

IOCM and the National Coastal Mapping Strategy (NCMS)

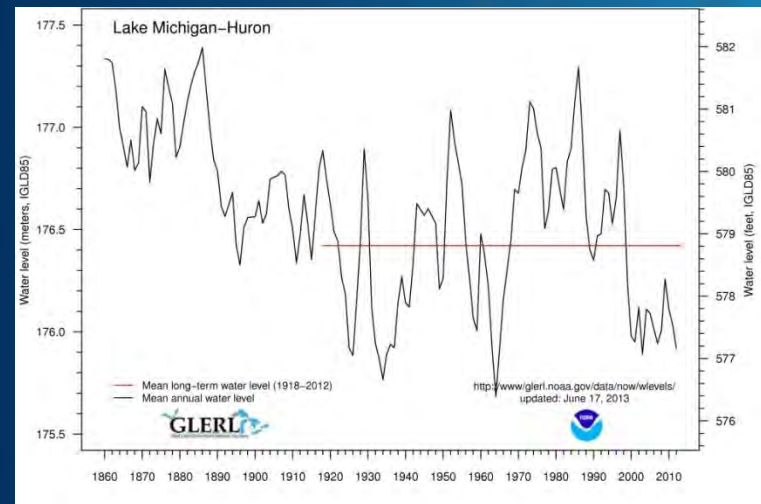
Ashley Chappell

NOAA IOCM Coordinator

Hydrographic Services Review Panel

April 9, 2015

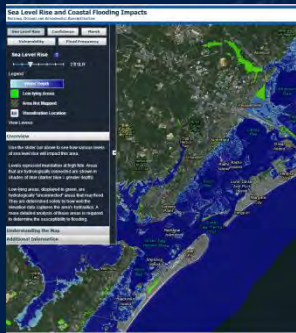
What Does the Future Hold?



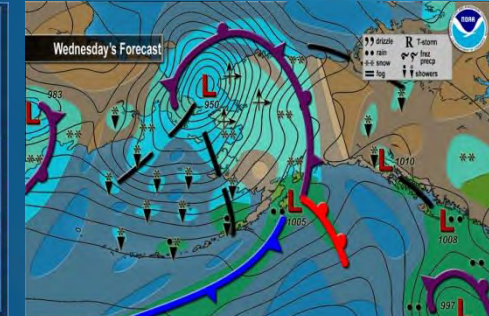
Coastal Mapping Data

Planning for Long-Term RESILIENCE

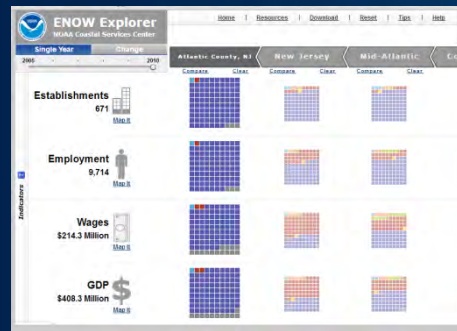
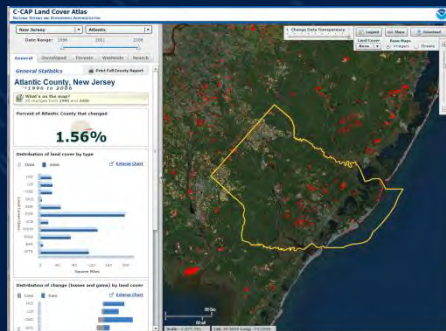
Promoting Resilience to Coastal Hazards and Climate Change



