



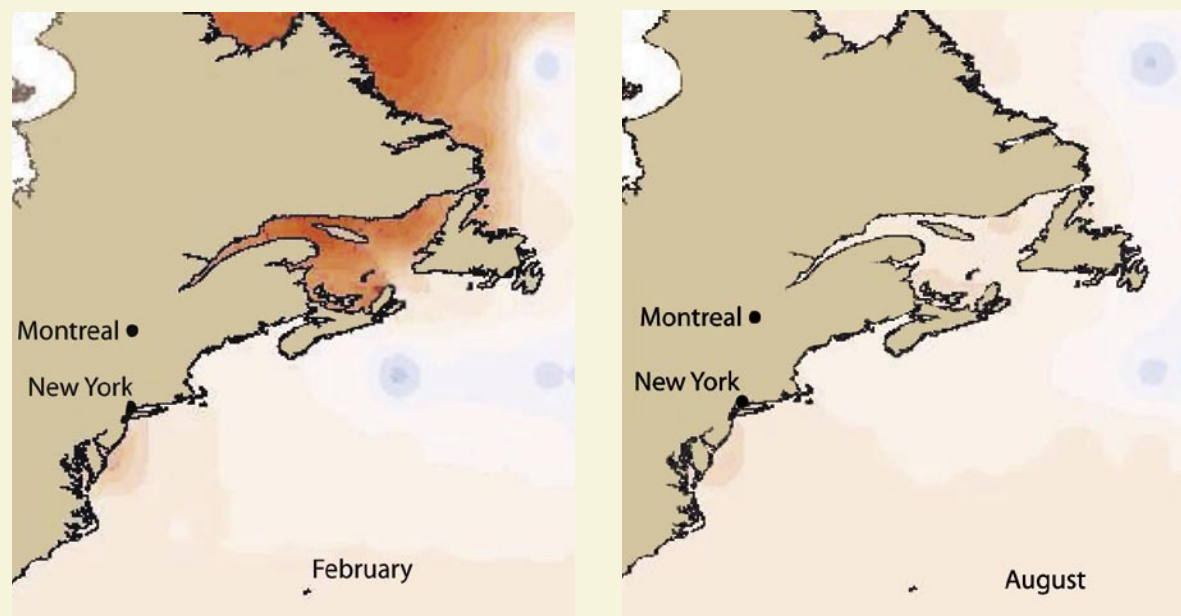
for a living planet®



2° is too much!

Implications of a 2°C global temperature rise for Canada's natural resources

The change in winter (February) and summer (August) sea surface temperatures with a 2°C warming projected by the climate model from the Canadian Centre for Climate Modeling and Analysis.



Summary

Sector	Fisheries		Forestry	
Location	Canadian Atlantic	Temperate fisheries worldwide	Ontario	Boreal forests worldwide
Climate Change Impacts	Little hope of recovery for Atlantic salmon commercial fishery	North Sea cod continues to decline	Many tree species, including important commercial species such as black spruce and sugar maple will be left stranded outside suitable climate conditions	Stored carbon released into atmosphere, compounding global warming
	The fishery for Atlantic deep-sea scallops in southern US may have to close	Blue whiting and redfish could disappear from the North Sea	Insufficient mature timber to meet market demands in 60 years	
	Expansion of exotic species; change in resident community structure; loss in clam and mussel fisheries	Pacific Ocean could become too warm for sockeye salmon	Maple syrup production could decrease	

Action needed!



Climate change is no longer a prediction in Canada. It is a reality that can be seen from coast to coast.

Canada has warmed by 0.8°C over the past 58 years. During the summer of 2005 – the 12th hottest on Canadian record – temperatures were more than 2°C (3.6°F) above the longer-term average in Ontario, Quebec and Nunavut. Glaciers in the Rockies have shrunk to their smallest in the past 10,000 years, leaving less water available for the western provinces. Warm temperatures have caused trees to bloom and bud earlier in Alberta and Ontario. Numerous studies have shown that continued warming could bring water shortages, higher levels of contamination in drinking water and more heat-related illnesses.

