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Texas Master Naturalist Ornithology

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Overview

- Basic Bird Biology & Diversity (*briefly*)
- Challenges of Bird Migration
- Birds & their Conservation in an Urbanizing Texas
- Working Lands Working for Birds
- Why Birds Matter: Connecting People to Birds
- How to Identify Birds for Citizen Science
- Citizen Science: Counting Birds for Conservation



Basic Bird Biology & Diversity



© Charley Harper, *Mystery of the Missing Migrants* (1990)

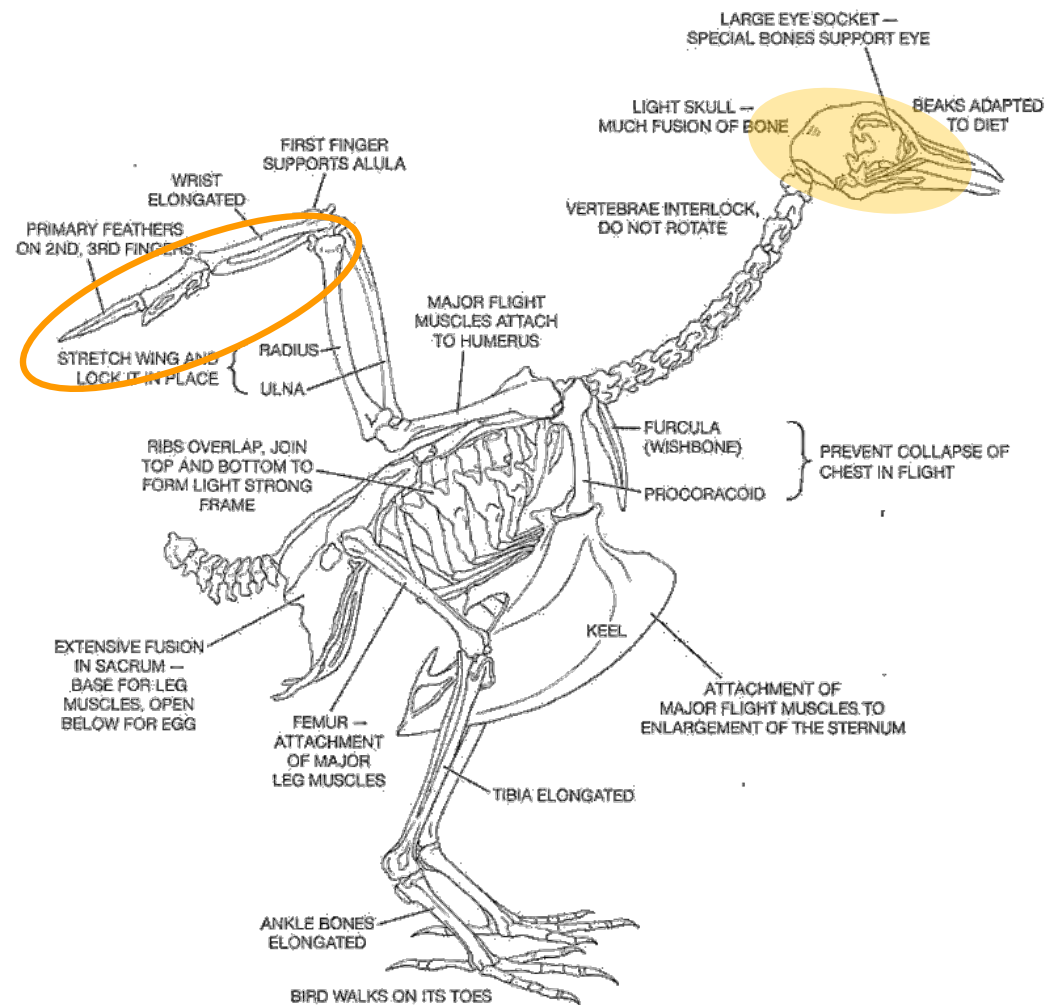


What makes a bird a bird: or how is a hummingbird like an ostrich?