Building a Weather-Ready Nation



Supporting Community Livability



Ensuring Safe, Efficient, and Environmentally Sound Navigation



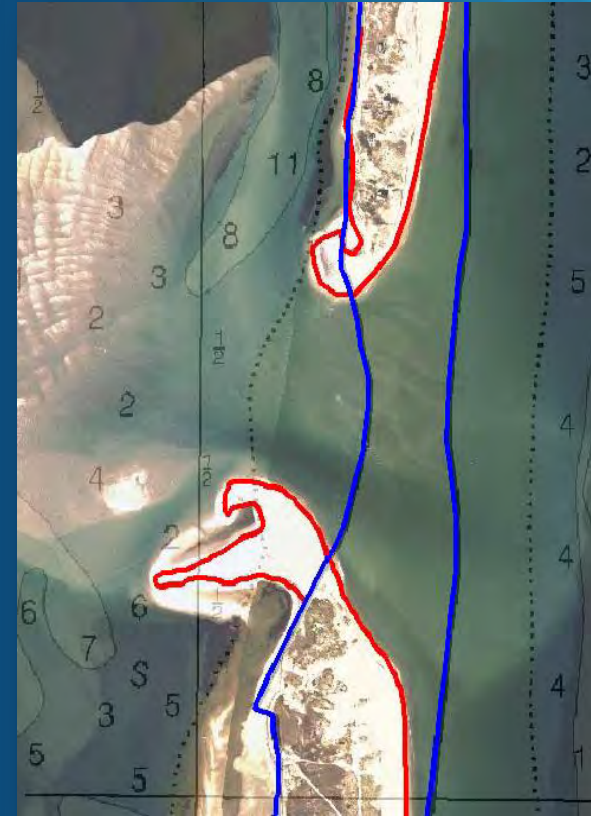
Opportunities

Maximizing Benefits of OCM Data

Oceans, coasts = economy, safety...

- Navigation, transportation, security
- Climate change and hazard resiliency
- Ecosystem-based management
- Energy siting and resource extraction

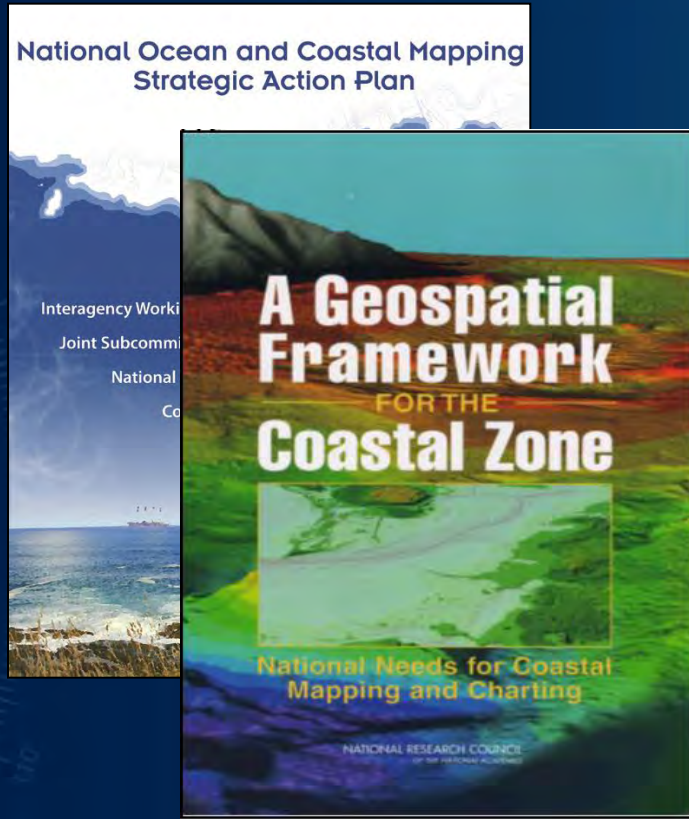
...Overlapping data requirements



The IWG-OCM

WHO:

- NOAA
- USGS
- USACE
- NAVO
- BOEM
- NSF
- NGA
- USCG
- EPA
- FEMA
- NASA
- *and other appropriate Federal agencies involved in ocean and coastal mapping.*



- Sits under the Subcommittee on Ocean Science and Technology (SOST) of the National Science and Technology Council Committee on Environment, Natural Resources and Sustainability (CENRS)
- Co-chaired by NOAA, USGS, and USACE
- Charged with facilitating “the coordination of ocean and coastal mapping activities and avoid[ing] duplicating mapping activities...”

Why a National Coastal Mapping Strategy

- Ocean and Coastal Mapping Integration Act of 2009 (33 U.S.C. 3504; Sec. 12205 of P.L. 111-11): need a “coordinated and comprehensive federal ocean and coastal mapping plan,” which includes a focus on “cost-effective, cooperative mapping efforts.”
 - Interagency Working Group on Ocean and Coastal Mapping Action: “develop an annually updated National Ocean and Coastal Mapping Plan...”

