



Muskoka
WATERSHED COUNCIL

Climate Change in Muskoka: Will It Affect Our Lives?

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Muskoka Lakes Assoc. Port Carling



Melting Arctic sea ice, summer 2015



Bleaching off Lizard Island, northern Great Barrier Reef, March 2016



Fort McMurray, May, 2016



Syrian refugees landing at Lesbos, September 2015

It is now undeniable

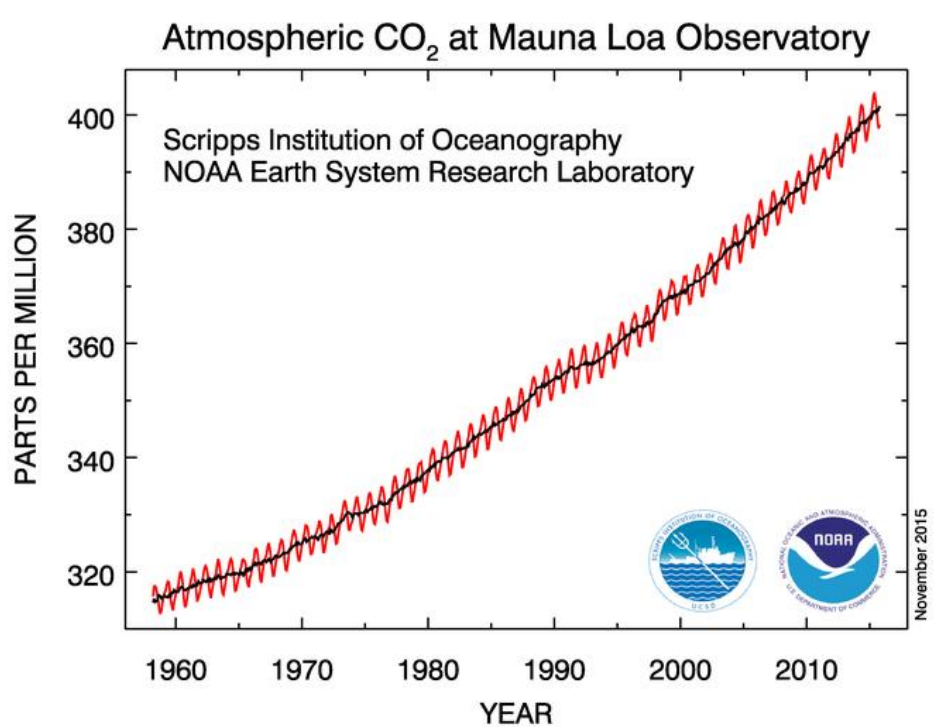
Three simple facts make it so...



- Greenhouse gases act to insulate and warm the planet
- CO_2 , CH_4 , N_2O , H_2O
- Why temperatures on Earth are warmer than on the moon or Mars

It is now undeniable

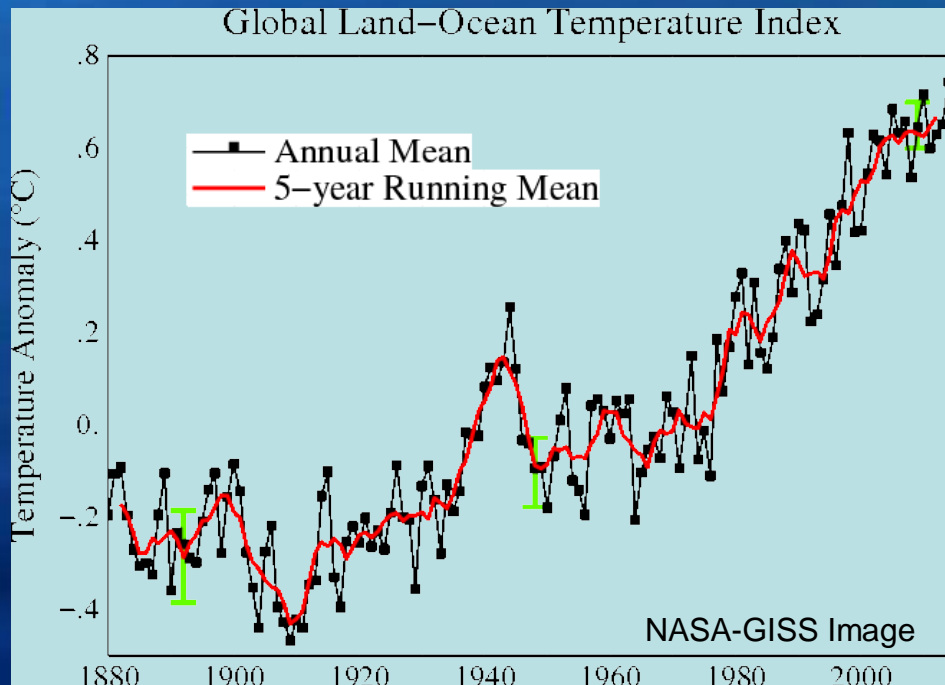
Three simple facts make it so...