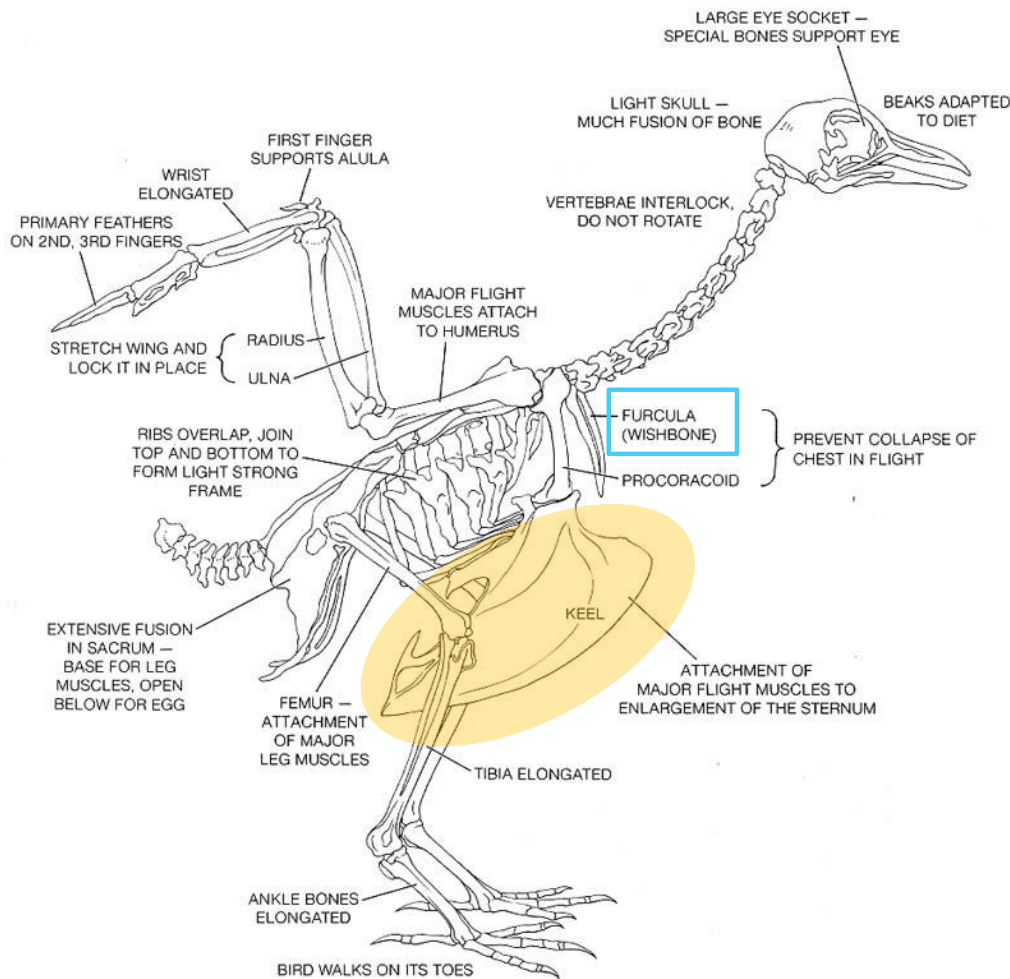
- They are vertebrates (have backbones)
- They maintain body temperature and high metabolic rates
- Four-chambered, large heart
- All birds lay eggs
- ALL birds have feathers (diagnostic feature)
- Most birds fly—all primitively adapted for flight

The Avian Skeleton

- Adapted for light weight and stability
- Fusion of bones
- Reduction of number of bones
- No modern birds have teeth
- Specialization for flight



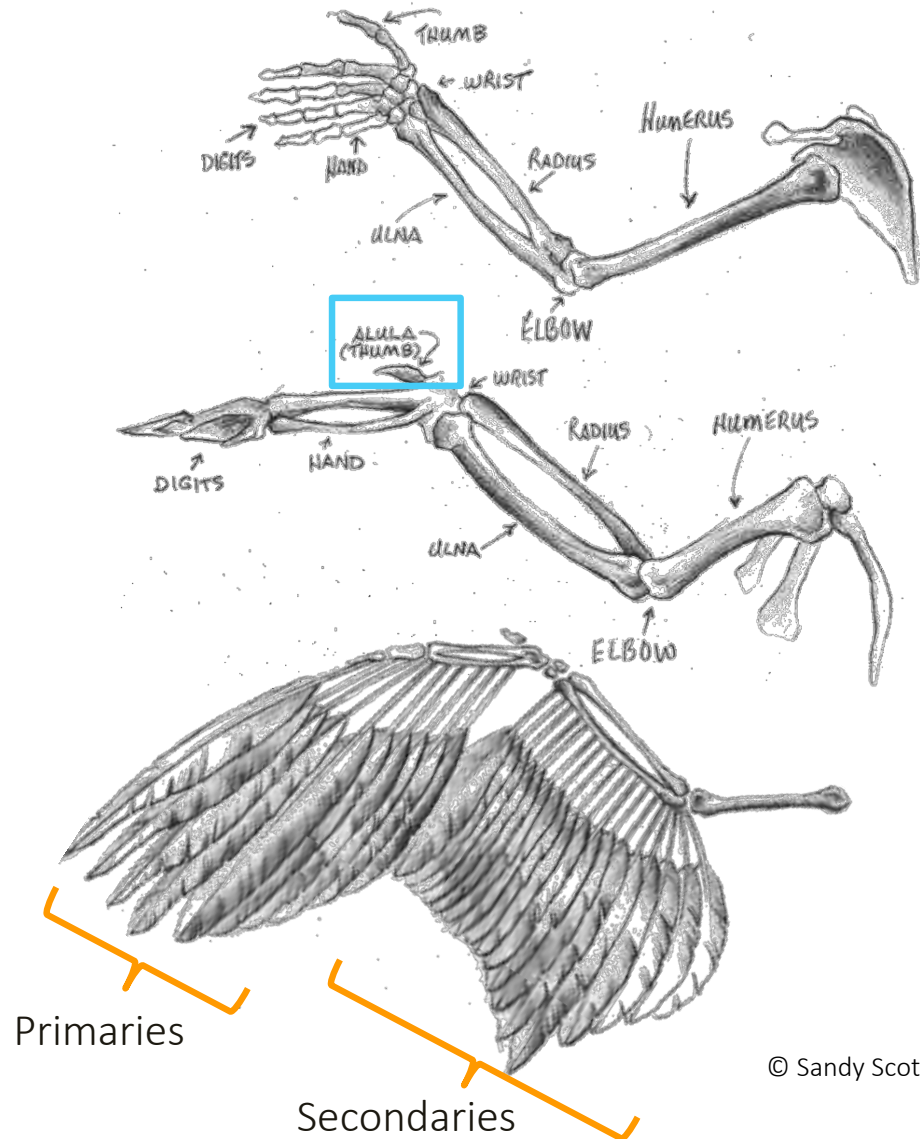
Flight Mechanics



- Muscles to both raise and flap wings are located on the breast and attach to **keel**
- Flight muscles can be 30% of body weight
- Wishbone (**furcula**) important for fine control of motion

Wing Structure

- Three major segments
 - Homologous with human arm
 - Roughly equal length
- **Feathers** on all three segments
- Fine control of lift = **Alula**(thumb)

