

OCEANS PROTECTION PLAN

Multi-partner Research Initiative for Oil Spill Research Natural Resources Canada (NRCan)

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Fisheries and Oceans Canada

OSPR/Chevron Oil Spill Response Technology Workshop
March 27-20, 2023



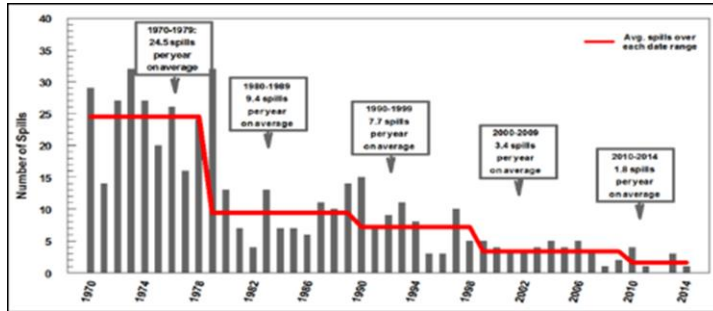
Government
of Canada

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du Canada

Canada

Concerns with the Potential Release of Petroleum in the Canadian Marine Environment

- Spills from tankers at sea have declined
- The risk of accidental releases of petroleum hydrocarbons is expected to increase with increases in marine shipping traffic (including the Arctic), anticipated increases in exploration & production of offshore oil and gas, and potential increases in pipeline and rail transport along coastal regions



Multi-Partner Research Initiative (MPRI) - Canada's Oceans Protection Plan

GOAL: To establish an *integrated, global research network to advance oil spill research* in Canada and enhance Canada's level of preparedness and response capability.

FOCUS: To advance scientific knowledge and science-based decision making in oil spill response operations by *improving our knowledge of current and emerging oil spill response and remediation strategies*

Program Governance

DG Level Steering Committee
(Chair – DG CanmetENERGY Devon)



and...

Advisory Committee
(Chair – Dr. Ken Lee)



MPRI Aims to Expand the Spill Response Community

- **TRAINING THE NEXT GENERATION:** Including students and other types of Highly-Qualified Personnel (HQP) in research projects
- **NETWORKING / INTERNATIONAL PARTERSHIPS:** Fostering interactions between academic and industry researchers with key international organizations in oil spill research
- **ENGAGEMENT:** Involving clients and stakeholders from the Federal Government, Provinces and Territories, Indigenous Groups, the Oil and Gas Industry, regulators, spill response organizations, and fisheries non-governmental organizations (NGOs)

MPRI Program: Phase II

Renewed under Canada's Oceans Protection Plan in 2022 (\$30.3M over 5 years) with a transfer of management from Fisheries and Oceans Canada (DFO) to Natural Resources Canada (NRCan)

- Phase II of the MPRI program expands the scope of its previous activities focused on ship-sourced spills to include oil spills on onshore (e.g., releases from pipelines into freshwaters) and offshore (e.g., releases associated with offshore oil and gas exploration, production and transport)



MPRI II Research Network Themes/Topic areas



Offshore and onshore

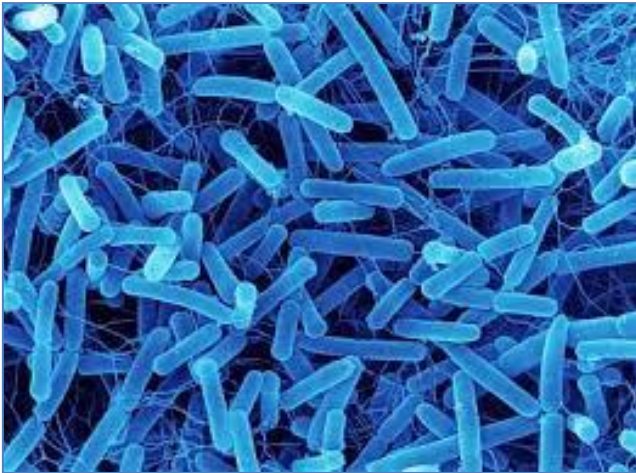
- **Fate, Behaviour, and Transport of Oil in the Environment**
- **Alternative Response Measures**
- **Oil detection and monitoring**
- **Biological Effects of Oil**
- **Physical Recovery of Oil**
- **Response Planning and Decision-making**