More Why

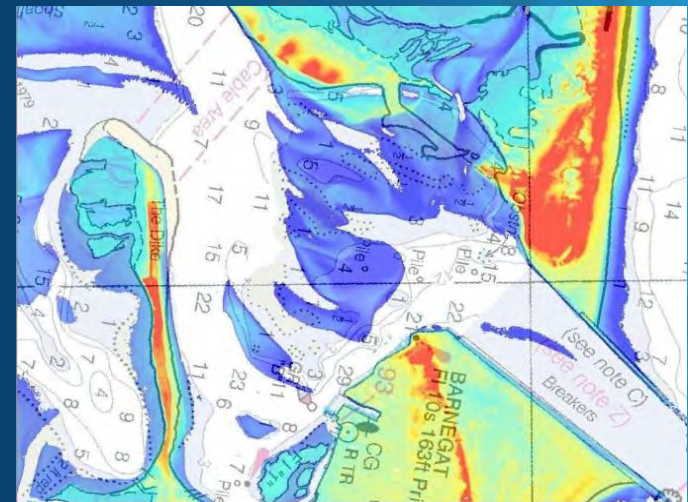
National Ocean Policy Implementation Plan –

- *Advance our mapping and charting capabilities and products to support a range of economic activities.*
- *Develop and share decision-support tools to identify coastal land protection and restoration priorities.*
 - IWG-OCM Actions: “Develop an interagency plan for topographic (primarily LiDAR or equivalent accuracy) and shallow bathymetric mapping to ensure comprehensive and accurate elevation information for coastlines.
 - Develop an annually updated National Ocean and Coastal Mapping Plan... that defines priority mapping needs and gaps, and implement the plan through interagency collaboration in planning, budgeting, and execution.

National Coastal Mapping Strategy 1.0

Coastal Lidar Elevation for a 3D Nation

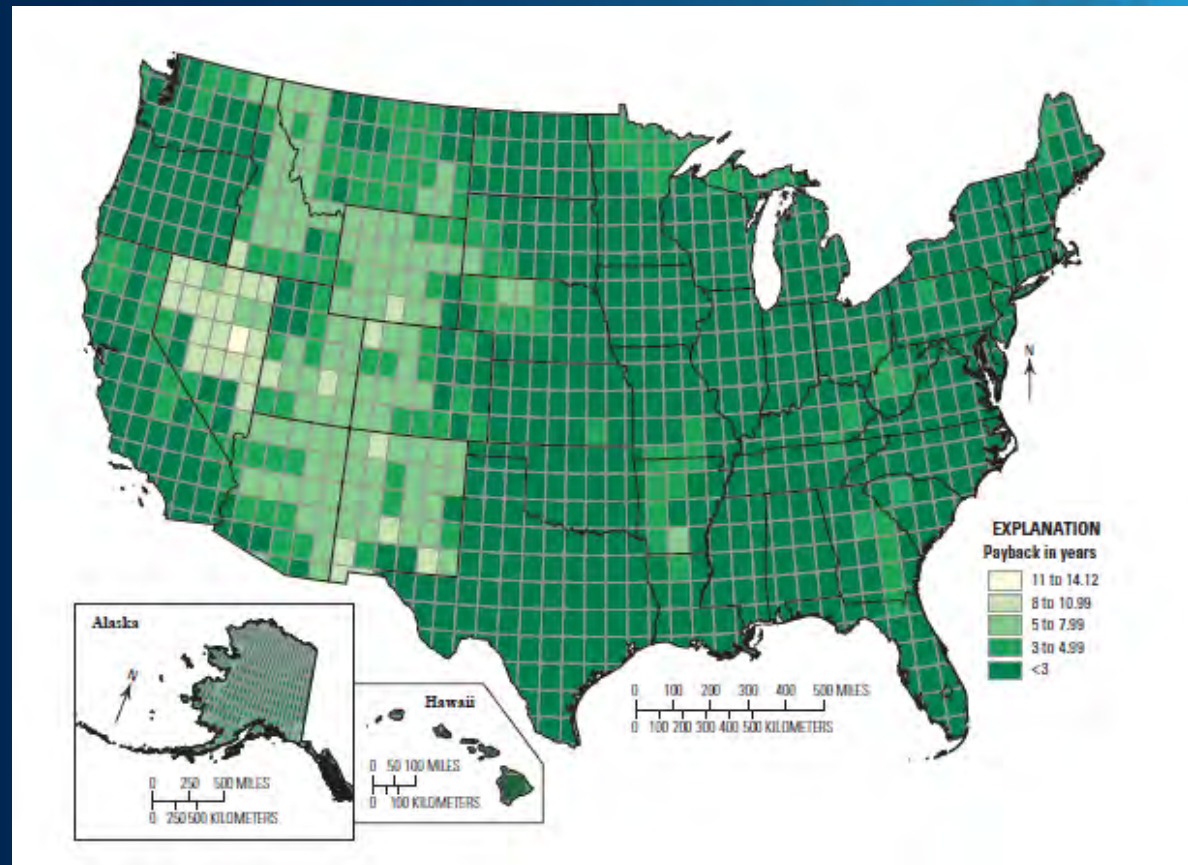
- **GOAL:**
 - To survey/map the Nation's coasts/nearshore areas on a 5-8 year cycle for multipurpose use
 - Repeat
- **Requires:**
 - Coordination
 - Broad Range of Partners
 - A Plan