- CO₂ concentration in atmosphere is increasing
- Because our energy-intensive economy adds 36 GtCO₂/yr, (and also adds CH₄)

It is now undeniable

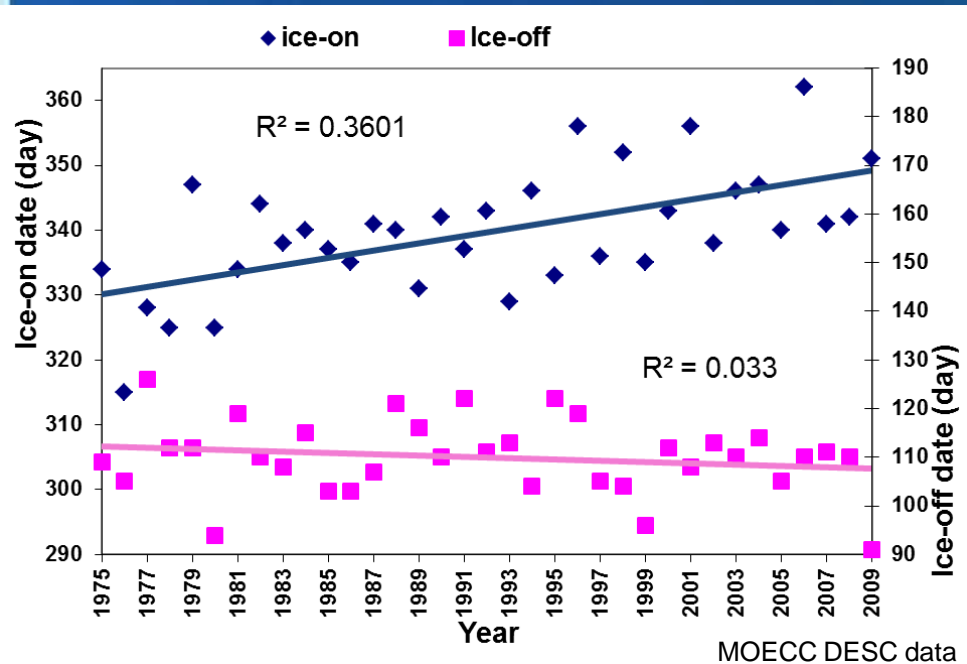
Three simple facts make it so...



- The changing concentration of CO_2 effectively adds insulation and warms the planet
- Warming leads to a number of other changes to climate

It is now undeniable

It is happening in Muskoka too...



- Three more weeks of open water on our lakes since 1975

Does Muskoka need to adapt, and if so, what needs to be done?



- Mid 2014 – MWC sub-committee to look into climate change impacts here
- We decided to look at mid-century

The Goldilocks Time



If you have children in school today, they could have children in school at mid-century.

Mid-century – How different will our climate be?



