



Monitoring the impacts of wind on water levels at Kugmallit Bay, NWT



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BACKGROUND AND OBJECTIVES

Over the generations elders pass on their traditional knowledge. The Inuvialuit, Inuit of the Western Arctic who have harvested belugas for 1000s of years in the Mackenzie Estuary and Kugmallit Bay say if there is west winds the water levels rise at a higher rate than normal.

The objectives of the study:

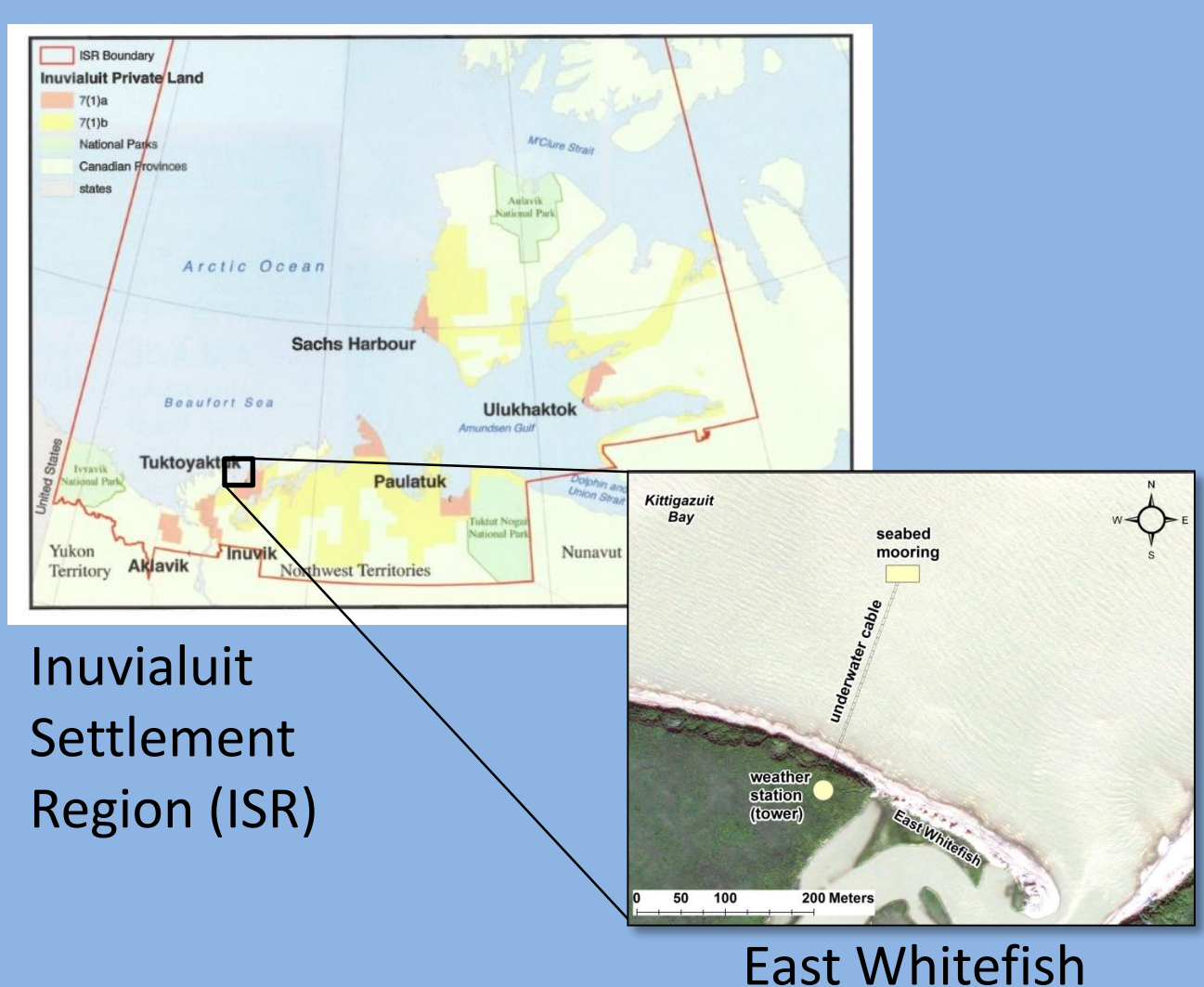
- Explore and understand the relationship between wind and oceanographic conditions
- Share findings with communities of the ISR and the Inuit people in a meaningful way
- Compare findings to traditional knowledge of localized weather patterns in the area



