

RRT 2 Meeting

Coastal Response Research Center

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October 4, 2006



Today's Talk

- Coastal Response Research Center history, mission and administration
- Center's external grants program
- Overview of some Center projects
- Center outreach
- Issues Center is monitoring
- Feedback/Input/Discussion



Handouts & Packet Contents

- Today's slides
 - 2005 Center annual report
-
- One page description of Center
 - 2006 requests for proposals
 - Table of projects funded
 - Contact information
 - On Center website (www.crrc.unh.edu)
 - Current project descriptions



Coastal Response Research Center History, Mission and Administration



Center Creation

- Funding for oil spill research decreasing
 - Government
 - Private sector
- Many research needs exist regarding spill response, recovery and restoration
- NOAA's Office of Response and Restoration wanted to partner with research-oriented university to create center to address research needs



Center Creation

- ORR/UNH oil spill partnership started in 2002
- Coastal Response Research Center formed in 2004
- Co-Directors:
 - UNH - Nancy Kinner
 - NOAA - Amy Merten



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 for new approaches to spill response and restoration



Center Oversight

- Advisory Board
- Science Advisory Panel



Mission: Advisory Board

- Evaluate Center's programs, activities and budget, research themes, and priorities
- Help establish partnerships with public and private sectors



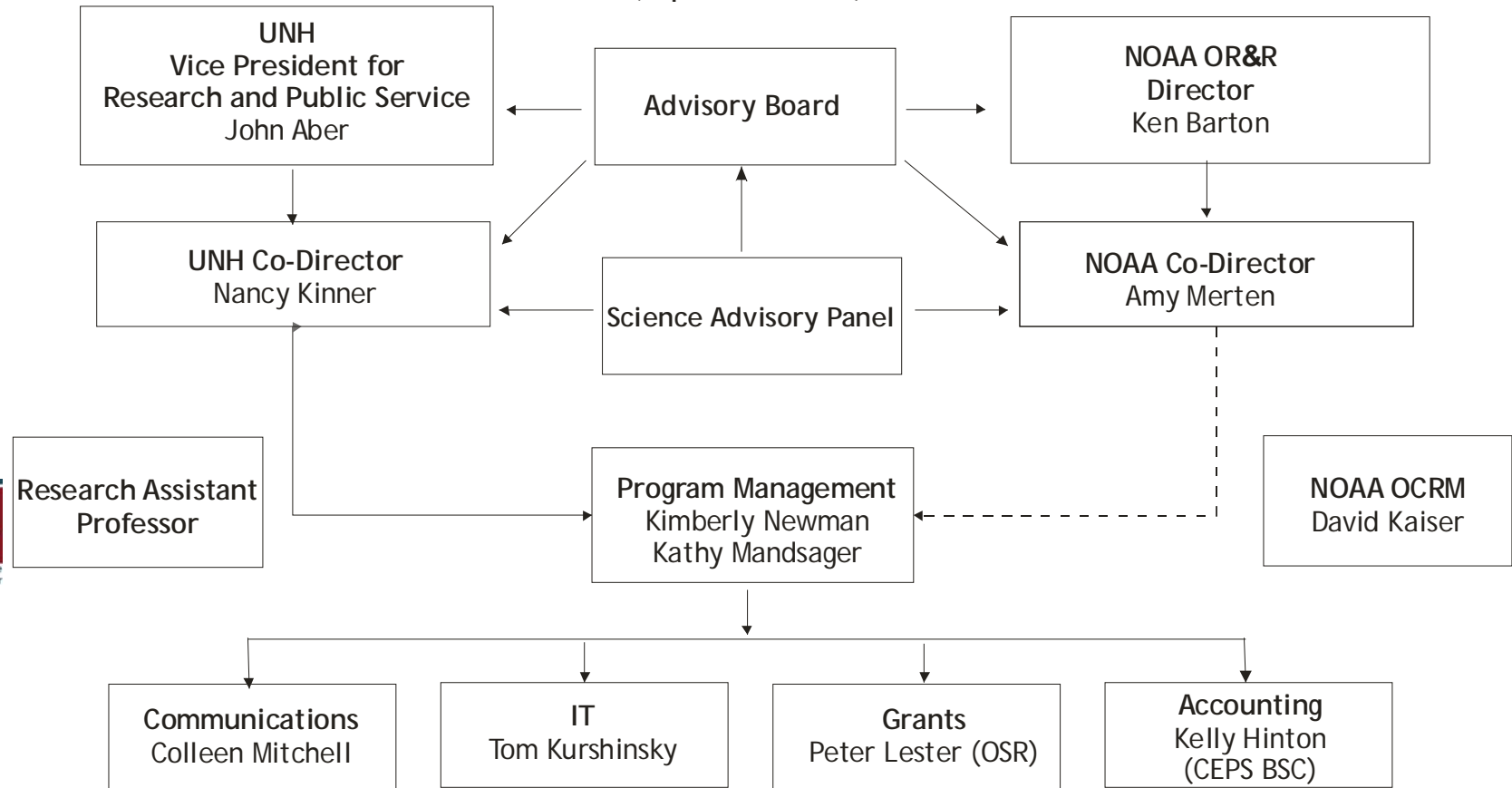
Science Advisory Panel

- Advice/recommendations on quality and usefulness of the funded projects
- Representatives from research community and users groups:
 - Academia
 - Governmental agencies (state/federal)
 - Private sector



Coastal Response Research Center Organizational Chart

(September 2006)



Center Budget

- Function of annual Congressional appropriation
- \$2-3M in FY 2004, 2005 and 2006
- >80% of money is used for research and outreach
- Most research is conducted by external entities
 - Academic institutions
 - Consultants
 - Government agencies



External Grants Program



Annual Request For Proposals

- Identification of priority research needs
 - Center-hosted research needs workshops
- Research needs meetings with NOAA staff



Annual RFP Mechanics

- Internet distribution, preproposal and proposal submittal, and reviews
