2019 LECTURE TOPICS

Lecturers were asked to provide in advance a brief list of topics to be covered in their presentations. The outlines received are listed below.

UNDERSTANDING CANADA (22nd May)
Susan Joudrey

- Canadian History and civics
- Canadian popular culture
- Colonialism
- Geography

THE SEA IN HUMAN HISTORY (24th May)
David Griffiths

- "The Sea Within" - Human biology and its roots in the sea
- "The Oceanic Circle" - Oceanic aspects of human migration from Africa around the world
- "Our Interdisciplinary Circle" - Ocean and coastal stakeholders
- "Humanity and the Blue Marble" - The meaning of ocean governance

PRECAUTIONARY PRINCIPLE (27th May)
David VanderZwaag

- The Precautionary Approach in Coastal/Ocean Governance: Beacon of Hope, Seas of Confusion and Challenges

UN AGENCIES (28th May)
Wendy Watson-Wright

- Ocean governance, United Nations

ECOSYSTEM APPROACH (28th May)
Olga Koubrak

- Historical development of ecosystem approach in science, resource management, and international law
- Main elements of ecosystem approach
- Ecosystem Approach to Fisheries and Ecosystem-Based Fisheries Management
- Ecosystem Approach under the Convention on Biological Diversity and other multilateral

environmental agreements
- Regional application of ecosystem approach through the Regional Seas Programme and Large Marine Ecosystem projects
- Unanswered questions and future developments

MARITIME BIOSECURITY: LEGAL ISSUES (29th May)
Jiayu Bai

- The concept and theory of marine biosecurity
- The main issues resulting from the threat of marine biosecurity
- United Nations Convention on the Law of the Sea and marine biosecurity
- IMO regulatory arrangements and marine biosecurity
- Vessels' ballast water and marine biosecurity
- Vessels' bulk fouling and marine biosecurity
- Transboundary tourism and marine biosecurity
- Climate change and marine biosecurity
- Islands environment and marine biosecurity
- State practice to the prevention of the threat to the marine biosecurity

THE ARCTIC IN INTERNATIONAL LAW – A CANADIAN PERSPECTIVE (30th May)
Wendell Sanford

The Arctic Ocean is an enormous body of water surrounded by 5 states (Canada, the US, Russia, Norway and Denmark). Its use is regulated by UNCLOS (the Third UN Convention on the Law of the Sea). There are issues which remain unresolved principally the allocation of the extended continental shelf. Each dispute is manageable within the UNCLOS framework. With respect to the Canadian Arctic our sovereignty throughout the archipelago is accepted. Two boundary disputes exist but are well managed. The dispute with the US regarding the Northwest Passage is well understood and not likely to ripen in the future.

THE ANTARCTIC – A UNIQUE PLACE IN FACT AND LAW (30th May)
Wendell Sanford

The Antarctic is a continent-sized land mass surrounded by ocean. It has never been populated in recorded history. Beginning with scientific efforts in the 1950s an Antarctic Treaty System has evolved which addresses claims by seven states (UK, France, Norway, Australia, New Zealand, Chile and Argentina); the interests of other states and international organizations and regulates scientific endeavours across the continent. The ocean space deals with all UNCLOS issues particularly Illegal, Unregulated, and Unreported (IUU) fishing and the advent of extended continental shelf claims.

INTRODUCTION TO ICOM MODULE (3rd June)
Paul Boudreau

This will be a very short, brief introduction to the module and the general field of Integrated Coastal and Oceans Management (ICOM).

MARINE SPATIAL PLANNING (3rd June)
Scott Coffen-Smout
Gary Pardy

An oceans management practitioner's perspective on the theory and practice of coastal and marine spatial planning (CMSP), including requirements for:

- data/information
- stakeholder engagement
- governance, and
- plan development.