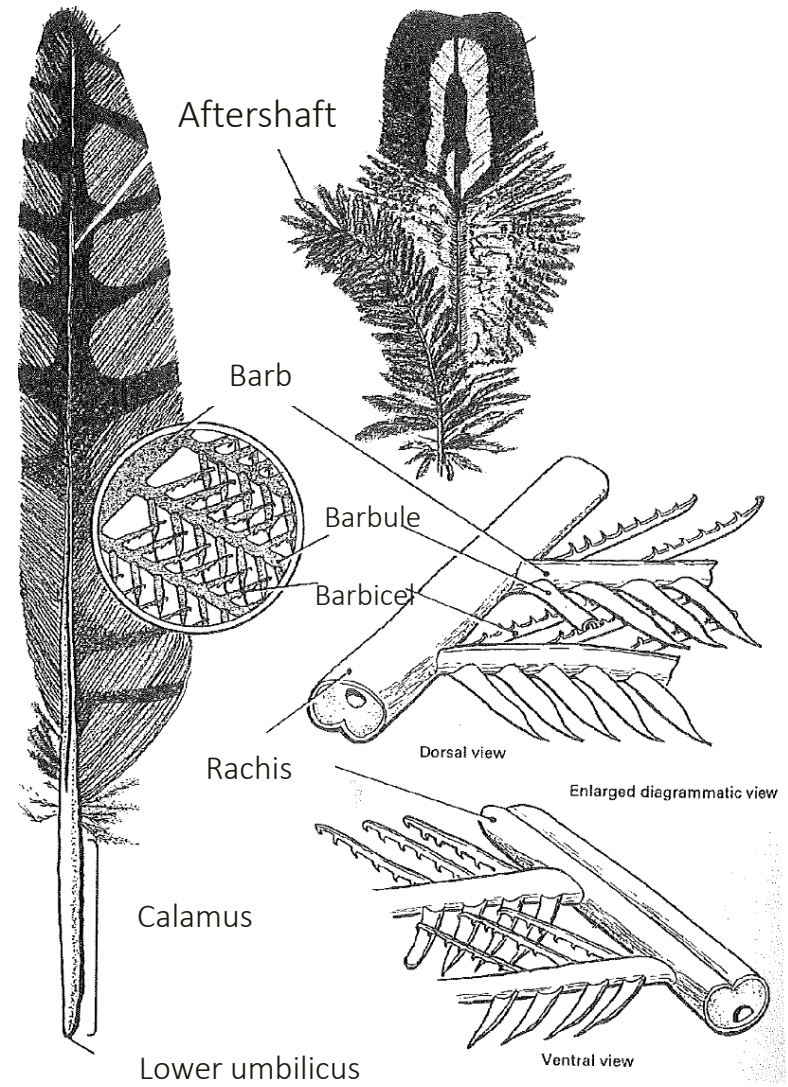


Feathers

- Sleek, lightweight covering
- Insulating
- Waterproof
- **Flight** feathers on wings & tail - airfoil
- **Contour** feathers cover the body

Primary Feather

Contour Feather



Diversity of Birds

Bill types correlated with food types; they are “nature’s cutlery.”



