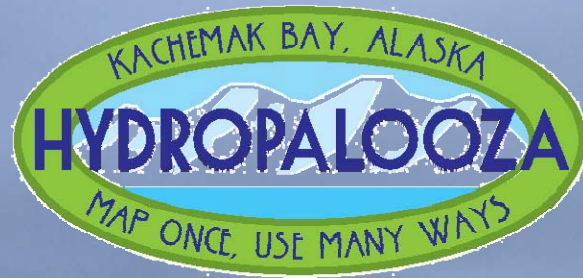


2008-2009 Kachemak Bay Integrated Ocean & Coastal Mapping Project



Kris Holderied
NOAA Kasitsna Bay Laboratory



Mapping Supports:

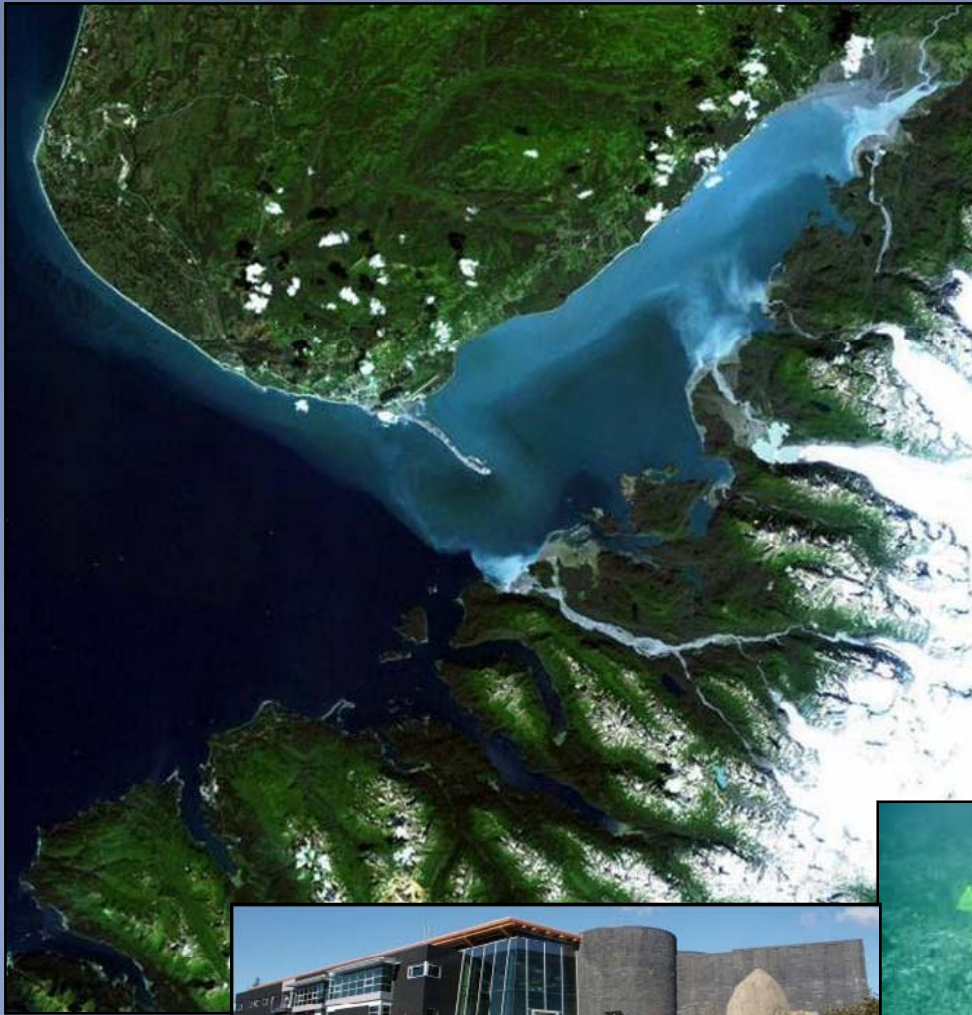
- NOAA Nautical Charting
- Resource Management
- Economic Development
- Emergency Response

Hydropalooza goal is to demonstrate integrated ocean and coastal mapping on an operational survey



Why Kachemak Bay?

- Ship schedules
- Management needs
- “Natural laboratory”
- Logistic support
- **Partners!!**

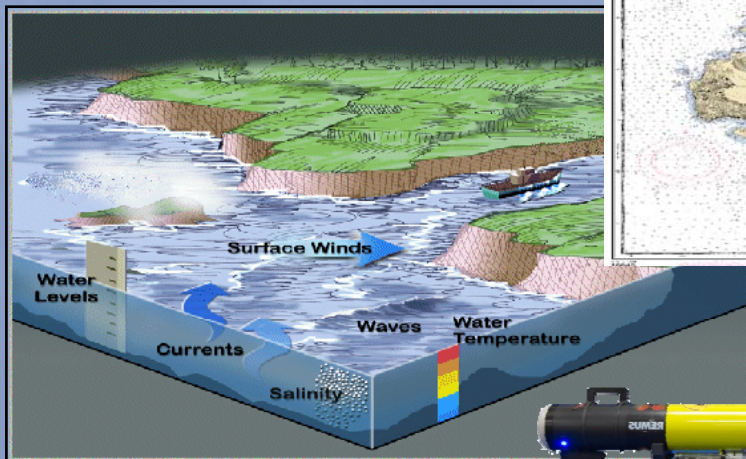


What Is Ocean & Coastal Mapping?

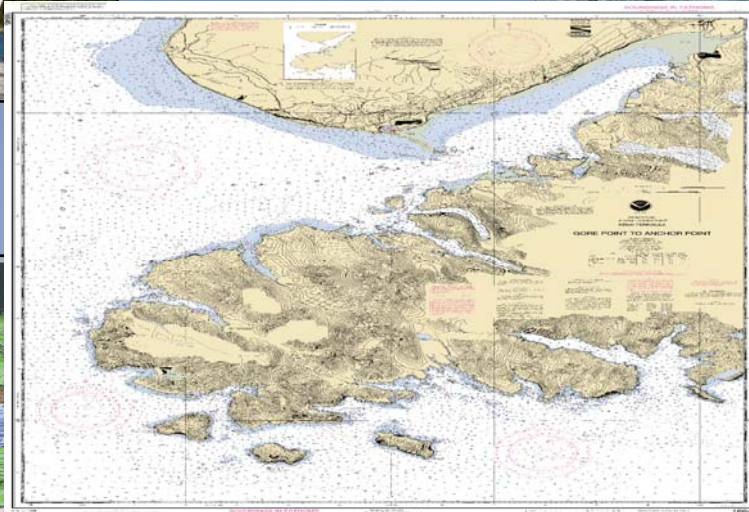
Seafloor Mapping



Tides & Environment



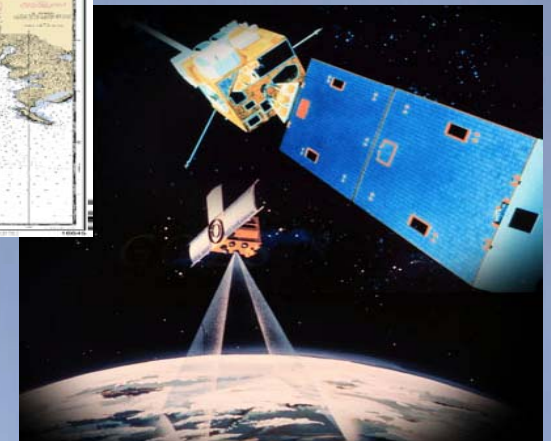
Nautical Charts



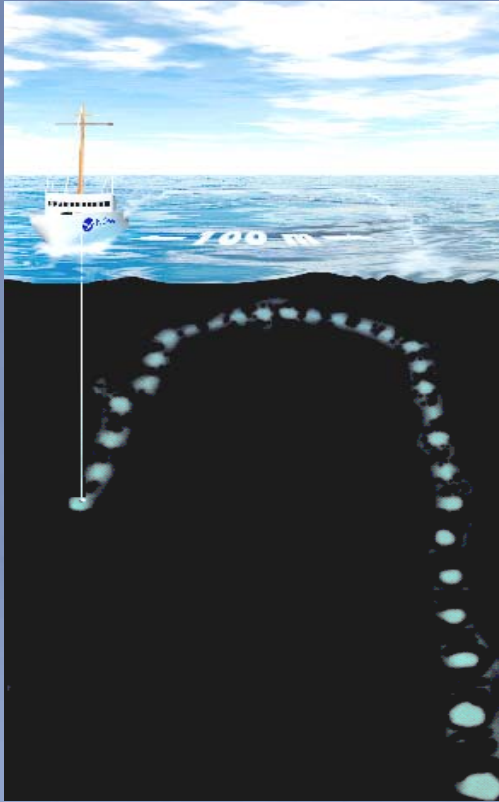
Shoreline Mapping



GPS Positioning

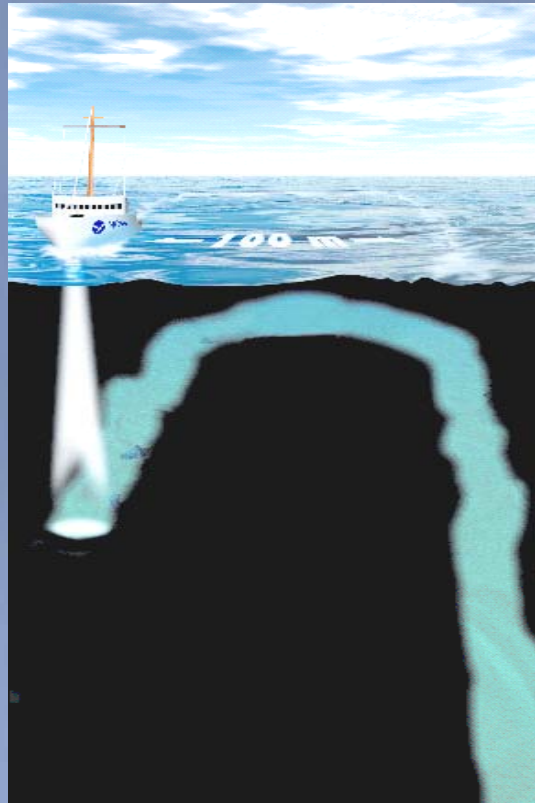


How has sea floor mapping changed over time?



