Natural Resource Damage Assessment and Restoration

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NOAA OR&R

United States Department of Commerce

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National Oceanic and Atmospheric Administration

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National Ocean Services

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Office of Response and Restoration

- Emergency Response Division
- Assessment and Restoration Division
- Marine Debris Program

OR&R – Who we are

- OR&R prepares for, evaluates and responds to threats to coastal environments

Common Hazards

- Oil spills
- Chemical spills
- Floating debris
- Hazardous waste sites
- Navigational hazards
- Derelict fishing gear
- Shoreline debris

Common Causes

- Ship collisions and groundings
- Offshore drilling accidents
- Severe weather
- Industrial pollution
- Lost/discarded fishing gear
- Poor waste management
- Tsunamis
- Lack of awareness

OR&R Work in Alaska

- Lead science advisor to the U.S. Coast Guard for oil spill response
  - Supported 200+ spill responses and 100+ trainings and drills in Alaska over 34 years
- Natural Resource Damage Assessment
  - Leads and participates in damage assessment and restoration projects throughout Alaska
- Marine Debris Program
  - Supporting local programs, outreach, and removal of 340+ metric tons of marine debris

NOAA Scientific Support Continuum

Planning and Preparedness → Emergency Response

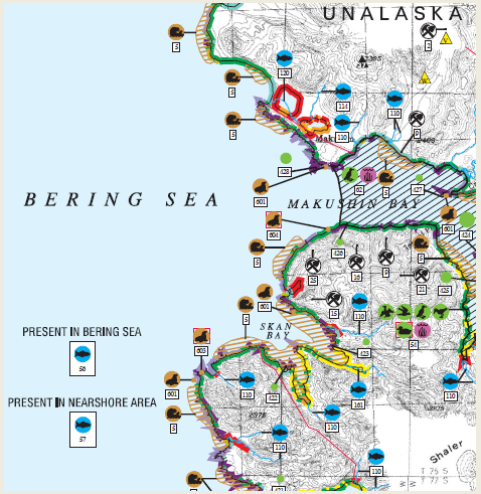
Restoration & Recovery ← Damage Assessment

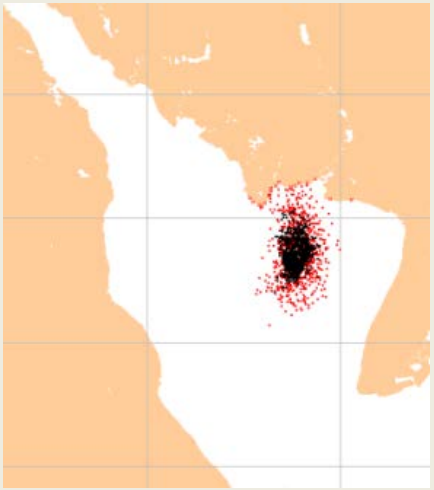
Emergency Response Division

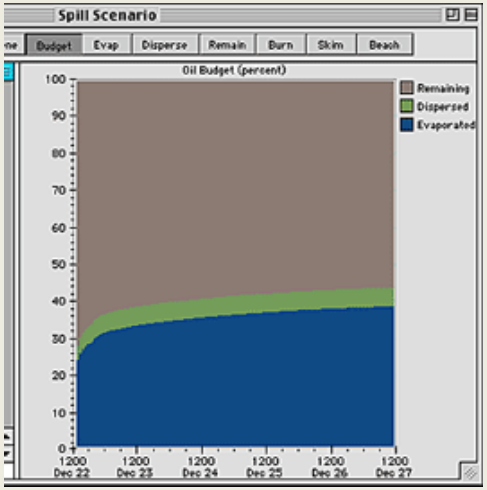
- Supports emergency response activities
  - Provides scientific support to the FOSC
    - Scientific Support Coordinators
    - Multidisciplinary team of scientists
- Assists in the development of contingency plans
- Provides training
- Develops tools for decision makers

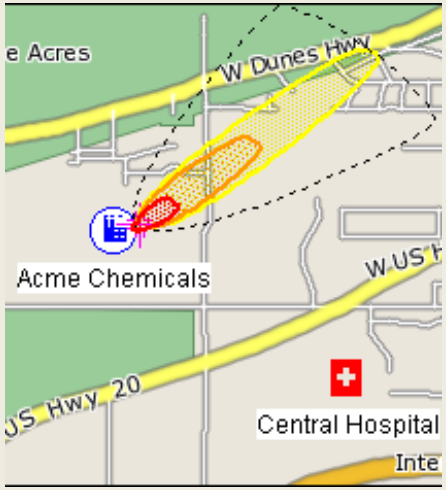
ERD Tools

- Environmental Sensitivity Index Maps (ESIs)
- GNOME (trajectory forecasting tool)
- ADIOS (oil weathering model)
- CAMEO (chemistry/reactivity model)