GENERALIST



INSECT CATCHING



GRAIN EATING



CONIFEROUS-SEED EATING



SCYTHING



FRUIT EATING



CHISELING



DIP NETTING



SURFACE SKIMMING



NECTAR FEEDING



RAPTORIAL



FILTER FEEDING



AERIAL FISHING



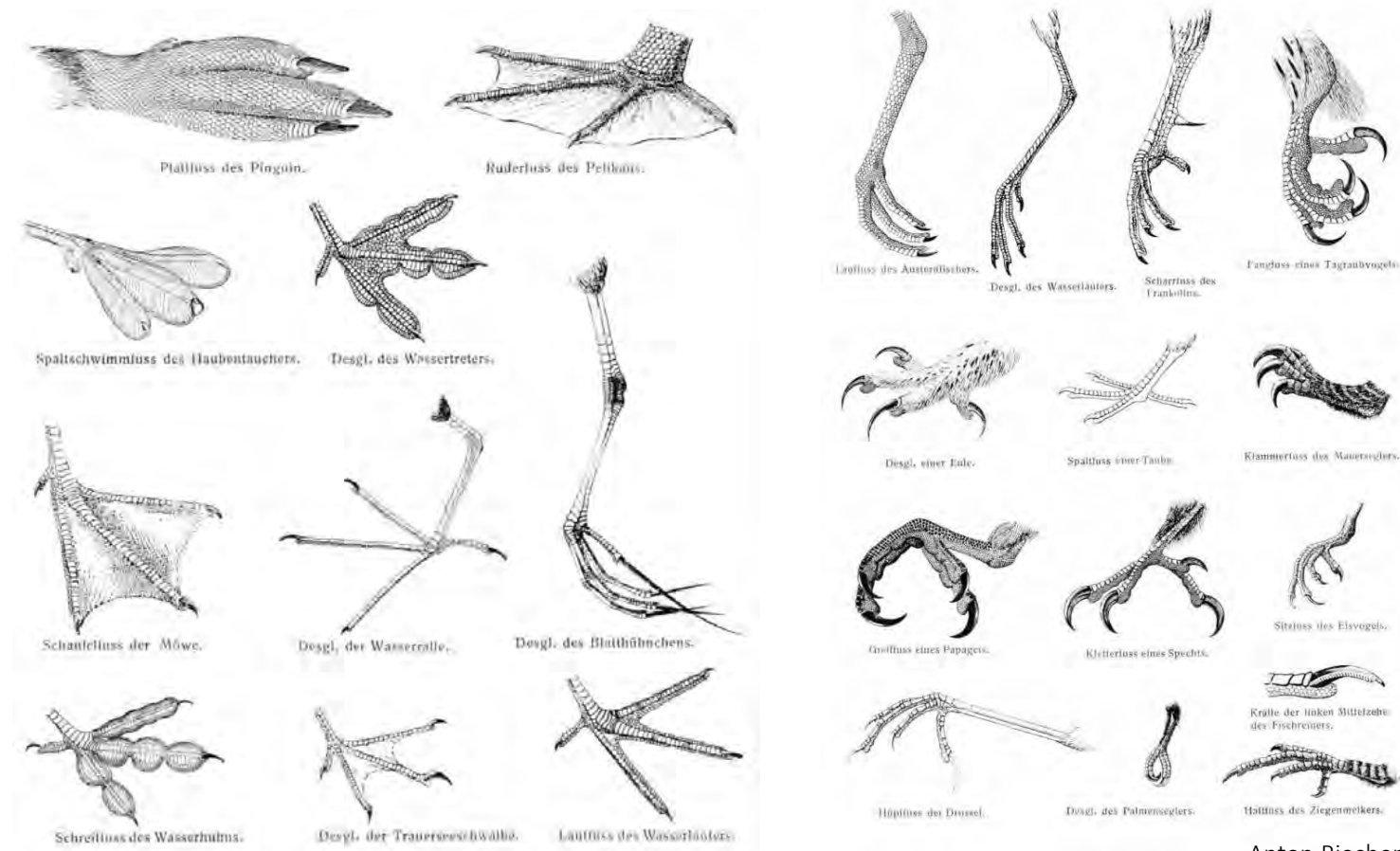
PURSUIT FISHING

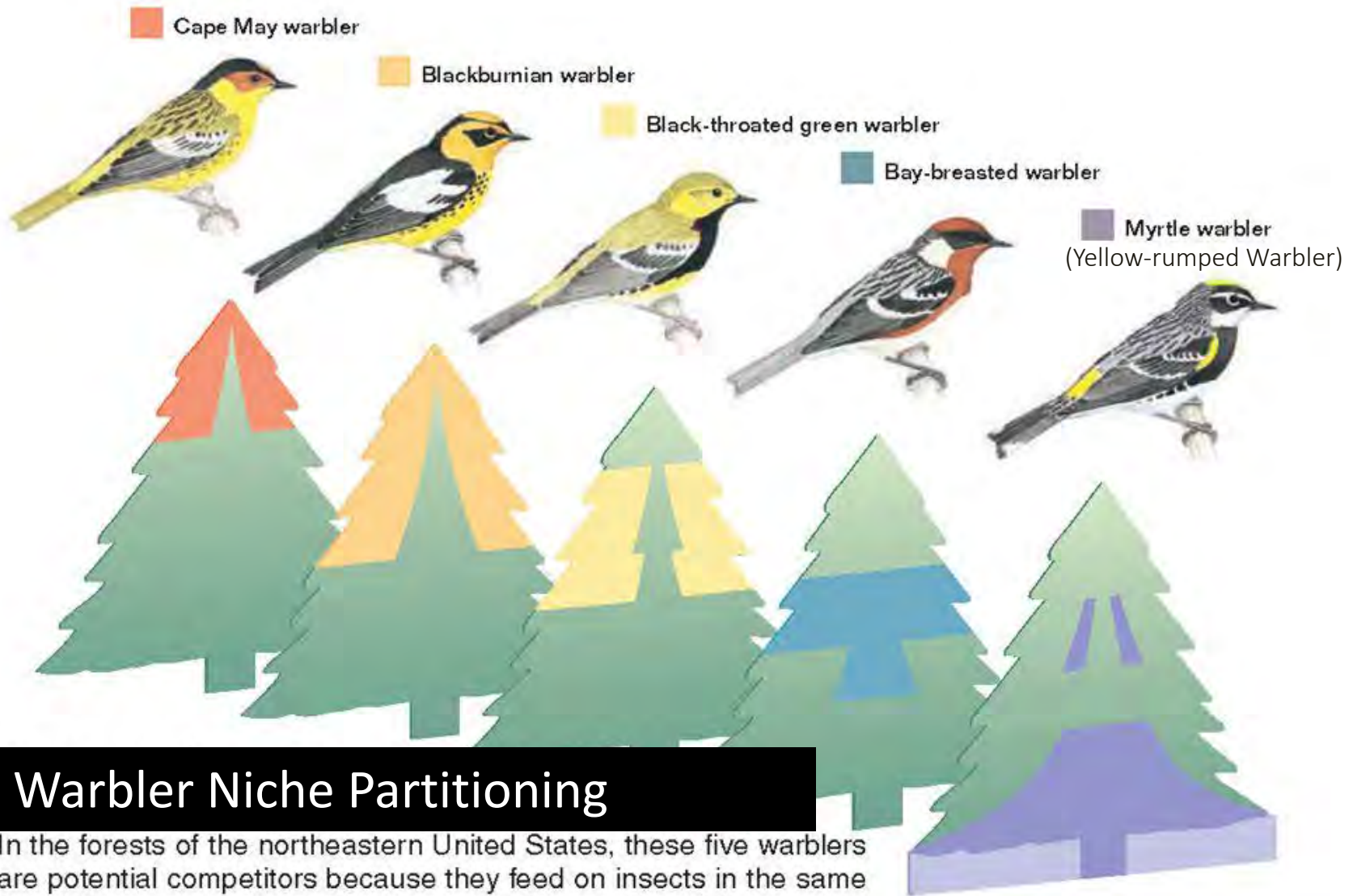


SCAVENGING

Diversity of Birds

Foot types correlated with habitat use and foraging





Warbler Niche Partitioning

In the forests of the northeastern United States, these five warblers are potential competitors because they feed on insects in the same trees. However, each species hunts only in a portion of the tree. Ecologist Robert MacArthur proposed that this feeding strategy reduced competition among these species of warblers.