COASTAL INFORMATION MANAGEMENT (4th June)
Suzuette Soomai

The role of scientific information in marine environmental decision-making:

- Characteristics of the science-policy interface
- Challenges and enablers to communicating information at the interface
- Case studies on information pathways (production, communication, and use) in governmental and non-governmental organizations

OCEAN AND CLIMATE CHANGE ACTION: OPPORTUNITIES FOR ECONOMIC AND ENVIRONMENTAL SUSTAINABILITY (4th June)
Peter Ricketts

- Climate Change and the Central Role of Oceans
- Oceans in the UN Framework Convention on Climate Change (UNFCCC)
- Role of the Global Oceans Forum and the COP (Conference of the Parties) Meetings
- Roadmap on Oceans and Climate Action (ROCA)
- ROCA Recommendations for Oceans and Climate Action
- ROCA Progress and Preparations for COP 25 in Chile
- ROCA as Tool for Economic and Environmental Sustainability
- Next Steps in the ROCA/UNFCCC Process

WORKING WITH MAPS (5th June)
Bob Branton

- Opens with presentation of global scale poster showing IOI-Canada alumniCounts data joined to Exclusive Economic Zone (EEZ) geometries, United Nations (UN) country metadata and World Bank (WB) economic data.
- Next are 'howto' style demonstrations of the free open software used to create the poster (QGIS mapper, R statistical programming environment and Google Docs).

- Then comes sample maps using data drawn from the Global Biodiversity Information Facility (GBIF) and World Data Base of Protected Areas (WDPA).
- Closes with brief overview of local data publishing activities using the COINAtlantic Search Utility and GeoContent Generator.

OCEAN TRACKING NETWORK (5th June)
Fred Whoriskey

- Ocean Tracking Network
- Electronic telemetry systems
- Aquatic animal migration

BLUE JUSTICE FOR COASTAL COMMUNITIES (6th June)
Ratana Chuenpagdee

- Coastal communities
- Small-scale fisheries
- Interactive governance
- Social justice

OCEAN AWARENESS AND LITERACY (6th June)
Kerri McPherson

The lecture on Ocean Awareness and Literacy will cover the following topics:

- Ocean Literacy: What is it?
- Ocean Literacy Principles
- Importance of Ocean Literacy and Education
- Specific examples from Nova Scotia curriculum
- Importance of Ocean Literacy in Government and Policy Making
- Challenges of Ocean Literacy
- Exercise based on Simulation Brief

FIELD TRIP: BEDFORD INSTITUTE OF OCEANOGRAPHY (7th June)
Scott Coffen-Smout
Alain Vézina
Gary Sonnichsen
Jon Griffin
Vladimir Kostylev
Brian Robinson
Hilary Moors-Murphy
César Fuentes-Yaco
Stephen Cole

- Welcome and Introductions
- Overview of BIO Programs
- Marine Geoscience in Natural Resources Canada
- Canadian Hydrographic Service Atlantic Program
- Coastal and Habitat Mapping
- COOGER Wave Tank
- Monitoring Whales in Atlantic Canada
- Remotely-sensed Ocean Colour for Planning Airborne Lidar Bathymetry
- C&P Surveillance and Enforcement Operations Demonstration
- Display Walkabout

15th ANNUAL EMB LECTURE – THE "BLUE REVOLUTION": CHALLENGES AND OPPORTUNITIES (7th June)
Renée Sauvé (keynote speaker)
Ratana Chuenpagdee (panel)
Susanna Fuller (panel)
Sigrid Kuehnemund (panel)
Sean Brillant (moderator)

The ocean is attracting a lot of attention, especially with the Blue Growth and Blue Economy initiatives being discussed in many fora around the world. The featured speaker will discuss Canada's recent experience on this topic and the panel members will respond from the perspectives of conservation, biodiversity, the environment and social justice.