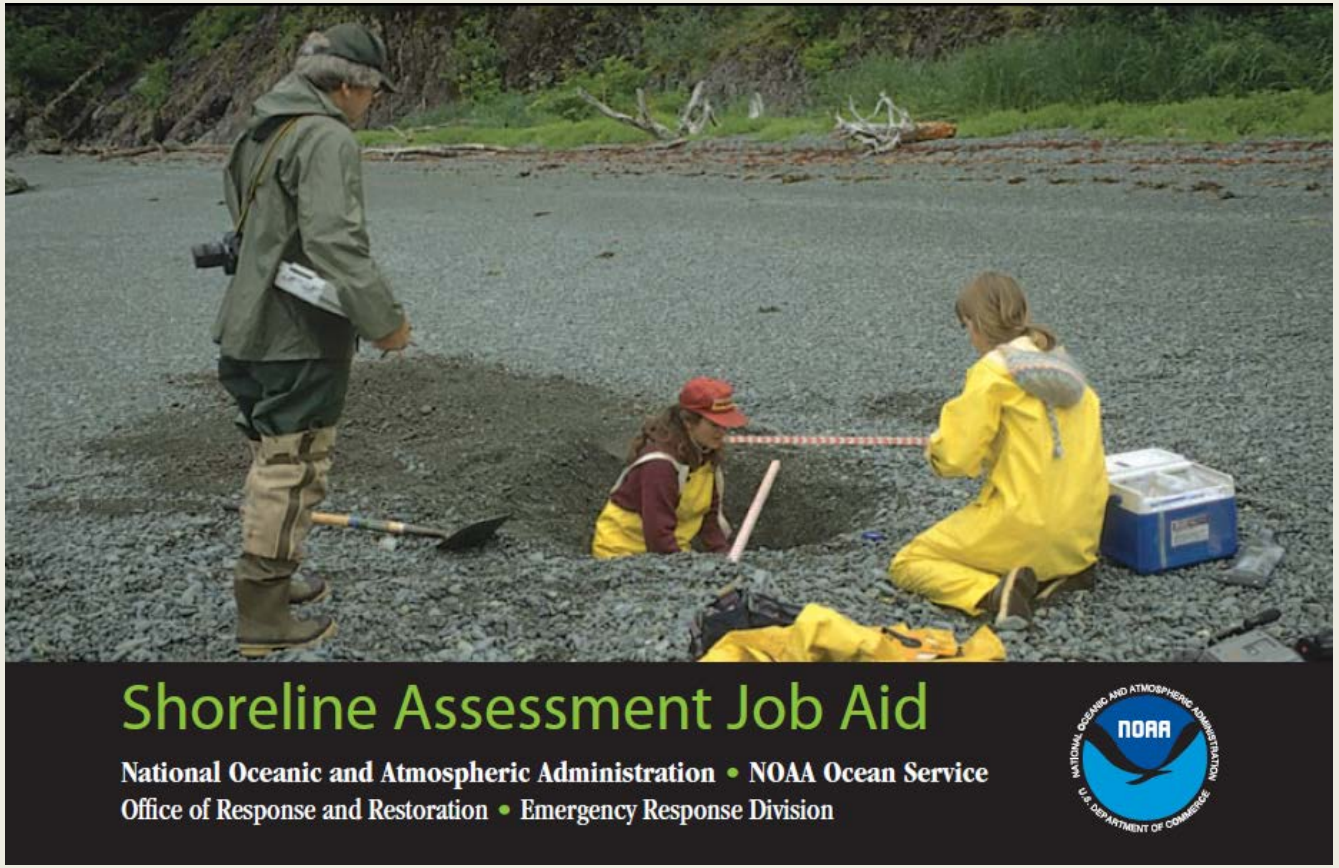






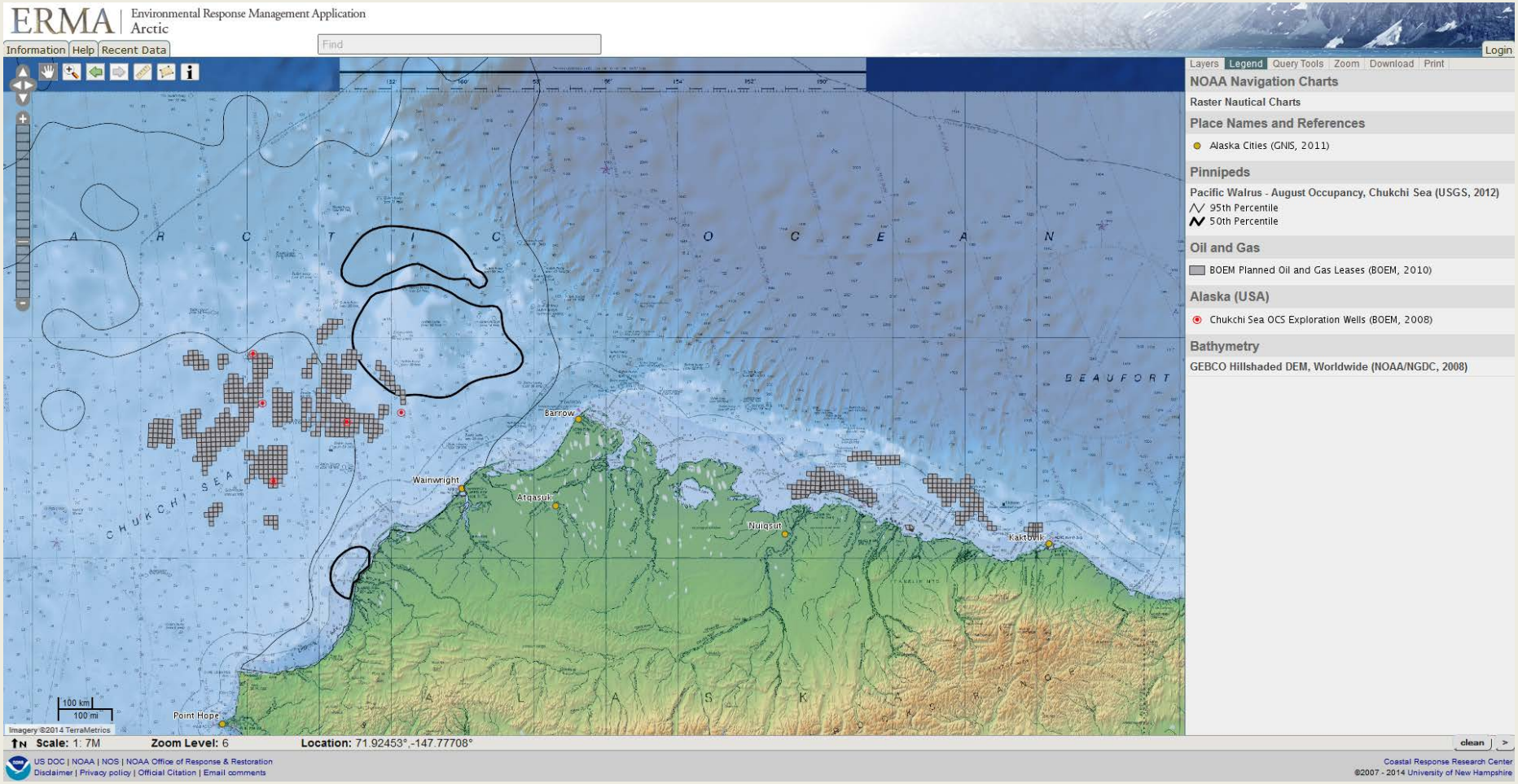
SCAT

- ERD organizes and participates in SCAT
  - Produces manual and job aid



ERMA

- Common operational picture for response and NRDA



NOAA Scientific Support Continuum

Planning and Preparedness → Emergency Response

Restoration & Recovery ← Damage Assessment

Natural Resource Damage Assessment

- Oil Pollution Act (OPA) authorizes natural resource trustees to conduct NRDA
- Goals of NRDA:
  - Assess injuries to natural resources
  - Determine amount of restoration needed and best restoration methods
  - Timely and cost effective
- Reasonable costs of assessment and restoration paid by RP (adjudicated by NPFC)

Joint NRDA Team

- Government agencies designated as natural resource trustees
  - Federal (NOAA, USFWS, EPA, BLM, NPS, BIA)
  - State (ADEC, ADFG, ADNR, ADOL)

- Cooperative NRDA – RP(s) is part of NRDA Team
  - RP(s) and Trustees work jointly on injury assessment and restoration
  - Degree of cooperation can vary
  - Reduces costs, potential for litigation, time to restoration

