

Drought; what can we do?

Part 1

Alberta contains a wide variety of landscapes that can be affected by drought in different ways. Our broad scale landscapes include mountains, foothills, boreal forest, grassland, and parkland. Many small, often temporary water bodies are scattered throughout the province, even though Alberta is naturally a relatively dry province, characterized by low levels of precipitation. We can expect climate change to modify the water balance and lead to extended and more frequent periods of drought. What is drought? It is a long period of low rainfall and shortage of water.

How does drought affect birds?

The many wetlands we have in Alberta are a great source of food and shelter for birds. Songbirds rely on an abundance of insects in wetlands, grasslands, and in the aspen and boreal forests to raise their young. Waterfowl take shelter and eat vegetation from wetlands. Also, some waterfowl and raptors catch and eat fish. Wetlands are shrinking in size due to climate change, which in turn, is reducing the habitat available for birds as well as the amount of food that they can eat. Droughts also impact grassland birds, with heat stress and declining availability of food causing them to abandon nests, resulting in reduced productivity. We will discuss more about the impacts of drought on grassland birds in upcoming weeks.

Just how important are wetlands to breeding birds? Let's use the Northern Pintail as an example. Northern Pintails are a species that nest on the ground, and then lead their young to water once they have hatched, to reduce the risk of predation and so the young can get food. Pintails rely heavily on these wetlands for food and for safety from predators once the young have hatched and can swim. One study found that in years when precipitation on the prairies was low, Pintails had to find other areas to breed in, and were displaced to less ideal habitat in the Boreal Forest and Arctic. Once displaced, fewer ducks found nesting sites and those that did produced fewer nestlings in these northern landscapes. This is significant because since 1966, Northern Pintail populations have dropped by 72%.



Male Northern Pintail Duck

What can we do?

We can mitigate the effects of drought by building structures and planning ecosystems that retain moisture. One example is planting trees. Trees retain more moisture from snowfall from the winter into the spring and summer. Trees also evaporate moisture throughout the growing season, contributing to subsequent rainfalls. We can also keep more of our water in the environment by using less water for residential and industrial uses. Both surface water withdrawals and extensive uses of well water reduce the water table increasing the impact of droughts. Changing agricultural practices can also help reduce the impacts of drought. We can use different harvest methods such as no tilling of the soil, or use more efficient harvest equipment. This allows the environment to retain more water and reduces the impacts of drought on agricultural lands, on birds and on their habitats.

Additional Reading:

Calverley, B. K., and Boag, D. A. 1977. Reproductive potential in parkland- and arctic-nesting populations of mallards and pintails (Anatidae). *Canadian Journal of Zoology* 55(8): 1242-1251, <https://doi.org/10.1139/z77-163>

Climate in Alberta. 2017. Alberta WaterPortal Society. Retrieved on November 24, 2017 from <https://albertawater.com/virtualwaterflows/climate-in-alberta>

Dai, A., K.E. Trenberth, and T. Qian. 2004. A Global Dataset of Palmer Drought Severity Index for 1870–2002: Relationship with Soil Moisture and Effects of Surface Warming. *Journal of Hydrometeorology* 2004 5:6, 1117-1130. Doi: <https://doi.org/10.1175/JHM-386.1>

George, T. L., Fowler, A. C., Knight R. L., McEwen, L. C. 1992. Impacts of a Severe Drought on Grassland Birds in Western North Dakota. *Ecological Applications* 2(3):275-284

IPCC, 2014: *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

Palmer, W. C. 1965. *Meteorological Drought*. U.S. Department of Commerce, Research Paper no. 45.

Sowerby, A., Emmett, B. A., Tietema, A., and Beier, C. 2008. Contrasting effects of repeated summer drought on soil carbon efflux in hydric and mesic heathland soils. *Global Change Biology*, 14: 2388–2404. doi:10.1111/j.1365-2486.2008.01643.x

Tait, C. 2017. In the face of drought Canadian farmers adjust to a changing climate. *The Globe and Mail*. Retrieved on November 24, 2017 from: <https://beta.theglobeandmail.com/news/alberta/in-the-face-of-drought-canadian-farmers-adjust-to-a-changingclimate/article36220413/?ref=http://www.theglobeandmail.com&>