Challenges of Bird Migration

Avian migration

Major challenges

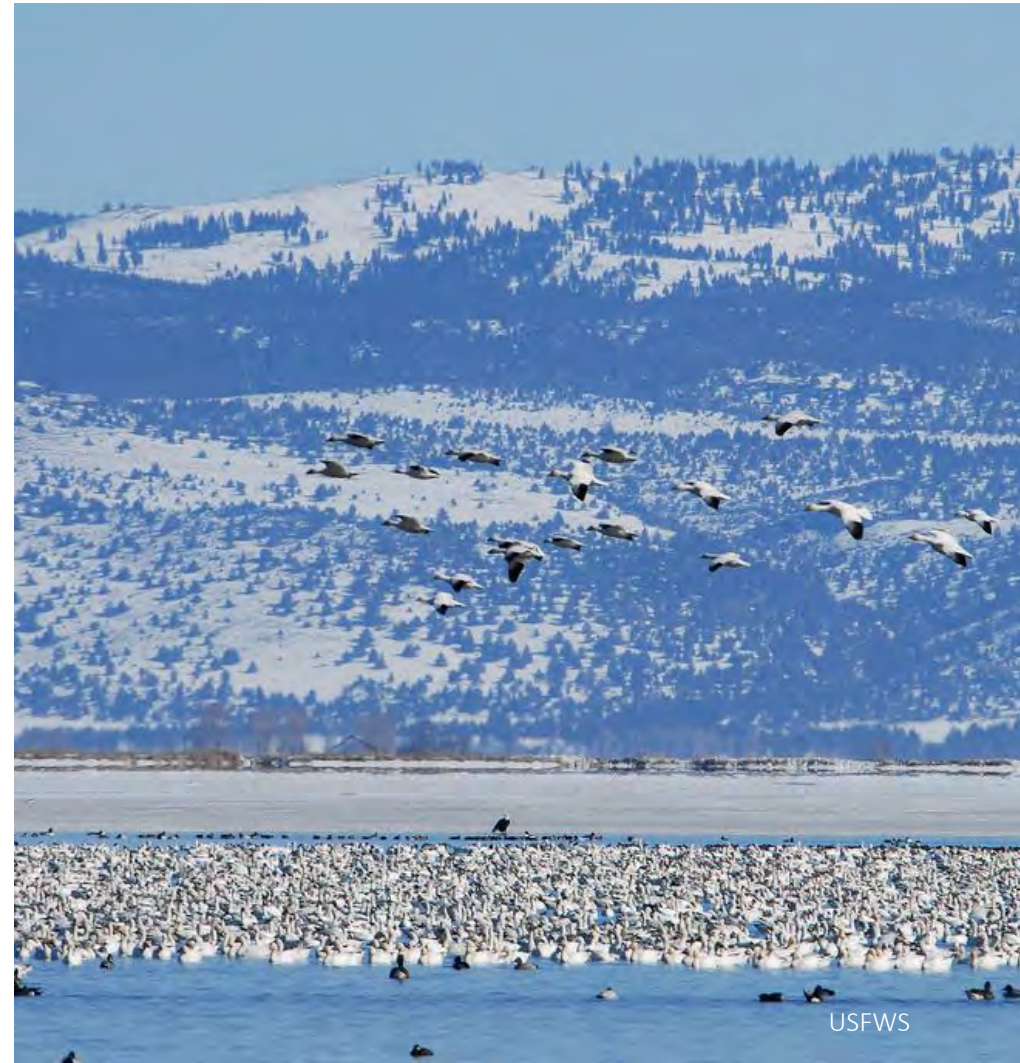
Supporting migratory birds on their journey



Kenneth Cole Schneider, Flickr Creative Commons

Migration

- Allows birds to take advantage of abundant resources throughout the year
- Birds need habitat for
 - Winter
 - Migration (spring & fall)
 - Breeding (summer)



Migration

Triggered by day length

- Zugunruhe* = migratory restlessness
- Hyperphagia*: Increased feeding & fat deposition (30-40% weight)

Weather also plays a role in timing

- Move with fronts and favorable winds

Diurnal or nocturnal



Den Smith, Flickr Creative Commons



from *Gulf Crossing* by Jackson Childs

gulfcrossingmovie.com



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Navigation

- Birds use a variety of means to orient themselves during migration
 - Sun & stars
 - Earth's magnetic fields – 2018 research on cryptochromes
 - Topography of the landscape
- Many species learn their migratory routes
 - Whooping Cranes

