Coastal Response Research Center

Nancy Kinner
Amy Merten

July 6, 2006
Today’s Meeting

• Center’s mission
• Center’s external grants program
• Overview of some Center projects
• Selected Center initiatives
• Feedback and discussion
Packet Contents

- Today’s slides
- One page description of Center
- 2006 requests for proposals
- Table of projects funded
- Contact information
- Current project descriptions
- 2005 Center annual report
- Center’s dispersants report
Coastal Response Research Center Mission
Center Creation

• Funding for oil spill research decreasing
  • Government
  • Private sector
• Many research needs exist regarding spill response, recovery and restoration
• ORR/UNH oil spill partnership started in 2002
• Coastal Response Research Center formed in 2004
Overall Center Mission

- Develop new approaches to spill response and restoration through research/synthesis of information
- Serve as a resource for ORR and NOAA
- Serve as a hub for spill research, development, and technical transfer
  - Oil spill community (e.g., RRTs)
Specific Center Missions

• Conduct and oversee **basic** and **applied** research and outreach on spill response and restoration
• Transform research **results** into **standards of practice**
• Encourage strategic **partnerships** to achieve mission
• Conduct **outreach** to improve preparedness and response
• Create a **learning center** to promote awareness of capabilities and realistic expectations about risks and benefits
Center Budget Expenditures Through 2005

Annual Budget (Congressional Appropriation) = $2-3M

Administration = 23%
Outreach = 3%
Internal Research = 1%
External Research = 73%
External Grants Program
Annual Request For Proposals

• Identification of priority research needs
  • Center-hosted research needs workshops
• Research needs meetings with NOAA staff
• Extensive peer review of proposals and funded projects
• Typical project = $150,000/yr for 2 years
2006 Annual RFP Topics

- Dispersed Oil
- Submerged Oil
- Integrating Ocean Observing Systems and Spill Response
- Uncertainty and Risk Communication
- Habitat Recovery
- Restoration Scaling Methods
Funded Projects

- 2002 = 3 projects
- 2003 = 5 projects
- 2004 = 5 projects
- 2005 = 6 projects (Started in Feb 2006)
- 19 Total Projects
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Title</th>
<th>Topic Area</th>
<th>$ Funded</th>
<th>Project Dates</th>
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<tr>
<td>Kenneth Lee</td>
<td>Bedford Institute of Oceanography</td>
<td>Wave Tank Studies on Dispersant Effectiveness as a Function of Energy Dissipation Rate and Particle Size Distribution</td>
<td>Transport &amp; Weathering of Released Materials</td>
<td>$199,999</td>
<td>1/2006 - 1/2008</td>
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<tr>
<td>Richard Lee</td>
<td>Skidaway Institute of Oceanography</td>
<td>Fate and Effect of Emulsions Produced After Oil Spills in Estuaries</td>
<td>Injury &amp; Recovery of Natural Resources</td>
<td>$197,593</td>
<td>8/2002-12/2005 (Completed)</td>
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</table>

Table in Your Packet
West Coast
- Chinook salmon smolts
- Columbia River sediments
- Southern California currents
- Copepods

Alaska
- Cook Inlet sediments
- Copepods
- Selendang sediments

Northeast
- Buzzards Bay terns
- Buzzard Bay stakeholders
- Copepods

Mid-Atlantic Coast
- Virginia beaches
- Snapping turtles
- Delaware Bay sediments
- Chalk Point, MD spill stakeholders
- Copepods

Gulf Coast/Caribbean
- Louisiana salt marshes
- Texas beaches
- Mississippi River delta sediments
- Soft corals
- Deepwater blowouts
- Grass shrimp
- Copepods
Project Topics

- Focus on ecosystem modeling and effects because of NOAA’s mission
  - Injury & recovery of natural resources
  - Transport & weathering of released materials
  - Human dimensions of oil spills
  - Dispersants
  - Toxicity
Translating R&D into Action -- Evolving Process

Major Emphasis and Unique Aspect of Center:

- NOAA liaisons for projects
- Establish working groups of practitioners and end users on:
  - Dispersants
  - Toxicity
  - Human dimensions of spills (risk communication, social impacts, subsistence issues, valuing resources, coordination among stakeholders, environmental ethics)
Dispersants Initiative

• NRC 2005 report on dispersants efficacy and effects discussed need for integrated research plan
  • Need for collection and dissemination of peer-reviewed information
    • Scientifically-robust and environmentally-meaningful context
  • Center’s mandate to address national issues related to spills
    • Act as a hub for oil spill research
Dispersants Initiative

- Center and NOAA convened meeting of USCG, USEPA, MMS, TXGLO, OSRI, LA OSRD, CA OSPR, API and Industry reps
  - July 2005
- General willingness by all parties to participate in formulation of integrated research plan (Dispersants Working Group)
- Workshop on R&D needs for making decisions regarding dispersing oil
Dispersants Workshop

• UNH on Sept 20-21, 2005 followed by Working Group planning meeting on Sept 22
• ~35 invitees from regulatory agencies, USCG, academia, private sector
• Outcome of workshop = list of RFP topics and brief descriptions
• Working Group will use these as basis for their upcoming RFPs
Dispersants Workshop

• Discussion topics:
  • **Dispersants effectiveness**: Parameters that affect overall effectiveness
    • Chemical
    • Operational and hydrodynamic
    • Modeling integration
  • **Effects of dispersants**
    • Fate of oil and dispersed oil in the water column and other habitats
    • Realistic exposure regimes
    • Toxicity testing
Dispersants Website

- Workshop summary report in your packet
- Dispersants link on Center’s website
  - www.crrc.unh.edu/dwg/
  - Description of Dispersants Working Group (DWG)
  - One pagers on each DWG member including research, funding opportunities
  - Links to on-going RFPs of members
  - Workshop report
Submerged Oil Issues

• Increasing trend in commerce of heavy oils to the U.S.
• Little capabilities for detecting, recovering, or mitigating submerged oil
• Limited capabilities to predict fate and transport of submerged oil
• Center developing initiative with UNH Joint Hydrographic Center
Submerged Oil Workshop

- Winter 2006/2007 at UNH
- Define current state of the art and explore current research
- Identify research needs and RFP topics and teams
- Coordinate with USCG, NOAA, MMS and Industry
New Projects/Partnerships

- **Marine Debris**
  - NOAA Marine Debris Program and CRRC
  - UNH/NOAA Marine Debris Projects
  - Support Safe Seas Drill, Aug 7 - 10, San Francisco, CA

- **CRRC experiment - dye, drifters, drogues, Dispersed Oil Monitoring Plan (aka refined SMART)**

- **Human Dimensions of Oil Spills - Workshop Results and Research**
Responding is More than Response

- NOAA ORR
  - Damage Assessment Center
  - Marine Debris Program
- One NOAA
  - Resource management
- Co-Trustees
  - Federal, State, Local
  - Impacts to birds and other non-NOAA trust resources
Goals of Shoreline Countermeasure and Assessment Technique (SCAT)?

• Collect data from the field that supports the response.
  • Where the oil is
  • Distribution, quantity and quality
  • Sediment penetration
  • Weather & tides
  • Key biological factors that will drive response

• On segments that completely encompass the potential area of impact
Marine Debris - Another ORR Mission

- Man-made pollution: marine debris has been recognized as a problem for over 50 years
- Persistent pollution in ocean and on shorelines
- Debris is everywhere - found in both populated and unpopulated & remote areas
- Harmful to:
  - People
  - Environment
  - Economy
Debris Impacts

• Aesthetic impacts (impact tourism/economy)
  • FL example: litter on the beach or in the water was identified as the third most important problem (behind water pollution from agriculture and industry) affecting Florida’s marine resources (FCSHWM, 1998)
  • NY medical waste - lost millions of dollars from a drop-off in tourism, and increased beach cleanup maintenance (NRC, 1995)