Knowing the direction of the wind is very important when determining if it is going to be a calm or stormy day on the water. Pictures from East Whitefish, Kugmallit Bay

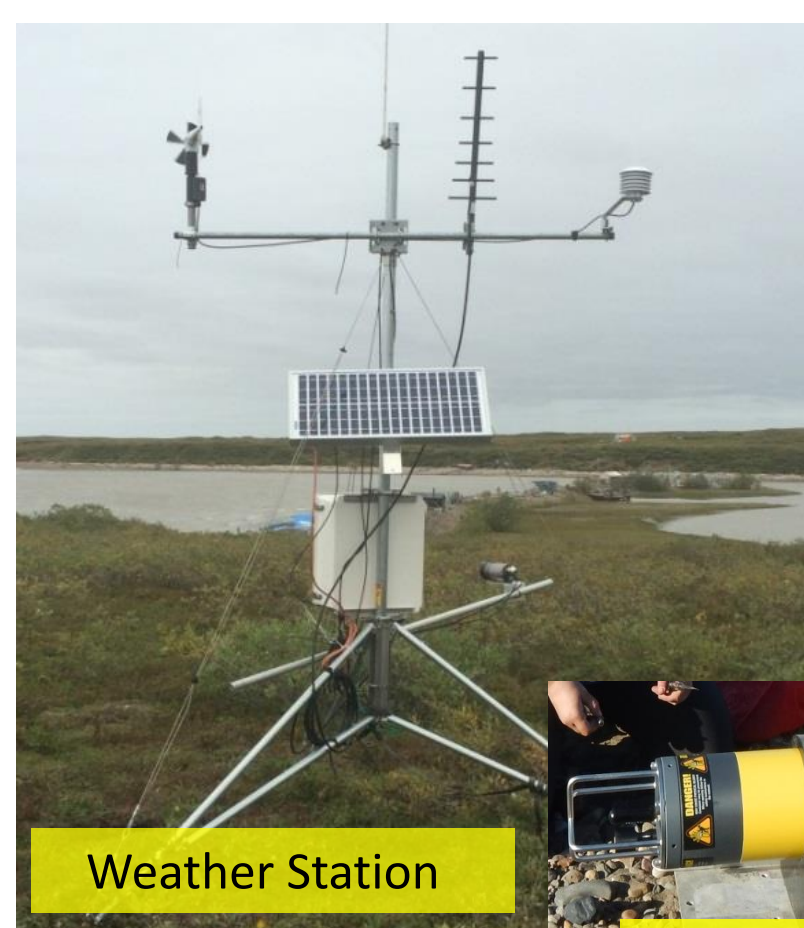
METHODS AND STUDY AREA

Kugmallit Bay, located in the southeastern Beaufort and within the ISR is an important summer aggregation spot for beluga whale. East Whitefish located in the bay is home to a number of subsistence camps. Data for this study comes from instruments located at this location.



