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Bears, Birds, Bugs and Climate: Environews #^

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BEARS, BIRDS, BUGS AND CLIMATE

The debate about global warming is ongoing. Some, who recognize its existence, feel that it is part of a natural warming cycle related to the tilt of Earth's axis or its proximity to the sun. Others deny that it exists at all, despite the observed fact that Arctic summer sea ice has shrunk by over 30% since 1979 (easily confirmed by NASA satellite photos available on line) and that Antarctic ice shelves have been collapsing, placing Adele penguins, a favorite food of leopard seals, at risk because their escape routes are diminishing.

Droughts being experienced around the globe may or may not be related to global warming. The continued desertification of North Africa has been ongoing for decades and is due in part to the denuding of the landscape for fuel but appears to have worsened due to global warming. The spectre of water shortages now haunts Libya. One climatologist, Joshua Busby of the University of Texas, predicts in the next 30 years drought days (i.e. no rainfall) could increase from 101 per year to 224. Most of Libya receives its water from a deep aquifer, the Nubian Sandstone Aquifer, which supports about 1300 wells supplying 6.5 million cubic metres of water daily to Libya's cities. A study by Femia and Werrell, published by the Center for American Progress in Washington, claims that this is unsustainable. Originally claimed to last for hundreds of years, these authors say it may run out in 50 years at the present rate of consumption.

The 2009/10 winter issue of *ON Nature* is devoted to the subject of global warming. It predicts impacts on plant and animal life based on estimated temperature increases that remain somewhat uncertain. Nonetheless the potential for catastrophic consequences is there.

Impact on Plants

The spruce budworm moth could flourish in a warmer climate leading to devastation of spruce forests.

An increase of 2°C is expected to have a negative impact on Canada's sugar maples as well as black spruce and jack pines. There would be a secondary impact on animal species as well since the seeds of the maple are an important food source for squirrels, porcupines, deer and insects. Bird species dependent on the arboreal cover would also suffer.

Pelee Island has a very mild climate, being the southernmost land in Canada. It is the only place where the eastern prickly pear cactus will grow, a species already listed as endangered. It grows only in the shade-free, sandy zone between the water's edge and the inland vegetation. Intense winter storms, predicted to be a consequence of global warming, could wash it out of existence.

Cold climate lichens, a growth that is a mixture of fungi, bacteria and algae, could suffer from increasing temperatures.

Conversely, invasive species like cattails and phragmites are hardy and can thrive in wetlands dried up by annual hot summers, leading to the elimination of native species. Since dense stands

of phragmites do not provide suitable cover to other creatures the end result is the loss of biodiversity.

Some organisms thrive in warmer climes when we would rather they not. Blue-green algae are a slimy example. Predictions are that 2013 might be the worst year yet for blue-green algae in Lake Erie. In 2011 the largest bloom of the algae ever recorded in the lake killed fish because of oxygen depletion, contaminated shorelines and covered up to one-sixth of the lake surface. A wet spring would contribute to phosphate runoff from agricultural fertilizers. Phosphorus promotes algal growth. Climate change has caused lake temperatures to warm and contributed to heavy spring rains, factors that can conspire to fuel the bloom. The algae produce cyanotoxin harmful to animals and people and may also contain E. coli.

Impact on Animals

Adverse secondary effects on animals resulting from the impact of warming on plant life have been noted. Direct effects obviously occur as well. Not all of these are deleterious. The lesser snow goose of James Bay is benefiting from a warmer climate, its population having tripled in the last 20 years. But in this case it is plant life that suffers from animal impacts. The 4.5 million breeding birds are stripping coastal marshes of grasses along the western coast of Hudson Bay, resulting in erosion of the shoreline.

The waters of the Great Lakes have increased in temperature by an average of 1.5^{o}C in the last 30 years, impacting the life cycles of numerous species, causing blooms of toxic algae, affecting cold water fish like lake trout and causing dead zones devoid of oxygen. Warmer waters promote evaporation, further lowering lake levels and causing increased winter precipitation along the eastern shoreline because the prevailing winds are out of the northwest and west.