• Hazards to navigation and fishing activities
  • Ongoing problem in Gulf of Mexico from Hurricane impacts
  • Chronic issues world-wide associated with derelict fishing gear

• Wildlife (entanglement, ingestion)
  • Well documented for more than 20 years to have impacted sea turtles, marine mammals and multitudes of birds

Pollution source and transport, esp. plastic
  • PCBs, DDE (Dichlorodiphenyldichloroethylene) and nonylphenols were detected in polypropylene pellets off the coast of Japan (Mato et al., 2001)

• Plastic abrasion - microscopic pieces of plastic ubiquitous
  • Thompson et al., 2004 - Science
  • Invasive species/bacteria transport
NOAA Marine Debris Program

OR&R revitalized the Program by:

- Funding marine debris prevention, reduction, and research projects in states such as NH, AK, WA, HI, MS, AL, MD, and FL

- NOAA has created two Federal Funding Opportunities for external partners

- Developing links and coordination among NOAA and outside partners to address marine debris activities

Photo: Bamford/NOAA; Puget Sound, June 2005. A 300 yard net was pulled from the seafloor, containing a shark among other organisms.
NOAA Marine Debris Program

OR&R revitalized the Program by:

- Crafting an overall implementation plan

- Creating outreach and education opportunities discussing marine debris
  - (http://marinedebris.noaa.gov)

- Co-chairing the Interagency Marine Debris Coordinating Committee made up of 11 Federal Agencies

Photo: Bamford/NOAA; Puget Sound, June 2005. A 300 yard net was pulled from the seafloor, containing a shark among other organisms.
Marine Debris and Spills

- **Sources:**
  - Incident-based (Selendang Example)
  - Land-based
  - Ocean-based
- Marine debris and oil - similar collection areas
- Complicates cleanup and disposal
- Restoration - removal of marine debris
- SCAT and MD - Apply same survey approach, geo-referenced photo-logging
- Integrated database/PDA development
Selendang Ayu
Selendang Ayu

- Broke apart Dec 8, 2004, Unalaska, AK
- Helicopter crashed during rescue
- ~ 500 miles of shoreline needed to be surveyed for extent of oiling
- Marine debris issues on remote shoreline
  - Incident related and general MD problems
- Combined project to have SCAT teams collect MD data during surveys
- MD database - prioritized MD cleanup and led to removal effort using NOAA MD funds
New Projects/Partnerships

• Marine Debris
  • NOAA Marine Debris Program and CRRC
  • UNH/NOAA Marine Debris Projects
  • Support Safe Seas Drill, Aug 7 - 10, San Francisco, CA

• CRRC experiment - dye, drifters, drogues, Dispersed Oil Monitoring Plan (aka refined SMART)

• Human Dimensions of Oil Spills - Workshop Results and Research
Typical Debris Found During Surveys
Helicopter Crash Debris Field
Helicopter Crash Debris Field

Black box located by SCAT teams
Planning for MD Removal Operations

No Priority Set
High
Medium
No Photo
No Photo Link
Very High
## MD Removal Operation Totals

<table>
<thead>
<tr>
<th>Date</th>
<th>Sites</th>
<th>Items</th>
<th>Weight, lbs</th>
<th>Comments</th>
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<tbody>
<tr>
<td>9/22/05</td>
<td>Broad Bay/UNK 9-14</td>
<td>Misc. debris, 7 crab pots</td>
<td></td>
<td>Crab pots rusted out and unusable</td>
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<td>9/22/05</td>
<td>Reese Bay/DTF 27-29</td>
<td>DFG and misc. debris</td>
<td>650</td>
<td>Estimated weight</td>
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<td>9/23/05</td>
<td>Reese Bay/DTF 29-31</td>
<td>DFG and misc. debris</td>
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<tr>
<td>9/24/05</td>
<td>Kasheega Bay/KSB 7-12</td>
<td>DFG and misc. debris</td>
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<td></td>
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<tr>
<td>9/25/05</td>
<td>Aspid Bay/ASP 13-18</td>
<td>DFG and misc. debris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/25/05</td>
<td>Alamuda Bay/ALM 6-10</td>
<td>DFG and misc. debris</td>
<td>12,379</td>
<td>Measured weight</td>
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<tr>
<td></td>
<td>Total Debris Collected</td>
<td>13,029</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>and Disposed off</td>
<td></td>
<td></td>
<td>13,029 Pounds!</td>
</tr>
<tr>
<td></td>
<td>Debris recycled</td>
<td>Supersack full of hard floats, 25 soft floats, some nets and lines</td>
<td>13,029</td>
<td>Not including crab pots</td>
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</table>
NOAA/UNH Beyond SCAT: An Integrated PDA-GPS Protocol UNH Research Project