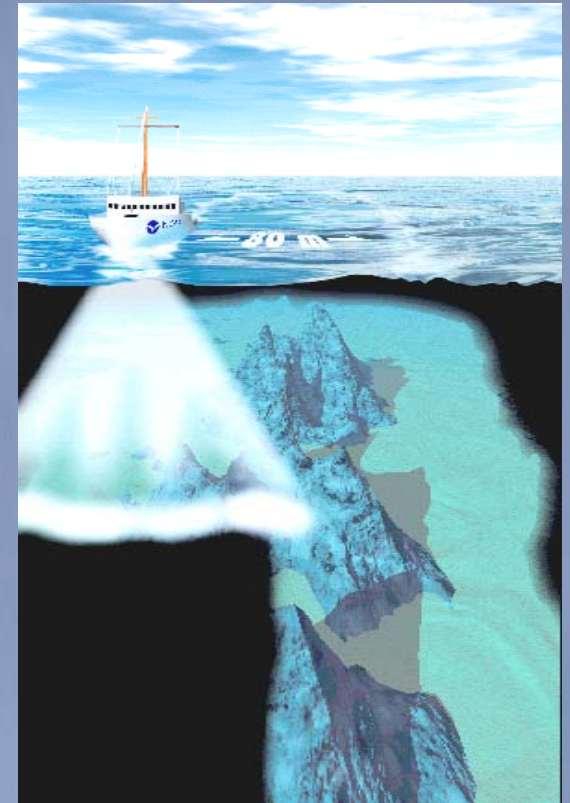
Leadline

- slow
- not many depths



Single Beam Sonar

- faster
- more soundings
- single line



Multi-beam Sonar

- full-bottom coverage
- need better ship positioning

Alaska North Slope

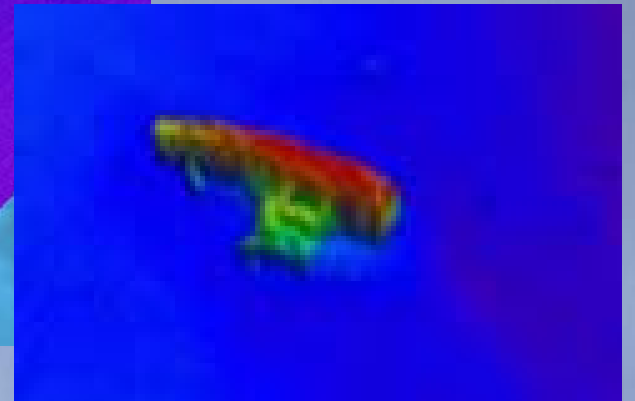
High Resolution Mapping

(blue is deep)

Single-beam sonar

50 ft wreck
inside
Homer spit

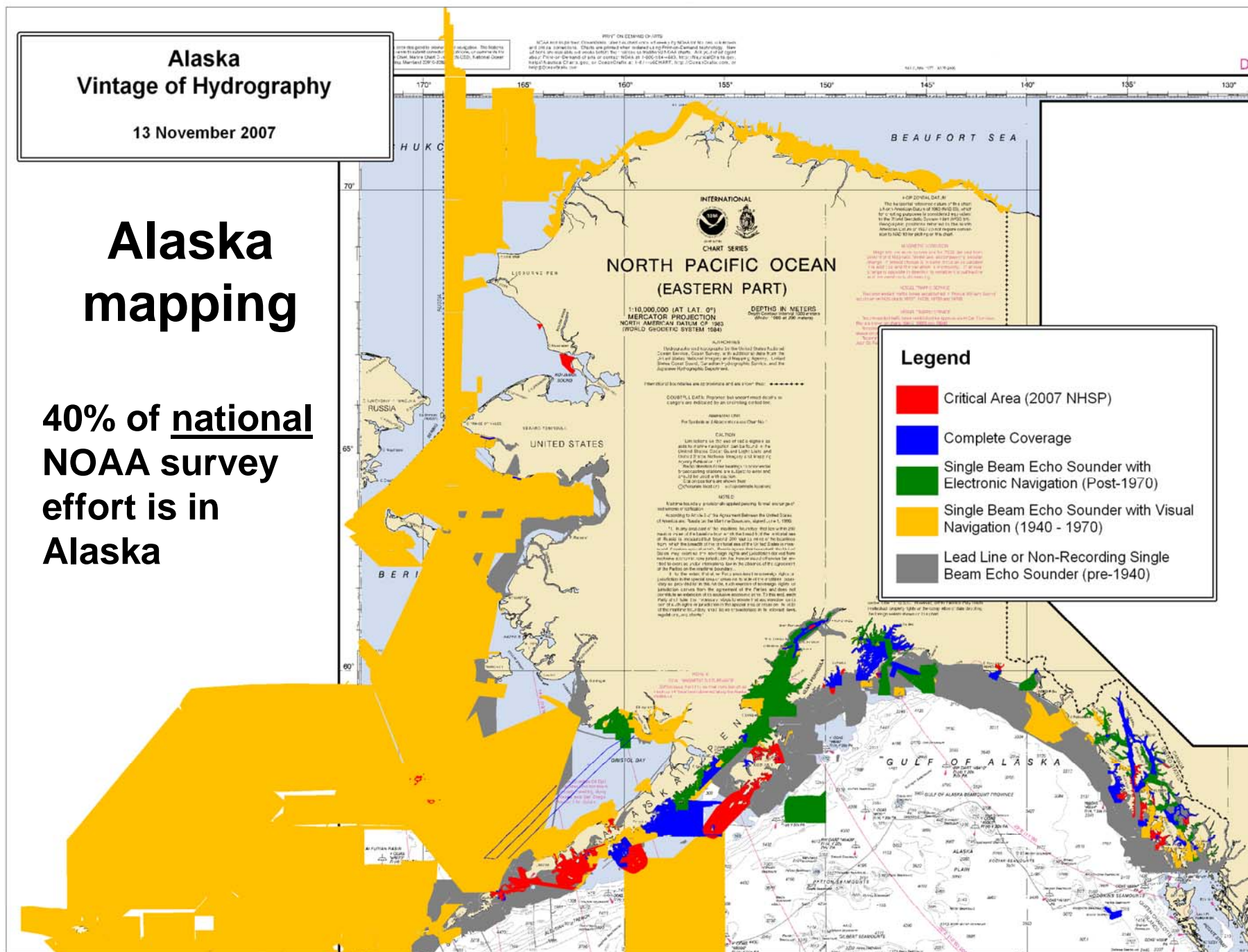
Multi-beam sonar



13 November 2007

Alaska mapping

**40% of national
NOAA survey
effort is in
Alaska**



Shoreline mapping with NOAA Cessna Citation



Shoreline Mapping

- Land elevations from laser (LiDAR)
- Photos
- Shoreline

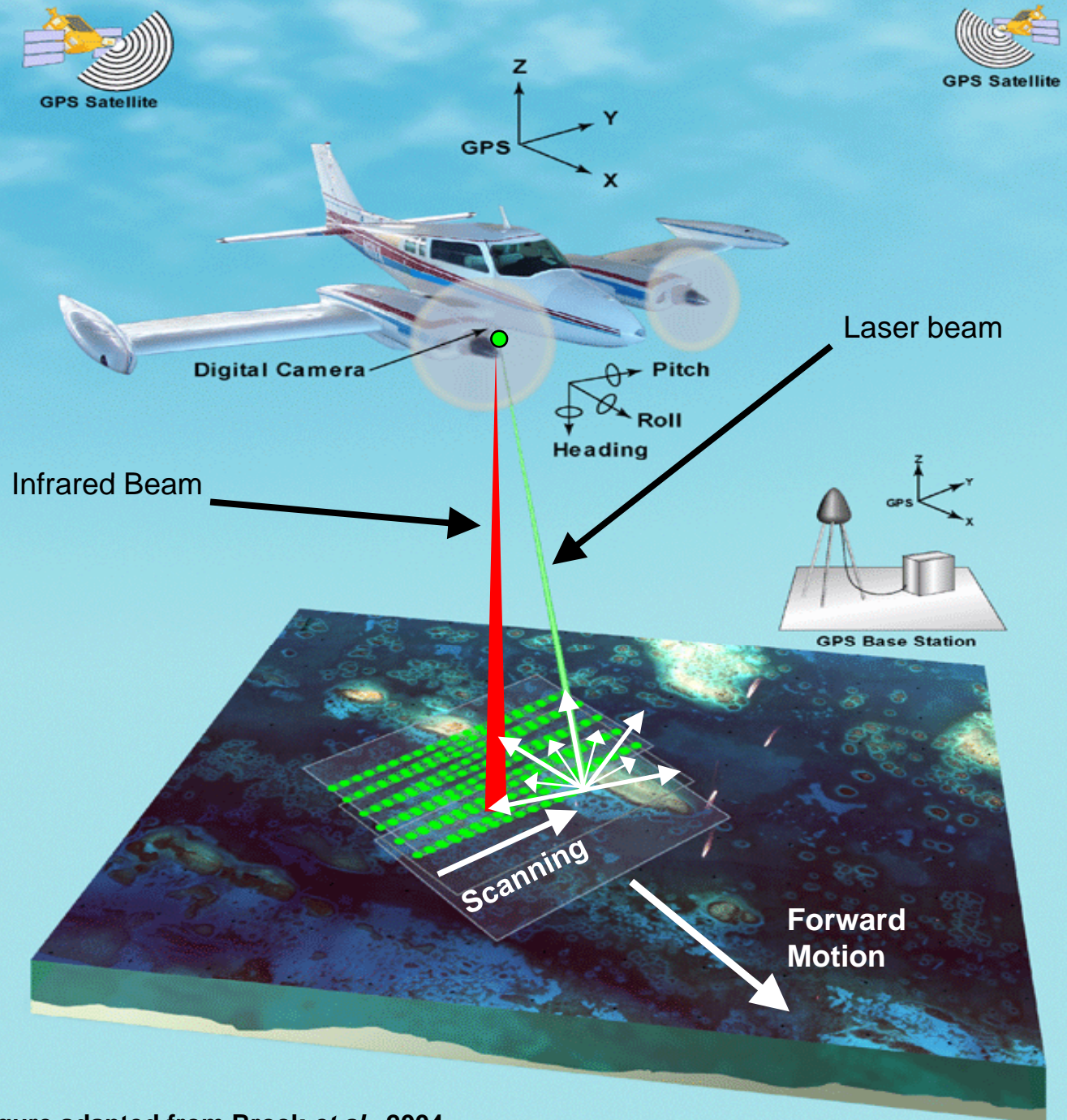


Figure adapted from Brock *et al.*, 2004

Hydropalooza Schedule

- **Shoreline:** Jul-Aug 2008
(aircraft) 2010 (TBD)
- **Sea Floor:** Jul-Aug 2008
(ships) Aug-Sep 2009
- **Sediments:** Jul 2008
Aug 2009
- **Data processing** – ongoing!