National Coastal Mapping Strategy 1.0

Coastal Lidar Elevation for a 3D Nation

- Focus initially on Coastal Lidar
- Version 2.0:
 - Offshore/OCS
 - Acoustic
 - Aerial photography, HSS



USGS analysis of 2012 NEEA Study ROI of lidar data, based on multiple-use requirements /uses

3D Elevation Program (3DEP)

- *Larry Sugarbaker, USGS*
- Systematically collect nationwide lidar coverage (AK ifsar) over 8 yrs for more than \$690 million in new benefits annually
- Accurate elevations
- Broad Area Announcements
- Coordinating with IWG-OCM

+ Terrestrial Elevation
Recommended Program Initiative - 3DEP

6



- High quality lidar in conterminous US and Hawaii, ifsar in Alaska
 - \$146 million/year for 8 years
 - Benefit to cost – 4.7:1
 - Total benefits - \$690 million/year
- Publicly accessible
- Partnership approach
- New products and services

National Enhanced Elevation Assessment
Example Business Uses from NEEA study completed in 2012



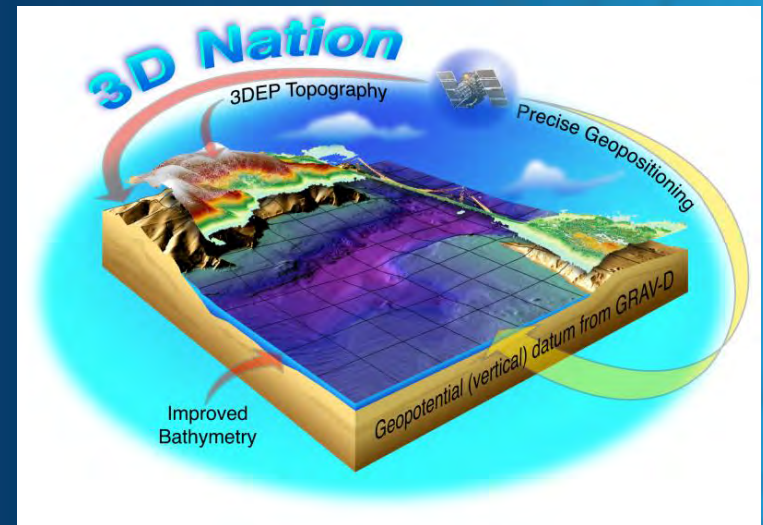
- Precision Farming
- Land Navigation and Safety
- Geologic Resources and Hazards Mitigation
- Natural Resource Conservation
- Infrastructure Management
- Flood Risk Mitigation

- 3DEP Partners:**
- USGS
 - NRCS
 - FEMA
 - USACE
 - NOAA
 - DISDI
 - EPA
 - USFS
 - FAA
 - NGA
 - States
 - others

National Coastal Mapping Strategy 1.0

Coastal Lidar Elevation for a 3D Nation

- Builds on existing partnerships
 - JALBTCX
 - 3DEP
- Leverages new initiatives
 - 3D Nation: A modern, accurate elevation foundation from our highest mountains to our deepest oceans.
- High priority data need