• Test PDA use at current monitoring locations
  • With researchers and community volunteers
• Implement PDA use at these sites
• Map marine debris sites with GIS after each cleanup
• Use PDA and GIS systems to survey and analyze coastal areas not currently monitored for marine debris (e.g., GB NERR)
• Document the use of the PDA, database and GIS in a protocol that can be used in the future as well as by other entities
Advantages to using PDA-GIS Use

• More efficient data collection, transfer and input
• More accurate debris location
• More detailed/standardized debris characterization
• Data on potential influencing factors can be tied to monitoring locations
  • weather data,
  • population density,
  • tourist visitation estimates,
  • water levels and currents,
  • and water quality.
• The full integration of all available data will allow the researchers to examine trends and correlations in marine debris data with myriad potential influences.
When the SCAT Database isn’t just SCAT

- One container
- One data standard
- Multiple interfaces

Data that supports expansion tools...

- Detailed NRDA
- Detailed Marine Debris

• Segment
• Survey
• Zone
• Samples
• Trenches
• Basic NRDA
• Basic MD
NOAA Safe Seas 2006

• Full-Scale 2 day Drill, Aug 9-10, 2006, CA (PREP credit)

• Goals:
  • Demonstrate NOAA’s human and technological capabilities
  • Build relationships across NOAA to foster long-term inter-program collaboration
  • Partnership with CA OSPR, USCG, and RP
  • Multiple Training Pieces
Exercise Design

Decision Elements

- Dispersant Use
- Place of Refuge
- Marine bird and mammal rescue
- Marine debris mitigation
- Natural Resource Injury Assessment
CRRC and UNH Involvement in Safe Seas

- Nancy Kinner - Observer/evaluator
- Taylor Eighmy - VIP contingent
- Amy Merten and Jenna Jambeck (Prof. Civil Engineering, UNH)
  - Integrating marine debris and oiled shoreline assessment ($96,200, NOAA Marine Debris Program)
  - SS: focus on emergency response MD assessment
    - Source: land, marine, incident related
  - Working with NOAA ORR to integrate database design, PDA/GPS interface, to automate SCAT
  - Setting the national marine debris assessment standard using a robust dataset collected from NH shorelines
Marine Debris and Safe Seas

- Integrated into scenario/drift cards for MD
- Integrated into SCAT requirements
- Marine Debris Short Course
  - Overview of marine debris program issues
  - Oil spill-specific marine debris examples
  - Local experts invited instructors
  - Integration into SCAT
    - Field tools
    - Information Management
  - Field component combined with SCAT training
• Field Verification of Oil Spill Fate and Transport Modeling and Linking CODAR Observation System Data with SIMAP Predictions. PI: J. Payne (Payne Environmental Consultants, 18 months, $196,041
Objectives

• Measure small-scale transport processes
• Develop/validate oil-spill model algorithms for application to subsurface dispersion modeling of naturally-entrained and chemically-dispersed oil
• Refine dispersed oil monitoring program in CA
3rd Field Experiment - Jun 21, 2006

- 4 field deployments
- 4000 ppm of fluorescein dye (~2 - 5 hr plume)
- Aerial photography
- GPS drifter/drogues (2 and 4 m)
- 3 Fluorometers
  - 2 Turners (USCG SMART Team)
  - SIO - weighted and finned for high resolution sampling
“It’s a bit frustrating to have people come in tell us that everything is going to be okay, knowing that when all is said and done they are going to get on an airplane and go back to their little lives and say, ‘We did the best we could.’ This is our home and our island and our beaches that have been impacted. It just frustrates me so much.”