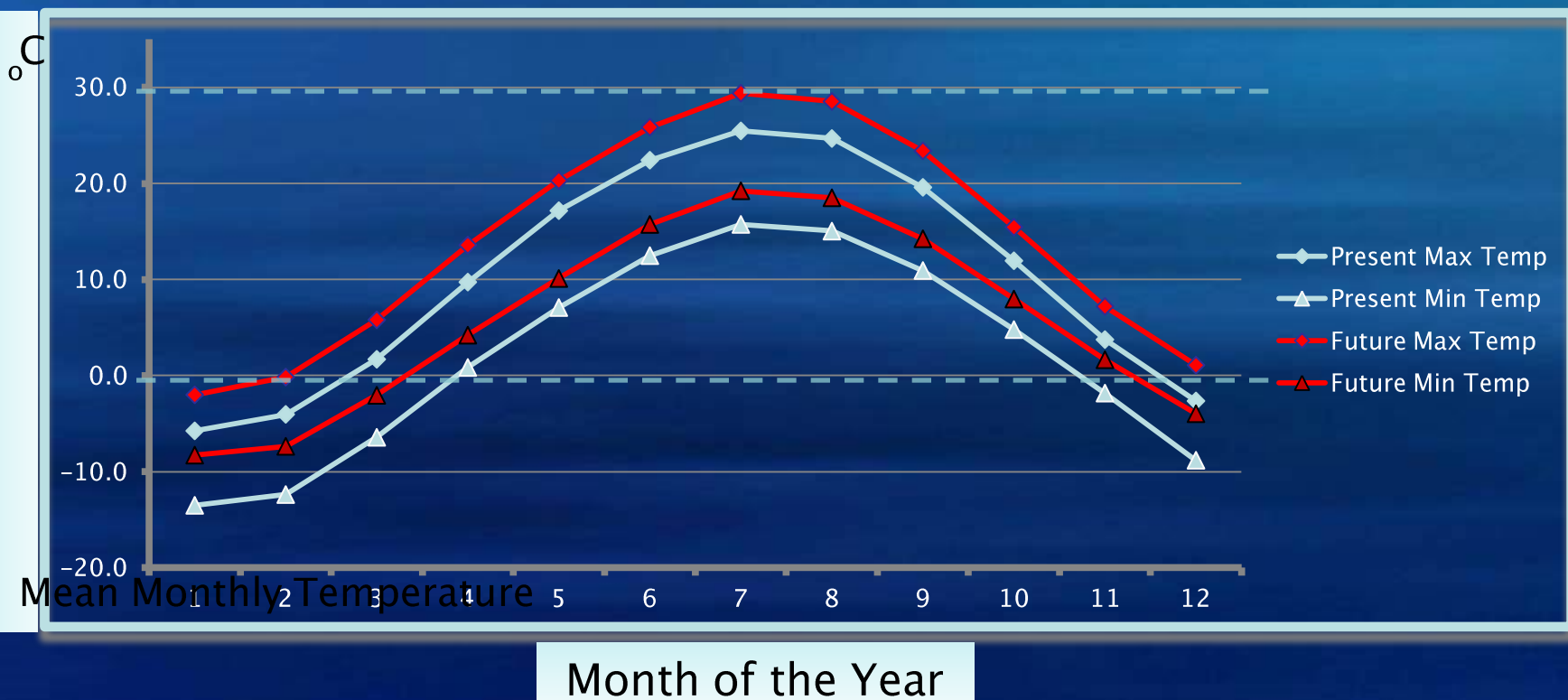
- What will be the impacts of that climate on
 - our environment
 - our infrastructure
 - our lifestyles
- Is there action we need to take?

Muskoka's mid-century climate methods:

- Not talking about the WEATHER
- Cannot PREDICT the future climate
- Can PROJECT the most likely future climate, given specific assumptions re our economy
 - Present climate – mean of 1971 to 2000
 - Mid-century climate – mean of 2041 to 2070
- Using IPCC CMIP5 dataset, we queried runs of 19 global climate models using IPCC scenario RCP8.5, 'business-as-usual', for a location within Muskoka.

