

# Unmanned systems for offshore areas: what is available and what is needed



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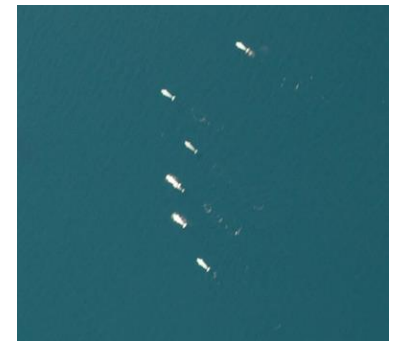
# The Need

- Offshore areas are sometimes hazardous to conduct aerial and water based studies because:
  - weather can be bad
  - study area can be far from land
  - ice or seas can make vessel operation dangerous
  - search and rescue operation may not be available



# Types of Data Needed

- The distribution, movements and numbers of marine mammals, birds, and fish
- Ice distribution and thickness
- Information on ocean currents
- Areas of high biological productivity
- Information on the ocean floor characteristics
- Information on sounds in the ocean
- Presence and location of vessels
- Weather data



# Reasons for new methods for data collection

- Data are relatively sparse in offshore areas compared to terrestrial areas
- Data collection from vessels or manned aircraft are expensive
- More data are needed to understand ecological processes that affect weather and important subsistence and commercial species
- There is a need to monitor effects of industrial activities such as shipping and oil & gas and mining activities
- Species distribution and abundance needs to be monitored in relation to the above activities and climate change

# Available Platforms

- Balloons or other stationary aerial platforms
  - Useful to monitor around stationary sites such as drill sites, mine sites, leads in sea ice
- Unmanned aerial vehicles (UAVs)
  - Useful to monitor large or inaccessible study areas
  - Flight endurance ranges from 20 min to 36 hr
  - Payload capacity ranges from grams to 100s of kg
  - Costs range from a few 1000s to millions



# Available Platforms

- Autonomous underwater vehicles (AUVs)
  - Provide access to data otherwise not obtainable
  - Give visual and other close up views of data traditionally collected from vessels
- Autonomous surface vehicles (ASVs)
  - Can be used to reduce costs instead of vessel deployments

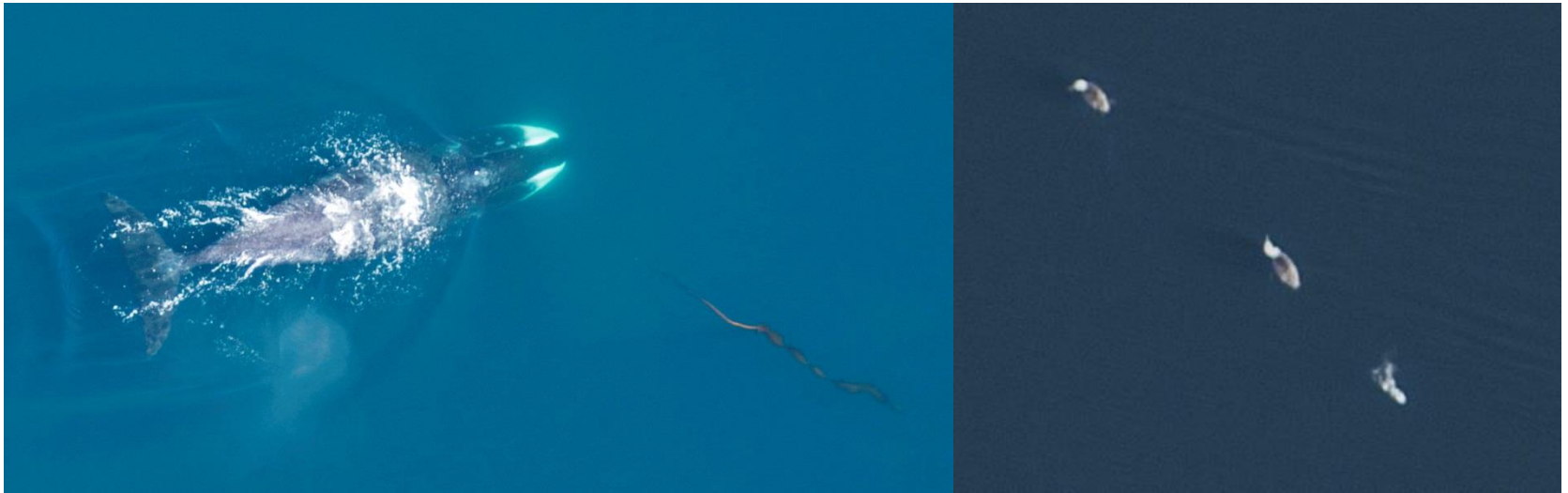


# Available Sensors – Aerial Platforms

- HD Video
- DSLR Cameras
- Integrated Camera Systems
- Hyperspectral/Multispectral Camera Systems
- Infrared Cameras
- LIDAR
- SAR
- Weather data including temperature, humidity, wind speed and direction (using GPS data)

# Available Sensors – Surface Vessels

- The same sensors on the previous and next slide since they can be deployed in air or in water





# Available Sensors

## - Underwater Vehicles

- HD Video (especially low-light cameras)
- DSLR Cameras
- Hyperspectral/Multispectral Camera Systems
- Sonars (side scan, single and multibeam)
- Acoustic current profilers
- Hydrophones (recording and locating acoustic sources – animals and human activities)
- Water chemistry (salinity, temperature, nutrients)
- Pressure (to measure depth at the AUV)

# Conclusions

- More data are needed
  - For offshore areas to understand ecosystem processes;
  - To meet permitting conditions associated with oil & gas, mining and shipping operations;
  - To identify areas for offshore development (mining and oil & gas)
  - For planning future activities; and
  - To operate as safely as possible.
- Unmanned systems are affordable and safe ways to collect these data

# Where We Go From Here

- Identify what data collection needs can be met by unmanned systems
- More testing on the available sensors
- Use combinations of sensors to create packages
- Reduce the size of some sensors
- Encourage military applications to become available to civilian users
- Work with Transport Canada to develop guideline for unmanned system operations
- Develop sense and avoid systems