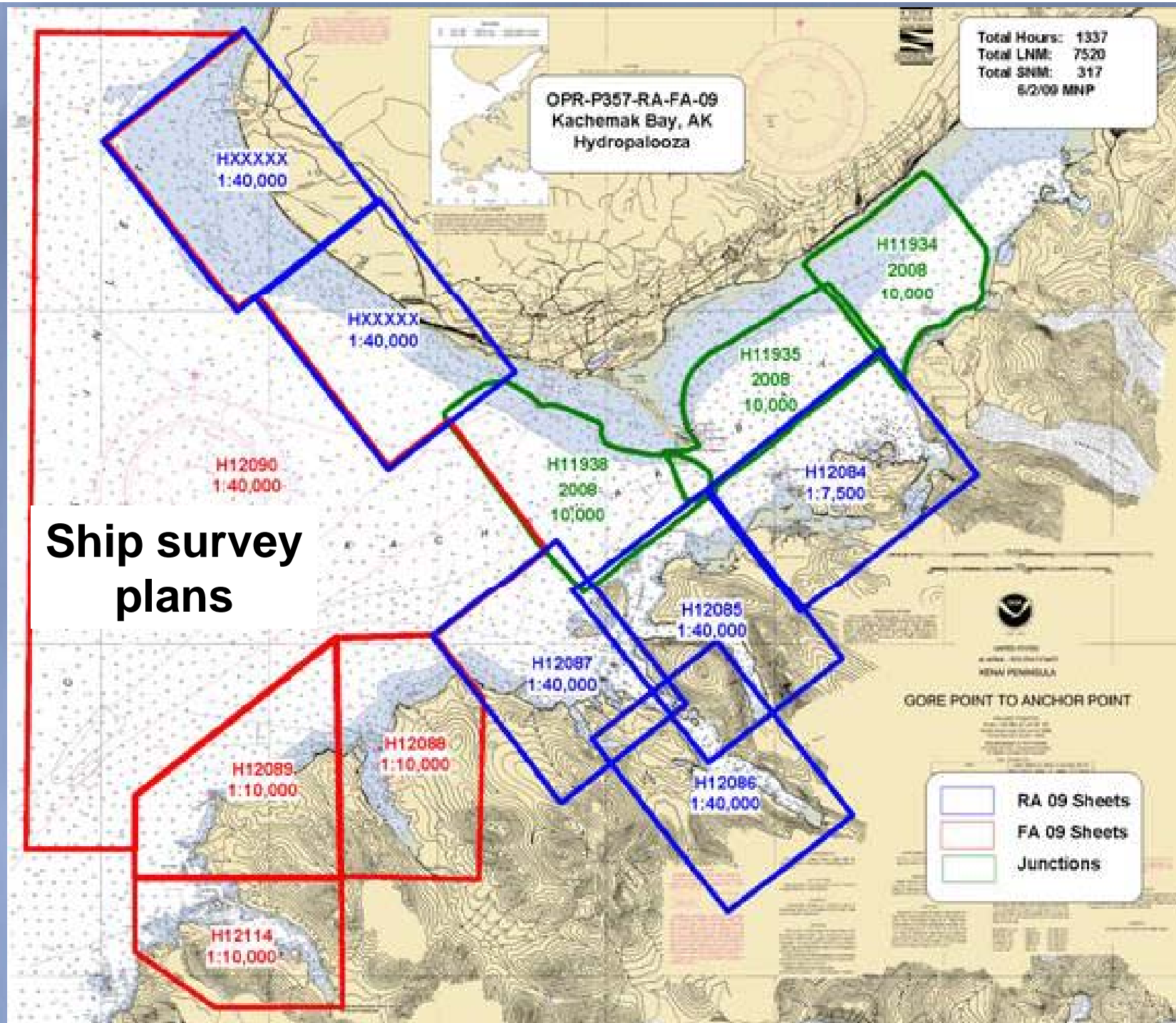


NOAA Ships
FAIRWEATHER
and RAINIER

NOAA Cessna
Citation aircraft



Ship survey plans

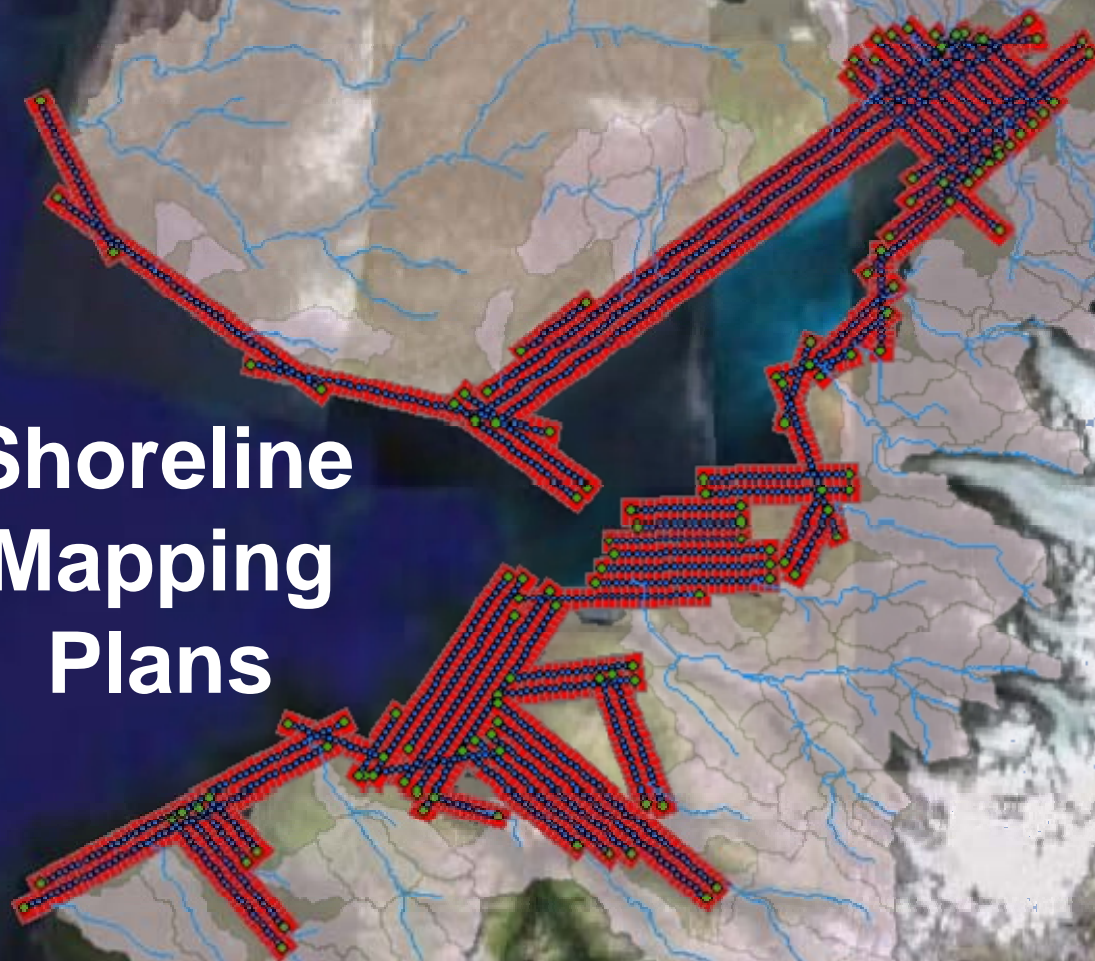




Legend

- katchemak bay drainage basins
- AK0801f-wpt
- AK0801c-wpt
- AK0801e-wpt

Shoreline Mapping Plans

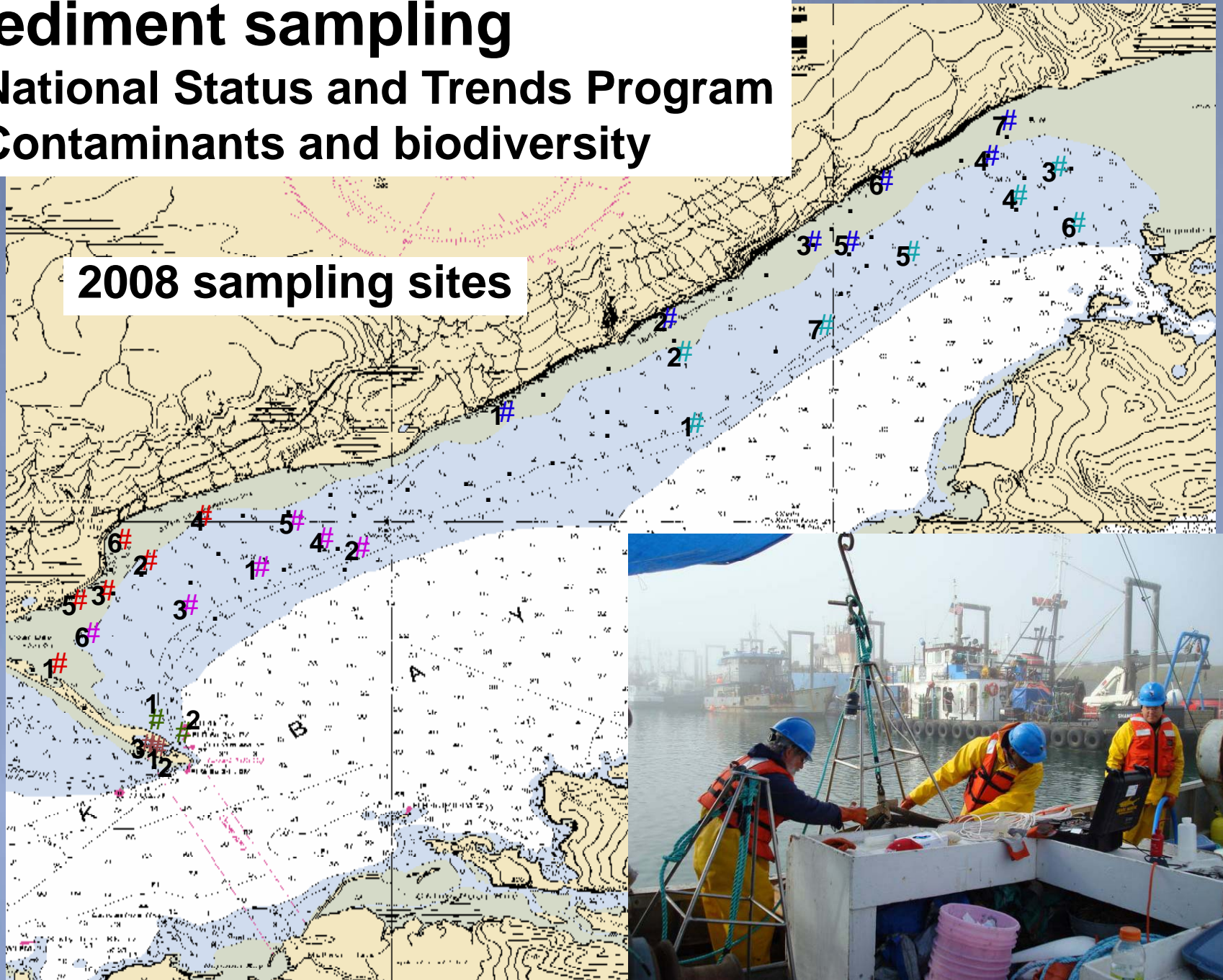


0 5 10 20 30

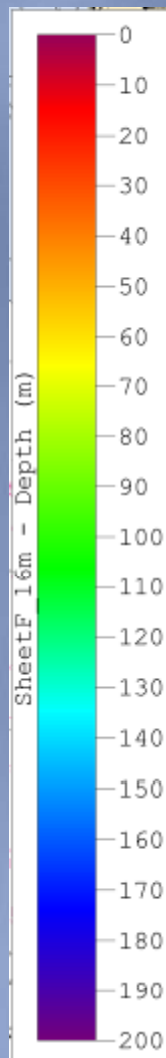
Sediment sampling

- National Status and Trends Program
- Contaminants and biodiversity

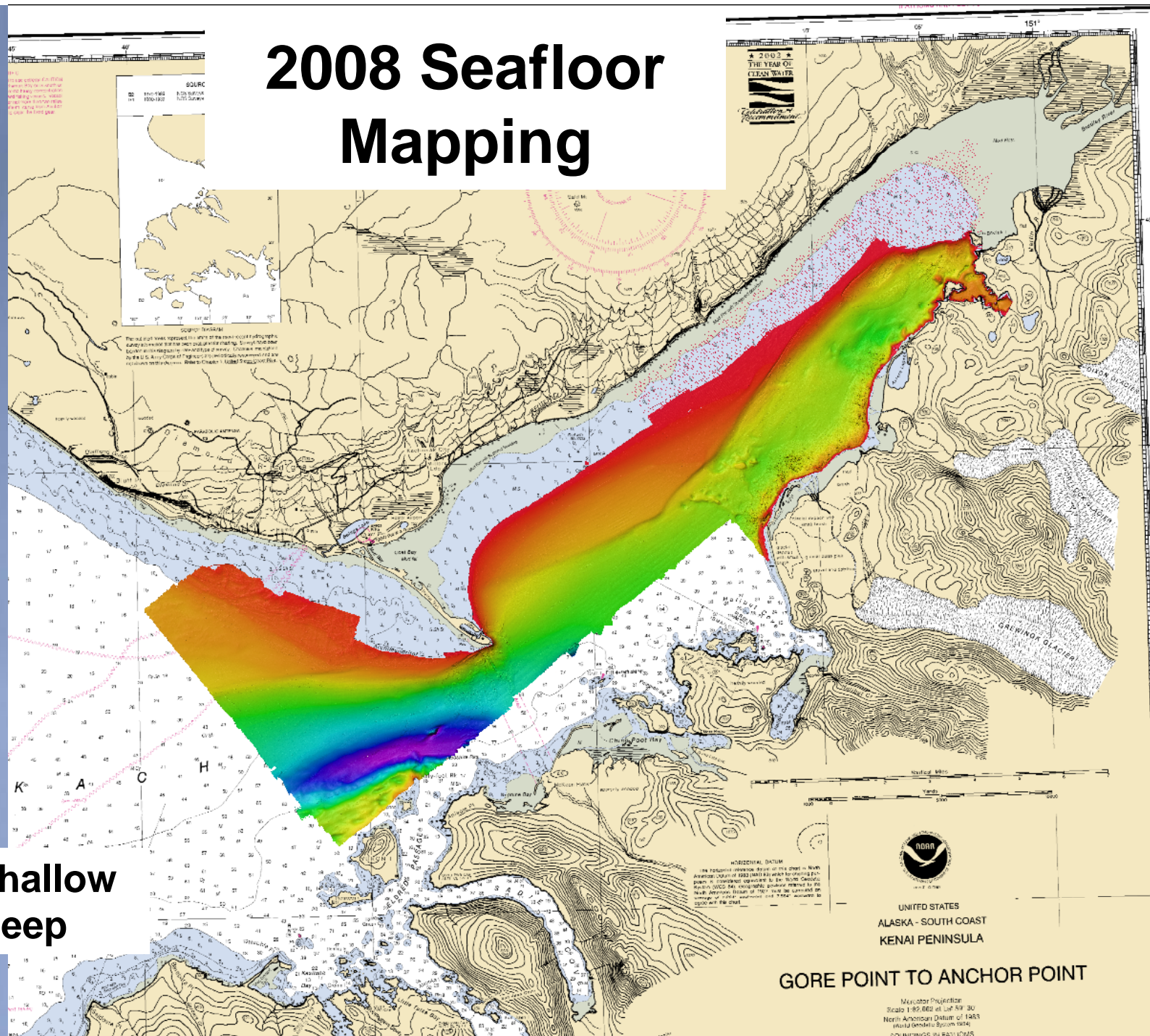
2008 sampling sites



2008 Seafloor Mapping

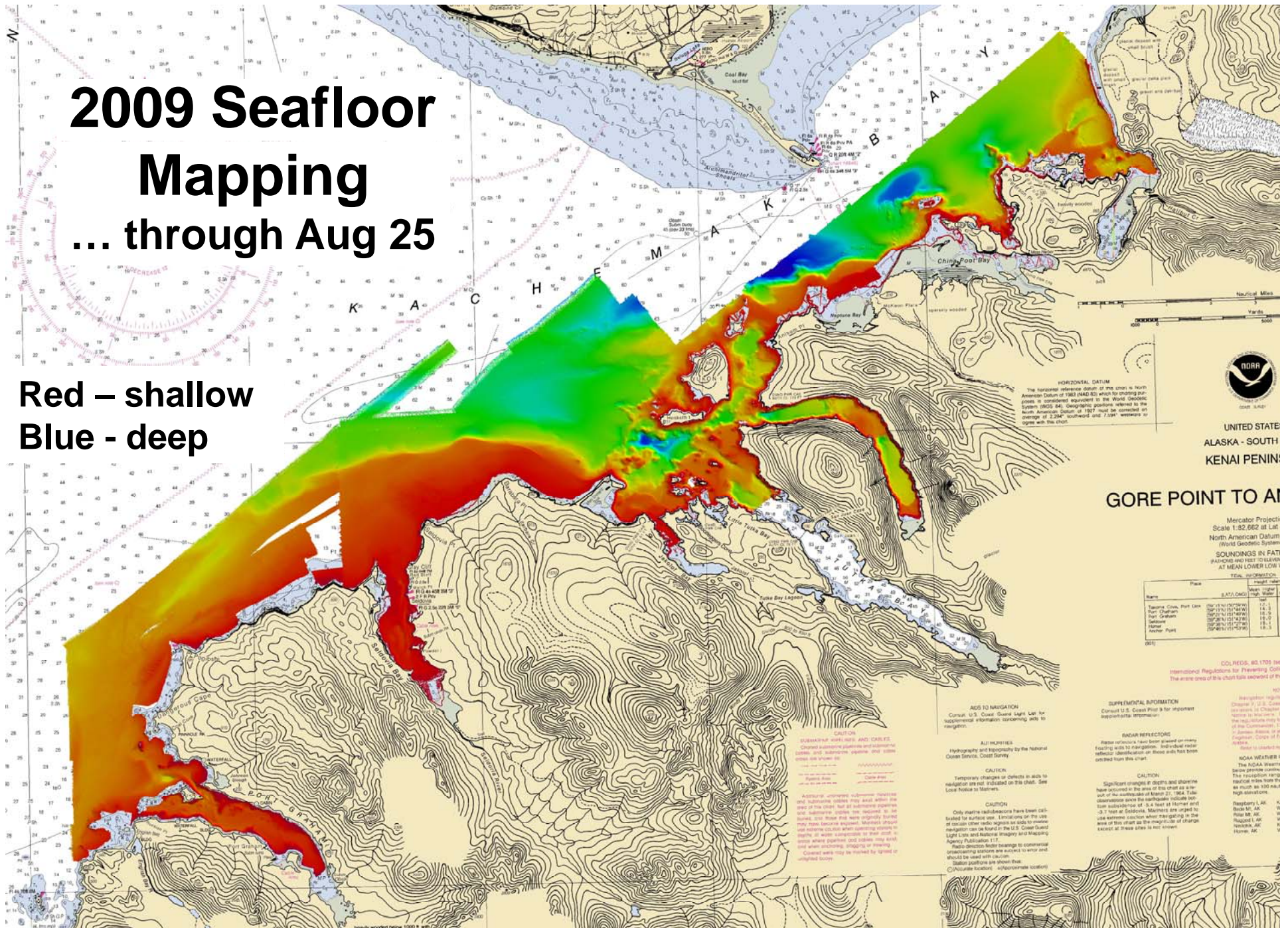


Red – shallow
Blue - deep



2009 Seafloor Mapping ... through Aug 25

Red – shallow
Blue - deep



GORE POINT TO A

UNITED STATES
ALASKA - SOUTH
KENAI PENIN:

Mercator Projection
Scale 1:82,662 at Lat.
North American Datum
1983 (NAD 83)

SOUNDINGS IN FATHOMS
(FATHOMS AND FEET TO SLUGS
AT MEAN LOWER LOW)

Place	Height
Name	Height
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1
Barrow	12.1

COLREGS, 60.1705
International Regulations for Preventing Collisions at Sea
The entire area of this chart falls within of the

ADDITIONAL INFORMATION
Consult U.S. Coast Pilot 9 for important
supplemental information concerning aids to
navigation.

