

# Long-Term Monitoring of Marine Conditions and *Exxon Valdez* Oil Spill Injured Resources:

## A New Integrated Program

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Alaska Ocean Observing System

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EVOS Trustee Council staff: Elise Hsieh  
Catherine Boerner



# EVOS Trustee Council FY12 RFP – Nov 2011

## Four focus areas with 2 long-term programs:

- ✓ Herring
- ✓ Long-term monitoring of marine conditions and injured resources
  - Harbor protection and marine restoration
  - Lingering oil

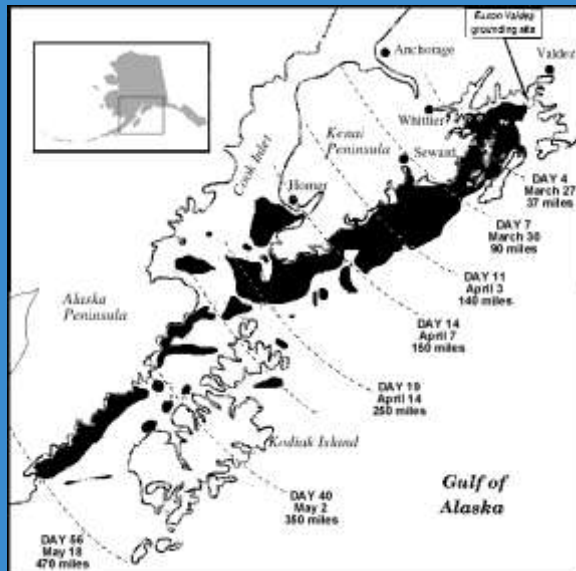
## Monitor multiple physical & biological factors:

“Long-term monitoring after a spill has two components: monitoring the recovery of resources from the initial injury and monitoring how factors other than oil may inhibit full recovery or adversely impact recovered resources. ... such data are increasingly valuable in illuminating the larger ecosystem shifts that impact and influence a broad variety of species and resources injured by the spill.” *EVOS Trustee Council RFP*



# Monitoring Program Goals

- Provide data and products to support information needs of resource management agencies, research community and general public
- Identify and help understand the impacts of multiple ecosystem factors on recovery of injured resources.



Long-term impacts of the EVOS spill in a complex, changing ecosystem



# EVOS Trustee Council Integrated Programs

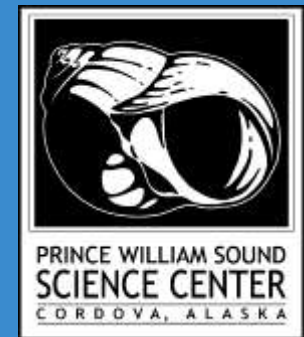
- **Long-term Monitoring of Marine Conditions and Injured Resources and Services**
  - **Integrated, multidisciplinary 5 year program, \$11.9M, 24 PIs**
  - **Team Lead:** Alaska Ocean Observing System - Molly McCammon
  - **Science Lead:** NOAA Kasitsna Bay Laboratory - Kris Holderied
  - **Admin Lead:** Prince William Sound Science Center – Katrina Hoffman
- **Prince William Sound Herring Research and Monitoring Program**
  - **5 year, \$5.6M program - process studies, monitoring, modeling**
  - **Team Lead:** Prince William Sound Science Center - Scott Pegau



Exxon Valdez Oil Spill  
Trustee Council



Kasitsna Bay  
Laboratory



# Long-term Monitoring Program Components



NOAA



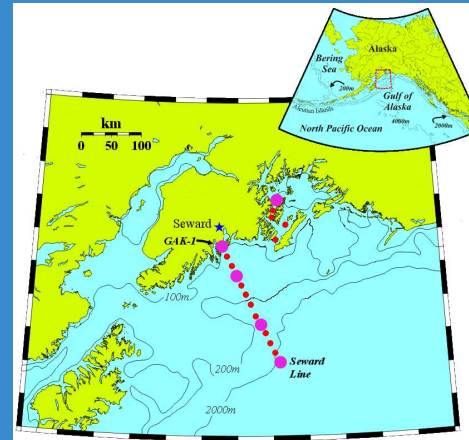
NOAA

## • Thematic

- **Environmental Drivers** – oceanography, plankton
- **Benthic** – intertidal invertebrates/algae, sea otters, seabirds
- **Pelagic** – whales, seabirds, forage fish
- **Lingering Oil** – sediments, sea otters/harlequin ducks

## • Geographic

- **Prince William Sound**
- **Outer Kenai Coast**
- **Lower Cook Inlet**



## • Programmatic

- **Integrated program management, administration, outreach**
- **Data management and services**
- **Synthesis - LTM program/ EVOS impacts & recovery status**



## Program Management and Science Coordination/ Synthesis

- Molly McCammon – Alaska Ocean Observing System (Lead PI)
- Katrina Hoffman – Prince William Sound Science Center (Administrative Lead)
- Kris Holderied – NOAA Kasitsna Bay Laboratory (Science Lead & Environmental Drivers)
- Tuula Hollmen – Alaska Sea Life Center (Conceptual Ecological Modeling)
- Rob Bochenek – Axiom/AOOS (Data Management Lead)
- Matt Jones – National Center for Ecological Assessment & Synthesis (Synthesis)



## Environmental Drivers Component

- Tom Weingartner – University of Alaska Fairbanks (Component Lead)
- Sonia Batten – Sir Alister Hardy Foundation for Ocean Science
- Rob Campbell – Prince William Sound Science Center
- Angela Doroff – ADF&G Kachemak Bay Research Reserve
- Russell Hopcroft – University of Alaska Fairbanks