Scientific observations

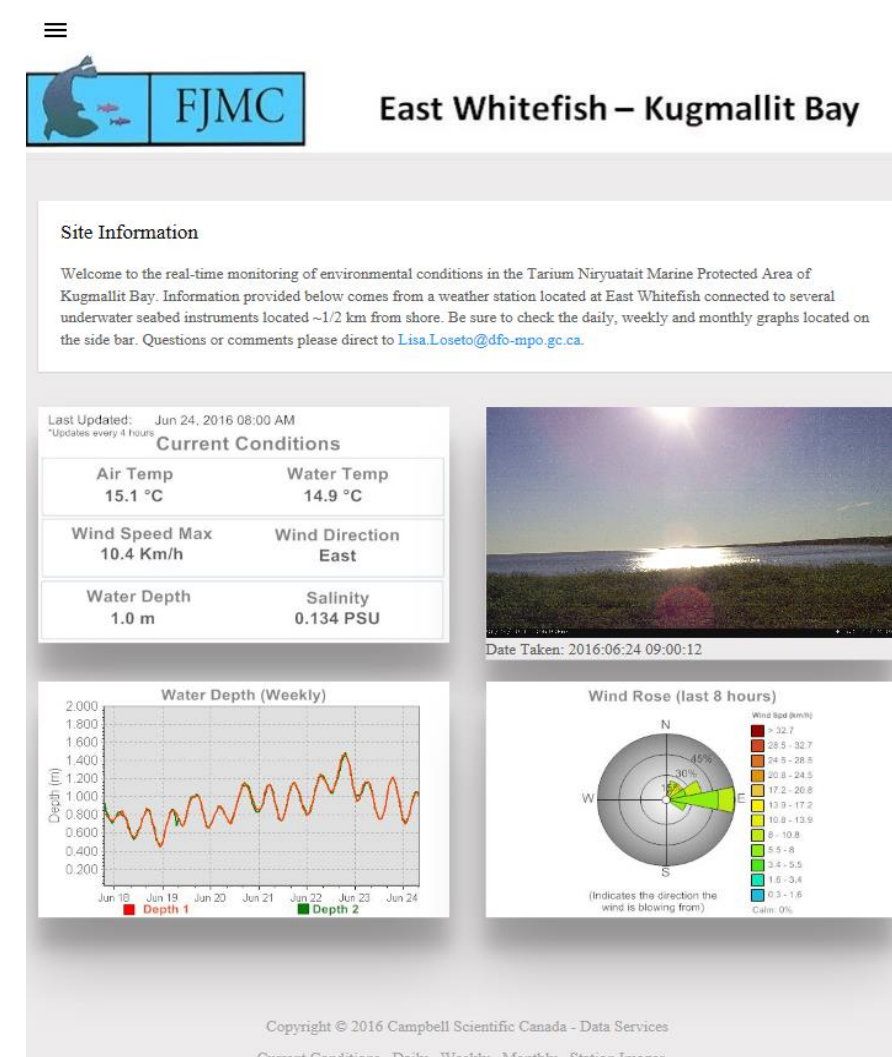
- Wind amplitude and direction
- Water depth and wave height
- Air and water temperature
- Underwater noise (whale vocalization)
- Time-lapse photography. (updated hourly)



Weather Station



Seabed Mooring

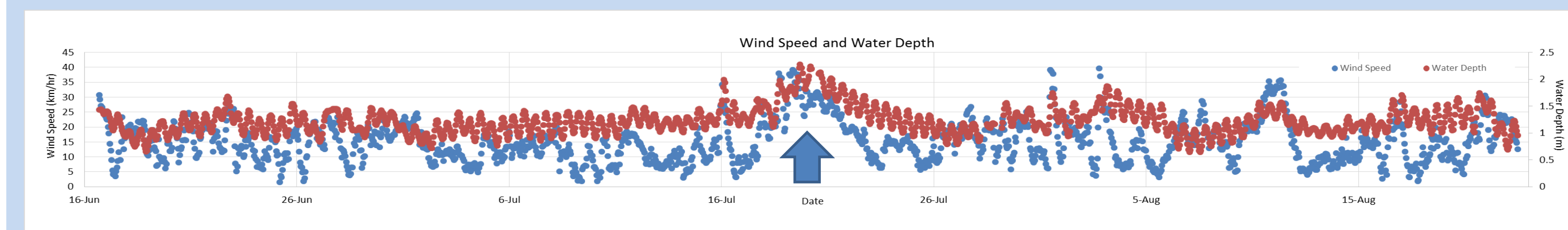


Data could be viewed through a publically accessible webpage. (<http://dataservices.campbellsci.ca/nrcan/index.php>). On average webpage was view 5 times a day

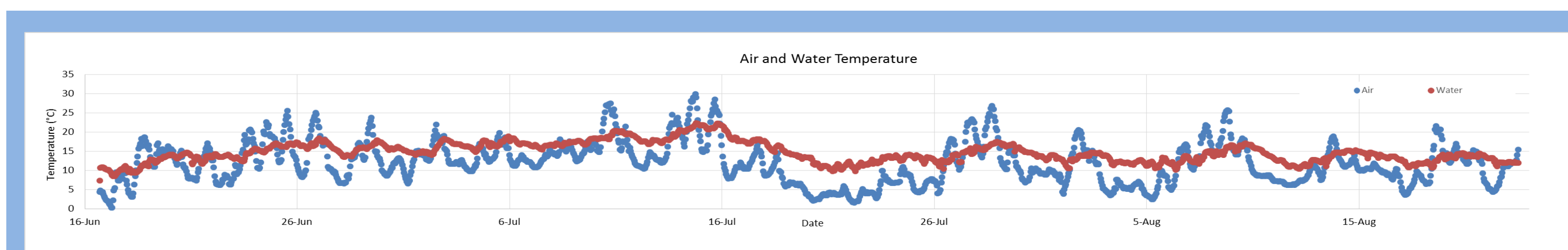
CONCLUSION

Water levels in the bay increased during periods of prolonged northerly winds, whereas extensive periods of southerly winds did not change the water conditions significantly. These findings support observations and knowledge held by the local Inuvialuit harvesters of the area. Lastly, this project provided real-time access to the data so it can be used as a tool by the communities to check conditions in the bay. The monitoring of real-time scientific information in combination with traditional knowledge is important to ensure safe travels and a better understanding of this valuable eco-system in this changing climate.