- Issue RFP in May
- Projects funded starting following January
- \$1.0 to 1.2M funding available annually
- Modeled after National Science Foundation process



Peer Review

- Several peer reviews per proposal
 - 4 experts do individual reviews
 - 2 panel reviews
- Reviewed for:
 - Technical approach and innovativeness 30%
 - Scientific and management relevance 30%
 - Transferability 15%
 - Budget appropriateness 10%
 - Qualifications of project investigators (PI) 10%
 - Support and capabilities 5%



2006 Annual RFP Topics

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



Projects Funded by Center 2002 to Present



Funded Projects

- 2002 = 3 projects
- 2003 = 5 projects
- 2004 = 5 projects
- 2005 = 6 projects (Started in Feb 2006)
- 19 Total Projects



Projects Summary

| Name | Affiliation | Title | Topic Area | \$ Funded | Project Dates |
|--------------------------------|---|--|--|--------------|-------------------------------|
| Don Aurand | Ecosystem Management & Associates, Inc | The Relationship Between Acute and Population Level Effects of Exposure to Dispersed Oil and the Influence of Exposure Conditions Using Multiple Life History Stages of an Estuarine Copepod | Injury & Recovery of Natural Resources | \$232,062 | 1/2006 - 8/2007 |
| Thomas Chandler | University of SC | Utility of Meiobenthos for Risk Assessment of Low Level Crude | Injury & Recovery of Natural Resources | \$119,864 | 1/2004-10/2005 (Completed) |
| <h2>Table in Your Packets</h2> | | | | | |
| Ali Khelifa | Environment Canada | Effects of Dispersants on Oil-SPM Aggregation and Fate in US Coastal Waters | Transport & Weathering of Released Materials | \$126,378 | 1/2006 - 3/2007 |
| Kenneth Lee | Bedford Institute of Oceanography | Wave Tank Studies on Dispersant Effectiveness as a Function of Energy Dissipation Rate and Particle Size Distribution | Transport & Weathering of Released Materials | \$199,999 | 1/2006 - 1/2008 |
| Richard Lee | Skidaway Institute of Oceanography | Fate and Effect of Emulsions Produced After Oil Spills in Estuaries | Injury & Recovery of Natural Resources | \$197,593 | 8/2002-12/2005 (Completed) |
| Qianxin Lin | Louisiana State University, Wetland Biogeochemistry Institute | Dispersants as an Oil Spill Countermeasure for Remediation and Restoration in Sensitive Coastal Habitats | Injury & Recovery of Natural Resources | \$188,472 | 1/2004-9/2006 |

