ESRM 350

Animal Movement

Autumn 2016

“Not all those who wander are lost”

- J. R. R. Tolkien

Types of Animal Movement

- Movements within the home range
- Exploratory forays beyond home range boundary
- Permanent departure from a home population
- Repeated movements between two (or more) home ranges

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Movement that transcends normal habitat use – focus of today's lecture

Dispersal

- Permanent movement of an organism from its home population
  - distance moved depends on the animal

- Two kinds
  - **Natal dispersal**: permanent movement of an individual from its *birth* site to a place where it reproduces
    - happens once
  - **Breeding dispersal**: permanent movement of *adults* between breeding areas (populations)
    - can occur multiple times

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    - Inbreeding depression

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- Competition for resources
  - Disperse if local resources (e.g., food, nest trees, etc) are limited

Sex-Biased Dispersal

- Males more likely to disperse in mammals
  - female reproductive success limited by nutritional constraints; males by number of females
    - familiarity with surroundings key for females?

Spotted hyena (*Crocuta crocuta*)

Sex-Biased Dispersal

- Females more likely to disperse in birds
  - males establish and defend breeding territories
    - may benefit more from familiarity with local surroundings (i.e., from knowing where to set up the best territory)

Collared Flycatcher (*Ficedula albicollis*)

Sex-Biased Dispersal

- Few studies looking for sex-biased dispersal in reptiles and amphibians
  - One example: Caribbean lizard (*Anolis roquet*)
    - male-bias detected
    - males mate with multiple females; those precluded from mating locally by dominant males have more incentive to disperse

Johansson et al. (2008) *Mol Ecol*

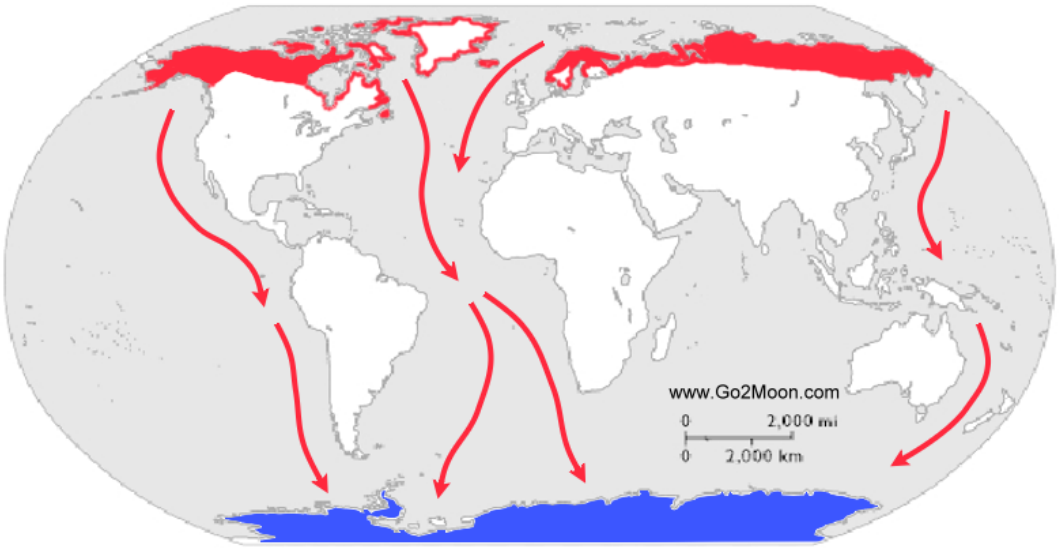
Migration

- Repeated movement between two or more areas not contained in the same home range
  - i.e., migratory animals have two or more distinct “activity spaces”
  - can be bi-directional, or a loop

Dingle and Drake (2007) *Bioscience*

Why Migrate?

- Avoid harmful climatic conditions (heat, cold)
  - latitudinal migration (N-S)



Arctic tern (*Sterna paradisaea*)

Travels 35,000 km (22,000 mi) each way between Arctic and Antarctic to enjoy 2 summers

Why Migrate?