Canada, like all countries that depend on their natural resources as part of their economy and for social well-being, is especially susceptible to climate change. The planet has already warmed by 0.6°C over the past century, caused by the release of greenhouse gases into the atmosphere, including carbon dioxide from the burning of fossil fuels. The European Union and WWF have determined that warming beyond 2°C above pre-industrial levels would become a dangerous and unmanageable problem. This is not something out of science fiction – this danger threshold could be reached in the next 20 to 50 years. In WWF's latest study, we examined the impacts of an average global 2°C warming on the resources of Canada and surrounding regions.



Some like it hot, some don't: Fisheries in the Northwest Atlantic

Under a 2°C global warming, parts of the Canadian Atlantic will warm by 1.5-2.2°C. For some species that live in these waters, this warming could mean that they would have to squeeze into an increasingly small area of suitable habitat. But for some exotic species common to more southern waters, the Canadian Atlantic could become a new home, chasing out existing species and changing the ecological balance.

No more Atlantic deep-sea scallops from the southern United States?:

Scallops are big business in North America. In recent years, over CAN \$100 million dollars and US \$200 million of scallops have been landed in Canada and the US respectively. Warming seas may eliminate scallops from the southern part of their range, meaning that small fisheries in the vicinity of Cape Hatteras and perhaps in Virginia waters will have to close.

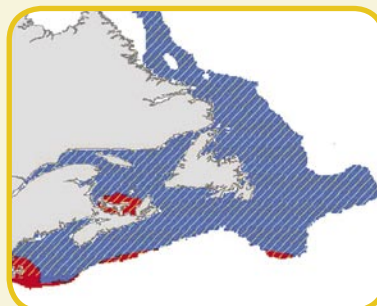
Temperate fisheries around the world:

What could happen in the Canadian Atlantic is certainly not unique. In the North Sea, studies have shown that warmer temperatures would cause some important commercial species, such as cod, to continue to decline and other species, such as blue whiting and redfish, to disappear completely. On the other side of the world, warmer waters could mean that the sockeye salmon could disappear from the entire Pacific Ocean.



Adieu to Atlantic salmon?:

Commercial Atlantic salmon fisheries in Canada have been closed since the 1990's due to a dramatic decline over the past 30 years. 2°C of global warming may firmly shut the door on any hopes of recovery, as warmer waters squeeze the salmon from the southern part of its range and pose an obstacle along migration routes. This warming could also spell bad news for recreational fishers, as rivers will be closed more frequently because of warm water temperatures.

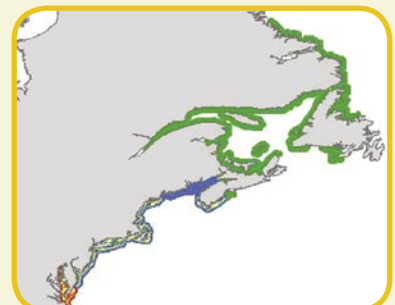


Change in distribution of Atlantic salmon under 2°C warming. Blue areas show current distribution, red shows loss of range under 2°C warming.



New Paradise for Asian shore crab:

This small crab, originally from around Russia and Japan, could expand all over Canadian Atlantic and New England shores. With its high population densities, voracious appetite and broad diet, it could make a serious dent in the fisheries and aquaculture of soft-shelled clam, blue mussel, and could completely change the native communities of crabs and shellfish.



Change in distribution of Asian shore crab under 2°C warming. Solid blue areas indicate likely geographic expansion without temperature change. Red shows loss of range under 2°C warming. Green shows increase of range.



Left behind: Ontario's forests

Because warming is expected to be strongest at high latitudes, 2°C warming on a global scale would correspond to even greater warming in Ontario, in the order of 3°C. Climate conditions that are suitable for existing forests in Ontario will be moving north so far and so fast that trees will not be able to keep up. Unable to migrate or colonize fast enough, important commercial tree species such as black spruce and sugar maple will be left stranded. Under such hostile and unsuitable conditions, these trees are likely to reduce, be less productive and more vulnerable to disease and pest damage.