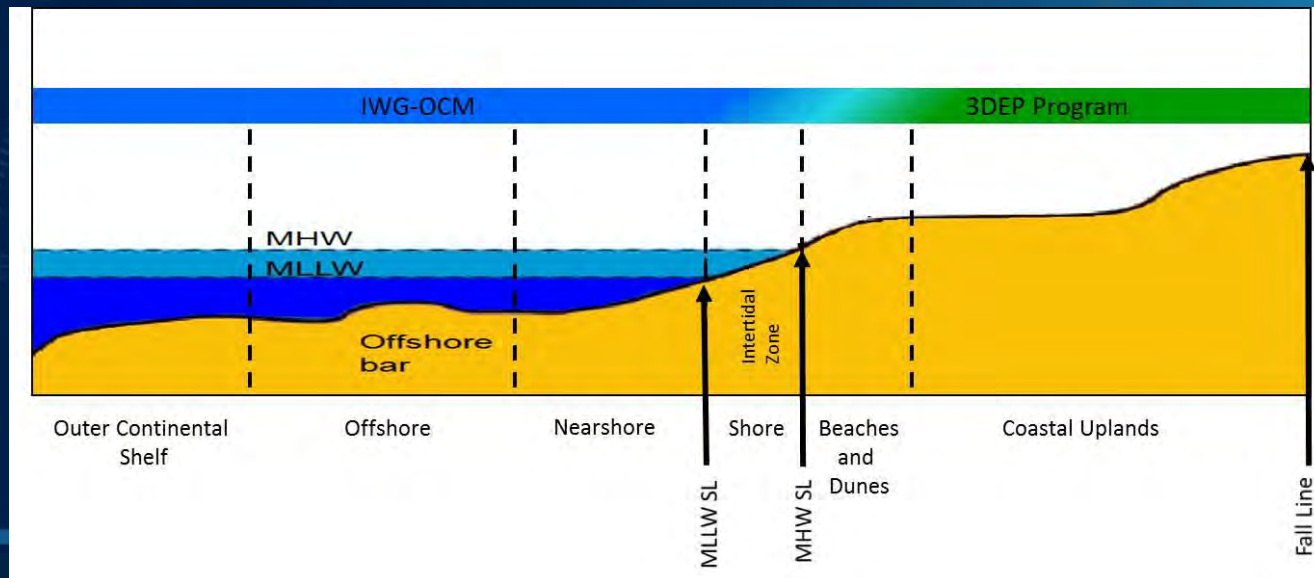


National Coastal Mapping Strategy 1.0

Coastal Lidar Elevation for a 3D Nation

Five Components:

- Aspirational eight-year plan to map U.S. coastal areas routinely
- Annual Coastal Mapping Summit for coordination
- Common standards;
- Whole life cycle approach to data;
- R&D on new tools/techniques for data collection and use.



National Coastal Mapping Strategy 1.0

Component 1: Aspirational Strategy

- How IWG-OCM agencies and partners *could* achieve comprehensive coastal lidar elevation mapping
- Assumes commitment to 3D Nation in addition to primary missions/mandates
- Sufficient resources
- Coordinated acquisition strategy among federal/state/academia/private sector

National Coastal Mapping Strategy 1.0

Component 1: Aspirational Strategy

**IWG-OCM National Coastal Mapping Strategy 1.0
Proposed Lidar Elevation Data Acquisition Schedule**

Region	Sub-region	Best Month for Lidar Collection	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
Alaska	South-east	Feb – Mar					IS	IS	IS	
	Gulf of AK	Jul – Aug			IS	IS	IS			
	Bering Sea	Jul – Oct	IS	IS						RS
	North Slope	Aug – Sep	IS	IS						RS
Gulf of Mexico	All	May - Jul, Oct, Dec	IS		RS		RS		RS	
South East		May – Aug		IS		RS		RS		RS
North East		Jan-Mar			IS				RS	
Great Lakes		Apr – Sep				IS	IS			
Hawaii		Jan – Dec (All Months)					IS	IS		
West Coast		Sep, Nov							IS	IS
U.S. Territories		Jul – May	IS			IS			IS	

IS – initial survey

RS – repeat survey

National Coastal Mapping Strategy 1.0

Component 2: Annual Coastal Mapping Summit

Coordination of coastal mapping plans and activities

- Convened annually to address the geospatial lifecycle of mapping data, from planning and collection through data archive and access.
- Mapping plans and requirements shared via simple, web-based geospatial tool.
- Areas of overlap will be identified at the Summit and evaluated for coordination opportunities.
- Post-Summit follow-ups on coordination specifics.