Identification and Prioritization are based on recommendations from:

- Royal Society of Canada Report on oil spill research
- Transport Canada's review on Canada's Ship-Source Oil Spill Preparedness and Response Regime
- USA's Interagency Coordinating Committee on Oil Pollution Research (ICOPR) 2022-2027 R&D Plan
- Feedback following MPRI's 2022 International Oil Spill Science Conference (IOSSC 2022)
- National Academy of Science's recent Oil in the Sea IV report

Fate, Behaviour and Transport of Oil in the Environment

Assessment of the potential for natural bacteria to degrade oil in marine and freshwater environments (including the Arctic) and the development of bioremediation strategies to enhance their rates



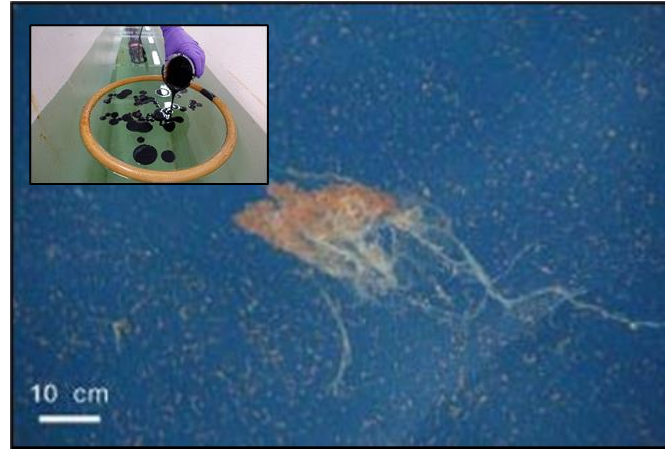
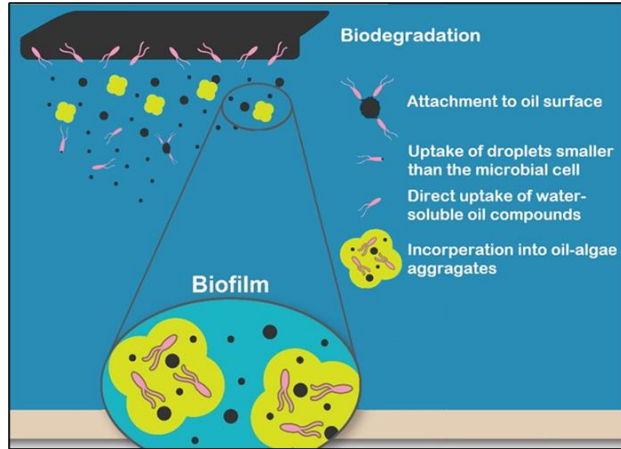
Investigate the formation and stability of oil emulsions under real-world conditions, and the influence of emulsified oil to the effectiveness of various spill response options

- Oil weathering, including emulsification, presents a major challenge for oil responders as it can reduce the effectiveness of various oil spill response options (e.g., physical recovery) and the rates of natural oil degradation



Fate, behaviour, and transport of oil, including diluted bitumen, spilled in freshwater or estuarine waters, including modelling, formation, and ecological significance of oil-particle aggregates