Project Topics

- Focus on ecosystem modeling and effects because of NOAA's mission
- Injury & recovery of natural resources = 10 projects
- Transport & weathering of released materials = 6 projects
- Human dimensions of oil spills = 3 projects
- Dispersant-related = 10 projects
- Toxicity = 10 projects



Project Demographics

- Government agencies = 2
- Academic institutions = 11
- Private sector = 6

- U.S. = 17
- International = 2

- Average \$ per project ~ \$149,000
- Average project length = 23 months



West Coast

- Chinook salmon smolts
- Columbia River sediments
- Southern California currents
- Copepods

Northeast

- Buzzards Bay terns
- Buzzard Bay stakeholders
- Copepods

Mid-Atlantic Coast

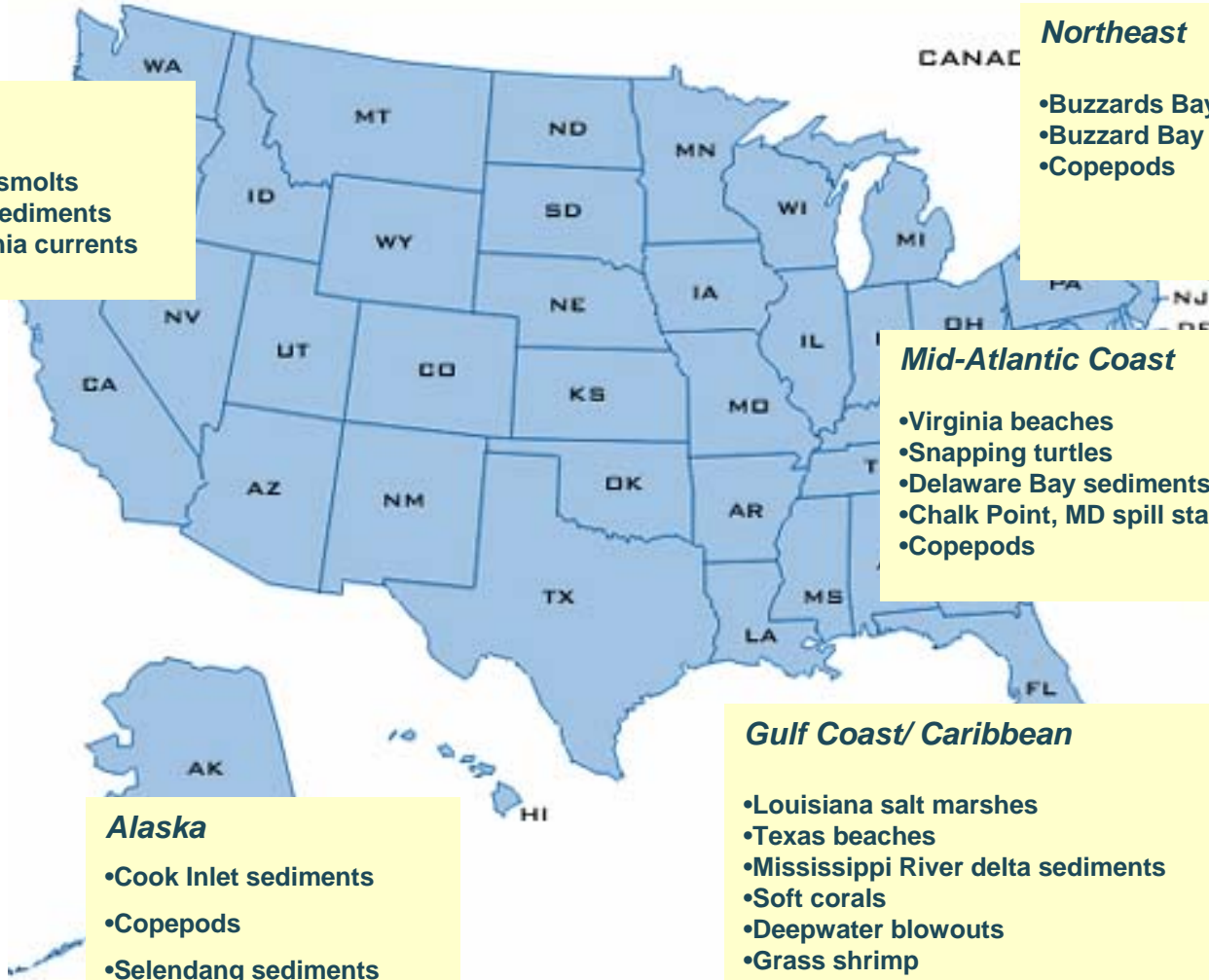
- Virginia beaches
- Snapping turtles
- Delaware Bay sediments
- Chalk Point, MD spill stakeholders
- Copepods