Muskoka's mid-century climate what we found:

Change in Temperature between
Now and Mid-Century



Muskoka's mid-century climate

what we found:

Number of days with:	Now	Mid-century
High temperature > 30°C	3.6	27.2
Low temperature < -20°C	28	12.8
Winter days > 0°C	35.8	55.8
Winter nights > 0°C	4.2	18.8

More summer heatwaves; more winter freeze/thaw cycles

Muskoka's mid-century climate

Change in Precipitation
between Now and Mid-Century



Wetter in all months except July–October;
warmer summer = more evaporation, so dryer summer/fall

Muskoka's mid-century climate

what we found:



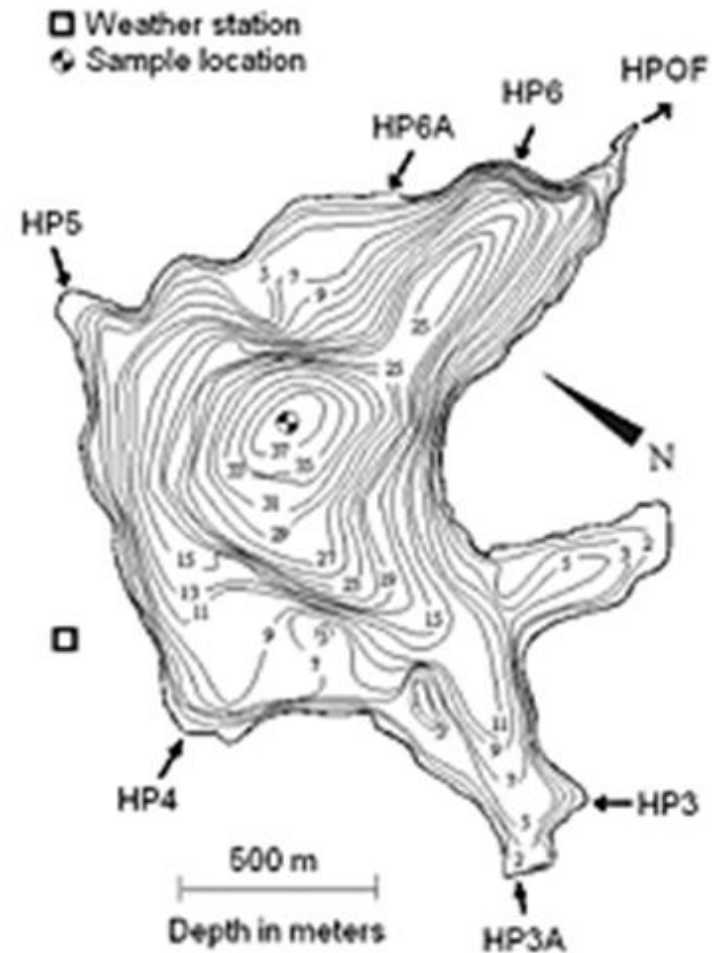
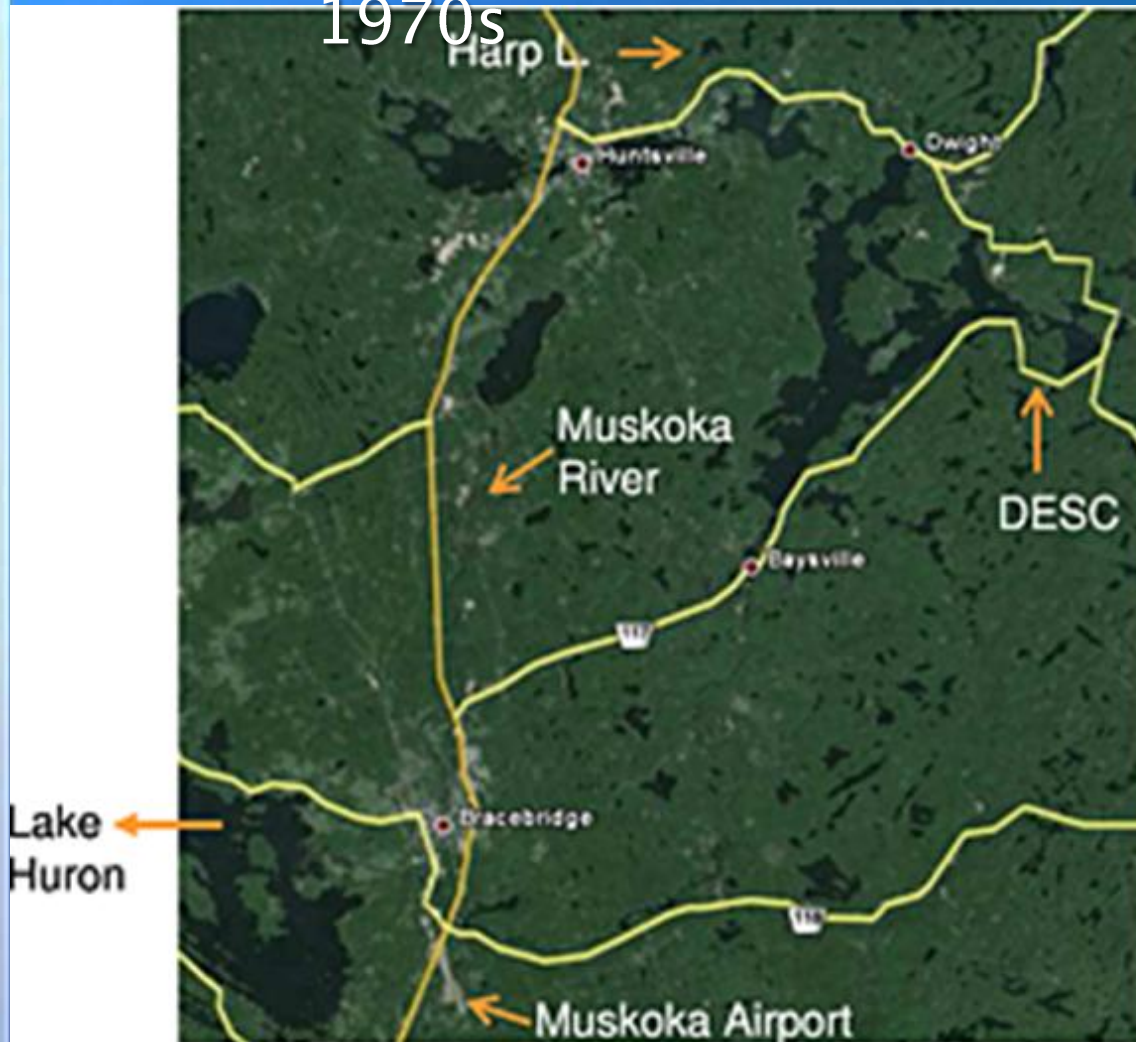
Our evaluation suggests that Muskoka's climate at mid-century is going to be warmer and slightly wetter than at present, that most precipitation will come in the winter, and may come in fewer but more pronounced storm events.

