

- Climate change effects on wildlife
 - Range shifts – elevational and latitudinal
 - Latitudinal changes expected when range limits are determined by temperature, in which case there would be a poleward shift
 - Upward shift in elevation if driven by temperature in the mountains
- Changes in phenology
 - Pied flycatchers mismatched with food supply and some populations have declined by as much as 90% (migration in flycatchers driven by photoperiod vs. climate for caterpillar larvae prey)
 - **Potential positive effects on fitness:** photoperiod triggers onset of breeding, but gonadal growth can accelerate if temperatures warm and in the snowbunting in Alaska breeding is earlier and spring temps warm and more pairs are having two broods rather than one
 - Rains instead of snow and petrels in Antarctica, reindeer in Russia
 - Migrant species that are able to breed earlier are favored over those breeding later because they can accommodate climatic changes better
 - Effects on communities may result from species dispersing to more suitable habitats at different rates
- Polar bears have less time to be on ice floes to catch juvenile ringed seals needed to put on fat to survive the summer fasting period when they are confined to land and seals are not available – results are decreased denning and smaller cubs, lower cub survival and lower adult survival
- Climate change can interact with other biotic influence (e.g., polar bear range shifts increases predation on snow geese, fungal chytrid mycosis in amphibians – interaction with warm climate reduced South American frog populations)
- Climate change affects whole communities through alteration of the food chain