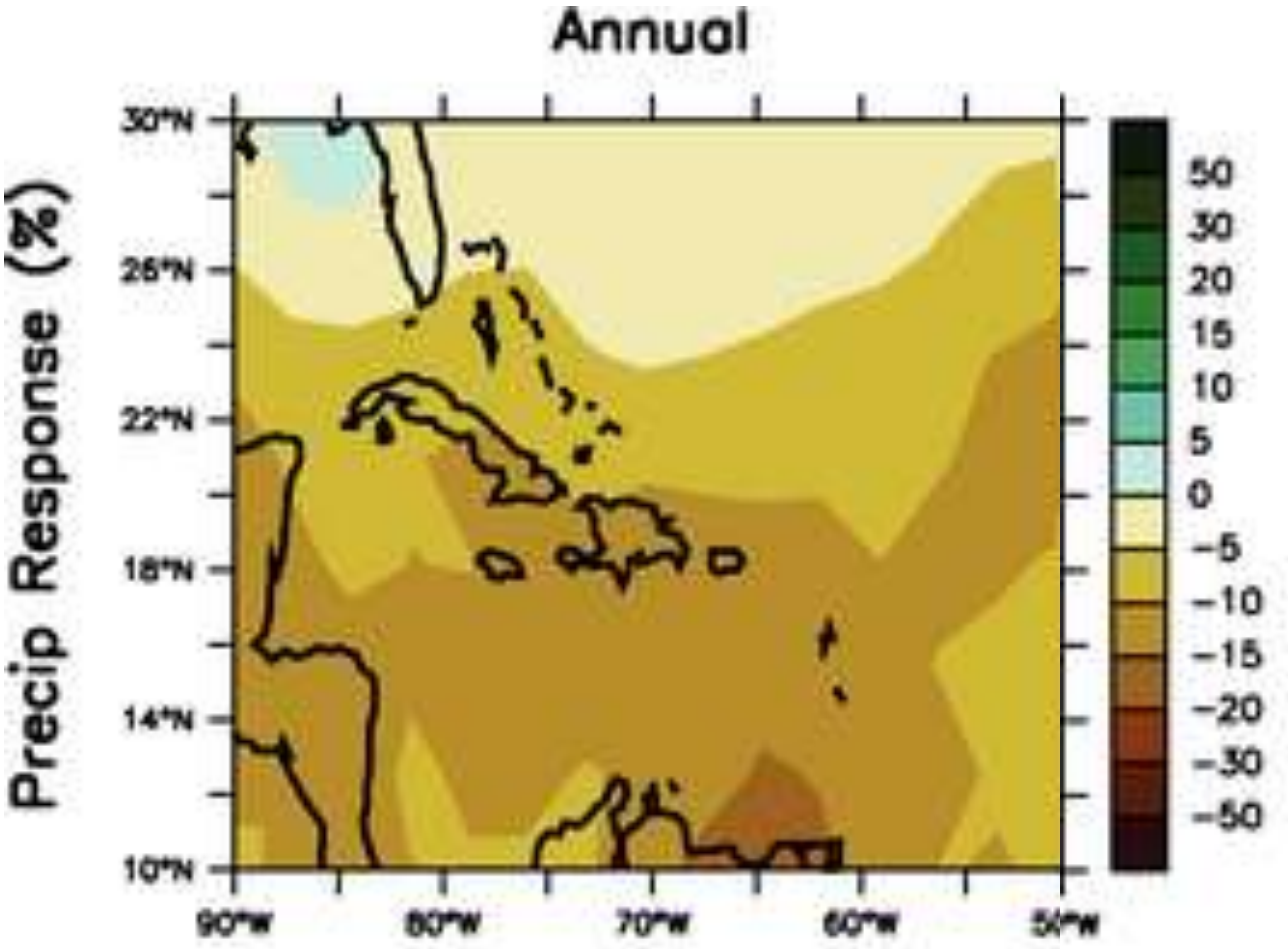


While those that DON'T shift earlier risk having their breeding season partially disconnected from those of the insects they need to feed their young.