Less timber: Ontario's forest industry provides 88,000 direct jobs and accounts for 20% of Canadian wood product exports. In a warmer world, there will be more forest fires and insect outbreaks, resulting in younger forests in the long run. Not only will harvestable trees become scarcer but they will also be under increased stress. Many of the trees planted today will find themselves in the wrong climate in just a few decades. A recent study shows that in 60 years there will no longer be enough mature timber in Ontario to meet market demands.

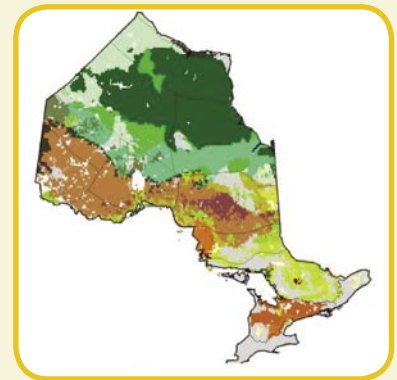
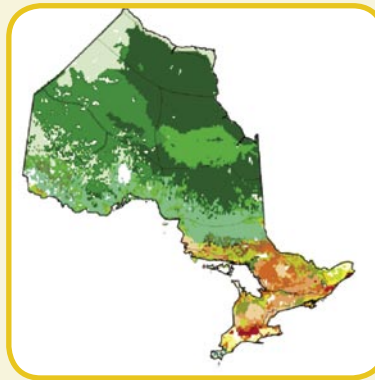


Figure shows existing distribution of forests in Ontario (left) and suitable climate conditions for those forest types in the future (right) Main forest types are: Black Spruce/Jack Pine dominated (greens), Sugar Maple dominated (oranges), Poplar and Birch dominated (brown), forests no longer dominated by any of the currently common commercial species (grey). The greater the difference, the harder it will be for existing forests to survive.

A vicious warming cycle: The boreal forest is a circumpolar ecosystem that extends across northern Canada, Europe, Russia and Alaska, storing large amounts of the world's carbon. Under global warming, the stored carbon could be released into the atmosphere as carbon dioxide, compounding global warming. This is already underway: a recent study shows that young black spruce forests in interior Alaska have changed from removing to releasing carbon dioxide into the atmosphere, as a result of the warming over the past 20 years.

Less syrup?: The production of maple syrup requires freezing nights followed by thawing days. Warmer temperatures in the forests of Quebec, Ontario and northeastern US would mean an end to the freezing during the sugaring-off season. This could lead to less maple syrup being produced, jeopardizing a part of the region's cultural heritage.

2°C IS TOO MUCH!

Today's actions, tomorrow's climate

A 2°C global warming is going to lead to massive changes in Canada, as well as in many other parts of the world. We need to keep global warming below the danger threshold of 2°C above pre-industrial levels:

- Industrial countries need to cut their CO₂ emissions as obliged under the Kyoto Protocol, and must agree to much more serious emission reductions after 2012. The rapidly industrializing southern countries need to tackle their emissions as well with the aim of leapfrogging into new, clean technologies with the support of developed economies, aid agencies and the global financial community.

- The single largest source of carbon dioxide is electricity generation, accounting for 37% of worldwide CO₂ emissions. The first step to move to a clean energy future is to clean up the power sector. WWF's PowerSwitch! campaign is challenging the electric power industry to become CO₂-free by the middle of this century in industrialized countries, and to make a significant shift towards that goal in developing countries.

- Governmental and private aid agencies are becoming aware of climate-related impacts and catastrophes. Comprehensive strategies to build resistance and resilience to climate change need to be developed, especially for threatened communities. But resilience building can only be a stopgap measure and will be useless if global temperatures are allowed to rise too high.

It is not too late. We can still avoid these impacts if serious action to reduce emissions is taken immediately.

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Based on report *Implications of a 2°C global temperature rise on Canada's natural resources* by Gail Chmura, Sarah Vereault, Elizabeth Flanary (McGill University), Lou Van Guelpen, Gerhard Pohle (Huntsman Marine Science Centre), Jay Malcolm, Danijela Puric-Mladenovic, and Hua Shi (University of Toronto).

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