FUNDAMENTALS OF CLIMATE CHANGE (11th June)
Alexander MacDonald

- What is Climate Change?
- Overview of Climate Change Science
- Overview of Climate Change Impacts
- Responses to Climate Change
    - Climate Change Adaptation
    - Climate Change Mitigation

- Overview of Climate Governance
- Climate Change in the Context of the Integration Exercise

CENSUS OF MARINE LIFE (12th June)
Bob Branton

- A broad overview of 'The First Census of Marine Life 2000-2010' (CoML). Mission statement for CoML was and is 'a global network of researchers engaged in an international collaborative initiative to assess and explain the diversity, distribution, and abundance of marine life in the oceans – past, present, and future - and to identify the current limits to knowledge - what is known, unknown and unknowable'.
- Presentation includes 24 of 69 original CoML slides provided to Ron O'Dor (CoML Chief Scientist) plus 11 briefing slides and links from Bob Branton (founding OBIS Canada node manager) on: RAM Legacy, Global Ocean Science Past and Global Ocean Science Future.

OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM (12th June)
Lenore Bajona

- What is OBIS?
- Using OBIS Portal
- Data Management and Best Practices

CITIZEN SCIENCE (12th June)
David Ireland

- Marketing Nature
- Citizen Science
- Environmental Visual Communication
- Partnerships and Coalitions

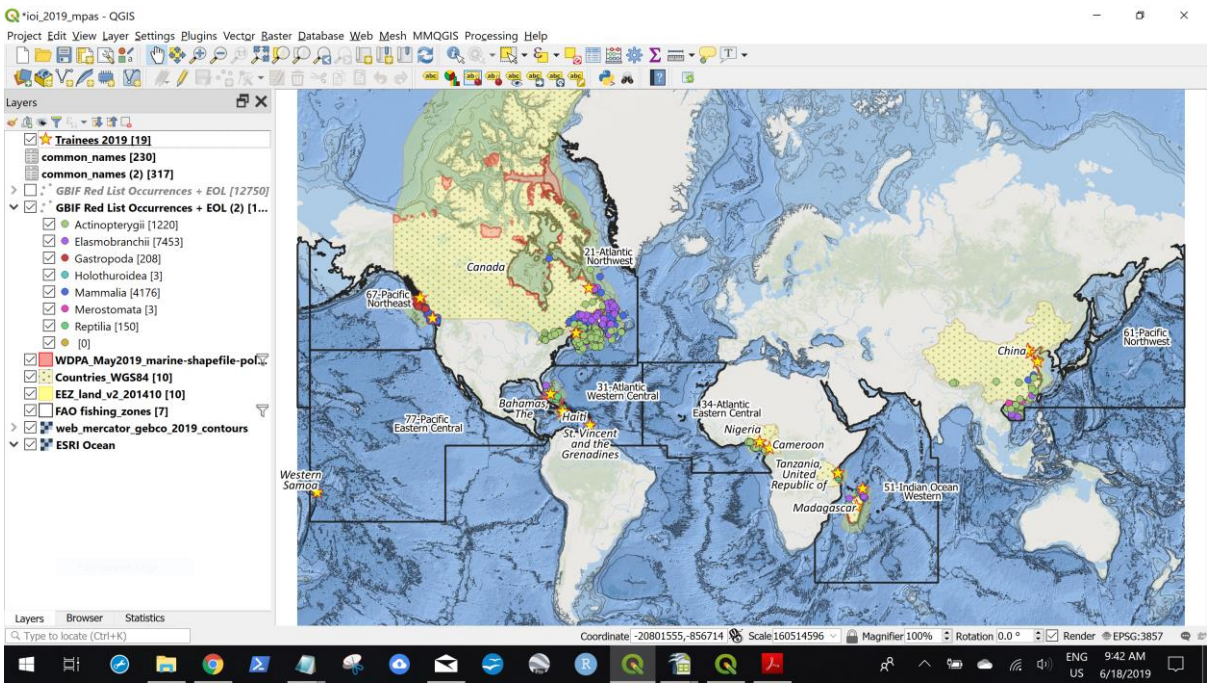
LIDAR AND INSHORE MAPPING (12th June)
Tim Webster

- Principles of topo-bathymetric lidar
- Information derivatives from a single topo-bathy lidar survey
- Perspective on Coastal Management using derived information
- Case study using information for shellfish aquaculture site suitability
- Information for risk assessments: flooding – landslides.