AUTHORITIES
Hydrography and Topography by the National
Ocean Service, Coast Survey.

CAUTION
Temporary changes or defects in aids to
navigation are not indicated on this chart. See
Local Notice to Mariners.

CAUTION
Only marine radioaltimeters have been cal-
ibrated for surface use. Limitations on the use
of ocean floor altimeters are noted in the
navigation notices on board in the U.S. Coast Pilot
Light List and National Imagery and Mapping
Agency Publication 1-1.

CAUTION
Radio direction finder bearings to commercial
unmanned systems are subject to error and
should be used with caution.
Station positions are shown here.

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Radio direction finder bearings to commercial
unmanned systems are subject to error and
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SUPPLEMENTAL INFORMATION
Consult U.S. Coast Pilot 9 for important
supplemental information.

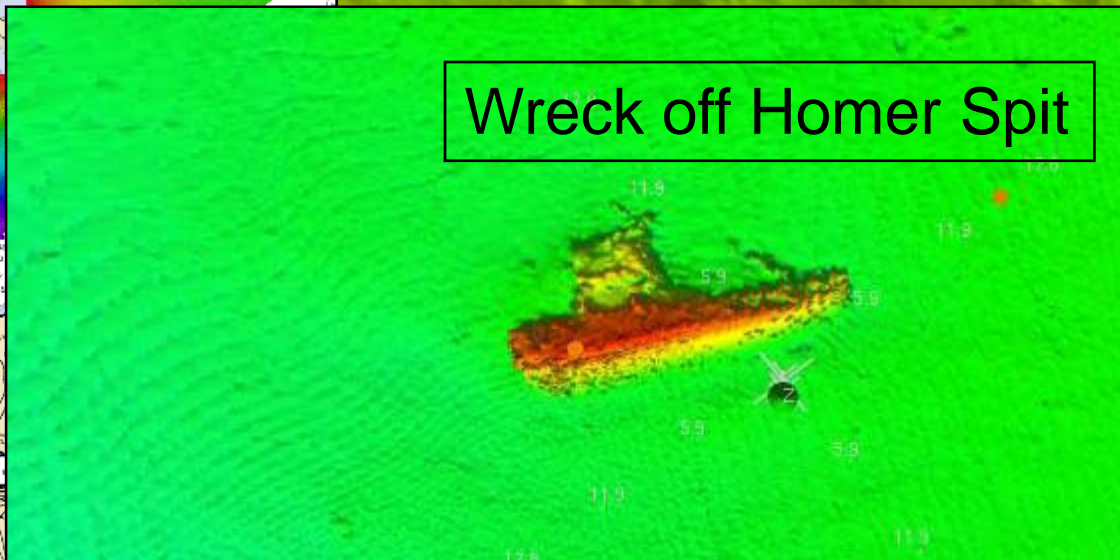
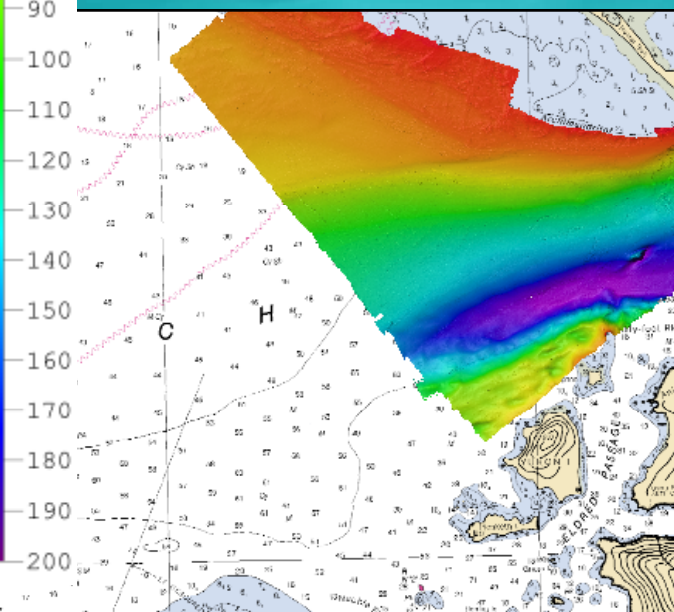
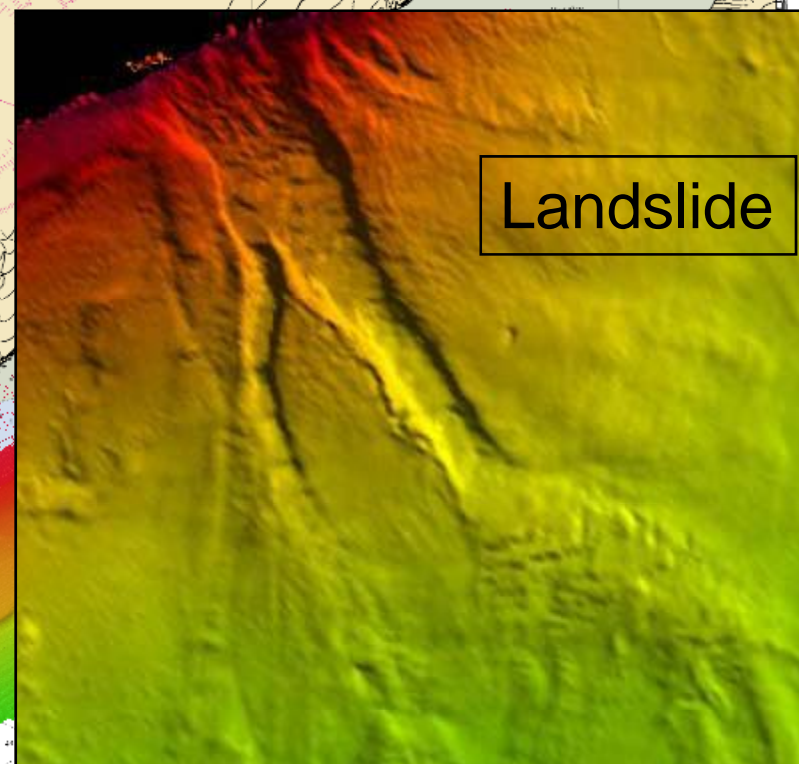
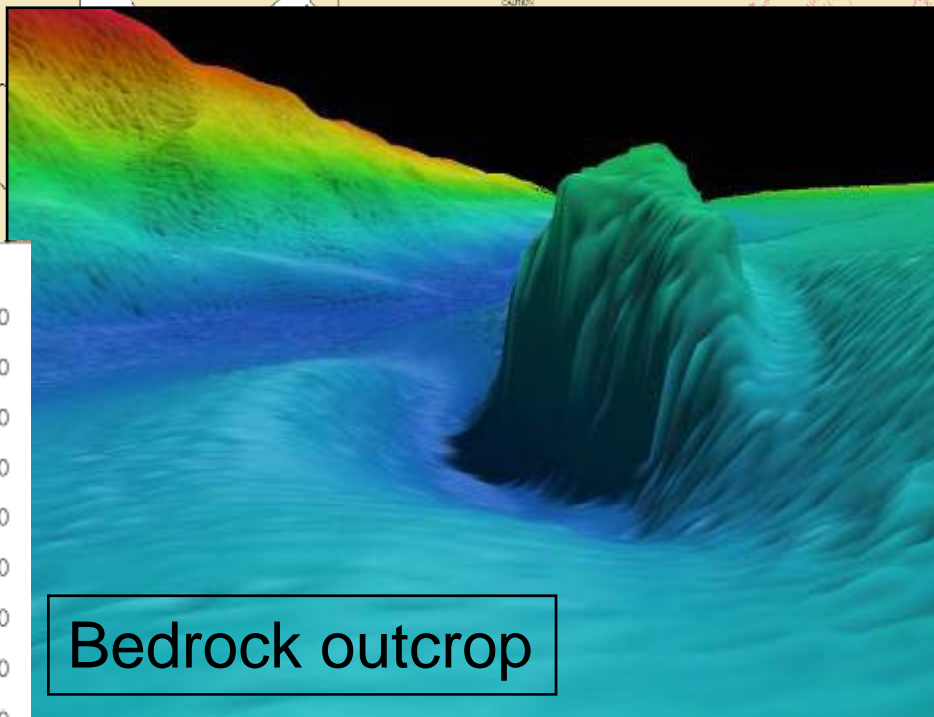
RADAR REFLECTORS
Radar reflectors have been placed on many
floating aids to navigation. Individual radar
reflector identification on these aids has been
omitted from this chart.