- Avoid harmful climatic conditions (heat, cold)
  - altitudinal migration

Mule deer (*Odocoileus hemionus*)

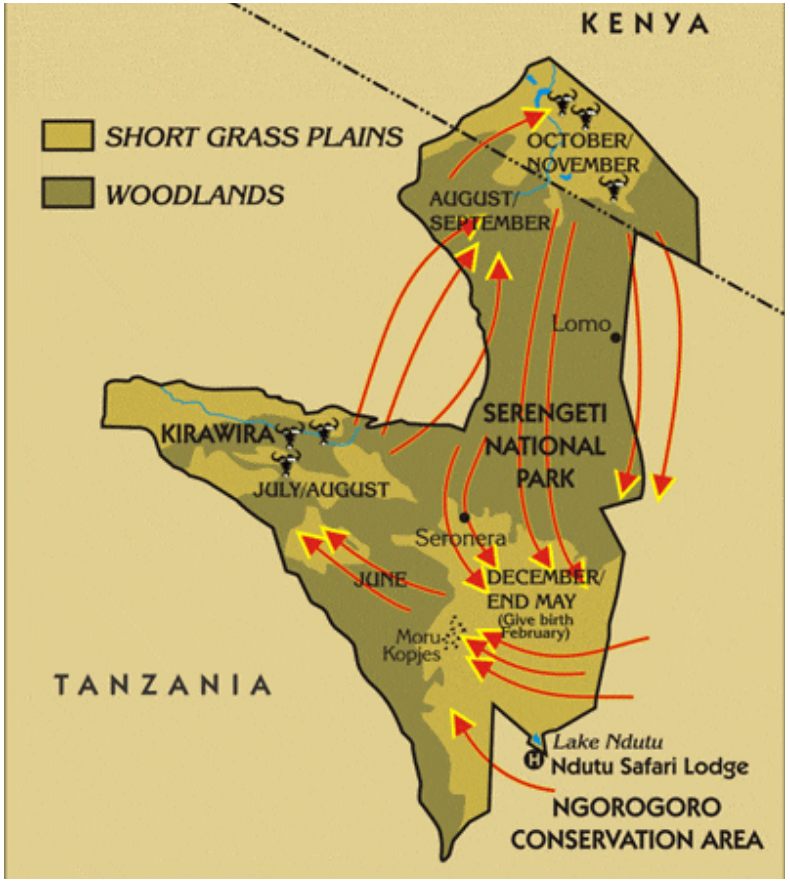
Some individuals migrate down from the high country each winter to avoid the cold; return the following spring

Why Migrate?

- Follow a resource (food, water)
  - The Serengeti wildebeest (*Connochaetes taurinus*) migration

1.5 million wildebeest (plus 400,000 zebra and 200,000 gazelles) migrate 1,500 km annually between Serengeti NP in Tanzania and Masai Mara National Reserve in Kenya.

Why? To follow the rain.



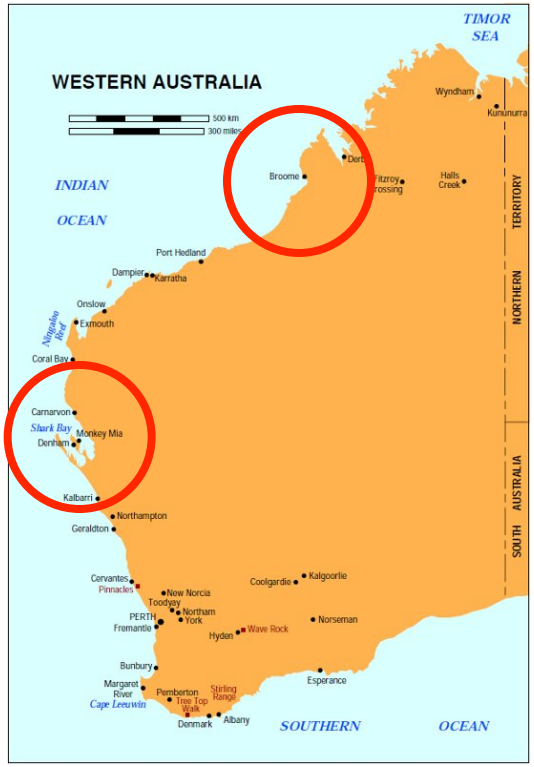
Why Migrate?