## Pelagic Component

- Jeep Rice – NOAA/NMFS Auke Bay Laboratory (Component Lead)
- Mary Ann Bishop – Prince William Sound Science Center
- David Irons – USFWS Alaska Region
- Craig Matkin – North Gulf Oceanic Society
- John Moran – NOAA/NMFS Auke Bay Laboratory
- John Piatt – USGS Alaska Science Center

## Benthic Component

- Brenda Ballachey – USGS Alaska Science Center (Component Lead)
- James Bodkin – USGS Alaska Science Center
- Heather Coletti – National Park Service, SW Alaska Inventory & Monitoring Network
- Thomas Dean, Coastal Resources Associates, Inc
- Brenda Konar – University of Alaska Fairbanks
- Katrin Iken – University of Alaska Fairbanks

## Lingering Oil Component

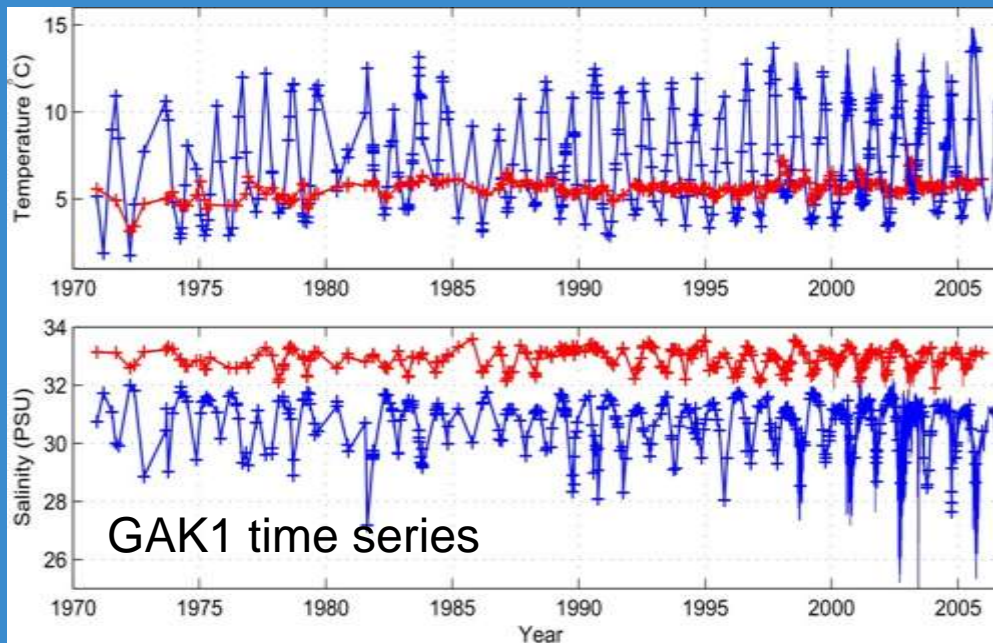
- Mark Carls – NOAA/NMFS Auke Bay Laboratory
- Brenda Ballachey - USGS Alaska Science Center

# Principal Investigators



# Approach / Philosophy

- Address needs of management agencies
- Maintain existing time series in spill-affected region
- Create sustainable program
- Incorporate multiple geographic areas/scales