CAUTION
Significant changes in depths and shoreline
have occurred in the area of this chart as a
result of the subsidence of March 27, 1964. Tide
measurements since the earthquake indicate
subsidence of 5.4 feet at Homer and
13.7 feet at Seldovia. Mariners are urged to
use extreme caution when navigating in the
area of this chart as the magnitude of change
exceeds that of any other area.

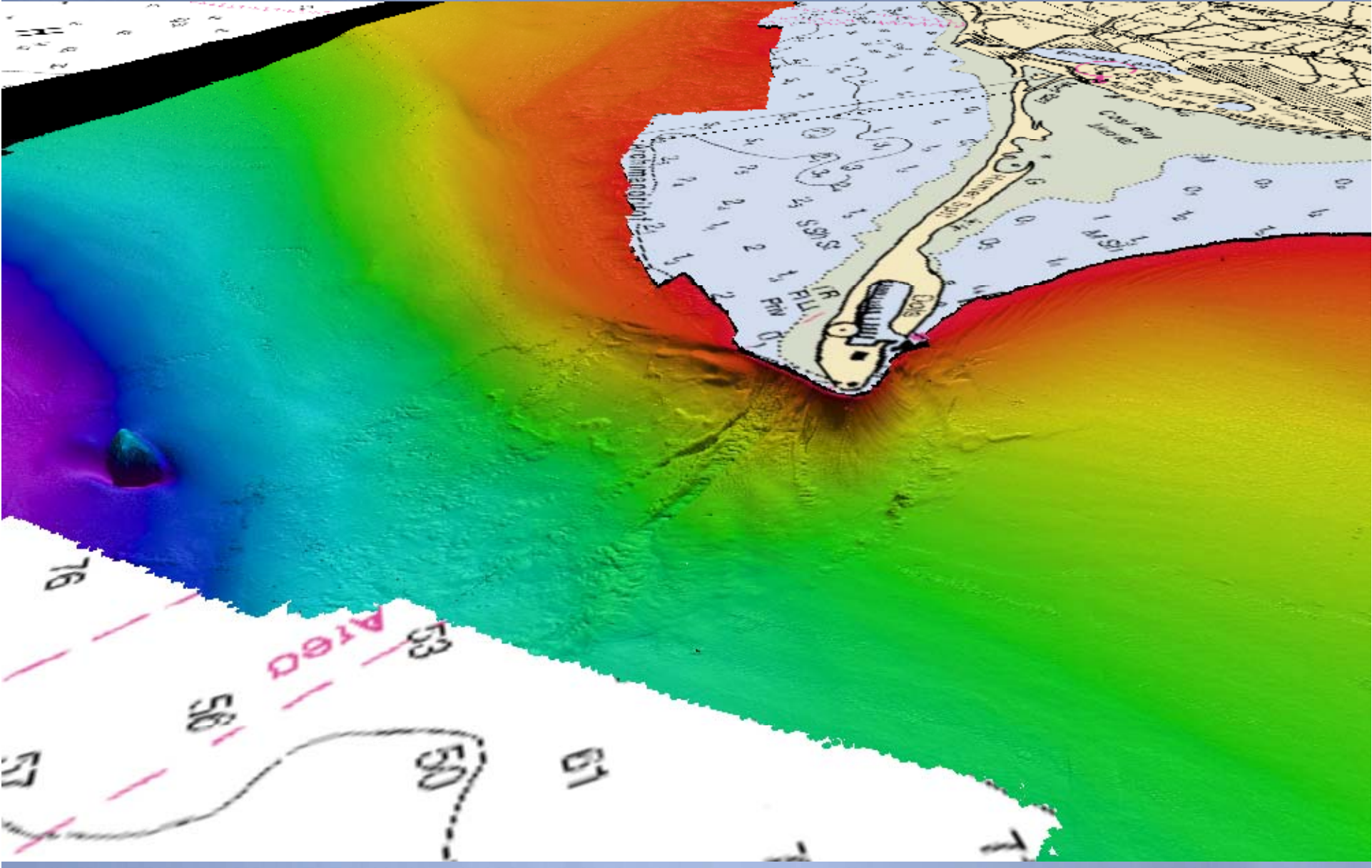
NOAA WEATHER
The NOAA Weather Service provides coastal
navigation information. The reception range
extends from the coast as much as 100 nautical
miles.