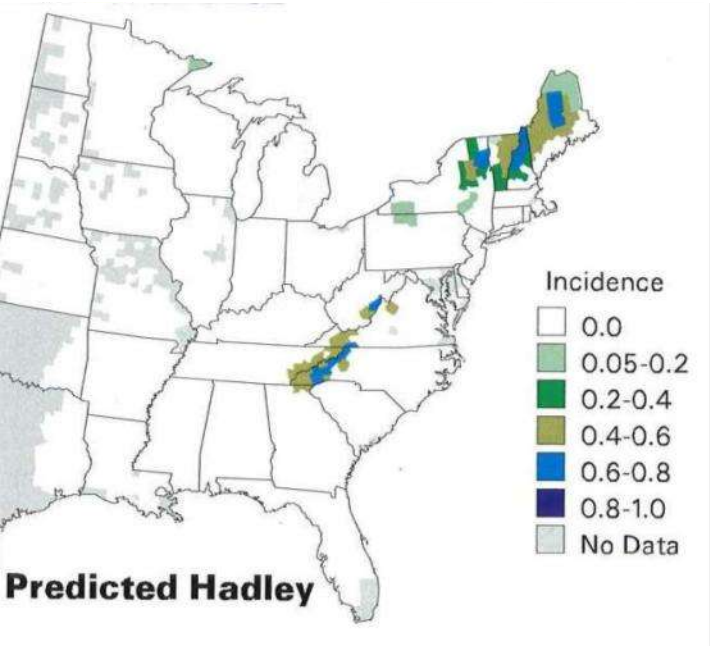
Spring Arrival Dates of Magnolia Warbler in New Hampshire



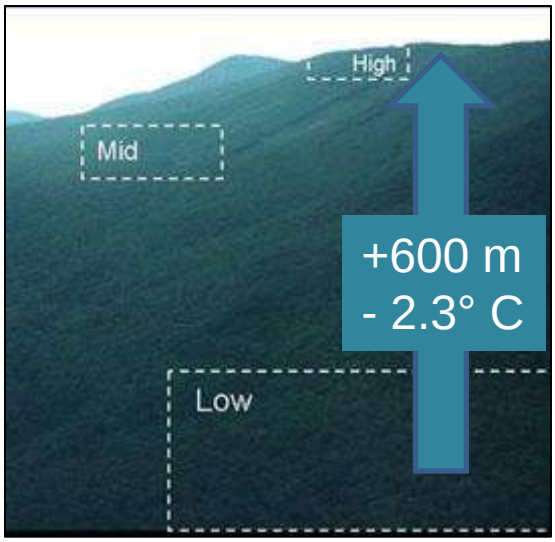
Last but not least, the vast majority of NH's breeding birds spend the winter well to the south. Climate models predict increased drought in the Caribbean Basin, which is likely to reduce survival in overwintering songbirds. Fewer would thus return to breed in New England, and many of those that do could be in poorer condition.