Gulf Coast/ Caribbean

- Louisiana salt marshes
- Texas beaches
- Mississippi River delta sediments
- Soft corals
- Deepwater blowouts
- Grass shrimp
- Copepods

Alaska

- Cook Inlet sediments
- Copepods
- Selendang sediments



Translating R&D into Action -- Evolving Process

- Major Emphasis and Unique Aspect of Center
- Examples:
 - Established NOAA Toxicity Working Group
 - NOAA liaisons for new projects



Translating R&D - NOAA Toxicity Working Group

- Synthesis of Center-funded research
- Identification of products useful for field
- Identification of remaining gaps
- August 2006 Toxicity Summit



NOAA Liaisons

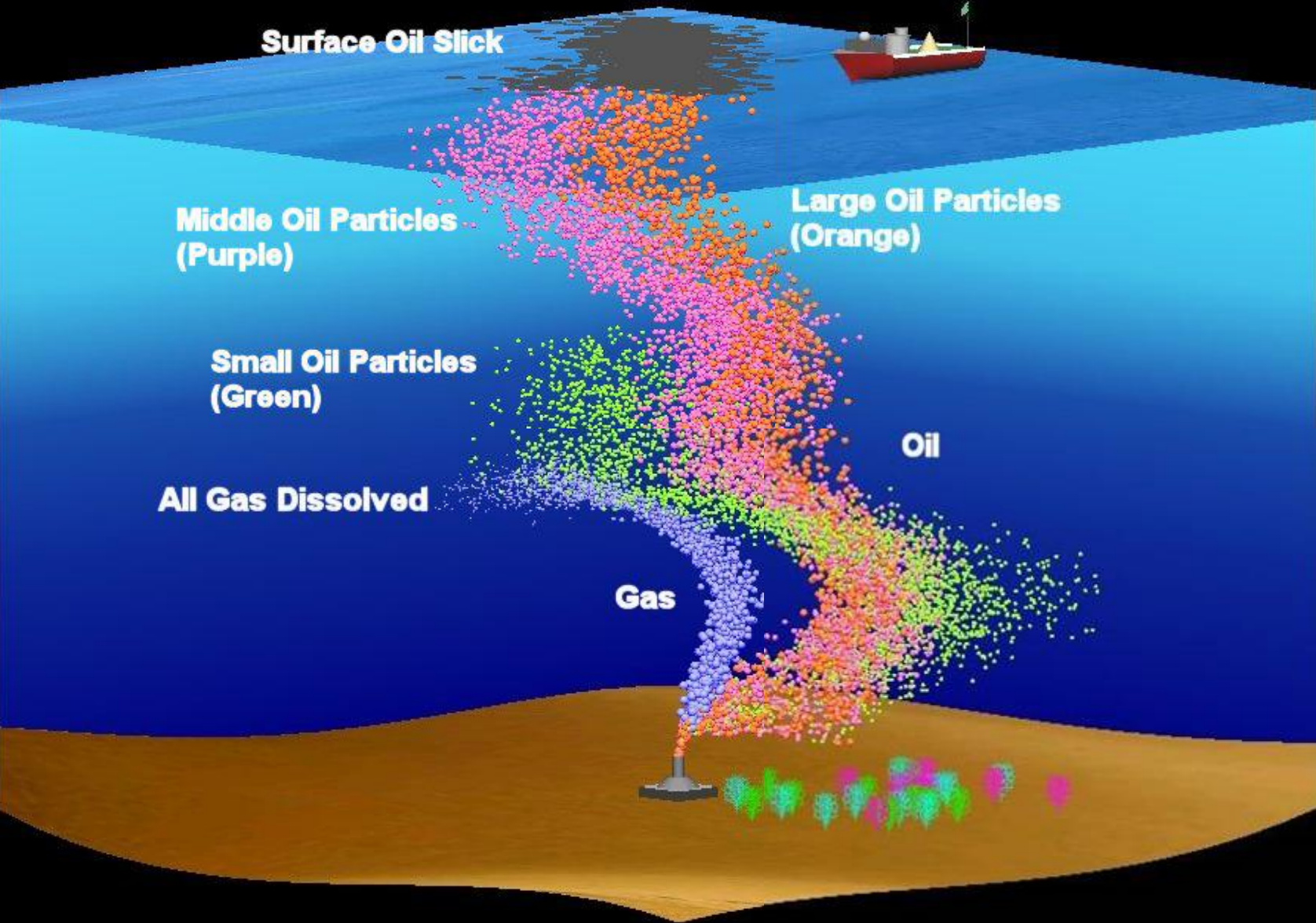
- NOAA liaison for each new project
 - Technical advisors to Co-Directors
 - Work with PIs to communicate research and develop products
 - Participate in site visits and field experiments
- Success story: Yapa et al. Deepwater well blowout model (CDOG)
 - MMS-funded research
 - Model for liaison initiative