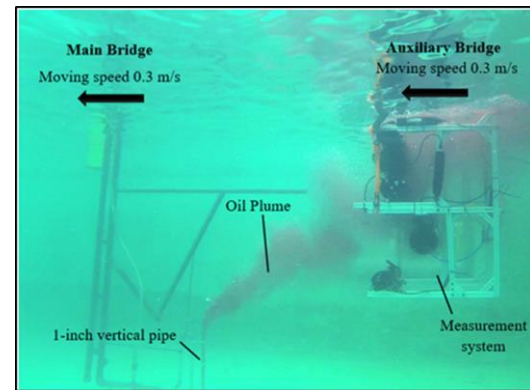
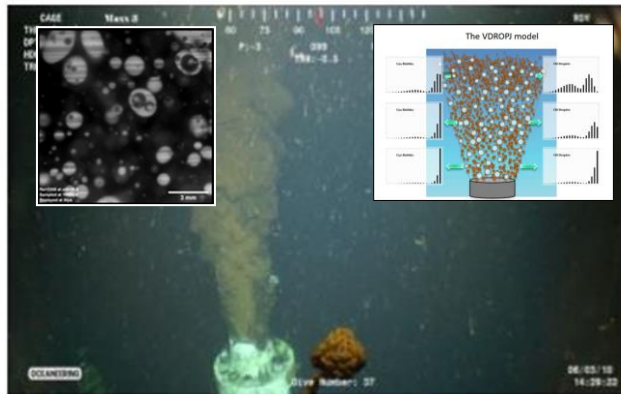
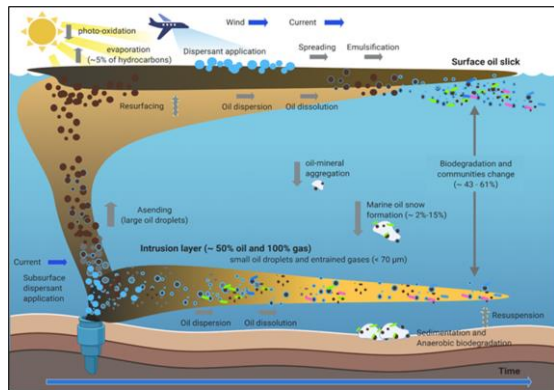
- Improve knowledge of the factors (e.g., formation of oil-particle aggregates) that may induce the submergence and sedimentation of oil in freshwater or estuarine environments



Studies on factors that influence oil droplet size, plume behaviour and slick formation following surface and subsurface releases in freshwater and marine environments

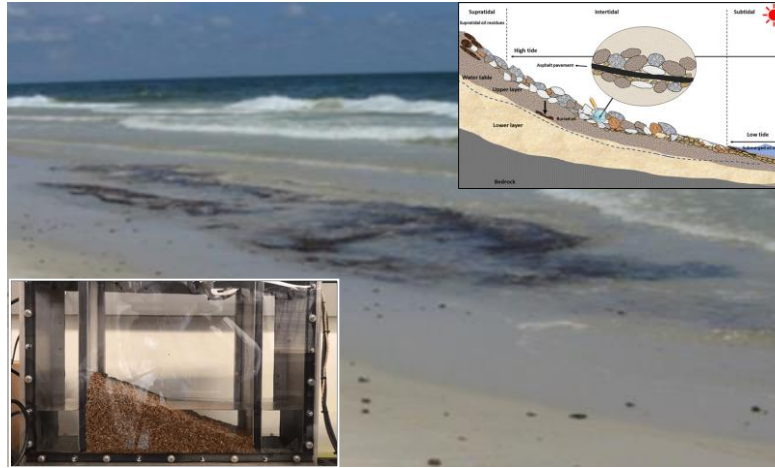
Modelling of oil spill behaviour following from accidental subsurface pipeline releases and deepwater blowouts (including subsea dispersant injection [SSDI])

- Oil spills in the aquatic environment can result from a multitude of surface (e.g., releases from ships, offshore oil, and gas facilities) and subsurface (e.g., pipeline ruptures, blowouts) point sources. Oil spill models are an essential tool for decision making on response actions



Enhanced understanding of the fate and behaviour of oil on shoreline environments

- Identification of the factors controlling the transport of oil stranded on shorelines oil to improve our ability to select and apply the most effective countermeasures available (e.g., flooding, flushing, surf-washing and/or the use of surface washing agents).