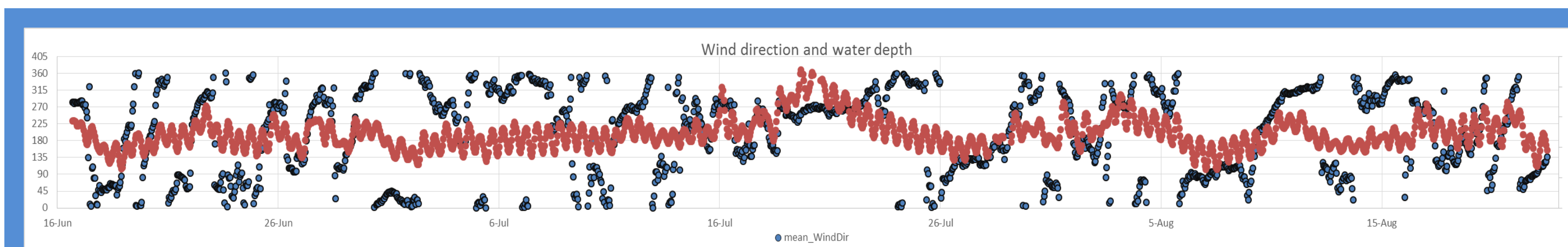
RESULTS



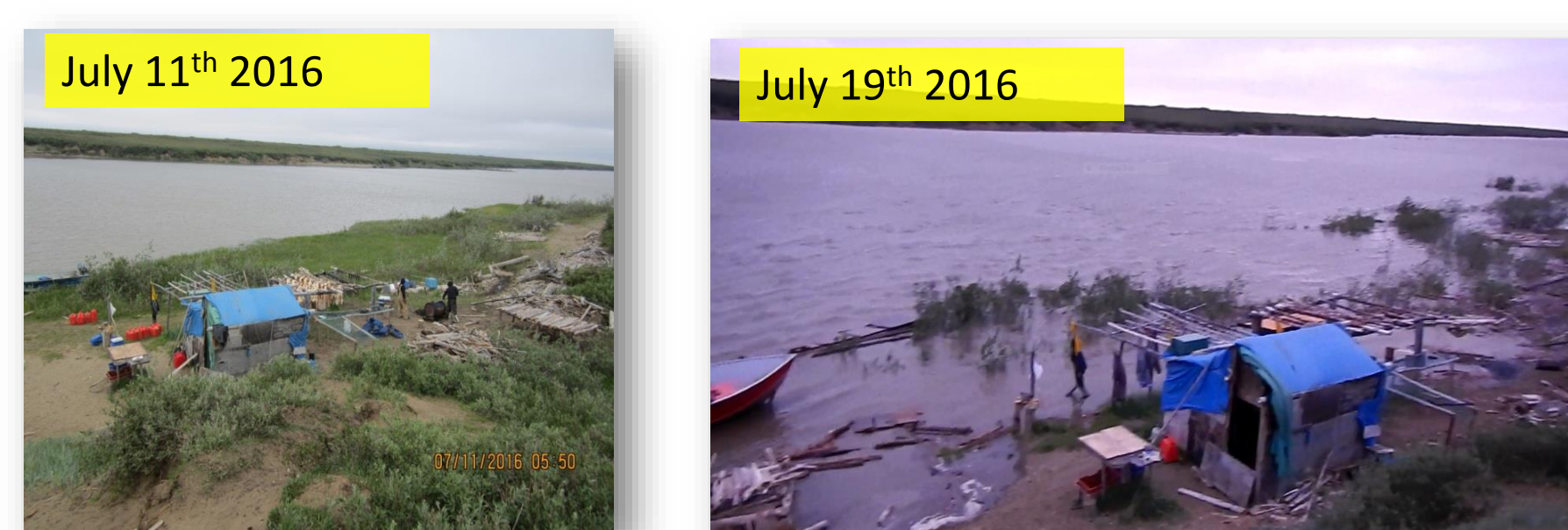
During a 4 day period in July, strong west winds averaging 42 km/hr (gusts up to 60 km/hr) caused water levels to surge to 2.2 m, measuring 1.2 m above normal level for that location.



