Coastal Response Research Center
Overview

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Today’s Topics

• Overview of Center
  • Origins/Mission
  • Research Foci
• Sample Center Projects/Products:
  • Environmental Response Management Application
  • Arctic: Oil-in-Ice
  • PAH Toxicity Field Manual
  • Sea Grant/NOAA Human Dimensions Project
Center Creation

- NOAA’s Office of Response and Restoration (ORR)/UNH spill partnership in 2004
- Co-Directors:
  - UNH - Nancy Kinner
  - NOAA - Amy Merten
- Funding for oil spill research decreasing
  - Government
  - Private sector
- Many research needs exist regarding spill response, recovery and restoration
Overall Center Mission

• Develop new approaches to spill response and restoration through research/synthesis of information
  • Annual request for proposal (RFP) of ~$1M/year
  • Focused peer reviewed research projects
    • Oil-in-Ice
• Serve as a resource for ORR and NOAA
• Serve as a hub for spill research and tech transfer for all stakeholders
• Hot topic workshops with All stakeholders
• NOAA Practitioner needs
Specific Center Missions

- Conduct and oversee **basic** and **applied** research and outreach on spill response and restoration
- Transform research **results into practice**
  - NOAA Liaisons
- **Educate/train students** who will pursue careers in spill response and restoration
Focus Topics

Dispersant Use

Submerged Oil

Injury Assessment

Integrated Modeling and Observing

Oil-in-Ice

Human Dimensions
Environmental Response Management Application
A Picture is Worth a Thousand Words...

- Diverse datasets interlaced on single map to visualize complex nature of situation
Advantage of Web Based GIS Platform for Spill Response

- Provide resource managers with information to make decisions
- Integrate and synthesize various types of information
- Provide fast visualization of current information
- Improve communication and coordination among responders and stakeholders
Functional Web GIS Platform for Response

• Package data in a well-designed management, visualization and analysis tool:
  • Easily accessible - field and command
  • User friendly
  • Quick to display
  • Capable of real-time data display
  • Simple to update/ download from
  • Secure
Features

• Secure Login
• Critical Datasets for Environmental Response
• Real-Time Vessel Traffic from Coast Guard
• Layers as Base Maps
• NOAA Navigational Charts
• Weather and Buoy Observations
• Interactive Tools
Practical Implementations of ERMA™

- Assist with spill preparedness
- Assist in coordinating response efforts
- Define the extent of potential impacts
- Assist in Recovery and Restoration

(DEMO)
Other Applications of ERMA

- Damage to infrastructure
- Larger storm events
- Coastal flooding
  - Rita, Katrina, Ike, Gustav
- Climate change
  - C. Wake later today
- Use ERMA as a decision aid
Potential Pilot Project for ERMA

- Ease of visualizing potential impact
- Possible Inputs (NH/Great Bay):
  - Flood plain models
  - Freshwater discharge models
  - Storm surge models
  - Sea level rise
- Collaboration with C. Wake?
Potential Pilot Project for ERMA

- Example: Coastal wastewater treatment plants
  - Which are at risk?
  - What are the potential consequences of plant damage/shutdown?
  - Are there preventative steps?
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Oil-in-Ice
Oil in Ice

• Opening the Arctic Seas: Envisioning Disasters and Framing Solutions Workshop-March 2008
  • Goal: identify key strategies, action items and research needs so Arctic Nations and communities can prepare for and respond to marine disasters incidents
  • Participants: 7 Arctic states/3 indigenous nations, governments, NGOs, private sector
  • Scenarios: oil tanker collision, cruise ship grounding, oil rig fire, tug/barge accident, fishing vessels trapped in ice
  • Agreement on 11 overarching conclusions used directly by:
    • Arctic Maritime Shipping Assessment
    • Arctic Council
Oil-in-Ice: Behavior, Biodegradation and Potential Exposure Research

Participation in Joint Industry Project:

• $6+M
• Norwegian, Canadian, French, U.S., Russian participants
• Industry and Government partnership
Conceptual Model
Arctic Food Web Cycle

AIR

ICE
Dissolved & particulate oil

1° Producers

Microbial loop

2° Producers/zooplankton (amphipods)

SEA WATER

Sedimentation of particulates (including small oil droplets & oil sorbed to particles)

1° Producers

Pelagic Feeders (fish, marine mammals)

BENTHOS

Microbes

Fish

Invertebrates

Surface

Water depth
Oil-in-Ice: Behavior, Biodegradation and Potential Exposure

- **Questions We Want to Answer?**
  - What is behavior of oil in ice?
  - What are transport & degradation processes and rates that control fate of oil frozen in ice?
  - What are exposures and effects for ice-related organisms?
  - How will response options affect exposure?
Focus Topics

Dispersant Use

Submerged Oil → Injury Assessment → Oil-in-Ice

Integrated Modeling and Observing

Human Dimensions
Oil Toxicity Field Guide for Aquatic Habitats

- Proof-of-Concept project designed to display oil toxicity information
- Consistent and easily searchable format
- Field guide and accompanying CD with additional data
Functions of Manual

- Communication of synthesized toxicity information to stakeholders
  - Federal, State, and local responders
  - Responsible parties
- Training of various personnel about acute effects of oil compounds to aquatic species
- Rapid evaluation of toxicity thresholds in freshwater and salt water
Example Scenario

- Cosco Busan oil spill (Nov. 2007)
- 58,000 gallons of heavy fuel oil
- San Francisco Bay Area
  - Dungeness Crab season
- Information collected
  - Source oil composition
- Is there a potential hazard to the crab catch this season?

Photo courtesy: NASA
Testing/Future of Project

- Tested successfully at Mississippi River spill in New Orleans last month
- Testing will continue through NOAA ORR
- Future improvements for guide:
  - Oil weathering models
  - CD with complete database and copies of source literature
  - Website
  - Continuing updates of database for both PAH toxicity levels and source oil compositions
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Human Dimensions

Oil-in-Ice
Problem

- Need for greater focus on human dimensions in state and national response process
- Projected increase in frequency and severity of oil spills
  - Natural disasters (e.g., hurricanes)
  - Subsidence
  - Aging infrastructure
Proposed Solution

• Enhance communications between NOAA OR&R and Sea Grant.
  • Link national, state, and local levels
  • Create more unified planning, response and restoration

• Sea Grant agents know unique set of potential oil spill stakeholders associated with:
  • Natural resources
  • Tourism and recreation
  • Cultural ties to community
Origins of LA Sea Grant/ORR Project

- Pilot for nation-wide Sea Grant/ORR activities
Spill Protocol

- NOAA ORR receives spill notification
- ORR personnel email spill information to Sea Grant extension agents (e.g., size, location, time of discharge)
- Sea Grant agents decide how to use the information (who to notify)
Applications

• 2 spills since June meeting
• Grand Isle
  • Information passed on to Port Commissioners in Grand Isle and Port Fourchon
• Mississippi River at New Orleans
  • High media attention
  • But low environmental impacts explained and less stakeholder alarm thus far
Coastal Response Research Center
Website
www.crrc.unh.edu