A Case Study:
The Black-throated Blue Warbler



1) Broad scale habitat change



2) Local habitat change →

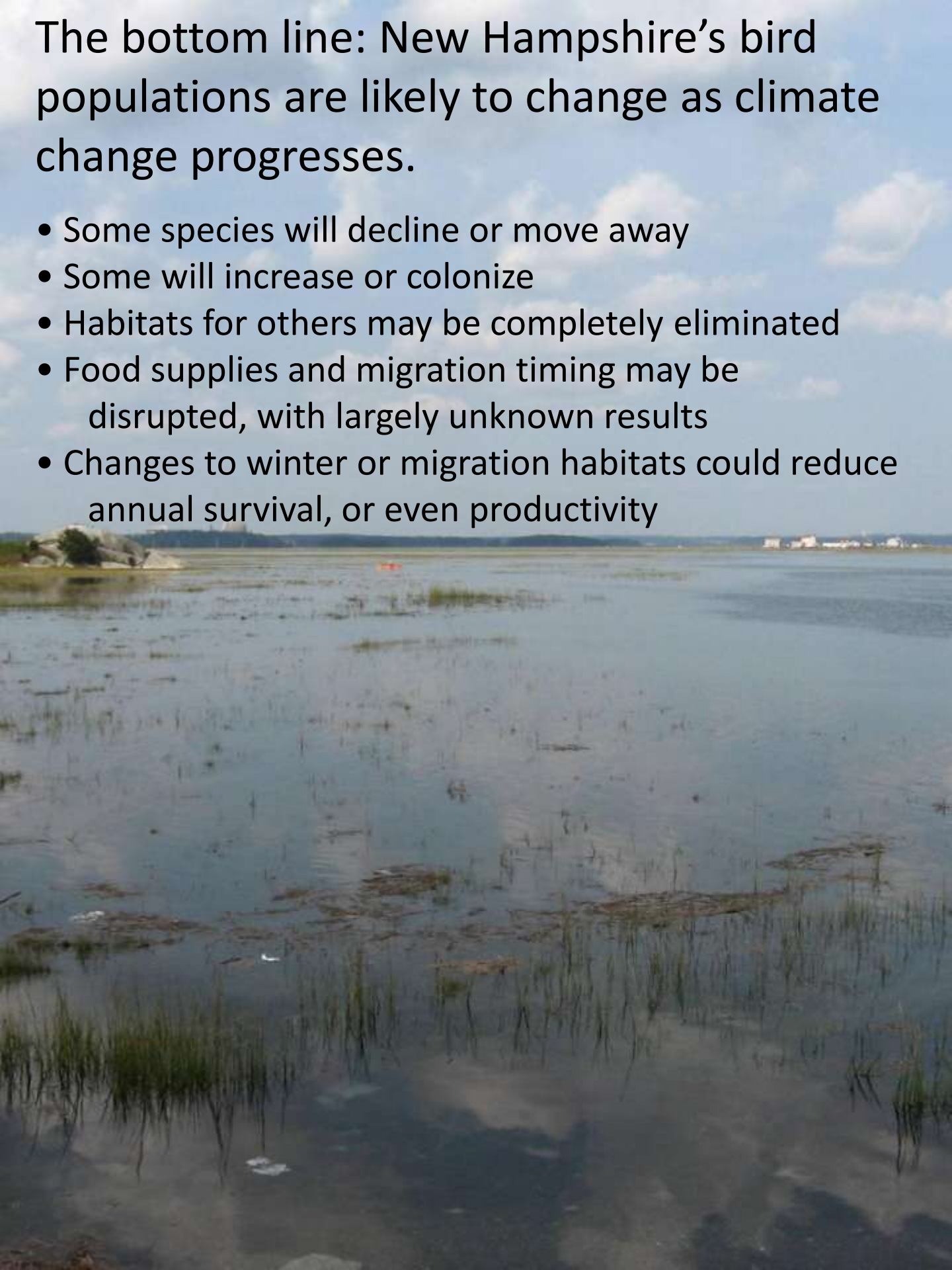
Higher elevations have:
- More food
- Denser shrubs
- Fewer predators

3) Phenological change

Leaf out happening earlier
Arrival doesn't vary strongly
Nest initiation linked to leaf out
Arrival/nesting mismatch may lower reproductive success

4) Spends winter in Greater Antilles

Thanks to Nina Lany and Nick Rodenhouse



The bottom line: New Hampshire's bird populations are likely to change as climate change progresses.

- Some species will decline or move away
- Some will increase or colonize
- Habitats for others may be completely eliminated
- Food supplies and migration timing may be disrupted, with largely unknown results
- Changes to winter or migration habitats could reduce annual survival, or even productivity