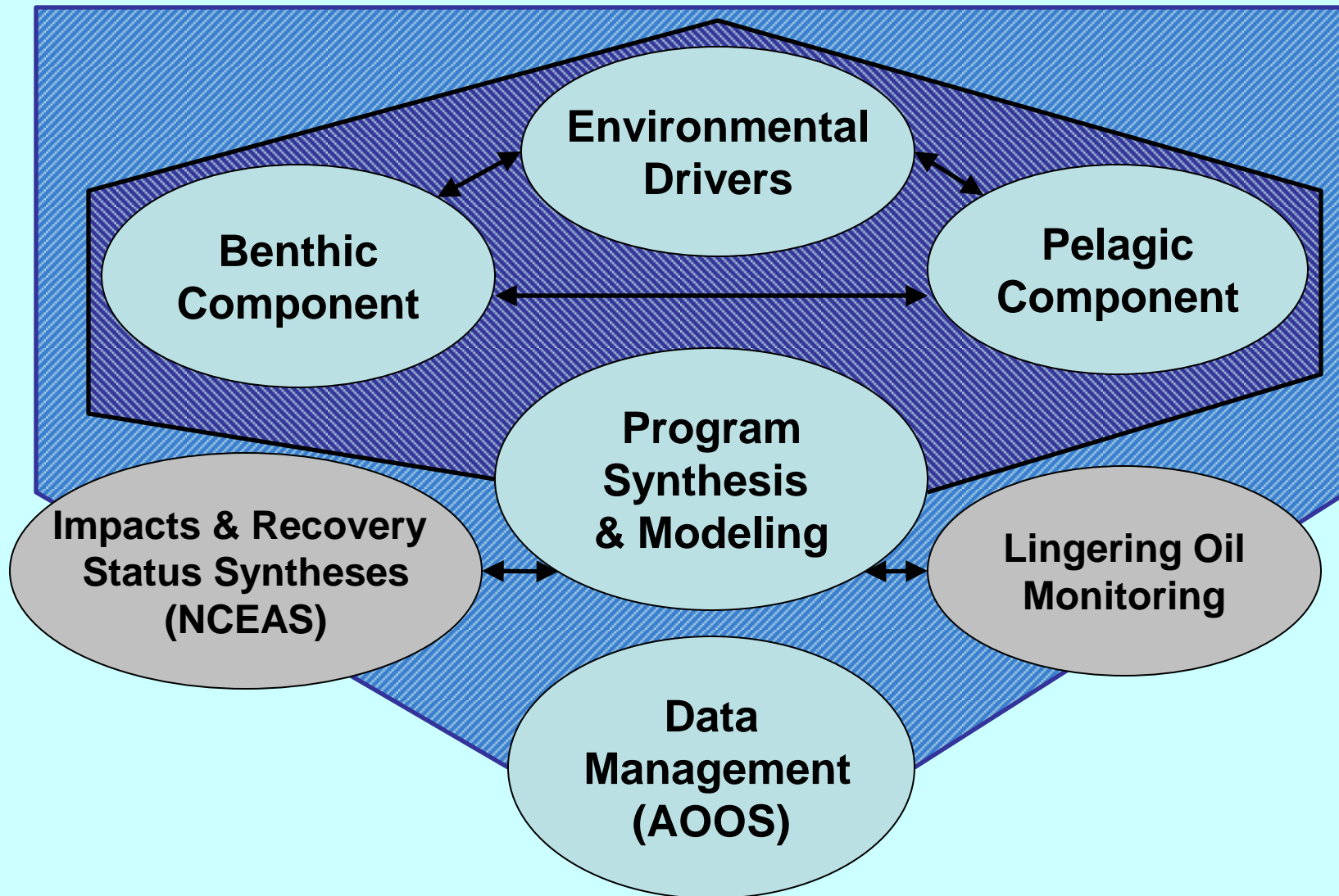
# Team Approach

- **LEVERAGE and collaborate with other efforts**
  - agency monitoring & data management efforts
  - close collaboration with EVOS Trustee Council PWS Herring Research & Monitoring Program
  - research funding programs (NPRB GOAIERP, NSF)
- **FUND data management & synthesis as integral part of the program**
  - data access & integration of multidisciplinary data
  - products - visualizations, decision support, outreach
  - conceptual ecological models as synthesis tools
  - historical data synthesis (NCEAS & GOAIERP collaborations)
- **Provide training opportunities for young scientists**