There was also a significant decrease in air and water temperature at the onset of the July storm mentioned above. With the surge of cold water into the bay, water temperatures fell almost 12 °C.

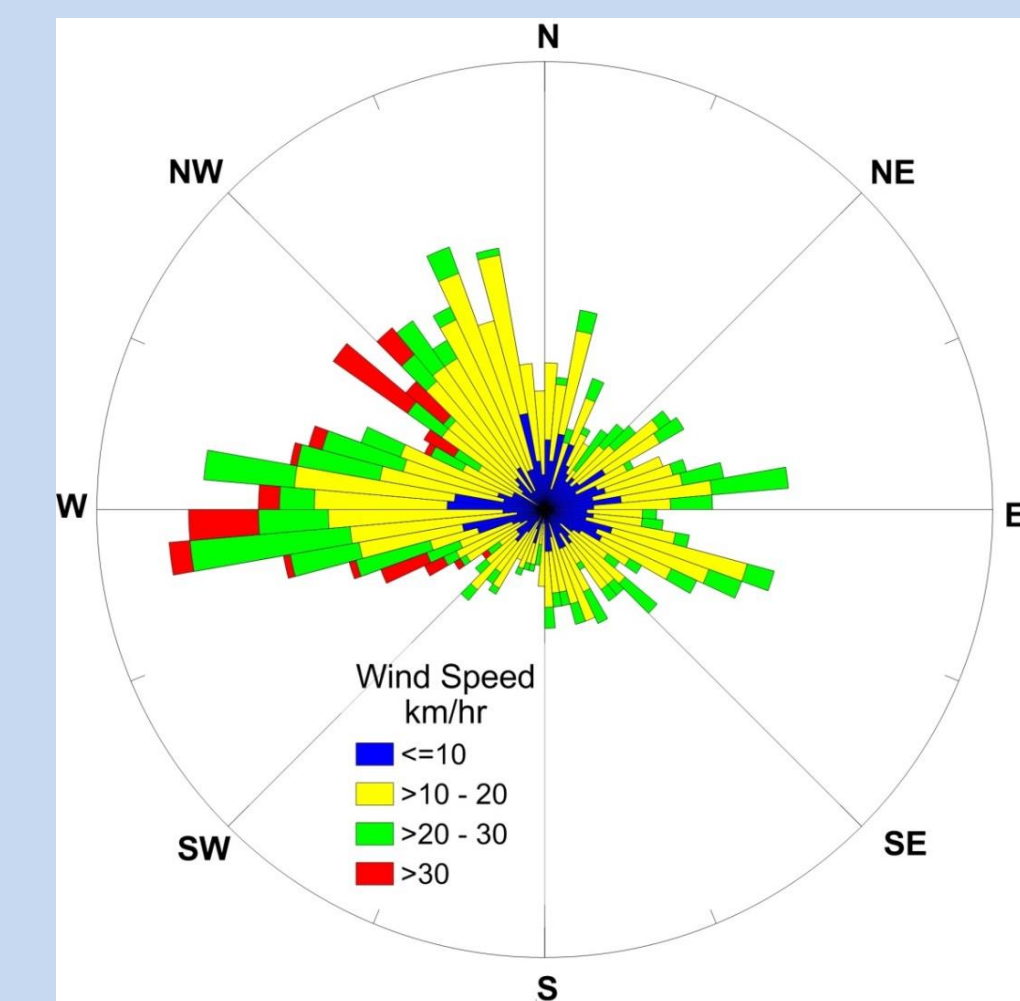


In contrast, during sustained southerly winds, water levels decreased and water temperature increased. In these periods the estuary resumed normal levels and tidal fluctuations.



Periods of sustained winds (> 48 hours) from the west by northwest (>20 km/hr) increased water levels in the bay. Water levels increased by 1.2 m on July 19th causing significant flooding to low-lying areas at East Whitefish (pictured above) and throughout the region.

The adjacent rose diagram shows the average wind direction and amplitude for the summer of 2016. The dominant wind direction was from the West to NW, reaching speeds greater than 30 km/hr on a number of occasions. This increased the water levels in the bay on 4 occasions including the unprecedented July 19 storm shown in the graphs above.



ACKNOWLEDGEMENTS

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Natural Resources Canada



Fisheries and Oceans Canada