- When components of the life cycle require completely different environments
  - e.g., forage in one environment; breed in another
    - sea turtles nest on land, forage at sea

Green turtle (*Chelonia mydas*)

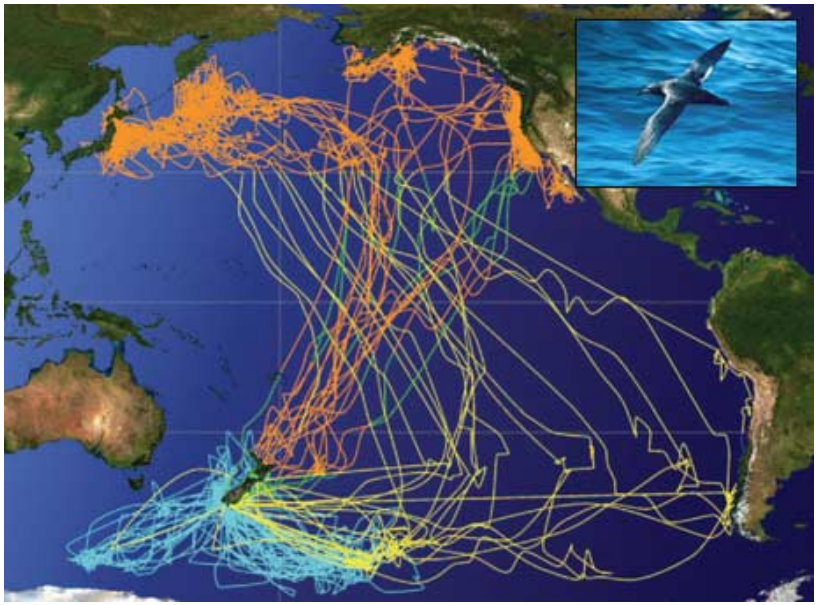
Forage in Shark Bay

Nest in Broome

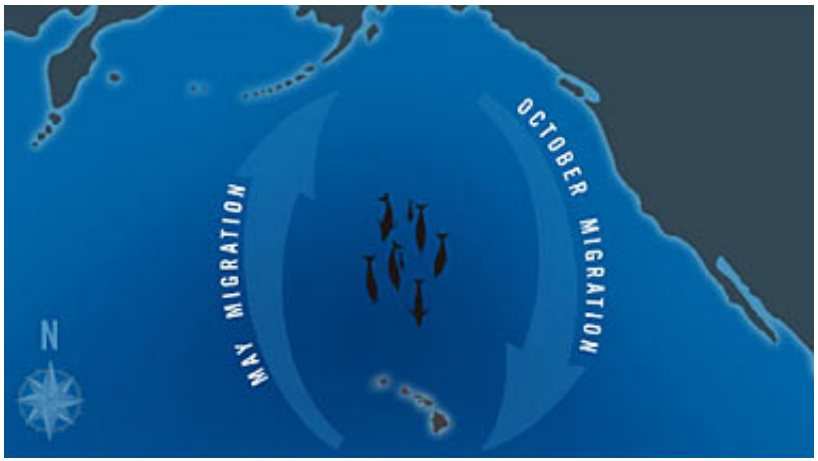


Amazing Migrations

- Sooty shearwaters
  - *Puffinus griseus*
  - New Zealand to N. Pacific
  - 40,000 mi (64,000 km) per year



- Humpback whales
  - *Megaptera novaeangliae*
  - 16,000 mi (25,000 km) from tropical to polar waters
  - Feed near the poles; calve in the tropics



Conservation Implications of Migration

- For migrating species
  - Must protect all activity spaces along the route
- Some migrating species also use temporary stopover sites
  - To rest and refuel (e.g., western sandpipers)
  - Migration disrupted if stopover sites are not protected

Western sandpiper
(*Calidris mauri*)