Alternative Response Measures

Development of smoke suppressants to support ISB operations

- ISB has gained a lot of interest following the Gulf of Mexico oil spill where it was demonstrated to be effective on an operational scale
- Research is needed to develop smoke suppressants that promote higher oil burn efficiency and the application strategies for ISB use in marine coastal, freshwater and wetland environments



Development of next generation Spill Treating Agents (STAs)

- **There is a need to** develop the next generation of STAs that are more environmentally benign and effective over a wider range of environmental conditions

Development and evaluation of improved low-toxicity surface washing agents

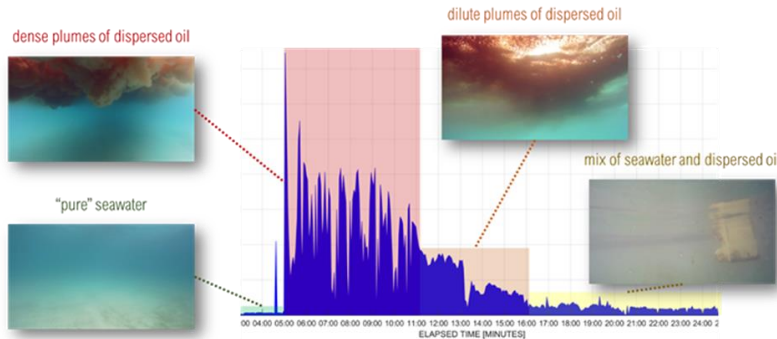
Research on the use of chemical oil dispersants in the Canadian environment



Oil Detection and Monitoring

Advancing unmanned surface and subsurface vehicles and sensors for oil spill response monitoring

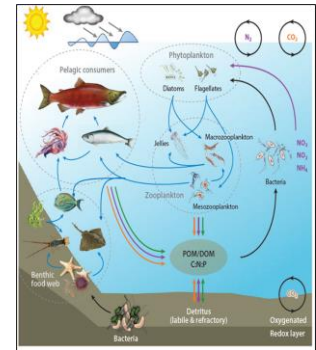
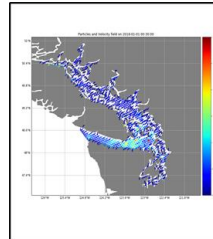
- Develop economical surface/underwater vehicles (that can be easily transported and deployed) to provide information in *near real-time* to responders about the horizontal and vertical extent of a spill in, on, and above the water (including under ice) using sensors, onboard water samplers (for sensor ground-truthing) and aerial drones.



Biological Effects of Oil

Development of predictive risk assessment models that integrate data on oil fate, behaviour and effects to support oil spill preparedness, response operations, and damage assessments

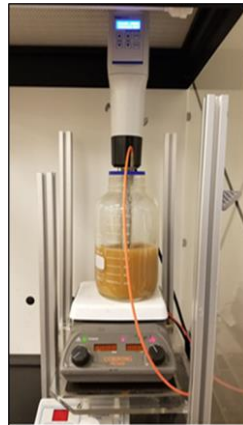
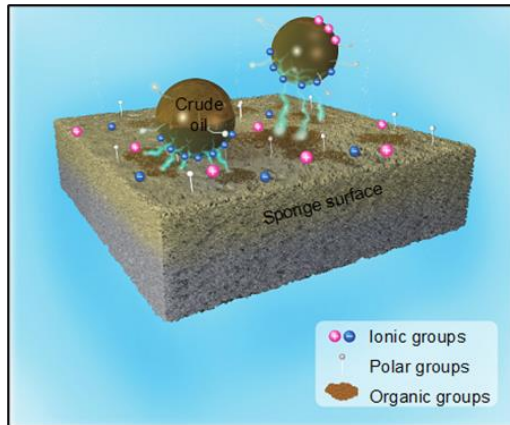
- Predictive models support decision making in the NEBA (Net Environmental Benefit Analysis) process for the selection and application of spill response options
- Improve our understanding of habitat damage by oil spills and their impact on population and community structure



Physical Recovery of Oil

Advancing oil adsorbant/absorbant, and solidifier technologies

- Advance the development effective (e.g., high capacity, regenerative, recyclable, etc.), and low-cost technologies based on engineered adsorbant and/or absorbant materials for oil-water separation and oil recovery in response operations under a wide range of conditions.



Advances in boom and skimmer deployments in open water and rivers

- Mechanical containment and recovery using booms and skimmers remains the primary oil spill response tool for use in Canada for the aquatic environments.
- Develop and evaluate an improved boom systems that can overcome the operational limitations of existing systems



Planning and Decision Making

Develop integrated spill response data management methods and user-friendly computer-based decision support tools for oil spill response and simulation training exercises for spill responders and other interested parties (e.g., Indigenous communities)