From Gill and Ritchie, The Selendang Ayu Oil Spill: A study of the renewable resource community of Unalaska/Dutch Harbor
Why Human Dimensions?

- 2003 Workshop to identify broad R&D topics for CRRC → 1 of 8 themes:
  “Communication: Public and Stakeholder Participation in Response and Restoration”
- CRRC response:
  - Topic area in RFP
  - Funded three studies ~ $400,000
- Hiring a research assistant professor
- Conducted a workshop Jun 13-15, 2006, to better delineate R&D needs
Human Dimensions of Oil Spills Research Needs Workshop

- Identify future R&D needs relating to breakout topics:
  - Subsistence
  - Environmental Ethics
  - Communication
  - Valuing Resources
  - Social Impacts
  - Coordination (Institutional Analysis)

- 35 invitees representing response community, regulators, researchers, responsible parties, local stakeholder groups
# Human Dimensions Participants

<table>
<thead>
<tr>
<th>Subsistence</th>
<th>Responder</th>
<th>Researcher</th>
<th>Regulator</th>
<th>Responsible Party*</th>
<th>Impacted Party</th>
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<td>John Kern</td>
<td>Tony Oliver-Smith</td>
<td>Alice Stratton</td>
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<td>Linda Robinson</td>
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<td>Rob Snyder</td>
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<td>Environmental Ethics</td>
<td>Pamela Bergmann</td>
<td>Don Scharer</td>
<td>Marybeth Bauer</td>
<td>Yvonne Addassi</td>
<td>Megan Baliff</td>
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<td>Yvonne Addassi</td>
<td>Doug Helton</td>
<td>Don Davis</td>
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<td>Alice Stratton</td>
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<td>Risk Communication</td>
<td>Ed Levine</td>
<td>David Loomis</td>
<td>Yvonne Addassi</td>
<td>Michael Macrandar</td>
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<td>Ron Morris</td>
<td>Don Scharer</td>
<td>Judith Holm</td>
<td>Macrandar</td>
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<td>Judith Holm</td>
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<td>David Kaiser</td>
<td>Ann Hayward-Walker</td>
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<td>Mike Ziccardi</td>
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<td>Alice Stratton</td>
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<td>Valuing Resources</td>
<td>Eric English</td>
<td>George Parsons</td>
<td>Steve Thur</td>
<td>Michael Macrandar</td>
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<td></td>
<td>Steve Thur</td>
<td>Christina Poulos</td>
<td>Eric English</td>
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<td>Mike Ziccardi</td>
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<td>Rob Snyder</td>
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<td>Social Impacts</td>
<td>Pamela Bergmann</td>
<td>Duane Gill</td>
<td>Ann Hayward-Walker</td>
<td>John Omohundro</td>
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<td>Liesel Ritchie</td>
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<td>Coordination in Response &amp; Restoration</td>
<td>Ron Morris</td>
<td>Tom Safford</td>
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<td>Don Scharer</td>
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Key-note speakers

• Doug Helton, NOAA Office of Response & Restoration
• Michael Macrander, Shell Global Solutions
• Duane Gill, Mississippi State University
Results/Thoughts

- Workshop report of R&D needs for each topic area
  - Eric Denny developing
    - Inform future RFPs
    - Basis for 3-5 year strategic planning for CRRC
- Better integration of social sciences into spill response at all levels
- Consideration of social scientists in hiring practices
- Development of training materials for natural scientists
- Foundation for broader interagency collaborations
  - “revitalization, something new, exciting, just what spill response needs”
Coastal Response Research Center

www.crrc.unh.edu