Fluctuating temperatures associated with climate change can be hard on hibernating species. Amphibians may wake up in a mild spell and be caught above ground and perish when the temperature plummets again. Insects also may be roused only to be caught in the next freeze-up. This can have a negative impact on insectivorous birds who may find their food supply greatly diminished in the spring.

There are numerous examples of both observed and predicted adverse effects on animals of climate change but none seems to have aroused more controversy than its impact, or lack thereof, on the polar bear. The conventional view shared by many biologists is that shrinking summer sea ice reduces the hunting area of the bear, which live primarily by hunting seals at their breathing holes, forcing it to swim longer distances and expend more energy, possibly even drowning. Bears may also be forced onto the land. There is still controversy over whether or not polar bear populations are in decline. The current world polar bear population is estimated at 20,000-25,000 animals. There are 19 groups, 13 of which spend at least part of the year in Canada. This is not a population that can withstand excessive losses. Hudson's Bay sea ice is melting sooner and forming later, each year. Most biologists feel that there will not be enough time for bears to adapt

to a land-based diet. In the summer bears forage on vegetation but a recent Canadian study by Hobson and colleagues examined the expired CO_2 of 300 tranquilized polar bears from the Western Hudson's Bay region in the summers of 1997 and 1998. From the staining of anal fur and teeth they identified bears that had consumed bog berries and black crowberries. Metabolic studies did not find any difference between this group and bears that did not consume berries and concluded that feeding on berries while fasting on land did not confer additional caloric intake. The ability to gorge on seals during the winter months is critical to the survival of the polar bear.

A contrary view is taken by some Inuit hunters. In villages across the Arctic, especially in Nunavut, they are reporting an invasion of polar bears strolling down the streets, killing dogs and stalking kids. One town, Arviat, is especially besieged. One resident, Darryl Baker, reported shooting a bear that was stalking his daughter and found it to have lots of fat. He states "most of the bears coming into Arviat are fat and healthy" (see "A town besieged by bears", *Up Here*", Jan/Feb 2013, page 54 or www.uphere.ca).

How can this discrepancy be? Is it, like real estate, simply "location, location, location"? The story is complex. The area between Churchill, Manitoba and Arviat, Nunavut (a distance of about 225 km) has long been known as "Polar Bear Alley". Every summer they invade the area and have long been a nuisance in Churchill, attracted, like most animals, by garbage food. The phenomenon has become a source of ecotourism with polar bears tours costing upwards of $4,000. The area has also probably become the most studied one in the world for its polar bears. The Canadian Wildlife Service (CWS) has conducted numerous counts. In 2007 it estimated the population at 794 to 1076. In 2003 it was 977. In 2011 the government of Nunavut did its own count and recorded 715 to 1398 bears. These numbers are neither suggestive of a declining population nor of an increasing one. Between 1989 and 1992 the CWS recorded a drop from 1,300 to 1000 bears but the numbers seem to have remained fairly stable since then. Some argue that that drop may have been a statistical anomaly or that natural population fluctuations could account for it. One blogger suggests that bears may move out of an area to avoid numerous helicopter flyovers and tourist snow buses (www.polarbearalley.com). So if the numbers are fairly stable, why is there this invasion of areas of human habitation? The easy pickings provided by human garbage are undoubtedly a factor, as is the availability of dogs (a reasonable substitute for seals). While it is widely accepted that summer sea ice is shrinking, this does not mean that it occurs at the same rate everywhere. Perhaps more rapid shrinking in some areas is forcing the bears onshore in larger numbers and sooner than in other locales.

. All that can be said with certainty is that the question of the polar bear's fate remains an open one and that studies will continue. And that's a good thing as Martha Stewart might say.

Not all impacts of global warming on wildlife are hypothetical. Dan Strickland, retired chief naturalist at Ontario's Algonquin Park has been studying its population of gray jays for decades which has been in decline for years. This non-migratory species winters over, depending on caches of berries, insects, mushrooms and carrion that they store all over their range. The cause

of their declining numbers has remained a mystery until recently. Strickland found that warming temperatures cause these food caches, normally preserved by the natural deep freezer, to rot and become inedible. The resulting loss of nutrition affects the jays' reproductive success, leading to the population decline (*Canadian Wildlife*, Nov/Dec, 2012, page 15).

And the beat goes on.