CDOG Results

Yapa and Xie

2.9 hr



Yapa et al. Center Research Results

- **Integrated CDOG-GNOME models allow users to run complete deepwater through surface scenarios for response and planning**
- **User centered design is key to successfully moving research model into operational use**
- **User starts with NOAA Deepwater Spill Incident Data Preparation Sheet to aid responders in entering data quickly**
- **Integration designed with future compatibility in mind**
- **Both GNOME and CDOG have extensive error checking**



Example of Center-Funded Toxicology Research Chandler et al. (U South Carolina)

- Risk assessments of oil spill effects on wildlife require *population-level* information to have highest predictive power
- Despite this need, *rapid lifecycle* bioassays have been unavailable for sediment organisms most at risk of oil exposure
- Chandler uses copepods as model organisms

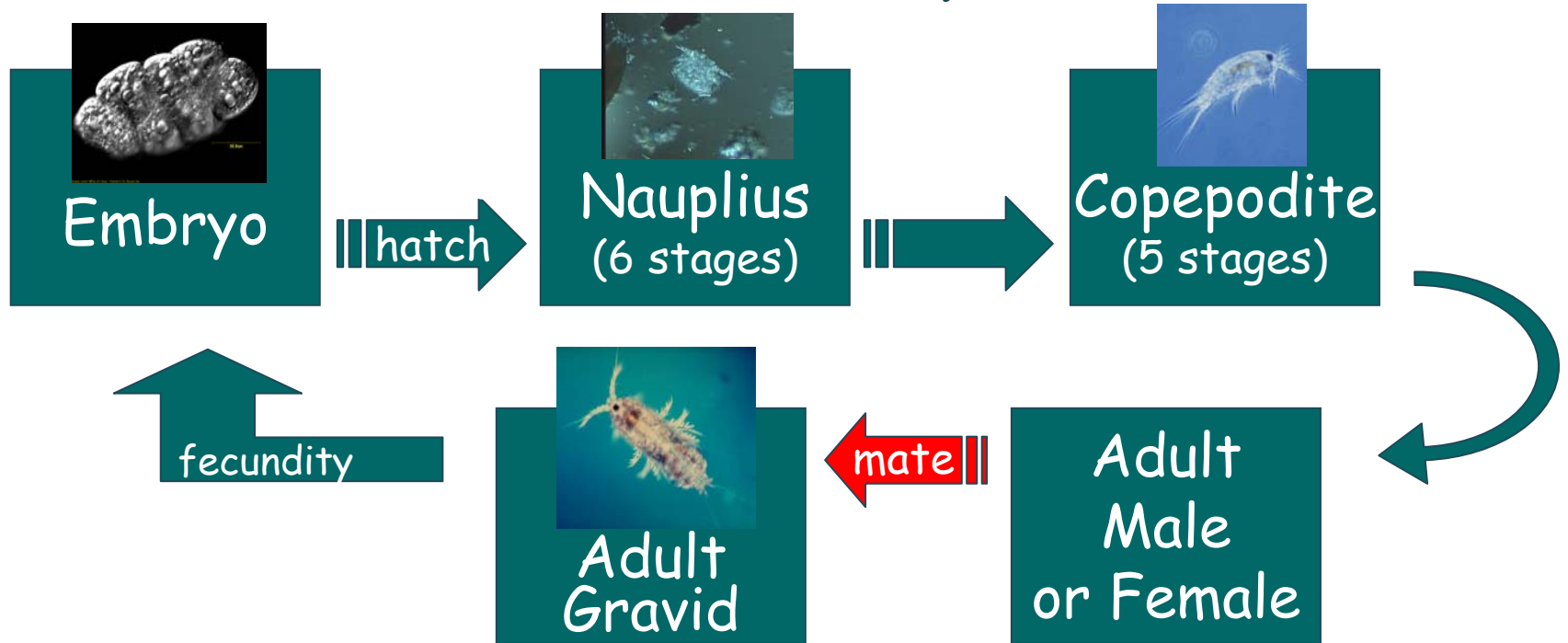


Objectives of Chandler's Research

- **Developed lifecycle assay for water soluble fractions of crude oil**
 - **Benchmarked against National Institute of Standards crude oil standard**
 - **Using Chandler's ASTM standard harpacticoid copepod bioassay**



Discrete Lifestages of the Meiobenthic Copepod *Amphiascus tenuiremis* at 25°C in 96-well microplate culture



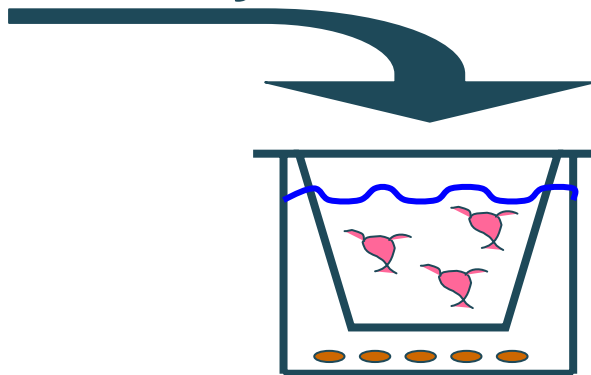
Lifecycle = 17-18 days Egg to Egg
Avg. Life Expectancy = 47 ± 2 days
Avg. Clutch = 6.2 ± 2 eggs



How the bioassay works..



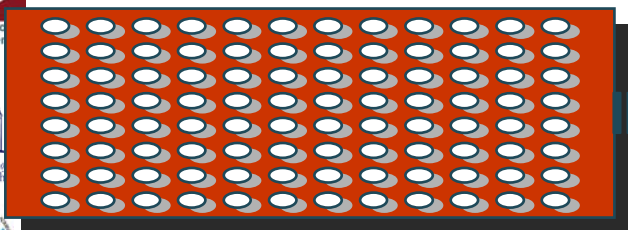
~ 200 gravid *A. tenuiremis*
(from lab stock mud cultures)



12-well plate Yields ~ 500 nauplii in < 24 h



- Life-cycle Endpoints:**
- Survival & Molting Success
 - Time to first Copepodite
 - Time to Adult
 - Sex Ratio
 - Fertilization Success
 - Clutch Size & Egg Quality
 - Hatching Success & Production