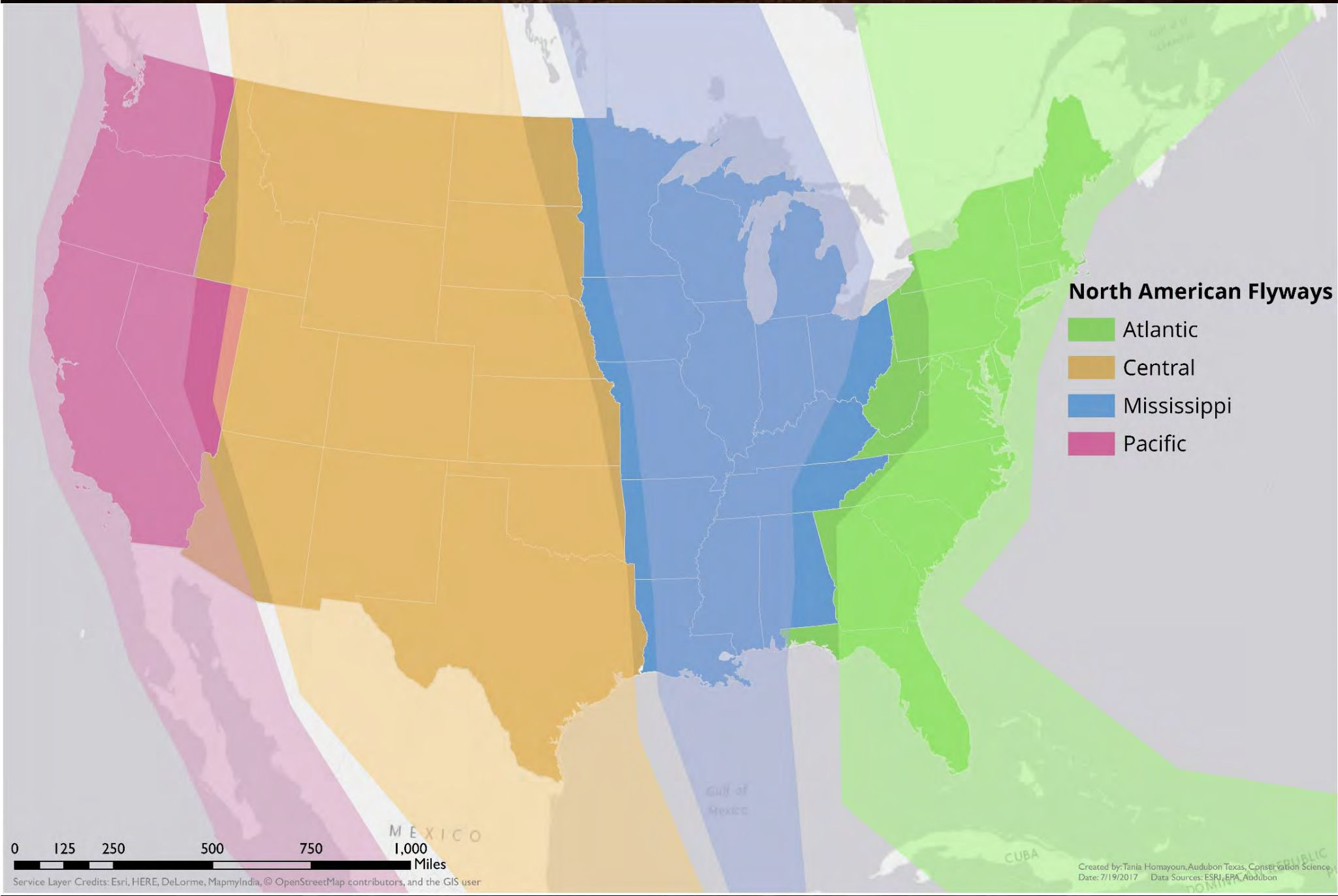




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North American Flyways

- Atlantic
- Central
- Mississippi
- Pacific

0 125 250 500 750 1,000 Miles

Service Layer Credits: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user

Created by: Tania Homayoun, Audubon Texas, Conservation Science
Date: 7/19/2017 Data Sources: ESRI, EPA, Audubon

Stopover Habitat

Birds need places to rest and refuel along the way

- Migration is high energy
 - Human 4-min mile for 80 hours straight!
 - 700,000 mi/gal
- Fallouts
 - High Island, Texas Gulf Coast





from *Gulf Crossing* by Jackson Childs

gulfcrossingmovie.com



Migration and Weather

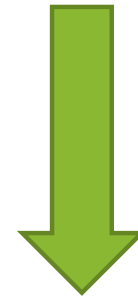


Stopover Quality

In human terms:

- Fire escapes
- Convenience stores
- Luxury hotels

Low Quality



High Quality

(Mehlman et al. 2005)