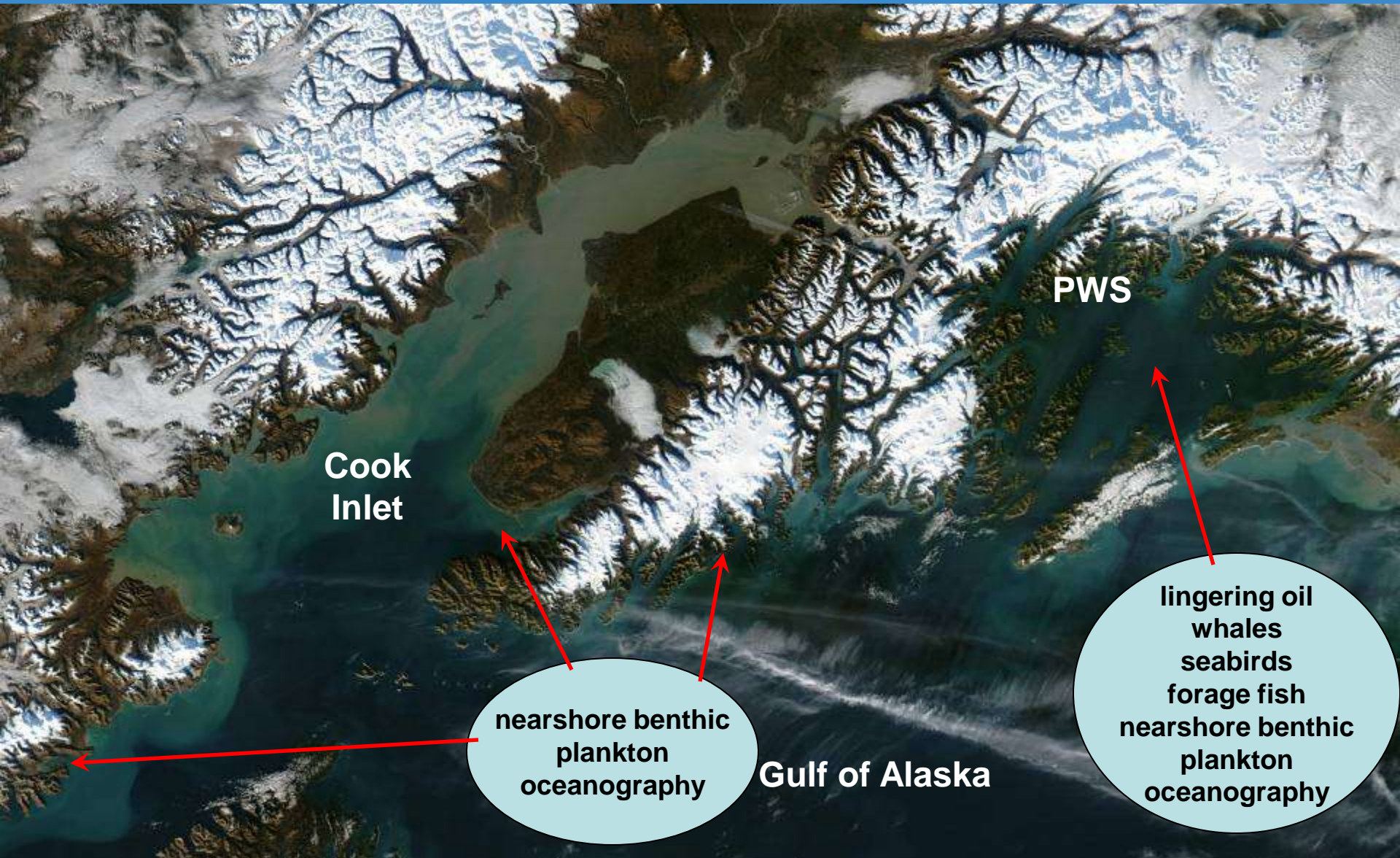


# Long-term Monitoring Team

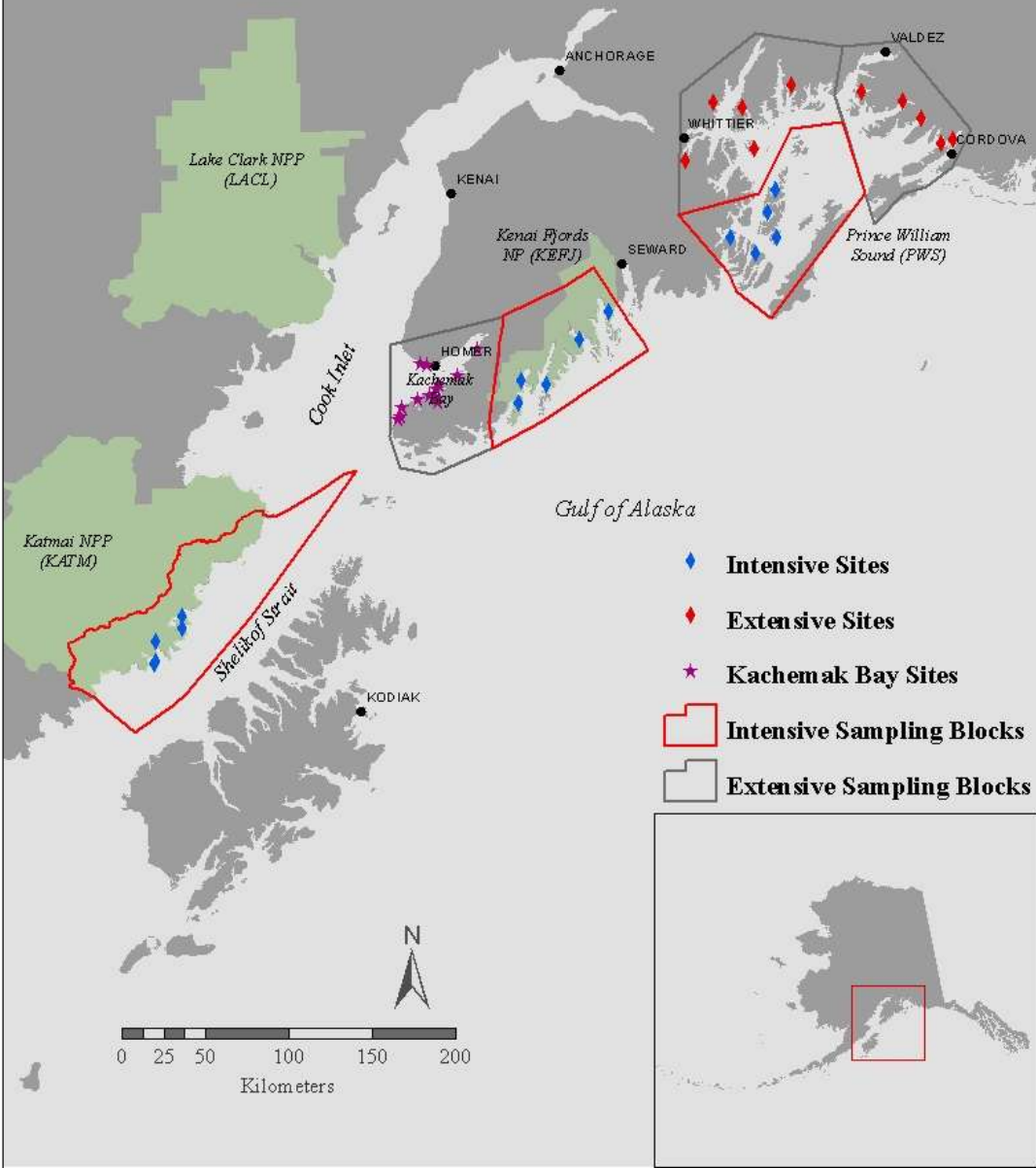
## PROGRAM MANAGEMENT AND ADMINISTRATION



# Long-term Monitoring Sites

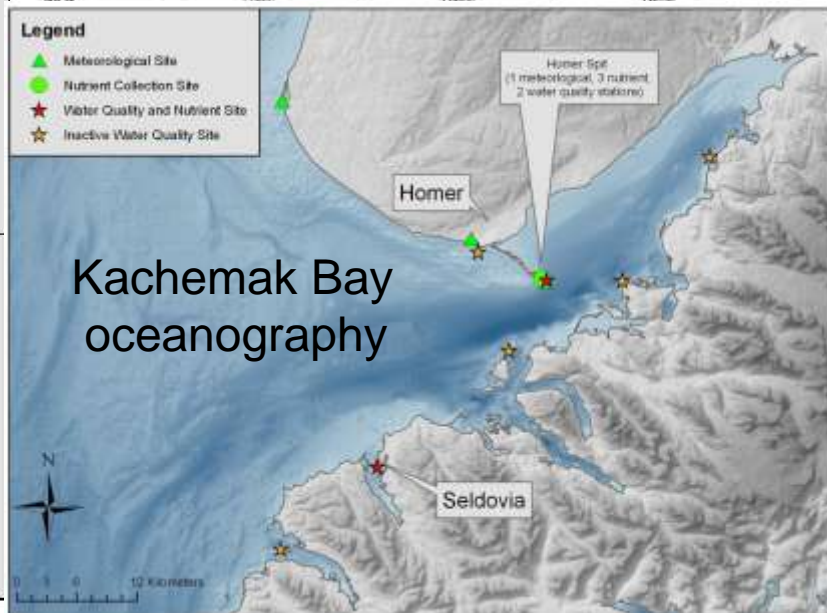
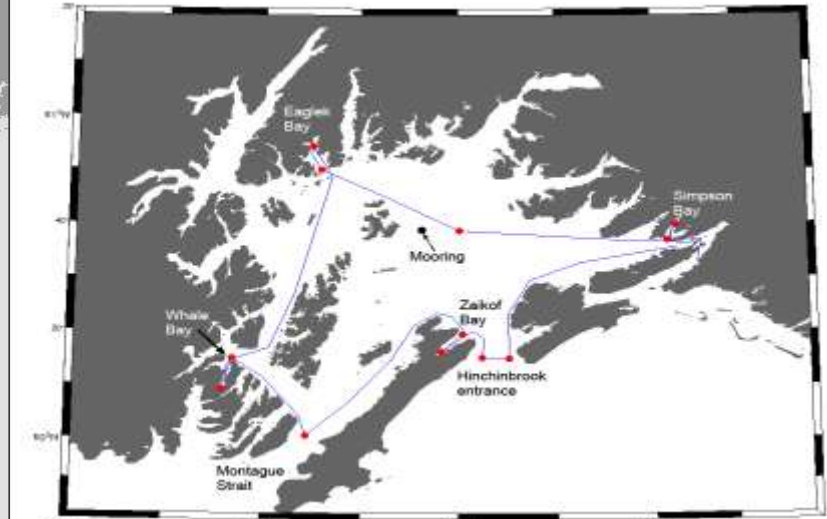