Regulatory Code
Baker, AK
Pilot, AK
Regulatory Code
Homer, AK

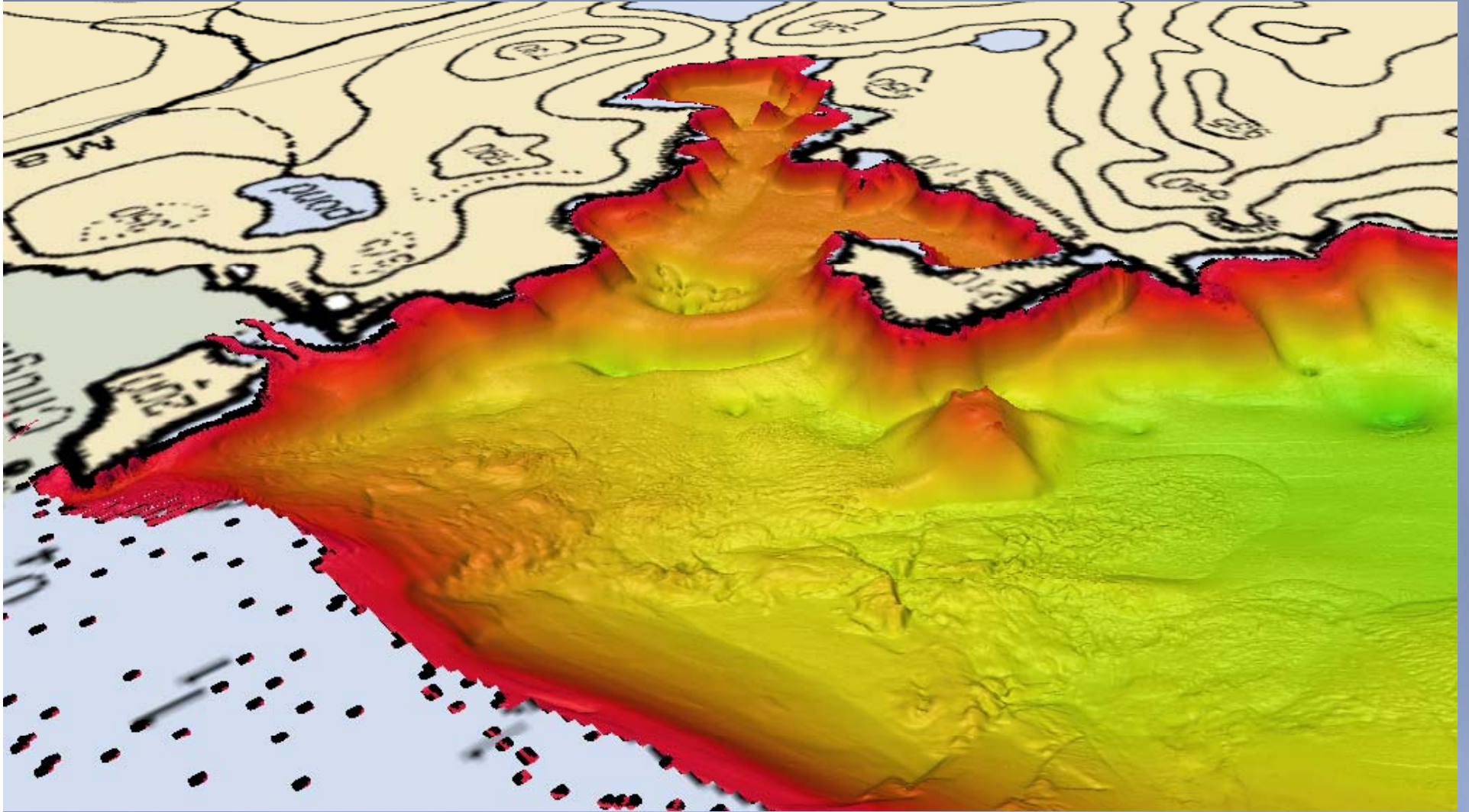
Seafloor features – 2008

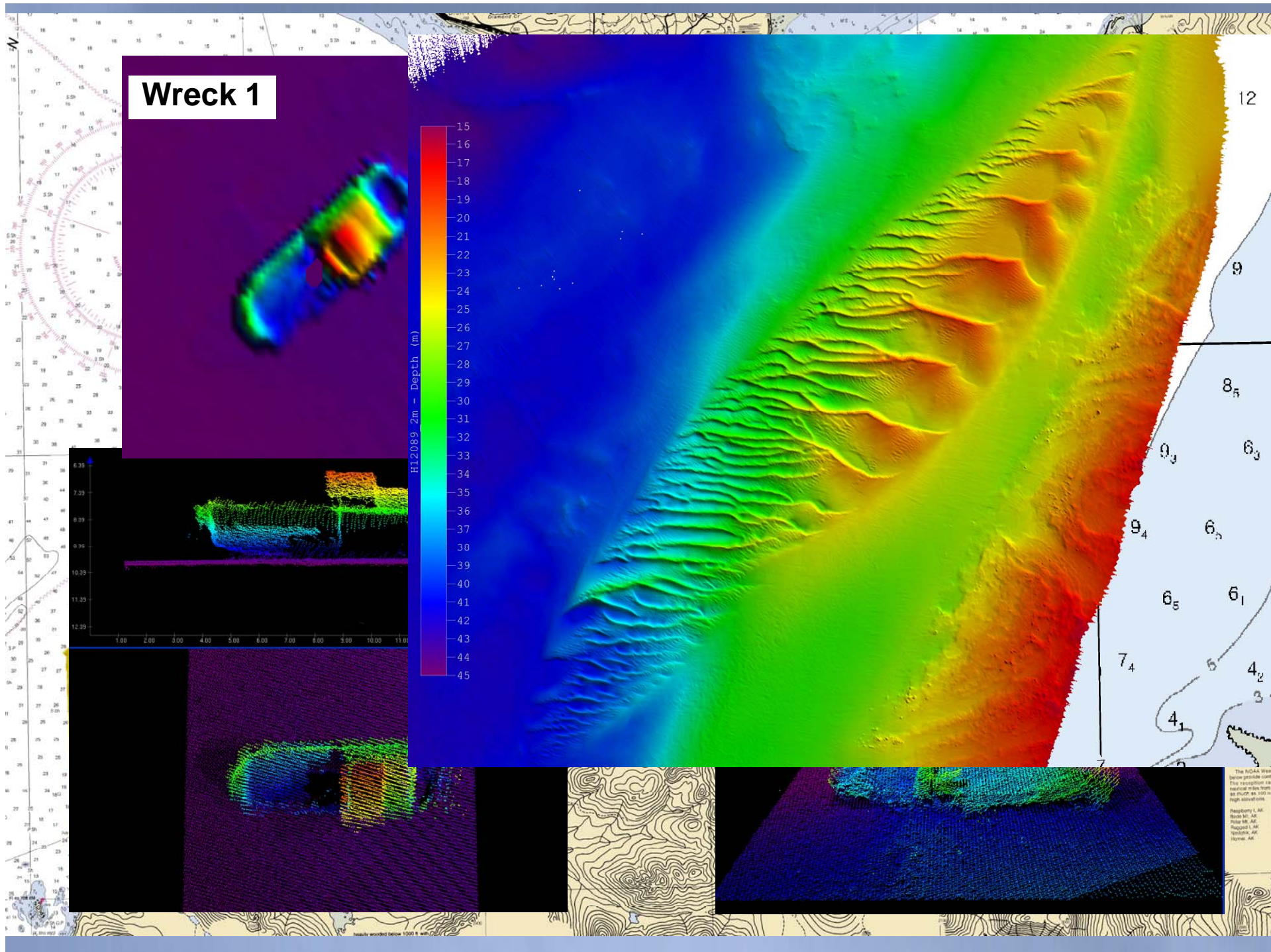


Homer Spit – landslide and bedrock outcrop



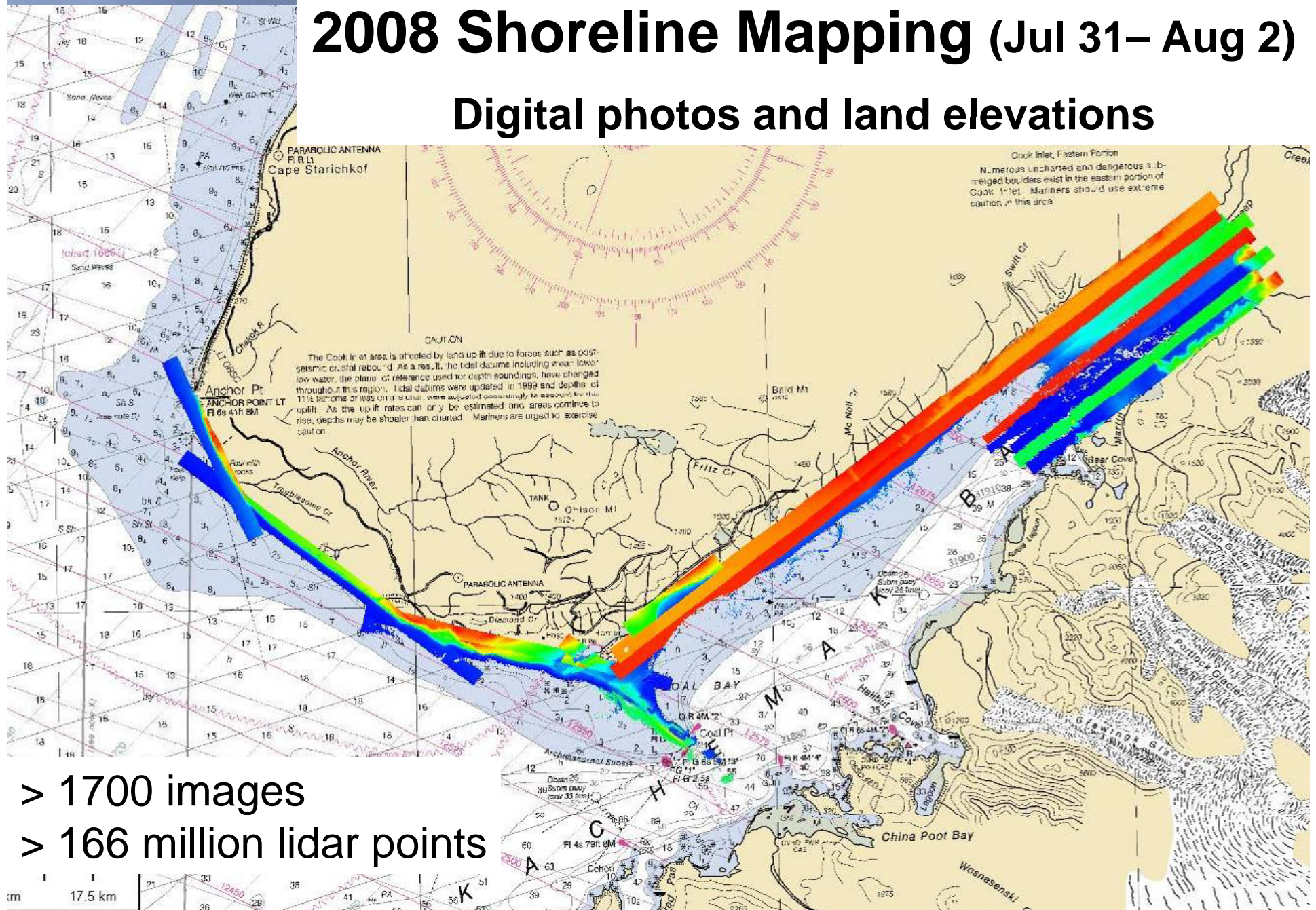
Bear Cove – glacial moraine and pinacles