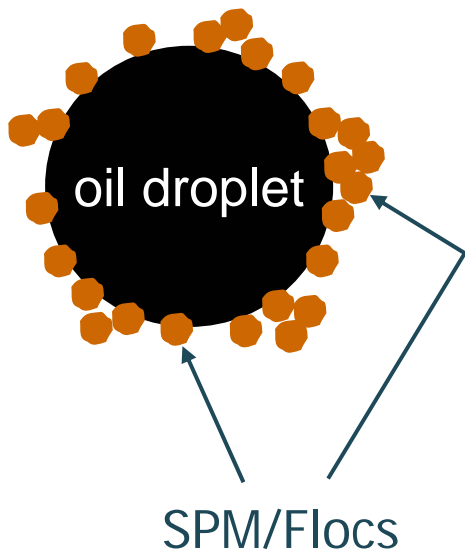
96-well Costar® microplate; 200 µl WSF
solution per 10 wells

X-MATINGS



Oil-SPM Aggregates (OSA)

Ali Khelifa & Merv Fingas
Environmental Technology Centre
Environment Canada
Ottawa, Ontario, Canada



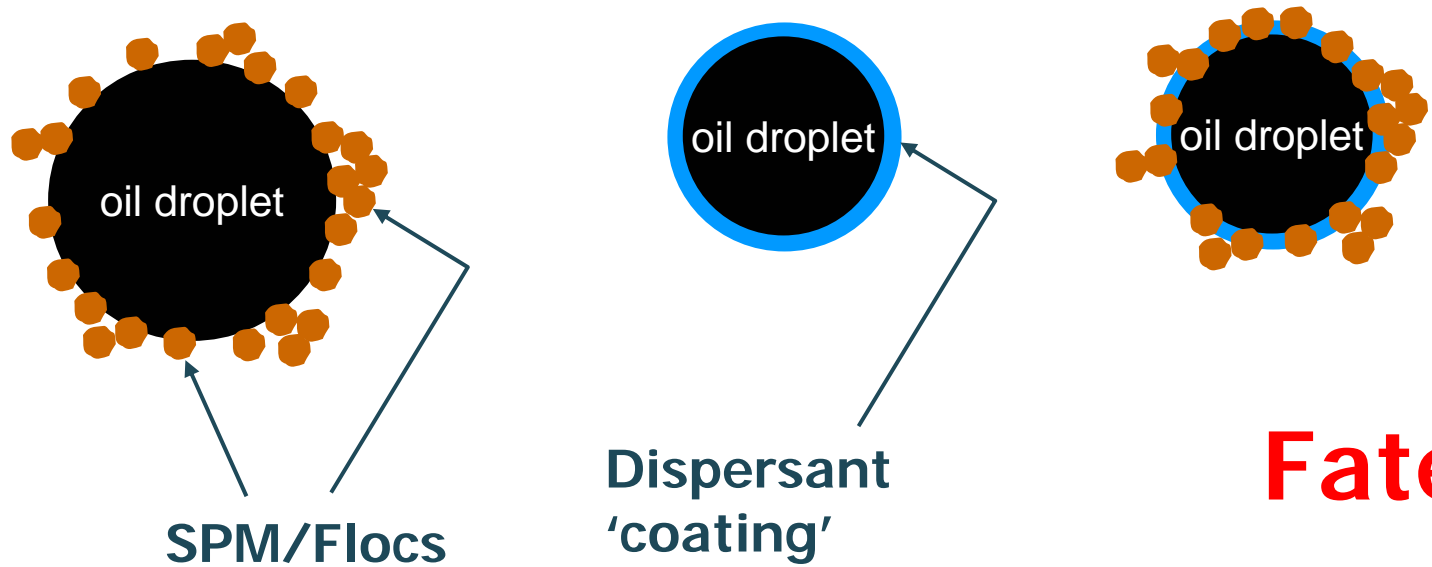
Oil Droplet

+
Suspended Particulate
Matter (SPM)

Oil-SPM Aggregate (OSA)



Issue: What Are Effects of Chemical Dispersants (CD) on OSA Formation?