Impacts on our lakes & rivers

- Longer ice-free season, earlier spring thaw, longer biologically active period
- Less water flow during late summer, fall
- Greater risk of spring floods, except when there are frequent winter thaws
- For only a handful of our lakes are there detailed monitoring records sufficient to make more precise projections – we used Harp Lake


Impacts on our lakes & rivers

Harp Lake – closely monitored since 1970s

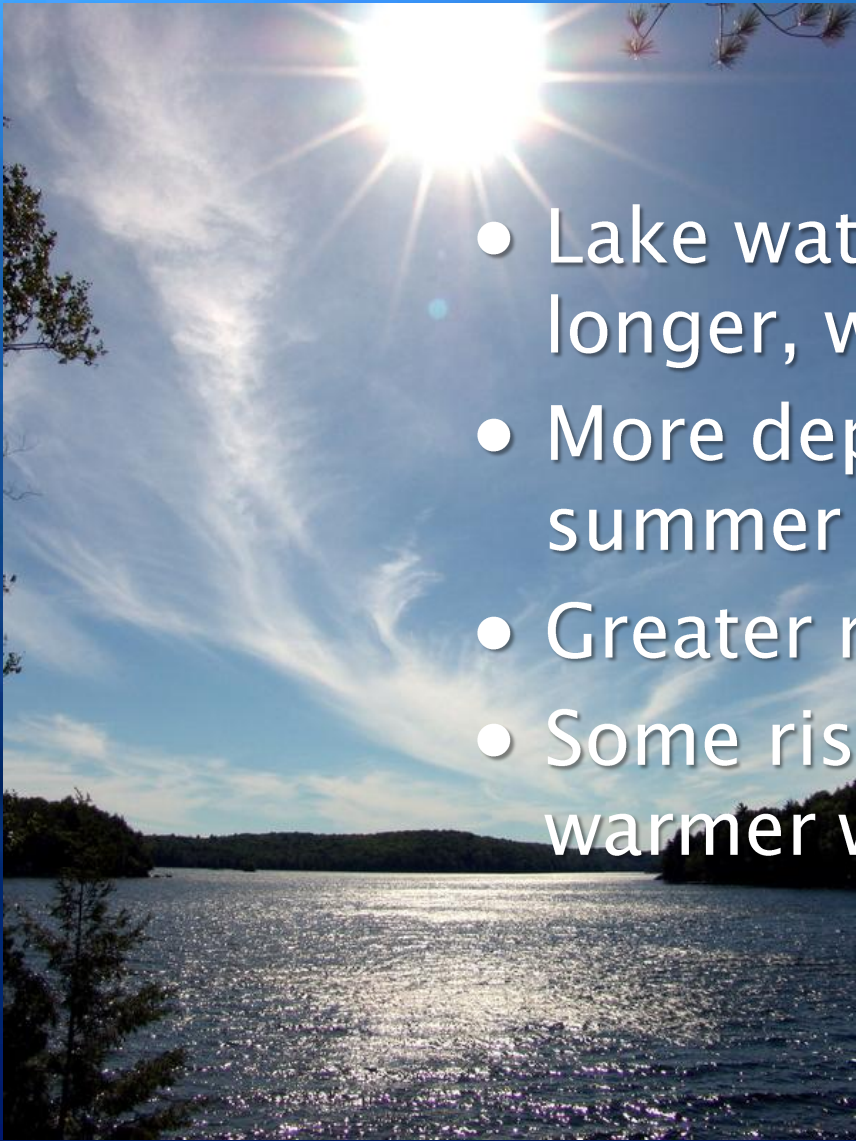


Impacts on our lakes & rivers

modeling of Harp Lake revealed

- 
- Increased evapotranspiration took care of increased precipitation
 - Shift of precipitation to winter yields strongly seasonal outflow
 - There will be 3X more water available to flow or flood in 4 winter months
 - And half as much water to nourish wetlands, rivers and lakes the other 8 months of the year

Impacts on our lakes & rivers

- 
- Lake waters will be warmer in the longer, warmer summers
 - More depletion of nutrients by late summer
 - Greater risk of algal blooms
 - Some risk of loss of fauna due to warmer water – Daphnia, Lake trout