# Nearshore benthic sites



# Monitoring Sites

PWS oceanography/plankton

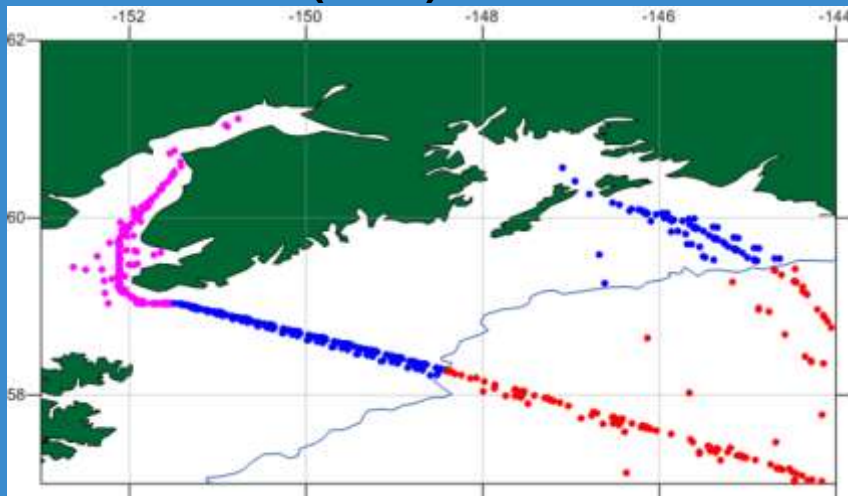


# Oceanography and Plankton Gulf of Alaska shelf

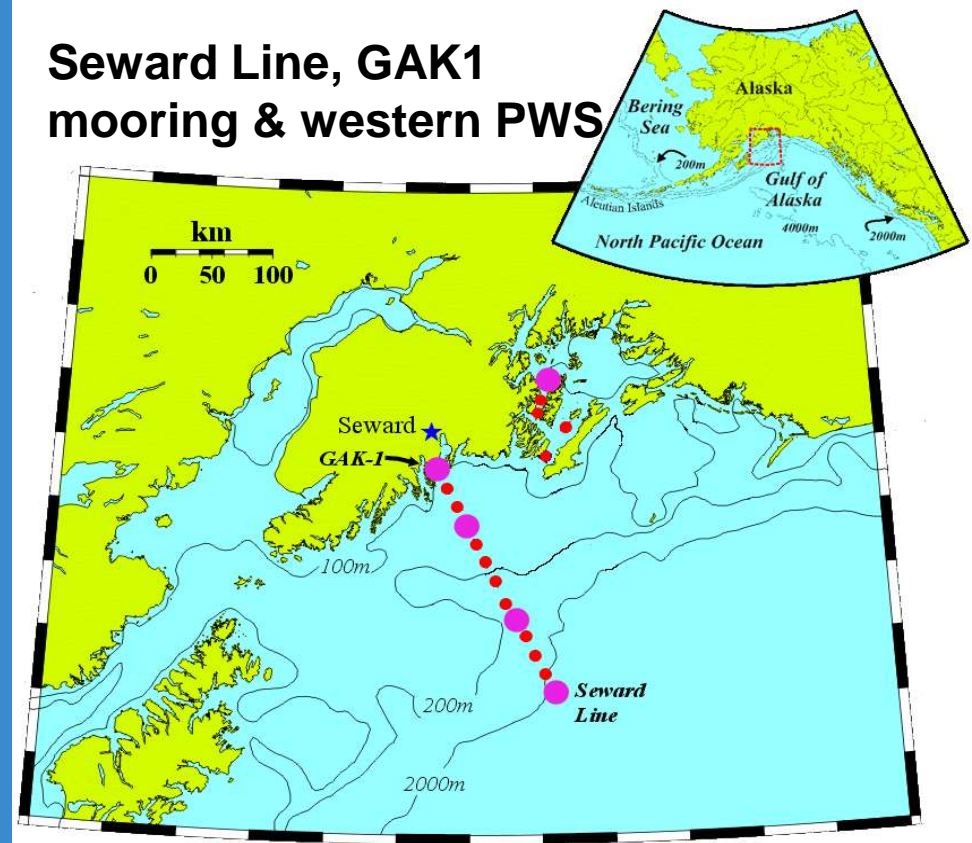
GAK1 – over 40 years (1970 to present)