Fate?



Objectives of Khelifa's Research

- Very little has been done and reported results are conflicting
- Quantify effects of dispersants on OSA formation under:
 - Various mixing conditions
 - Several sediment types and concentrations



Experimental Procedure

- Conditions

Sediments

Natural from four U.S. coastal waters

$C_s = 25, 50, 100, 200, 300$ mg/L

Oils

Three most shipped crudes in the U.S. waters

Chemical Dispersants

Corexit 9500 and Corexit 9527

DOR= 0, 1:10, 1:20, 1:40

Mixing

Controlled temperature =15°C

Constant mixing energy



Acute/Chronic Effects of Crude and Dispersed Oil on Chinook Salmon Smolts

Tjeerdema et al.- UC Davis

- Joint funding with CAOSPR and CA Oiled Wildlife Care Network
- Compare relative toxicity using 96 hr flow-through, declining exposure experiments
 - WAFs and CEWAFs of Prudhoe Bay crude
 - Corexit 9500
- Measure lethal and non-lethal endpoints (amino acids, energy molecules)
- LC_{50} WAF = 0.88 mg/l
- LC_{50} CEWAF = 152 mg/L
- Smolts exposed to WAF and CEWAF devoted resources to cell repair at expense of energy generation
 - Long term growth implications



Field Verification of Oil Spill Fate and Transport Modeling and Linking CODAR Data with SIMAP Predictions

Payne et al.

- Jointly funded with CAOSPR (2 releases each)
- Release of fluorescein dye to simulate dispersed oil and test tracking with High Frequency (HF) Radar and subsurface drogues
- Using vessels and airplanes off San Diego
- Measure small scale vertical and horizontal diffusivities and develop algorithms to improve/validate models including uncertainties



Communication

- Establishing Performance Metrics for Oil Spill Response, Recovery and Restoration
 - S. Tuler, SERI, 2 years
 - Including public in review and examination of metrics used in describing progress of spill response and restoration
 - e.g., Using actual spills as case studies
 - Chalk Pt, MD pipeline leak
 - Bouchard Barge 120 leak in Buzzards Bay, MA



D. Information Transfer and Outreach



Outreach

- Center Website (www.crrc.unh.edu)
- Information on research projects
 - Proposals
 - Progress reports
 - Final reports
 - Presentations
 - Articles
- Upcoming events/workshops/meetings of interest on spill response, recovery and restoration and related topics
- Center contact information



Dispersants Initiative

- NRC 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 from NOAA to address national issues related to spills
 - Act as a hub for oil spill research



Dispersants Initiative

- Center and NOAA convened meeting of NRC, USEPA, MMS, USCG, TXGLO, OSRI, LA OSRD, CAOSPR, 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
- Outcome of workshop = list of RFP topics and brief descriptions
- Working Group will use these as basis for their upcoming RFPs



Dispersants Website

- Workshop summary report available on Center's website
- 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



Human Dimensions of Spills

- High priority for NOAA and Center
- Selendang Ayu - Unalaska, AK -- Subsistence and cultural issues major driver in response, seafood contamination, risk communication, and damage assessment
- Hurricane Katrina experience



Human Dimensions of Spills Research Needs Workshop

- Communication, valuing natural resources, social impacts, subsistence, environmental ethics, institutional analysis
- Date: June 13-15, 2006 at UNH



Human Dimensions Workshop

- Identified several key areas in need of research
- Emphasis on including stakeholder input during planning and restoration
- Methods of valuing resources and informing stakeholders during immediate response
- Report will be available on website in late Fall 2006
- Center will initiate Human Dimensions Working Group



Future Outreach Initiatives

- Submerged/Heavy Oil Research Needs Workshop
 - Winter 2006/2007
- Coastal/Ocean Observing Systems and Oil Spill Response/Recovery Integration Workshop
 - Spring 2007



Coastal Response Research Center

www.crrc.unh.edu

