



DID YOU KNOW?

Here is what's already occurring:

Global climate change is already having significant effects on species and ecosystems. ¹ Scientists estimate we're now losing species at 1,000 to 10,000 times the natural rate of about one to five species per year, globally. ² Populations of mammals, birds, and fish species have already been impacted in Ontario, such as the Grey Jay (also known as the "Whiskey Jack", or Wiisagejaak) and Moose.



While we have a fairly good understanding of the ways in which ecosystems, habitat and species are likely to be impacted, our ability to anticipate species-specific wildlife responses to climate change is limited by our predictions of how local climates will be affected by the complex, interactive effects of global changes ³ and how species adaptations will impact each other.



Here are the projections on local wildlife, some of which have already begun:

- Shift species distributions, including elevational and longitudinal gradients (e.g., in the northern hemisphere, many species have shown northward or westward expansion of their ranges as well as altitudinal shifts ⁴);
- Change the timing of life-history events (e.g., nesting and breeding ⁵);
- Decouple coevolved interactions, such as plant-pollinator relationships (e.g., simultaneous interactions with other species or adjacent trophic levels ⁶), and/or synchrony in ecological systems (e.g., the Lynx-Hare cycle) may be reduced ⁷;
- Affect demographic rates, such as survival and reproduction, and reduce or increase population size;
- Increase extinction or extirpation rates of range-restricted or isolated species and populations (e.g., cold-adapted species like the Canada Lynx, *Lynx canadensis*, and American Marten, *Martes americana*);
- Lowered immune systems for some species due to heat or nutritional stress (e.g., moose susceptibility to heat stress) ⁸
- Shift entire ecosystems (e.g., the extent of the boreal forest "bioclimatic envelope" – based on temperature and precipitation – could be reduced by as much as 50%, with more southern areas being replaced by temperate bioclimatic envelopes) ⁹
- Increase habitat loss due to changes in water levels, increased fire frequency, insect outbreaks, altered





- weather patterns, and direct warming of habitats (e.g., lake ecosystems);
- Increase the spread of wildlife diseases and parasites (e.g., pathogens are sensitive to changes in temperature, rainfall, and humidity ¹⁰ ;
- Increase populations of species that are direct competitors of local species for conservation efforts (such as the Virginia Opossum, *Didelphis virginiana*);
- Increase the spread of invasive or non-native species, including plants, animals, and pathogens; and
- Impact species most sensitive to change (e.g., species at risk and isolated populations)

“Predicting the effects of climate change on communities and species interactions poses a new conservation challenge.”



WHAT CAN WE DO?

Our forests, wetlands, lakes and rivers must be managed to leave enough space for these species to adapt and/or migrate if they are to have a chance to survive in the changing and unpredictable climate we have created.



TAKE ACTION NOW!

- Communicate about climate change
- Encourage decision makers to take action
- Get involved with community initiatives



REFERENCES:

- 1- e.g., Gitay et al. 2002; Hannah et al. 2002a, 2002b; Schneider & Root 2002; Stenseth et al. 2002; Walther et al. 2002; Hannah & Lovejoy 2003; Parmesan & Yohe 2003; Root et al. 2003; Inkley et al. 2004; Thomas et al. 2004; Lovejoy & Hannah 2005; Parmesan 2006; Fischlin et al. 2007.
- 2- Chivian and Bernstein 2008.
- 3- Houghton et al. 2001, Humphries et al. 2004, IPCC 2007
- 4- Thomas et al. 2001, Walther et al. 2002, Parmesan and Yohe 2003, Walther 2010
- 5- Pounds et al. 2006, Post and Forchhammer 2008, van der Wal et al. 2008, Bowman and Sadowski 2012.
- 6- Harrington et al. 1999, Tylisanakis et al. 2008, Van der Putten et al. 2010
- 7- Stenseth et al. 2002
- 8- Lenarz et al. 2009
- 9- Rizzo and Wiken 1992, Malcolm et al. 2002, Gray 2005
- 10- Harvell et al 2002

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