CPR – 2000 to present

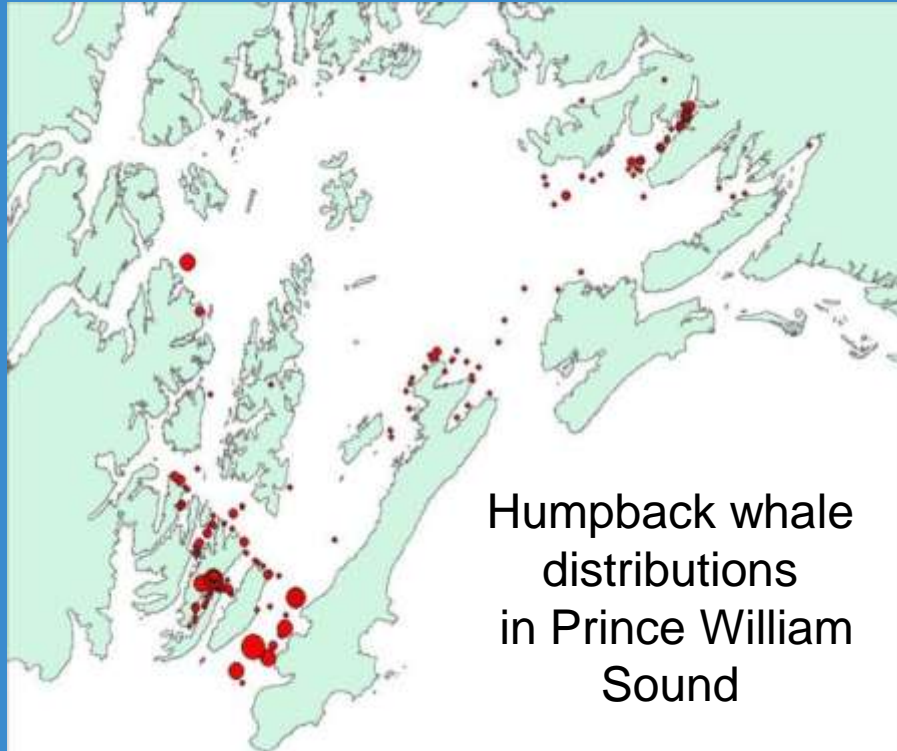
Continuous Plankton  
Recorder (CPR)



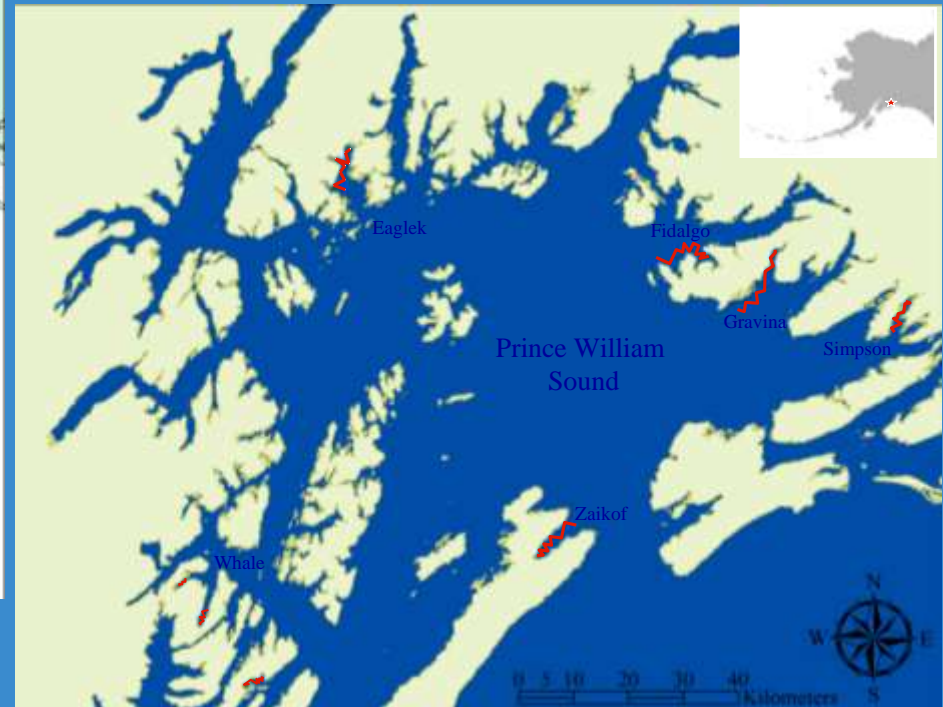
Seward Line, GAK1  
mooring & western PWS



# Monitoring Sites – Whales and Seabirds



## Prince William Sound seabird surveys



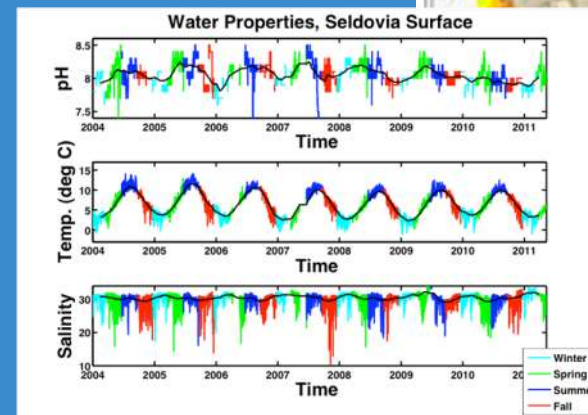
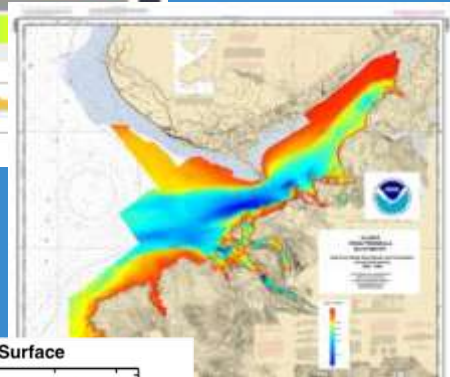
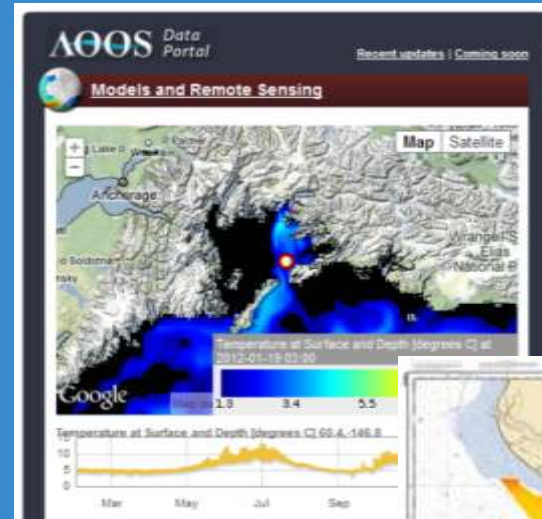
# Integrate across disciplines to address resource management questions: Examples