QGIS MAPPING LUNCH & LEARN - OPTIONAL SESSION (12th June)
Bob Branton

Follow-on session for interested trainees from 5th June lecture on 'Working with Maps':

- individualized assistance with download, install and use of free & open QGIS geographic information system and selected project files and data from 5th June session;
- group follow along demonstration of multi-layered world map (see below) showing details of individual trainee home countries, including: national coastlines and boundaries, exclusive economic zones, marine protected areas and world fishing zones overlaid with occurrences of endangered and threatened marine species.
- post session wrap up instructions for creating zoomed-in national take-home project maps.



LAND-SEA INTERFACE (12th June)
Graham Daborn

- The nature of an Estuary;
- Types of estuaries;
- Roles of tides and river inflow;
- Biological productivity: characteristic organisms, patterns of distribution, and relationships with tidal and other water movements;
- Biological connections between estuaries, and between terrestrial, fresh and salt water ecosystems;
- Case study: the Bay of Fundy - productivity, biological diversity and connections, human impacts (including climate change).

Fundamental message: Coastal ecosystems such as estuaries are among the most important and biologically productive ecosystems known, with huge importance to most of the world's population. Management of those coastal waters requires a sound understanding of the interactions between the terrestrial, fresh and salt water environments, recognition of their internal - and sometimes long distance - interactions, and their vulnerability to human activities. The size and scope of the coastal zone therefore varies according to the coastal watershed, and management decisions therefore need to be based upon a full understanding of land-sea interactions.

OCEAN ACIDIFICATION (13th June)
Krysten Rutherford

- Keeling Curve
- Science basics of ocean acidification (OA) & biological effects of OA (e.g. calcium carbonate & shells)
- Carbon dynamics in Canadian oceans, with the northwestern North Atlantic as a case study
- Factors affecting carbon dynamics (biological cycling, ocean circulation, temperature changes, etc.)
- Possible future states of carbon dynamics & the acidification of the coastal ocean
- Socio-economic effects of OA

REMOTE SENSING OF THE OCEAN (14th June)
Dirk Werle

I will briefly cover the principles of 'Remote Sensing' and portray some important applications of satellite imagery with regard to mapping and monitoring marine and coastal environments. Furthermore my presentation will touch on governance aspects concerning the commons of ocean space, outer space and cyberspace as they relate to collecting, processing, accessing and utilizing satellite remote sensing data.

MARINE MANAGERS AND THE NEWS (20th June)
Ian Porter
Paul Withers

In addition to a day and a half of presentation-skills training, the Communication and Negotiation Module includes a day entitled **Marine Managers and the News**, an overview of relationships between organizations and the news media. It will examine some of the challenges the media present to marine managers and examine how you can engage with the media both to respond effectively with your public and to develop public support for good management of marine resources.

NEGOTIATION THEORY AND PRACTICE (21st June)
Hugh Williamson
Nayha Acharya

- Negotiation theory (various models will be discussed, with some emphasis on integrative bargaining)
- Practical skills in negotiation

ECOSYSTEM-BASED FISHERIES MANAGEMENT PART 2 (24th June)
Noreen Kelly

- Human activities and cumulative effects
- Cumulative impact mapping: a new scientific endeavour
- Cumulative Impact mapping: The Halpern model
- Case Study: British Columbia, Canada
- Ongoing work in Maritimes region

CERTIFICATION OF FISHERIES (25th June)
Isa Elegbede

- Introduction to certification in the fisheries sector
- Historical background
- International regulations supporting certification of fisheries
- Minimum requirements of standards and certification schemes
- Impact of certifications in the fisheries sector
- Guidelines and pathways of certifications
- Benefits of certifications
- Challenges facing certifications in fisheries
- Existing certification schemes in the fisheries sector
- **Case studies**:
    - Case study 1: Marine Stewardship Council (MSC): Comanaged Red rock lobster fishery in México
    - Case study 2: Friend of the Sea (FOS): Shrimp lobster fisheries in Africa
    - Case study 3: Research on the development of the Indigenous certifications for the American Lobster fisheries in Nova Scotia