“Fire Escape” Stopover





“Convenience Store” Stopover



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“Luxury Hotel” Stopover



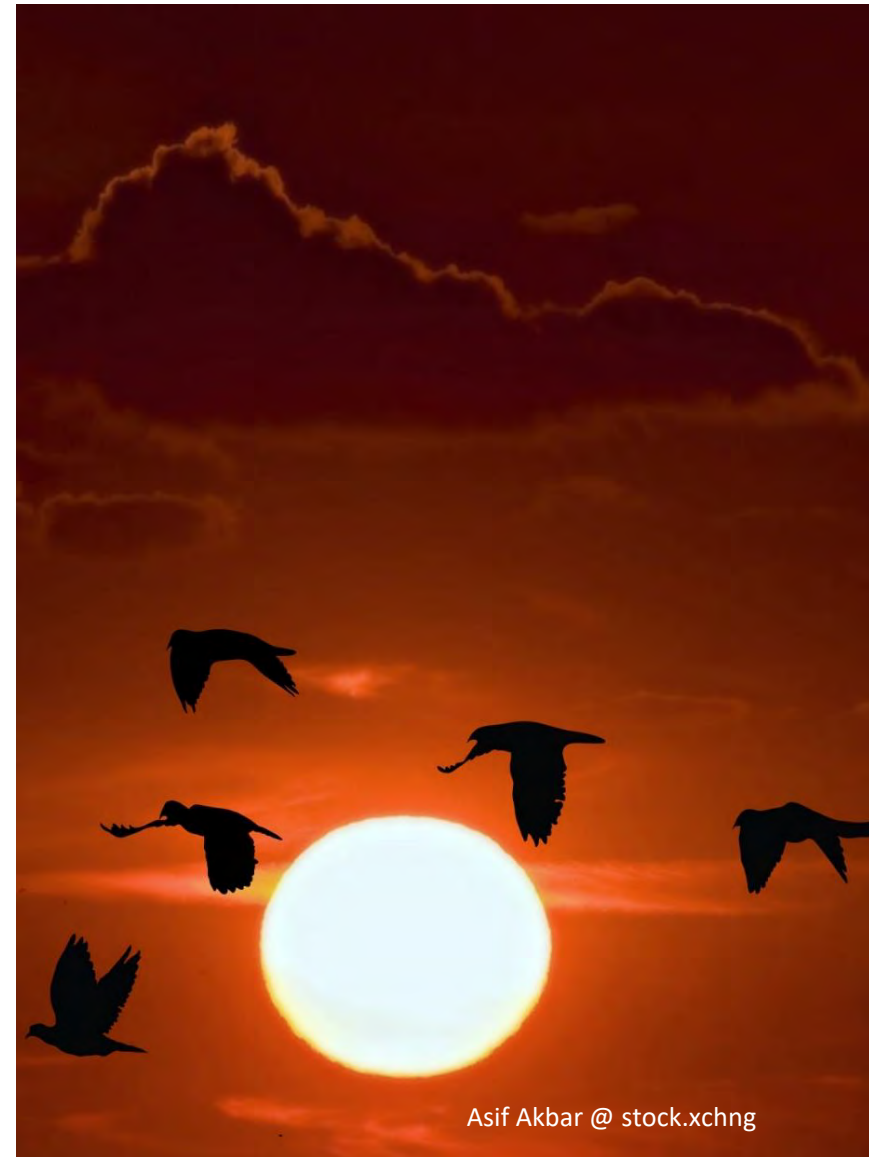
Michael Key @ stock.xchng

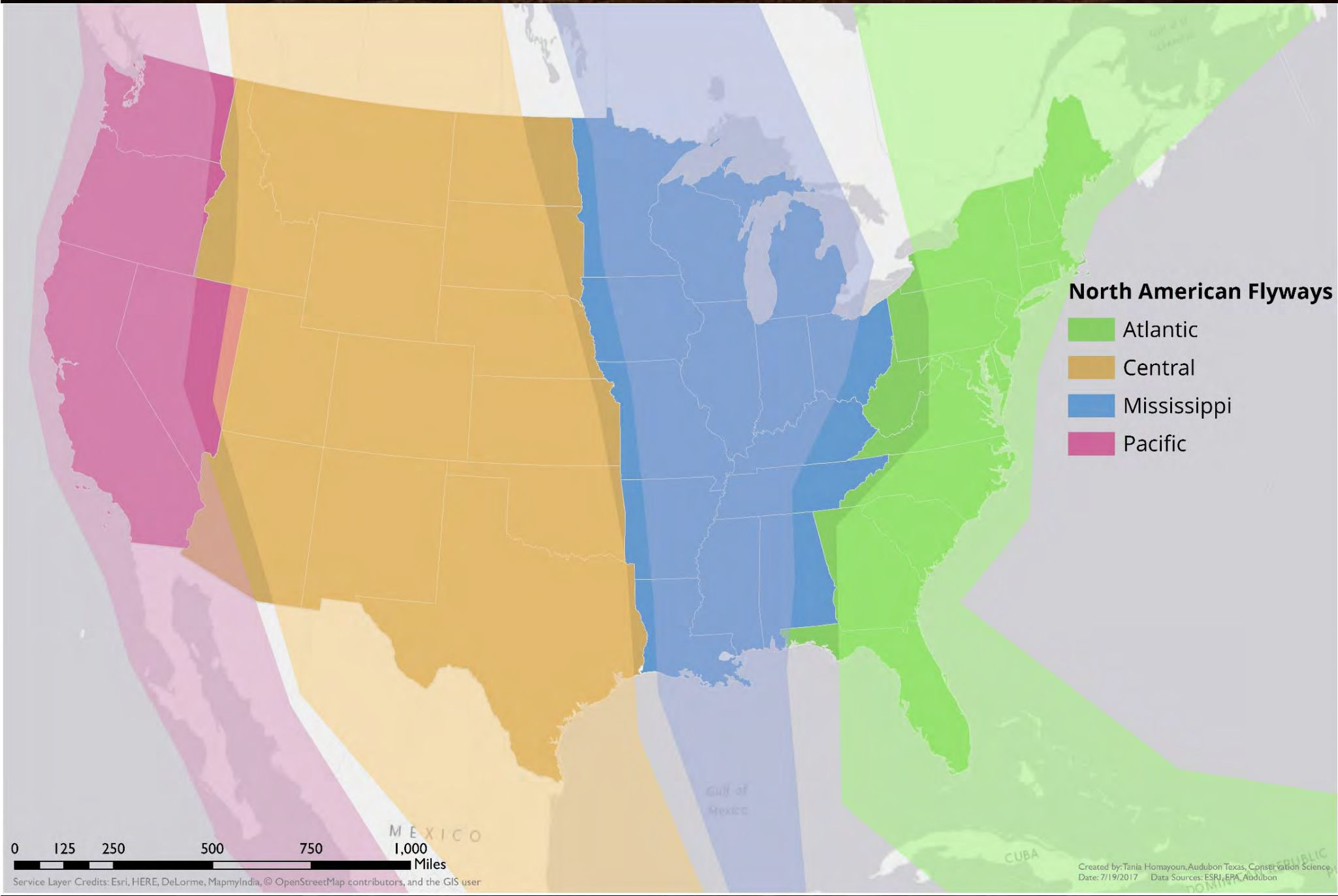


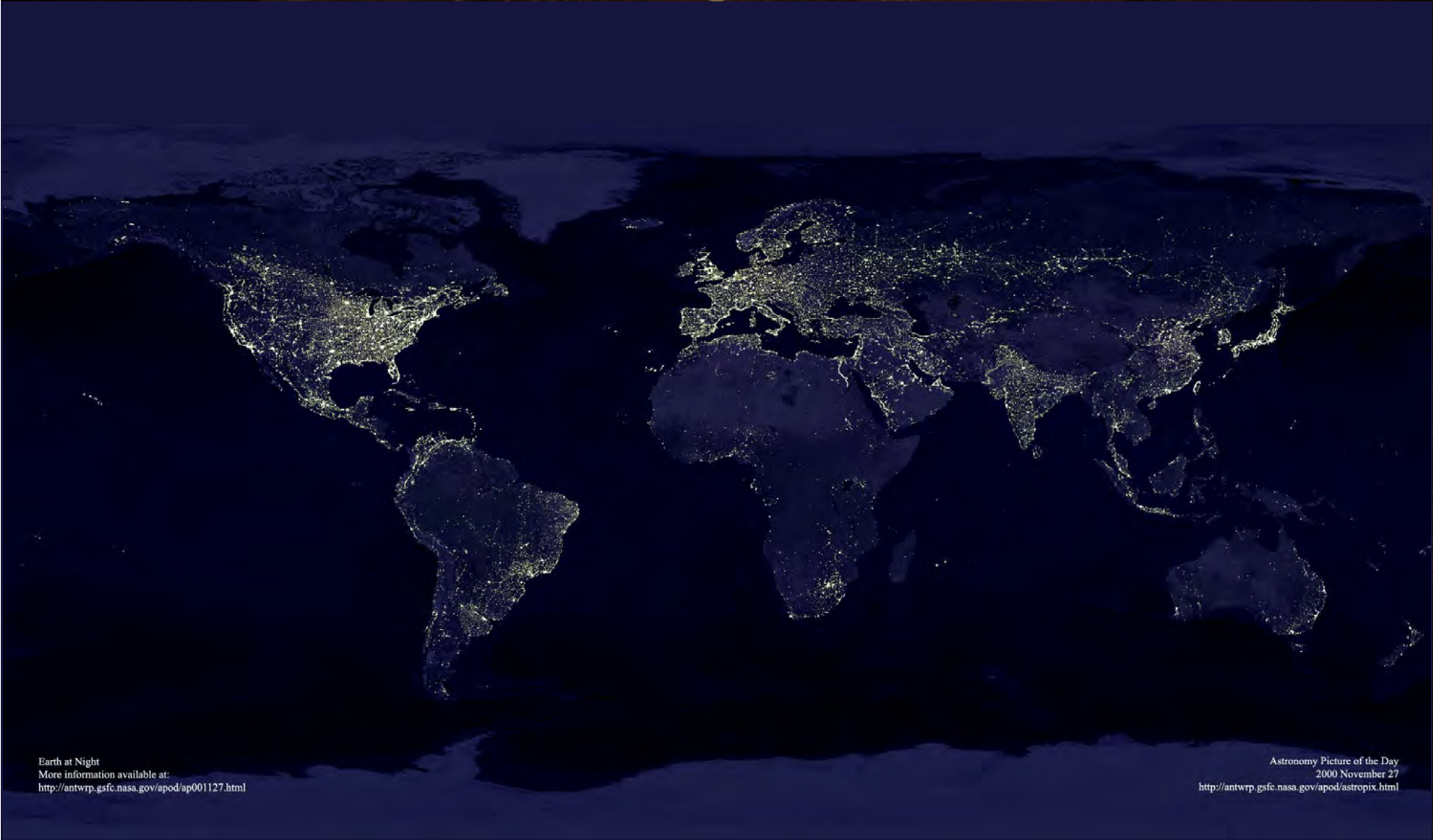
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Migration Challenges

- Physical stress of migration
- Weather events
- Human-related threats
 - Climate change
 - Cats
 - Window collisions
 - Light pollution
 - Herbicides/Pesticides
 - Habitat loss







Earth at Night
More information available at:
<http://antwrp.gsfc.nasa.gov/apod/ap001127.html>

Astronomy Picture of the Day
2000 November 27
<http://antwrp.gsfc.nasa.gov/apod/astropix.html>



Audubon's Birds and Climate Change Report

314 Species on the Brink

Shrinking and shifting ranges could imperil nearly half of U.S. birds within this century



Common Loon

By 2080, this great icon of the north could lose 75 percent of its winter range.

[See the climate forecast map »](#)

Audubon's Climate research is investigating

- How different bird species will respond to changing climate conditions into the future
- What birds will be at risk
- Where we should focus our work in the future

Burrowing Owls are predicted to lose 77% of their breeding range by 2080





Cats are the #1 human-related cause of death to birds in the US.

Free-roaming and feral cats kill between 1.4 and 3.7 billion birds annually.





Piping Plover



Greg Schechter, Flickr Creative Commons

Nocturnal Migrants & Urban Lights

- Light pollution can interfere with nocturnal migration
- Birds can become attracted to or “trapped” in beams of light
- Songbirds vulnerable as they migrate at lower altitudes





Collisions with glass kill between 365 and 988 million birds annually.

Up to 44% are collisions with residential buildings.

Herbicides & Pesticides

- Pesticides kill more than 72 million birds annually (USFWS)
- Biomagnification
- Organochlorines
- Classic case: DDT
 - Eggshell thinning
 - Adult mortality of songbirds





Loss of habitat:

- Limits resources for birds to replenish their fat reserves and energy
- Increased risk of predation
- Fewer places to stopover, overwinter, and breed