AK Joint Assessment Team

- Established in 2011
- Meets quarterly in Anchorage
- Mission:
  - Facilitate NRDA and restoration planning in Alaska through cooperation between Trustees and PRPs
  - Increase the likelihood of successful cooperative assessment and restoration in the event of a spill
- Scope:
  - NRDA for oil spills covered by OPA
  - Statewide - focused on the Arctic

AK JAT Participants

- Federal and State Trustees
- Industry
  - Shell
  - ConocoPhillips
  - ExxonMobile
  - BP
  - Chevron
  - Pioneer Natural Resources
  - ITOPF
  - Alyeska Pipeline Services Company

NRDA Process

Release

Pathway

Exposure

Injury

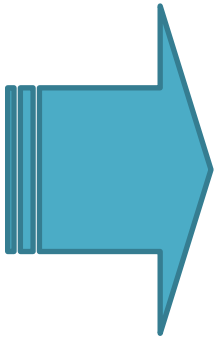
MUST ESTABLISH ALL ELEMENTS

PREASSESSMENT SCREEN
Ephemeral Data Collection Activities

Public and Community Involvement

INJURY ASSESSMENT / RESTORATION PLANNING

Field Studies
Data Evaluation
Modeling
Injury Quantification

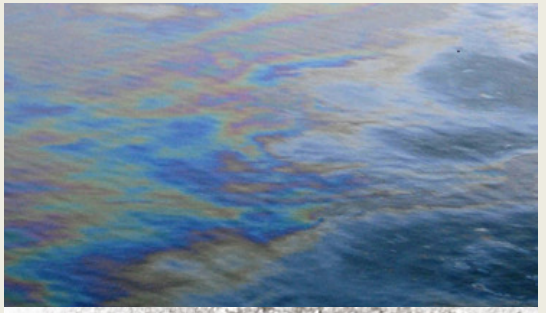


Project Identification
Project Scaling
Draft Restoration Plan
Final Restoration Plan

RESTORATION IMPLEMENTATION

Release, Transport and Fate

- What was released?
  - Source oil characterization
- Transport and fate
  - Product spilled
  - Local environmental conditions
  - Ageing
  - Degradation
- Response activities

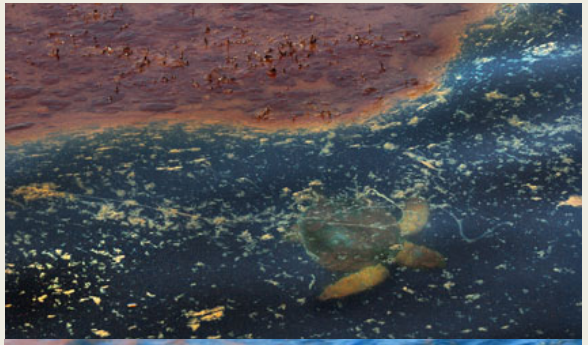


Pathway

- Spatial-temporal co-occurrence of resources and oil

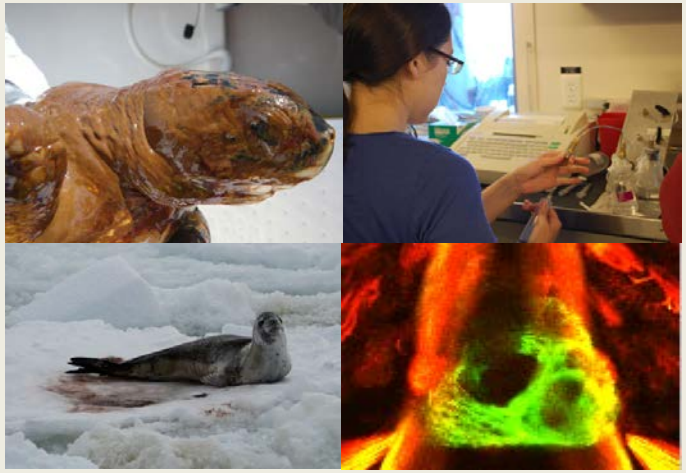
- Direct
  - Oiling
  - Exposure to oil chemicals in the environment