Greater risk of algal blooms

Summer conditions will be more favorable for algal growth

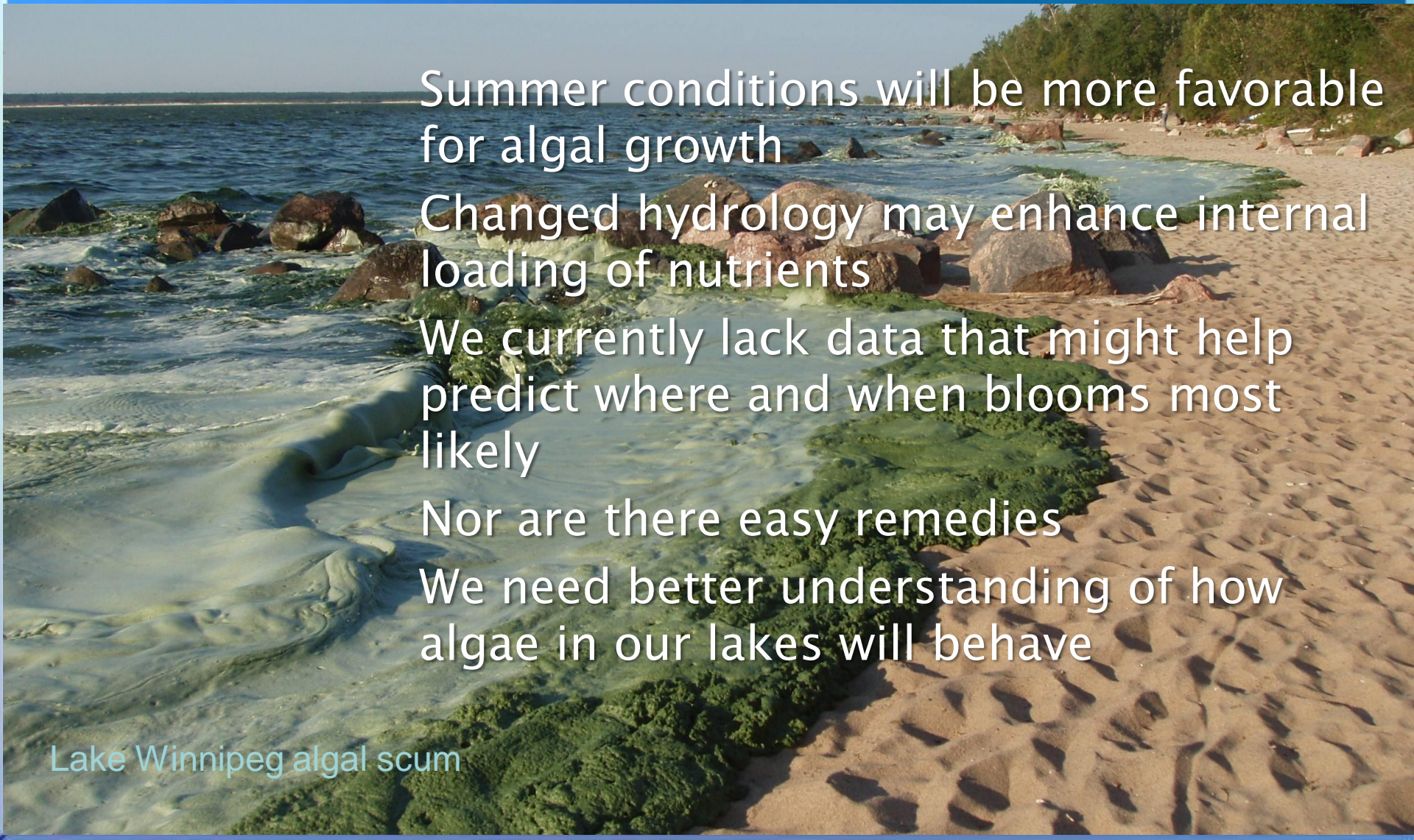
Changed hydrology may enhance internal loading of nutrients