- Are changes in oceanographic conditions in the outer Gulf of Alaska shelf mirrored in the near-shore marine environment and population trends of injured (recovering and recovered) resources?
- Is herring and forage fish overwintering success tied to spring and summer productivity and seasonal or year-to-year differences in the zooplankton community?
- Are variations in seabird abundance and distribution associated with zooplankton stocks and/or oceanographic conditions?

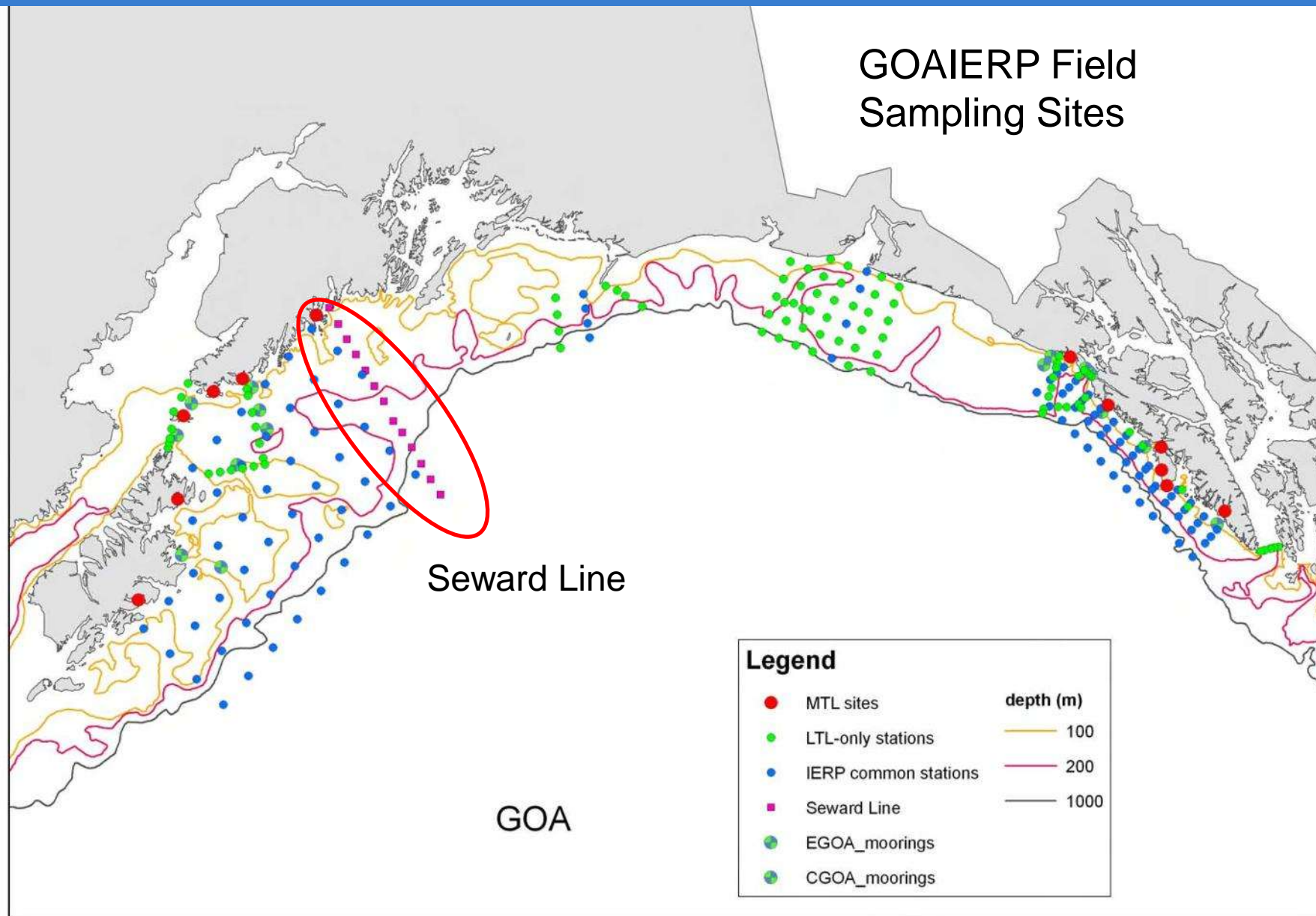


# Linkages to Other Programs

- **Alaska Ocean Observing System**
- **North Pacific Research Board**
  - **Gulf of Alaska Integrated Ecosystem Research Program (GOAIERP)**
- **National Park Service**
  - **Southwest Alaska Network (SWAN) Inventory & Monitoring Program**
- **NOAA**
  - **Weather, tides, currents, fisheries, mapping**
- **Kachemak Bay Research Reserve**
  - **System-Wide Monitoring Program**
- **US Fish and Wildlife Service**
  - **Sea otter and seabird monitoring**



# North Pacific Research Board Gulf of Alaska Integrated Ecosystem Research Program



Program website: [www.aos.org/EVOS-LTM](http://www.aos.org/EVOS-LTM)