FISHING FLEET ECONOMICS (25th June)
Rob Parker

- Expanding the concepts of fisheries economics and fisheries management to capture climate change and other broader environmental challenges
- The current state of energy inputs and greenhouse gas emissions in the world's fisheries and how they compare to other systems
- How can fisheries and fisheries management contribute to lowering our carbon footprint?
- Considering the broader implications of fisheries management decisions when viewing fisheries through the lens of global food production systems and their environmental footprint, including potential unexpected or counter-intuitive effects

SEAFOOD VALUE CHAIN (27th June)
Megan Bailey

- Sustainable seafood movement
- Supply chains and value chains
- Governance
- Traceability
- Socio-economic contributions

FISHERIES MANAGEMENT CYCLE (27th June)
Suzuette Soomai

Fisheries management cycle in DFO (Maritimes Region):

- Overview of fisheries sector in the Maritimes region and related regulatory and policy frameworks
- Decision-making process (management measures, fisheries management plans, precautionary approach, stakeholder consultations, ecosystem approaches to management and climate change considerations in decision-making)

SEA-CAGE AQUACULTURE (28th June)
Jon Grant

- Aquaculture and global food security
- World aquaculture statistics
- Aquaculture and ecosystem-based management
- Need for management in aquaculture
- Ecosystem services
- Measures of sustainability
- Characterization of aquaculture ecosystems

- Marine spatial planning
- Ecological modelling applied to aquaculture
- Fish health
- Waste management
- Case study – Port Mouton Bay

MARITIME SECURITY (2^{nd} – 5^{th} July)
Bob Edwards
Remi-Martin Gionet

The purpose of the maritime security module is to familiarise participants with maritime security and emergency management concepts and methods to protect maritime interests, counter maritime threats, and meet maritime-related obligations under international law. The module will also assist participants prepare their integrated ocean and coastal policy document which is to be presented at the end of the program.

The IOI-Canada Integration Exercise 2019 materials are the basis for the maritime security policy exercise. These materials will be augmented with additional information.

Participants will be representing Antillia, one of the simulated countries used during the IOI program. Three groups will work independently in separate break-out rooms to develop an Integrated Maritime Security Policy for Antillia. Each group will use the Integrated Maritime Compliance and Enforcement (IMCE) methodology to develop their policy. This methodology is taken from the module's source document, *Integrated Maritime Enforcement: A Handbook* (IME Handbook), Centre for Foreign Policy Studies, Dalhousie University, and International Ocean Institute, February 2000.

First, they will identify Antillia's maritime interests, threats and obligations across the spectrum of marine activities: the protection of maritime sovereignty, countering illegal activity, the protection of the marine environment, the management of marine resources, and marine safety. This will include a risk analysis of maritime threats and challenges to determine priority areas.

Next, they will identify the capabilities needed to address these maritime interests, threats and obligations in four categories: political , legal, operational/bureaucratic, and non-state/user. The final task is to develop policy objectives and implementation recommendations. A risk analysis as well as a quantitative analysis (using matrices) are included in the methodology to assist in developing well reasoned policies.

Some of the questions we will address:
- What is maritime security?
- What are maritime security interests? threats & challenges? obligations?
- How do I develop a maritime security policy?
- Is there a difference between a maritime security policy and a strategy?
- How can navies & coast guards be used within a maritime security regime?
- Does Antillia need a navy? or a coast guard?