We currently lack data that might help predict where and when blooms most likely

Nor are there easy remedies

We need better understanding of how algae in our lakes will behave

Lake Winnipeg algal scum



Our watershed is mostly forests



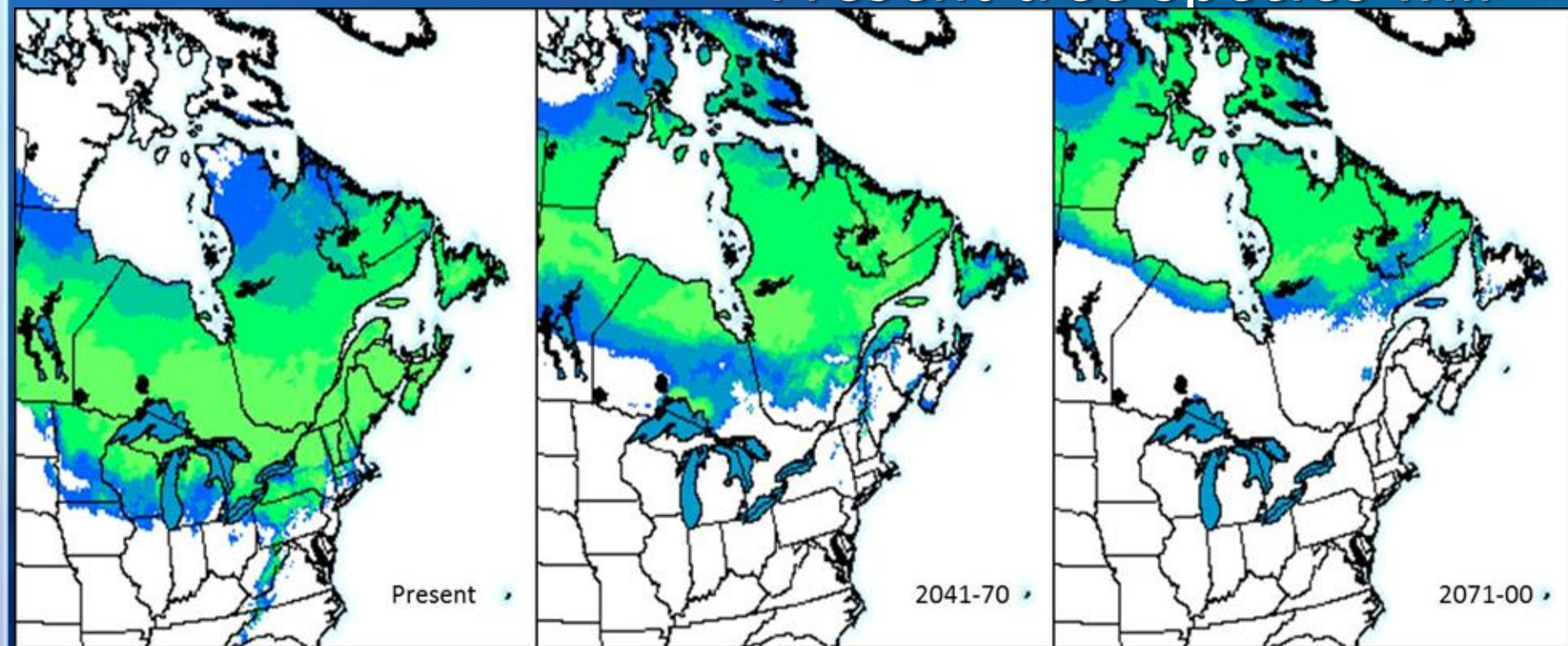
Forests are vital to our economy & quality of life
How will climate change affect them?

Warmer, longer growing season

But dryer as well

Warming is shifting plant growth zones

Present tree species will



Possible future range for white spruce

Risk of fire will also increase



Hot dry summers will favor fire

NRC expects a 6-fold increase in central Ontario

Fire may reshape our forests as more fire-tolerant species persist

Risk of property losses as well as loss of life

New forest pests and pathogens



New plant pathogens
including Beech bark
fungus, Hemlock wooly
adelgid, Emerald ash
borer moving north
Probably others to come

Overall, our forests are going to change in a number of ways over the next few decades



They may deteriorate;
they will certainly become
different

Forest management will
have to adapt to these
changes

May have to become
more proactive

Impacts on our infrastructure and our lives

- Winter recreation?
- New diseases?
- Drought and forest fire?
- Winter road maintenance?
- Stormwater management?
- Electrical & data grid resilience?
- Energy efficiency & renewable sources?

Impacts on our infrastructure and our lives



We must adapt our built infrastructure to the new climatic conditions

- greater volumes of run-off
- greater snowpack in some years
- more freeze-thaw cycles
- more severe winter storms

We should modify our lifestyles to reduce our carbon footprints

Muskoka is not immune to climate change

The mid-century climate will create challenges
Some undesirable impacts on our environment
Some changes that will challenge our built
infrastructure
Some changes that will alter our lives

Muskoka has a decision to make

We can ignore climate change
Or we can plan ahead, and act to adapt
to new circumstances

We can also act to mitigate some
changes, gaining a better future by
doing so.

MWC recommends planning and action

15 Recommendations:

Some large, some small

- Learn about, and undertake to lower personal carbon footprints
- Support research on algal blooms in our lakes
- Provide landowners with information for managing forested land in a changing climate
- Undertake a major planning and infrastructure project to hold water back to be available in summer and fall
- Support those who strive to plan and act

What can I do?

- Learn about climate change in Muskoka
- Understand need for action to minimize undesirable climate impacts
- Reduce my own carbon footprint & become a better environmental steward
- Support forward planning and action

Muskoka is a very special place

Muskoka can remain special as climate changes if our community has the wisdom to plan carefully, and act to adapt and in some cases ameliorate the impacts that are coming.

We have a real choice to make, and now is the time to make it.