2008 Shoreline Mapping (Jul 31– Aug 2)

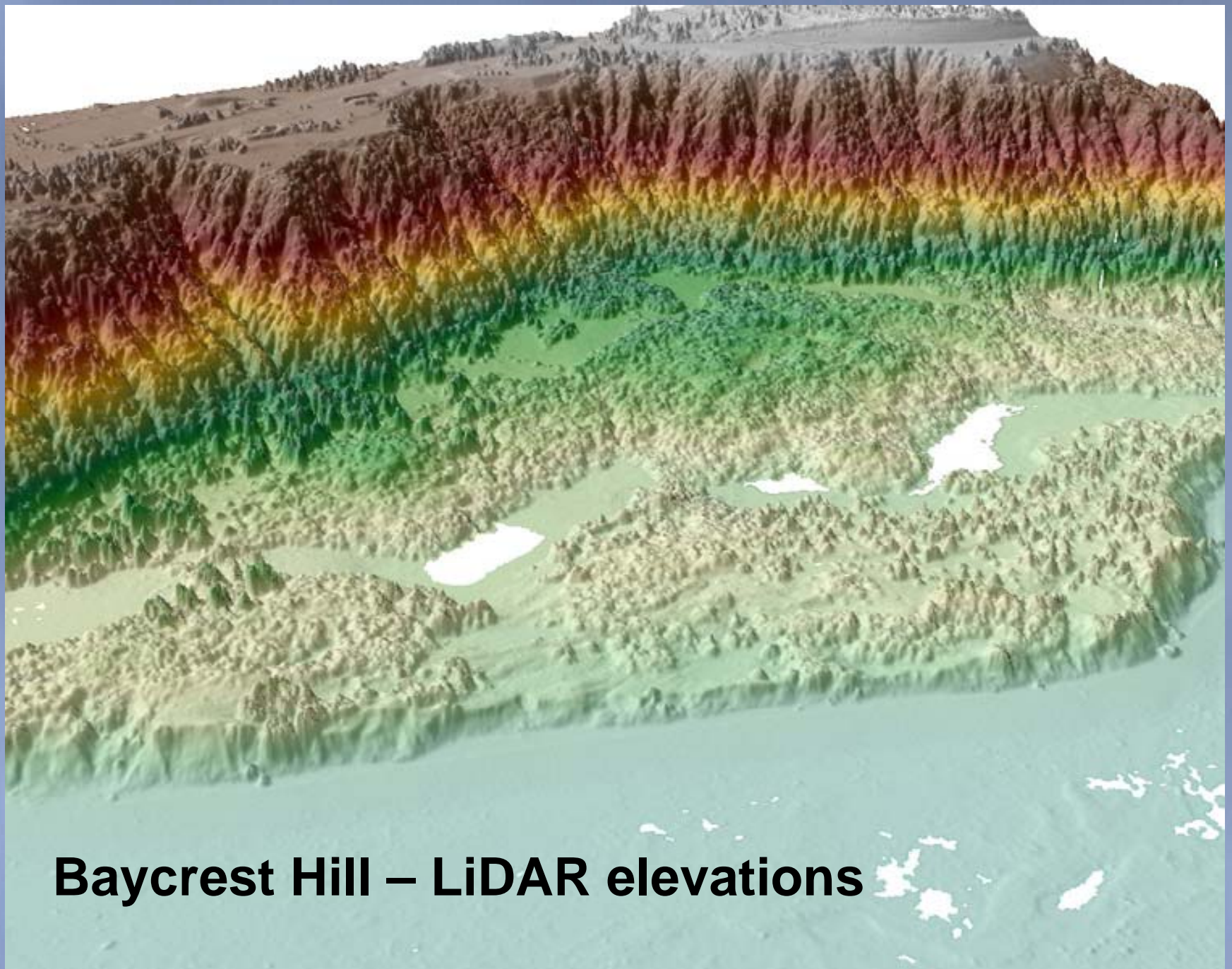
Digital photos and land elevations



> 1700 images
> 166 million lidar points

End of Homer Spit in 3-D

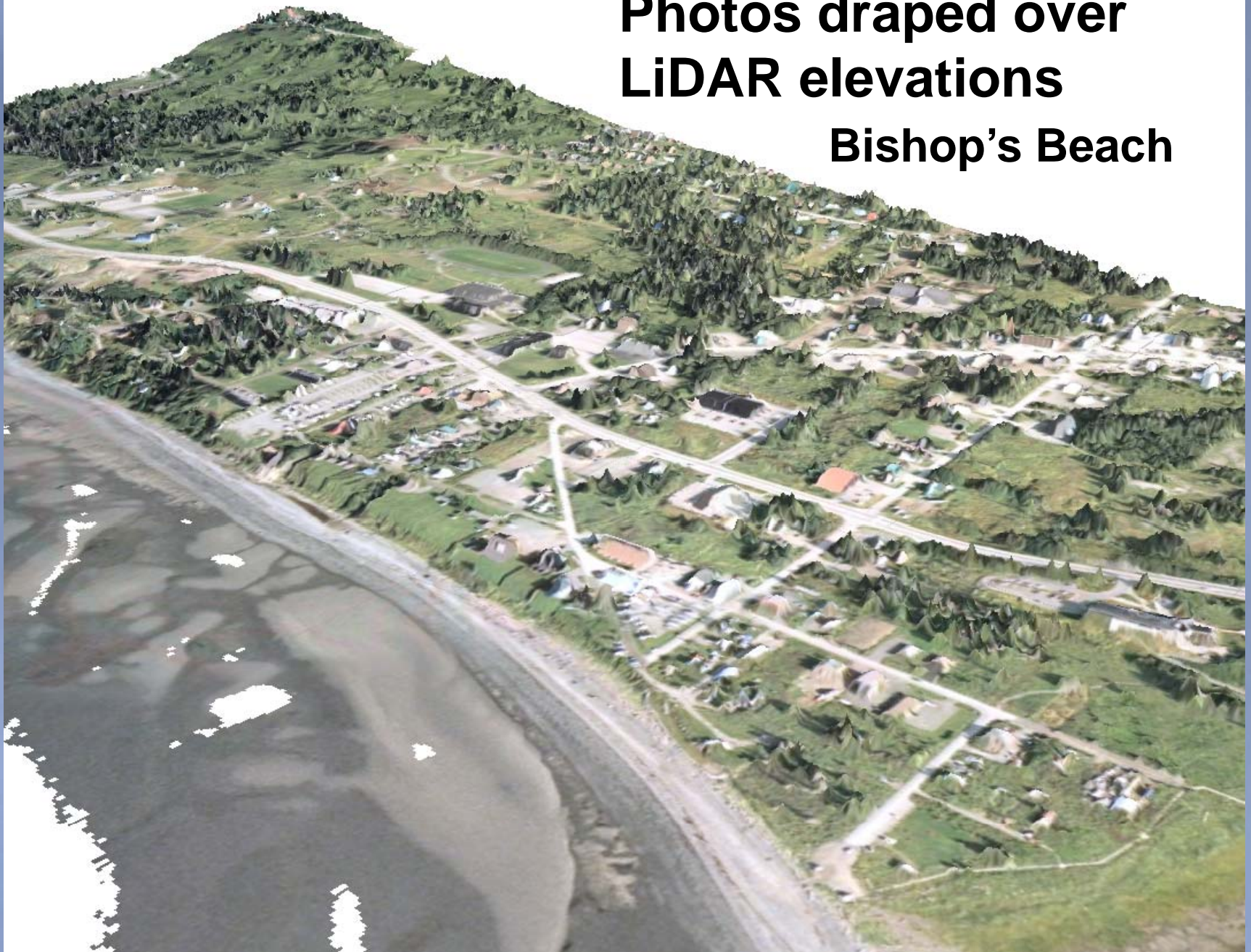




Baycrest Hill – LiDAR elevations

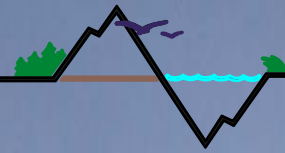
**Photos draped over
LiDAR elevations**

Bishop's Beach



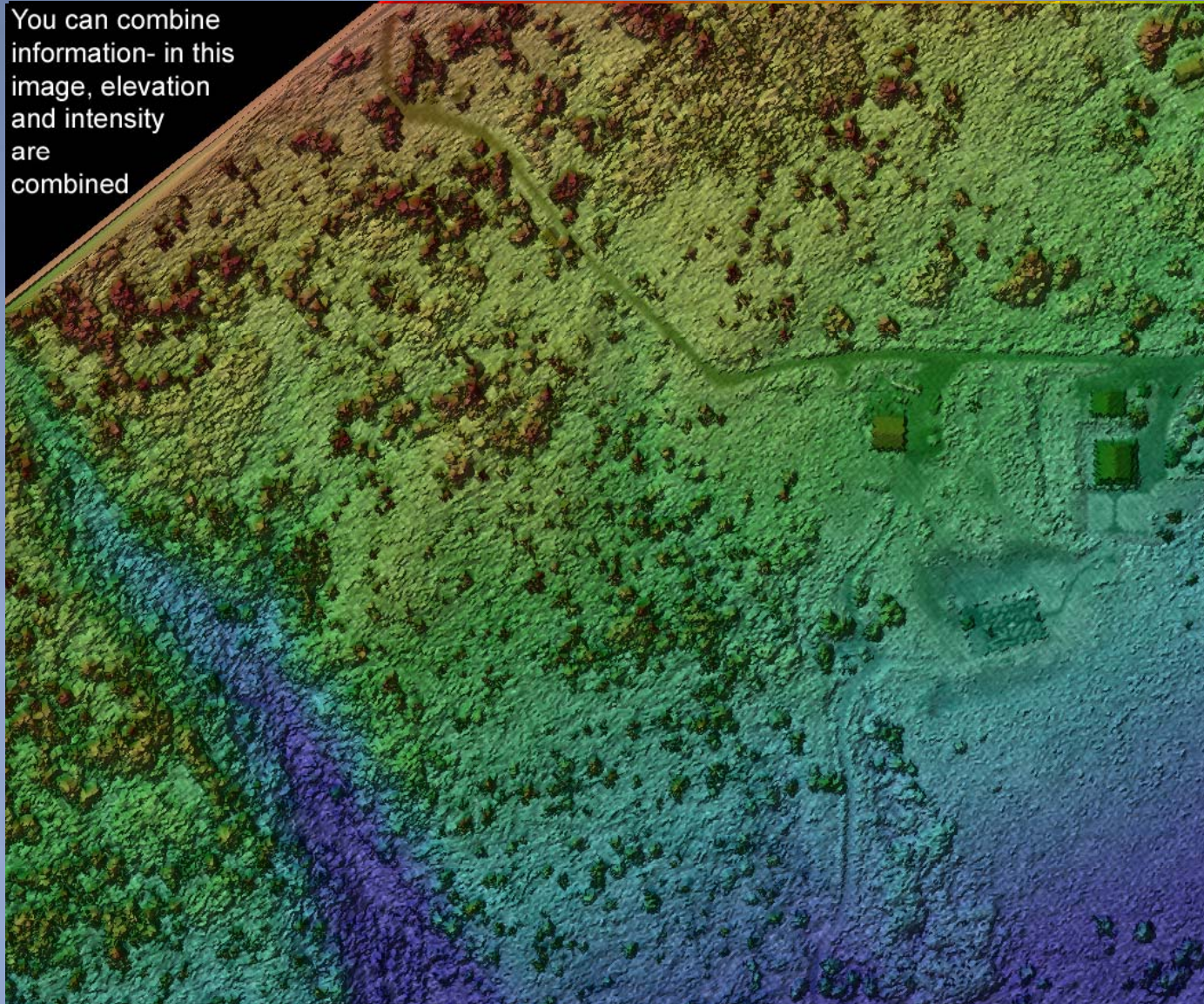
Courtesy of Steve Baird

National Estuarine Research Reserve System



**Kachemak Bay
Research Reserve**

You can combine
information- in this
image, elevation
and intensity
are
combined



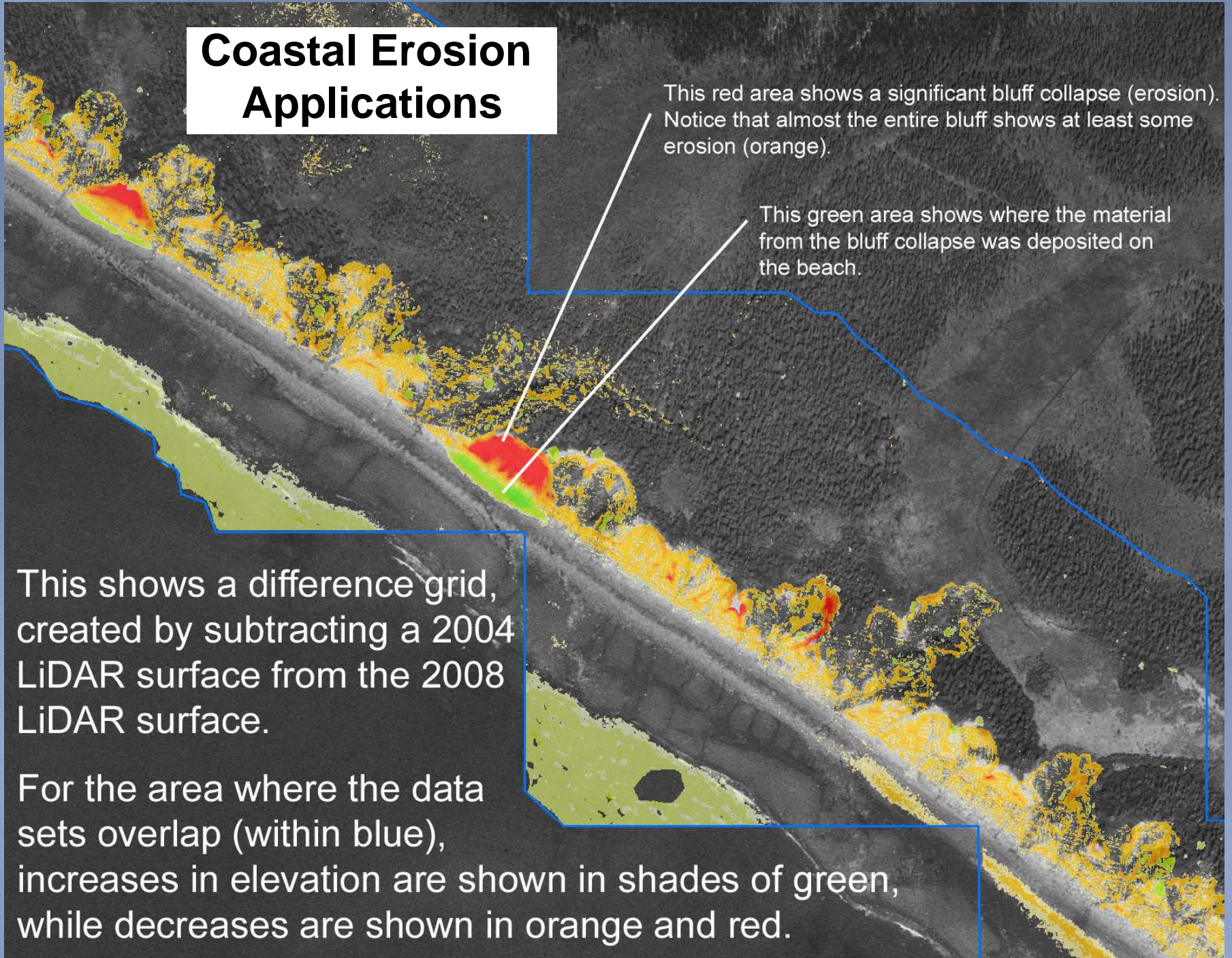
Coastal Erosion Applications

This red area shows a significant bluff collapse (erosion). Notice that almost the entire bluff shows at least some erosion (orange).