Topics will include:

- An introduction to maritime security
- A methodology to develop a maritime security policy
- Navies & coast guards within a maritime security regime
- Marine compliance & enforcement

Themes for the Maritime Security module:

- The importance of the oceans for prosperity
- The need for stability & order on the oceans and along the coasts for prosperity and sustainable development
- The importance of determining what 'capabilities' are required – political, legal, operational & non-state & users – to protect maritime interests, prevent and counter maritime threats, and meet obligations (duties) under international law when developing maritime security policies.
- Along with protecting maritime interests, preventing and countering maritime threats, and meeting obligations come opportunities to increase international mutual understanding and build trust & confidence ('confidence-building measures' or CBMs).
- The need for cooperative, coordinated and, where possible, integrated approaches to: protect maritime interests, prevent and counter maritime threats, and meet obligations.
- The importance of 'political will' and following international law when addressing maritime security threats and challenges.
- The maritime security principles of: understanding the maritime environment, prevention, response & recovery.
- The need to detect and understand what is occurring off our coasts ('maritime domain awareness'), and the necessity to respond appropriately to counter maritime security threats and support maritime interests.
- The important role of 'compliance' within a maritime security regime.
- The requirement to uphold international law.
- The need for international cooperation.

SHIPPING FUNDAMENTALS (8th July)
Jack Gallagher

- Why do we venture onto the oceans?
- Focus on commodity transportation.
- Major commodity ship types
- Ship functions
- Marine terminology
- Concept of a Port
- How we make shipping safer – IMO, maritime administrations, Class, training standards
- Current challenges to international shipping

PORT GOVERNANCE AND REFORM (9th July)
Mary Brooks

- Define governance and explore key issues in governance decisions
- Introduce some history on port reform and what leads governments to initiate reform
- Examine governance models in Canada, the U.S., and then Africa.
- Discuss port governance issues for developing countries
- Explore how port performance is measured (and by whom)
- Determining appropriate goals for various port stakeholders and impacts on port reform proposals
- Open discussion on port governance and port reform (and where the existing models fail).

INTERNATIONAL MARITIME ORGANIZATION (10th July)
Bud Streeter

- The Role and Record of the International Maritime Organization
- A brief industry overview
- The International Marine Regulatory Regime
- The Role of Delegated Organisations in the enforcement of the regulatory regime

INTRODUCTION TO GEOPHYSICS (12th July)
Kris Kendell

- Geophysical methods used in marine hydrocarbon exploration:
    - gravity
    - magnetics
    - seismic
- Acquisition/operations of collecting marine geophysical data, with an in-depth discussion on seismic
- Interpretation of geophysical data for the purposes of hydrocarbon exploration

GEOLOGY, ENERGY AND FRACKING (12th July)
David E. Brown

- Geology 101
    - Rock Types
    - Depositional Environments
- Petroleum 101
    - Sedimentary Basins
    - Petroleum Systems Elements
    - Petroleum Systems Processes
- Hydraulic Fracturing

EXPLORATION AND RISK (15th July)
Jennifer Matthews

- Atlantic Canada offshore
- Project Life-cycle
    - exploration
    - development
    - production
    - decommissioning
- Health, safety and environmental considerations
- Risk and risk management

TIDAL POWER: GLOBAL (15th July)
Sue Molloy

The goal of the class:

- To give a basic understanding of the marine renewable energy tidal power systems that are being developed and deployed in Canada
- Learn the technical challenges in this industry
- Familiarise participants with environmental and socio-economic issues

Topics covered as best as possible in the time available:

- Tidal Power
    - energy resources
    - science and engineering of tidal power turbines
    - types of turbines
    - where tidal power fits in the energy mix
    - why tidal power is worth pursuing
    - what concerns are there with respect to the development of tidal power systems?

TIDAL POWER: BAY OF FUNDY (15th July)
Daniel Hasselman

- What is marine renewable energy?
- Why tidal power?
- The creation of FORCE: process and permitting
- FORCE's dual roles: host and steward
- Environmental monitoring program overview
- Ongoing research and development programs
- Next steps at FORCE

WIND POWER (16th July)
Kevin Doucette

- Wind Energy (macro level)
- Requirements for Developing a Wind Farm