- Indirect
  - Food web

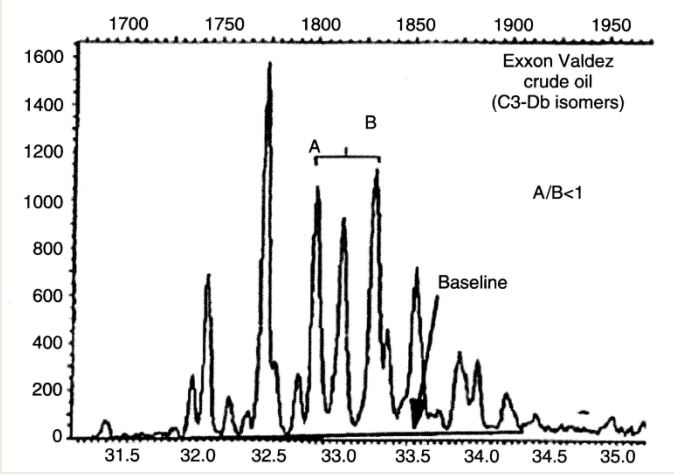


Exposure

- Methods for assessing exposure to oil chemicals
  - Visible oiling
  - Oil chemicals
  - Oil chemical metabolites
  - Biomarkers of exposure



- Connecting chemical exposure to released source oil
  - Chemical fingerprinting



Injury

- Resources, habitat and human use

- Direct measurements
- Toxicity testing
- Modeling
  - Connecting laboratory data to environmental damage assessment

Restoration Planning & Monitoring

- Selecting and scaling restoration
  - Primary restoration
  - Compensatory restoration

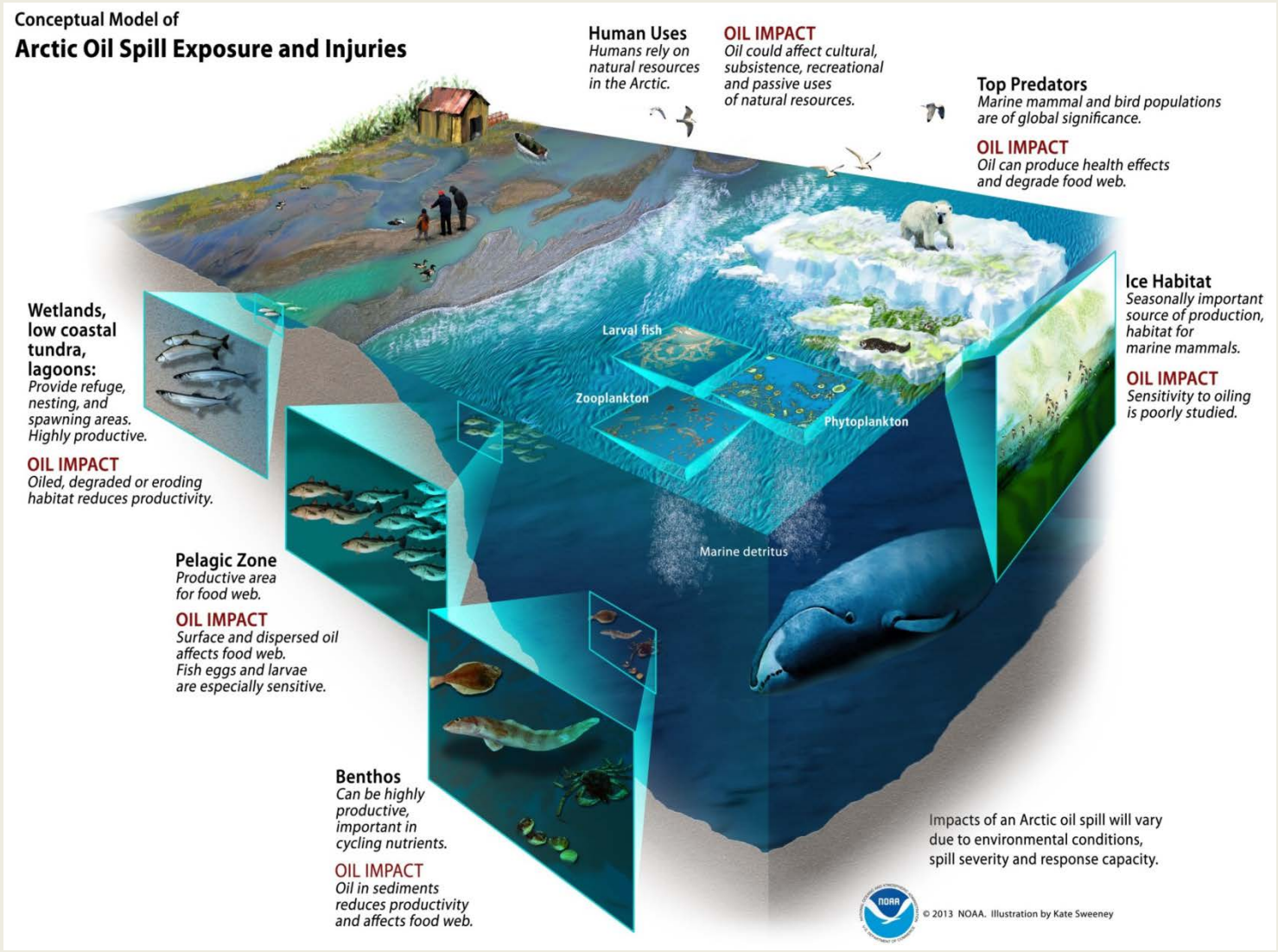
- Short- and long-term recovery monitoring

