How will the impacts of climate change influence our bird populations and their habitats?

The current conservation projects and focus of the EHJV include tidally influenced coastal wetlands, freshwater wetlands, agri-urban and forested habitats. Each of these habitat types will be impacted by climate change in the following ways:

- coastal wetlands will be most significantly impacted by sea-level rise
  - current sea level modeling indicates a rise in the mean sea level of approximately 1.3 metres by 2100. It will also be important to consider the impact of crustal displacement which ranges from 20 centimetres of subsidence along the Nova Scotia coastline to 100 centimetres of rebound along the James Bay lowlands

- freshwater wetlands by changing temperature and precipitation regimes

- agricultural habitats by changing temperature and precipitation regimes as well as sea-level rise

- vast forested areas of the Boreal by temperature and precipitation changes

Net water balances are predicted to decline by 2100 having a significant impact on wetland and riparian habitat across the EHJV. Expected impacts include reduced wetland permanency, significantly reduced summer time river flows and significant long-term reductions in Great Lakes-St. Lawrence River water levels. These impacts will place stress on existing managed and natural wetlands systems and will also increase the vulnerability of these systems to northward migrations of invasive species. In addition, models are predicting increases in the frequency and severity of storm events potentially increasing the risk to existing wetland infrastructure. These issues will be particularly problematic in the settled areas of southern Ontario and Québec.

i) The extent and duration of ice cover along the coastal areas and in the Great Lakes will be significantly reduced by 2100. A reduction in ice cover will increase the potential overwintering populations of waterfowl (i.e., American Black Duck, Canada Goose, Mallard) necessitating the adjustment of long-term monitoring programs to detect these expected shifts in staging and wintering population distributions.

ii) Shifts in climate are expected to change the range of crops grown across the agricultural areas of the EHJV; it is unknown what the impact of that shift will be on the provision of food for staging and wintering waterfowl or how the changes in agronomic practices may influence wetlands. In our coastal areas there is the risk that sea level rise will significantly impact agricultural lands held behind dyke structures. While it may reduce the availability of forage for waterfowl it may also create opportunities for coastal wetland restoration as dykes are re-aligned.

iii) Forested areas - At this point all projections for the Boreal remain conjecture that will be addressed in future studies.

Range of predicted changes in Temperature and Precipitation by 2050 for settled and forested EHJV landscapes

		Annual	Winter	Spring	Summer	Fall
Settled (~ 42° - 55° Latitude)	Temperature (ºC)	2.4 to 3.0	2.4 to 4.0	2.1 to 3.0	2.3 to 2.8	2.3 to 2.8
	Precipitation (%)	2.5 to 8.0	5.6 to 40.5	4.9 to 9.7	-2.4 to 5.0	-1.6 to 5.8
Forested (~ < 55° Latitude)	Temperature (ºC)	2.0 to 4.0	2.3 to 7.3	1.7 to 3.4	1.9 to 2.8	2.0 to 3.3
	Precipitation (%)	3.9 to 17.5	5.6 to 14.9	4.8 to 15.2	1.7 to 12.2	0.4 to 18.4

Based on Ensemble Model: High Emissions Scenario (CCCSN)

How might climate change alter EHJV conservation activities?

A projected shift in the focus of securement activities from existing coastal wetlands only to securing wetlands and associated uplands, where wetlands are expected to migrate to in the future, will likely increase the immediate cost of securement activities. Projected changes in storm frequency and intensity will result in the need to design wetland infrastructure to accommodate higher flows thereby increasing the cost of restoration and management.

EHJV Climate Change Assessment Priorities

1. Ensemble Model (Global Climate Change parameters) Selection and output – model outputs for sub regions of the Joint Venture for 2050 and 2100
2. Ongoing assessment of climate change activities/plans across individual EHJV regions
3. Determine key habitat requirements for key species
4. Species distribution shifts – model potential shifts in bird distribution that could be attributable directly to changes in climatic conditions
5. Sea level rise –plan for a 1.3 metre increase in mean sea level by 2100 and consider impacts of crustal displacement ranging from 20 centimetres of subsidence along the Nova Scotia coast to 100 centimetres of rebound along the James Bay Lowlands
6. Great Lakes and St. Lawrence River water levels – assessment of wetland vegetation response to climate change along the Great Lakes and the St. Lawrence River
7. Boreal forest wetlands:
   Model temporal and spatial trends in waterfowl abundance, distribution and habitat in the Canadian Boreal Forest
   Model potential climate-induced changes in wetland plant distribution
   Assess changes in Black Duck breeding effort and productivity in the Clay Belt Region of Ontario.
8. Agri/urban wetlands – model the impacts of climate change on Southern Ontario wetlands

The EHJV Board has directed its science team to address the eight key priorities but other key information gaps exist beyond those eight areas:

- Baseline and decadal mapping of wetland distribution to assess net landscape change (wetland inventory)
- Modelling impacts of climate change on wetland distribution
- Mapping of coastal habitat vulnerability to storm surge
- Determine the impact that changes in the distribution of wetland and other habitats will have on bird use
- Develop a more comprehensive understanding of the potential climate change impacts to Boreal ecosystems