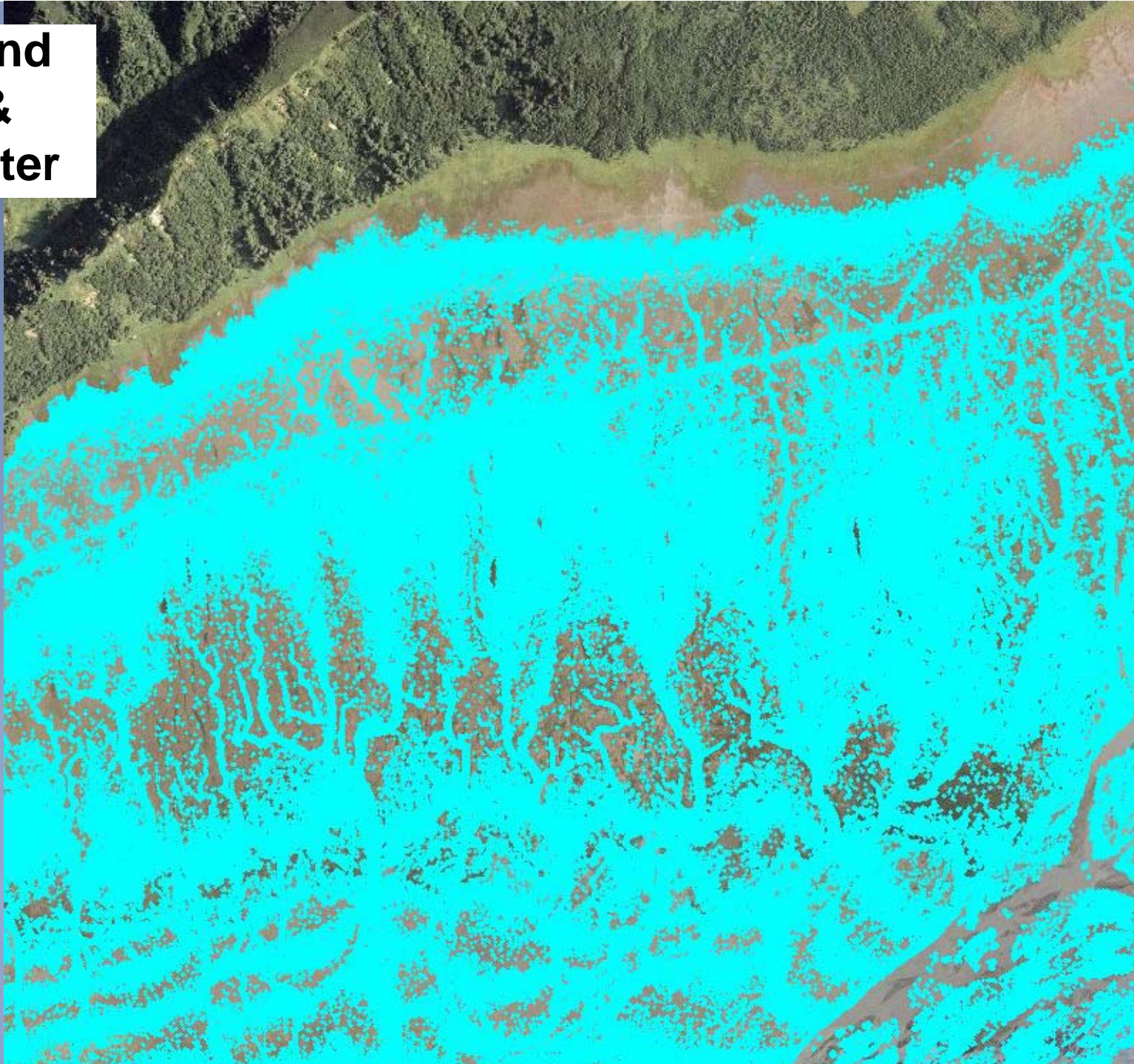
This green area shows where the material from the bluff collapse was deposited on the beach.

This shows a difference grid, created by subtracting a 2004 LiDAR surface from the 2008 LiDAR surface.

For the area where the data sets overlap (within blue), increases in elevation are shown in shades of green, while decreases are shown in orange and red.



Land & Water



NOAA Kasitsna Bay Lab

Why we love Hydropalooza



Habitat mapping

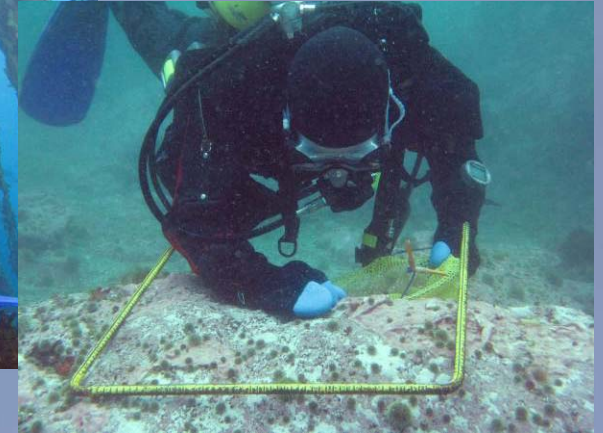
Oceanography



Education



Habitat change studies



Technology applications

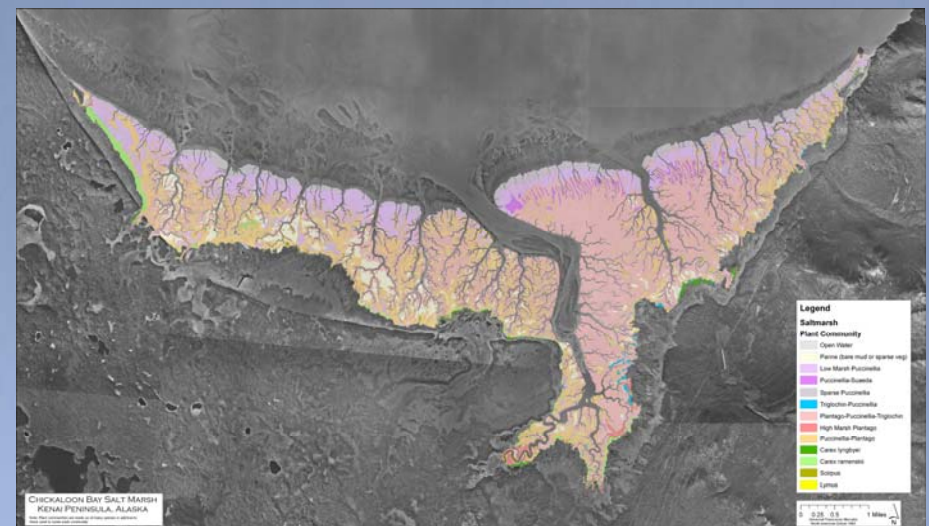
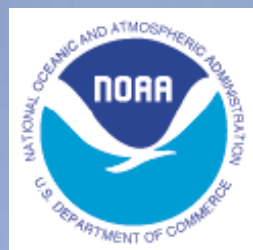




Intertidal Habitat Mapping



Hardshell Clam Project



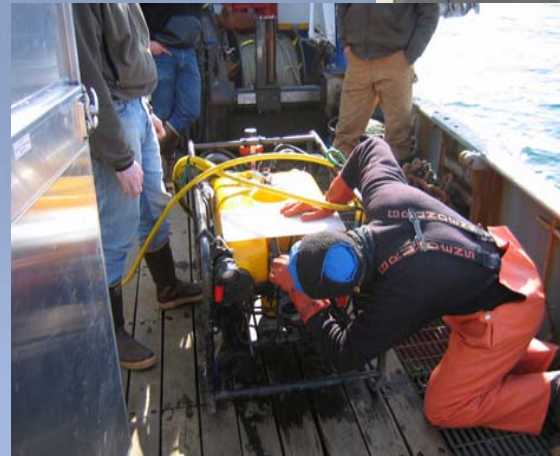
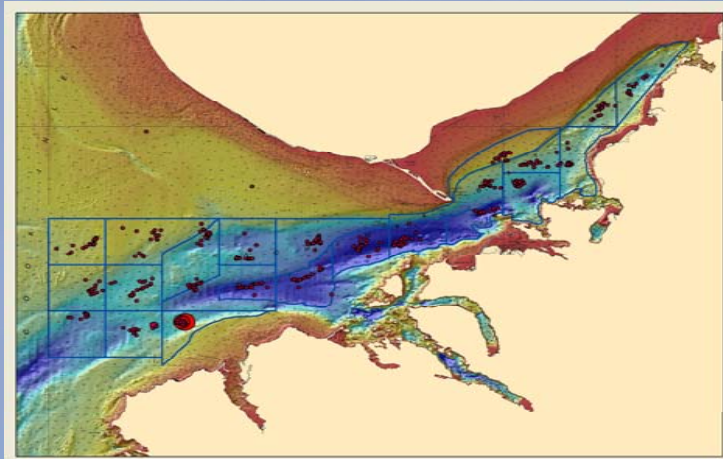
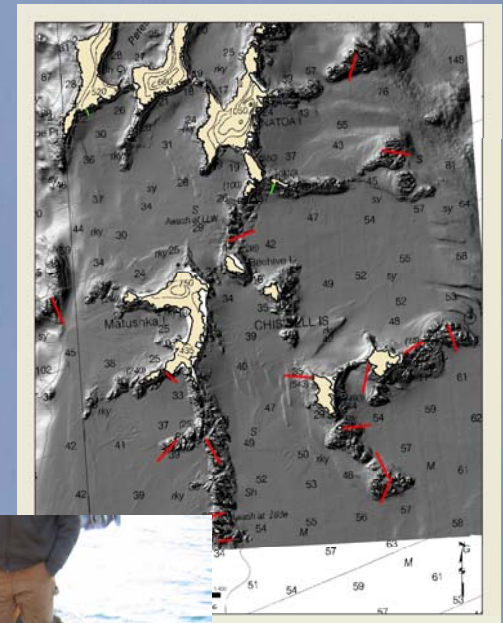
Saltmarsh Mapping

Using Multibeam Bathymetry for Fisheries Research and Management

[Courtesy of Margaret Spahn and Dr. Ken Goldman -

- Improve trawl survey planning
- Delineate marine benthic habitats
- Enable use of new survey technologies
- Explain species distributions
- Improve population estimates
- Locate hazards and marine debris

ADF&G]



Participating NOAA Offices

National Ocean Service (NOS)

- Office of Coast Survey
- National Geodetic Survey
- Center for Operational Oceanographic Products and Services
- National Centers for Coastal Ocean Science
 - Kasitsna Bay Laboratory
 - National Status and Trends Program
- Office of Coastal Resource Management/National Estuarine Research Reserve
- Coastal Services Center

National Environmental Satellite Data and Information Service (NESDIS)

- National Geophysical Data Center

Office of Marine & Aircraft Operations (OMAO)

- NOAA Ship FAIRWEATHER (S-220)
- NOAA Ship RAINIER (S-221)
- NOAA Citation Aircraft (N52RF)

Office of Oceanic & Atmospheric Research (OAR)

- West Coast and Polar Regions National Undersea Research Center

National Marine Fisheries Service (NMFS)

- Habitat Conservation Division, Alaska Regional Office
- Alaska Fisheries Science Center

Alaska Regional Collaboration Team (ARCTic)



Thanks!!

For more information:

Hydropalooza:

<http://www.hydropalooza.noaa.gov/>

NOAA mapping data:

<http://www.ngdc.noaa.gov/mgg/bathymetry/relief.html>

NOAA Kasitsna Bay Laboratory:

<http://www.ccfhr.noaa.gov/about/kasitsna.html>

Kris.Holderied@noaa.gov