EVOS Long Term Monitoring Project | Alaska Ocean Observing System

**AOS** Alaska Ocean Observing System  
THE EYE ON ALASKA'S COASTS AND OCEANS

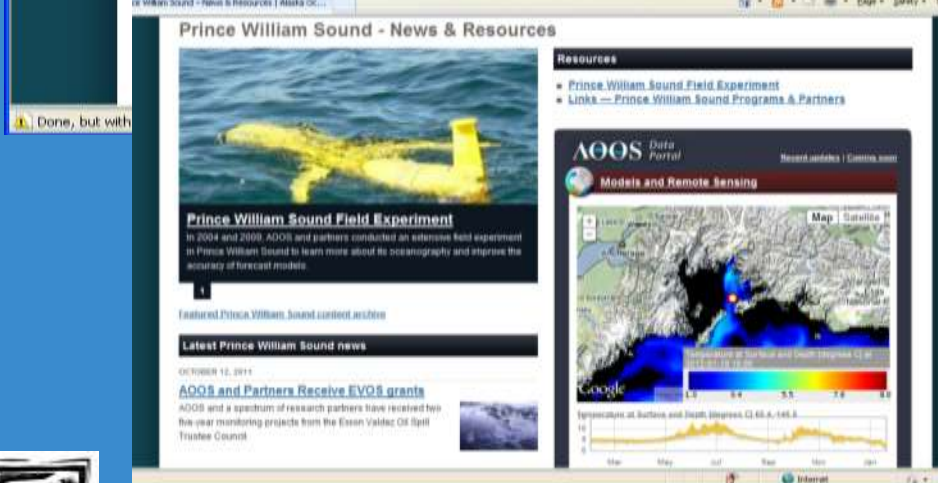
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Home >


## EVOS Long Term Monitoring Project

### Meeting Resources

- Nov 2011 PI Meeting Agenda
- Nov 2011 PI Meeting Summary



Prince William Sound - News & Resources



**Prince William Sound Field Experiment**  
In 2004 and 2009, AOS and partners conducted an extensive field experiment in Prince William Sound to learn more about its oceanography and improve the accuracy of forecast models.

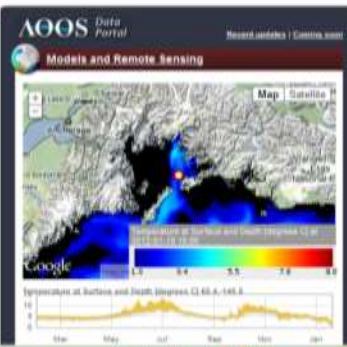
Featured Prince William Sound content archive

Latest Prince William Sound news

OCTOBER 12, 2011  
**AOS and Partners Receive EVOS grants**  
AOS and a spectrum of research partners have received two five-year monitoring projects from the Exxon Valdez Oil Spill Trustee Council.

**Resources**

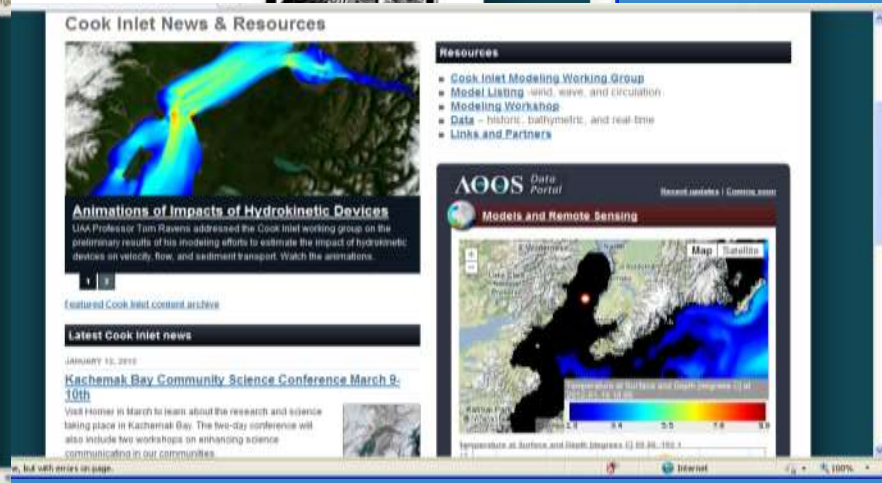
- Prince William Sound Field Experiment
- Links — Prince William Sound Programs & Partners




**AOS Data Portal**  
Models and Remote Sensing

Temperature at Surface and South Inlet (3 88.4-143.8)

Year	Temp
2004	~5.5
2005	~5.5
2006	~5.5
2007	~5.5
2008	~5.5
2009	~5.5
2010	~5.5
2011	~5.5



Cook Inlet News & Resources



**Animations of Impacts of Hydrokinetic Devices**  
UAF Professor Tom Ravens addressed the Cook Inlet working group on the preliminary results of his modeling efforts to estimate the impact of hydrokinetic devices on velocity, flow, and sediment transport. Watch the animations.

Featured Cook Inlet content archive

Latest Cook Inlet news

JANUARY 19, 2011  
**Kachemak Bay Community Science Conference March 9-10th**  
Visit Homer in March to learn about the research and science taking place in Kachemak Bay. The two-day conference will also include two workshops on enhancing science communication in our communities.

**Resources**

- Cook Inlet Modeling Working Group
- Model Listing - wind, wave, and circulation
- Modeling Workshop
- Data - historic, bathymetric, and real-time
- Links and Partners



**AOS Data Portal**  
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# Special thanks to:


**Nancy Bird – Prince William Sound Science Center**

**Scott Pegau – PWSSC**

**Elise Hsieh & Catherine Boerner – EVOS Trustee Council staff**

**Pete Hagen – NOAA National Marine Fisheries Service**

**EVOS Trustee Council**



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