Baseline

- Pre-spill monitoring data
- Conditions at unimpacted sites

- Challenges:
  - Dynamic baseline, natural variability
  - Multiple sources of contamination

Focus on the Arctic



Collaborative Science

- Science that improves emergency response & NRDA
- Science from agencies, academia and industry
  - Peer-reviewed, independently verified
- Science that addresses unique habitats/resources
- Inclusive of range of spill scenarios
  - Oil exploration, oil production, tankers, shipping

Science for Response

- Reporting and verifying ice concentration and distribution reports
- Dispersant effectiveness in cold water
- Trajectory modeling of oil in ice
- Long-term fate of oil
- **Converting expert knowledge into operational decision making**

Science for Understanding Baselines

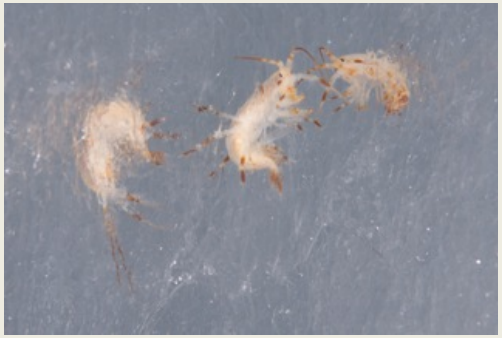
- Baseline data
  - Resources at risk
  - Arctic resources/habitats
    - Nearshore
  - Variability and trends
    - Long-term monitoring
  - Traditional ecological knowledge
  - Identification of key data sets
    - ERMA

Science for Field Assessments

- Sampling plans for unique habitats and resources
- Review Arctic ephemeral data collection guidelines
- Sentinel organisms for exposure and injury assessment
- Develop and verify innovative sampling methods

Science for Injury Quantification

- Toxicity testing
  - Relevant organisms and conditions
  - Exposure conc. and durations
  - Relevant endpoints for NRDA
  - Comparable
- Sublethal impacts
- UV potentiated toxicity
- Volatile organic compounds
- Traditional ecological knowledge
- Impacts of oil on sympagic organisms, communities and ecosystems



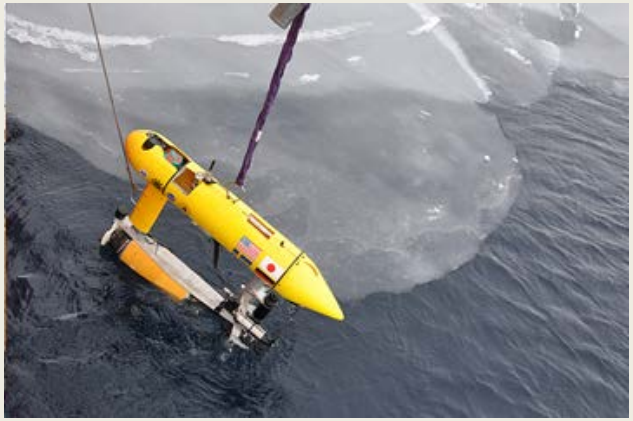
Science for Restoration

- Identifying potential restoration options
  - Planning and prioritizing NRDA
  - Scalable
  - Primary and compensatory
  - Arctic
- Restoration implementation
- Restoration monitoring
  - Short- and long-term

Using New Technology

- Unmanned Aerial Systems
  - Oil spill response and damage assessment
- Autonomous Underwater Vehicles

- Data interpretation and use in NRDA



Summary

- ERD provides scientific support for emergency response to oil spills
- NOAA/ARD is a trustee for NRDA
- NRDA is a legal process used to quantify injuries to natural resources and determine the type and amount of restoration required
- OR&R supports and applies science and technology to improve spill response and exposure and injury assessment

Questions??

www.response.restoration.noaa.gov

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