Mapping Coordination

- 2013 – IWG-OCM agencies coordinated on Sandy topobathy lidar data collects
- Cape May example -- USGS and NOAA discussed overlaps, modified plans for best outcome

The screenshot displays a web-based mapping application. At the top left is the NOAA logo and the text "Integrated Ocean and Coastal Mapping Sandy Coordination" and "Sandy Supplemental Mapping Priorities and Plans" with an "admin" link. The top right features the "seasketch" logo, a "help" link, and the user name "ashley chappell". The main map area shows Delaware Bay with a green hatched area indicating a specific region of interest. On the left side of the map are navigation controls: a plus sign for zoom in, a minus sign for zoom out, and a wrench icon for settings. The right side of the interface contains a "Data Layers" panel with tabs for "Data Layers", "Basemap", and "Legend & Ordering". Below these tabs is a search bar labeled "Search layers by name or keyword". The "Data Layers" list includes:

- NOAA Hydro Survey Existing Modern Coverage
- USACE Post-Sandy Lidar Collection
- USGS Post Sandy LIDAR Acquisition
- NOAA Post-Sandy Aerial Imagery (takes time to load)

The "PLANNED MAPPING ACTIVITIES" section includes:

- Demo layers
 - NOAA USGS proposed DEM (NGDC)
 - NOAA Digital Aerial Photography FY2014 (NGS)
 - NOAA 2013 Hydro Surveys underway (OCS)
 - NOAA GRAVD flight plans (NGS)
 - NOAA 2013 Topobathy Lidar Underway (NGS RSD)
 - NOAA tri lidar project (NGS)
 - USACE planned topobathy lidar mapping
- USGS Topo LIDAR Planned and Underway 2013/14
- USGS EAARL-B Topobathy Lidar Plans
- NJ Planned Seismic Lines

Seasketch and Mapping Coordination

- Great visualization tool for understanding requirements, plans
- Eg. NOAA/USGS/USACE and partners worked to maximize Sandy topobathy lidar data collects
- USACE worked with USGS and WA stakeholders to discuss overlap requirements, modify plans for best outcome

The screenshot displays the Seasketch web application interface. At the top left is the NOAA logo and the text "Federal Mapping Coordination A Site for Federal Mapping Data Acquisition Coordination". To the right is the "seasketch" logo and navigation links for "take a tour", "help", and "Sign In". The main area features a topographic map of the Pacific Northwest coast, including the Olympic Peninsula and Puget Sound. The map shows various cities like Seattle, Tacoma, and Olympia, along with geographical features like the Olympic Mountains and Puget Sound. A green shaded area highlights a specific region in the Puget Sound area. On the left side of the map, there are navigation controls: a plus sign for zoom in, a minus sign for zoom out, and a wrench icon for map tools. On the right side, there is a "Data Layers" panel with tabs for "Data Layers", "My Plans", and "Participate". The "Data Layers" tab is active, showing a search bar and a list of data layers. The list includes "Hydro/Bathy surveys" (checked), "NOAA CSC FY14 planned multibeam" (checked), "NOAA Ocean Exploration FY15 Mapping" (unchecked), "Arctic" (unchecked), "National Coastal Mapping Strategy Long Range Plans" (checked), "USGS Topo Lidar FY15 FY16" (checked), "USACE JALBTCX Topobathy Lidar HSS Aerial Photog 13-19" (checked), "NOAA Digital Imagery Aerial Photo 2014-2019 (NGS/RSD)" (checked), "NOAA CSCAP Aerial/Satellite 2014-2019 (NGS/RSD)" (checked), "NOAA NGDC DEMs" (unchecked), "NOAA Topobathy Lidar FY15 Key West (NGS RSD)" (unchecked), "FEMA Topo Lidar Plans FY15-17" (checked), and "Alaska IFSAR Status" (unchecked), "USGS_Alaska_ifSAR_Data_Availability_Status 2014" (unchecked).

National Mapping Coordination

- IWG-OCM and 3DEP agencies have agreed to use Seasketch tool to share info on acquisition plans
- Additional tools available for use

U.S. Federal Mapping Coordination
A Demonstration Site for Federal Mapping Data Acquisition Coordination admin

seasketch

take a tour help ashley chappell

Data Layers My Plans Participate

Data Layers Basemap Legend & Ordering

Search layers by name or keyword

- NOAA CSC Great Lakes DEM development areas
- BOEM 2014 Hawaii Interest Area
- Topo/Topo-Bathy Lidar
- Acoustic/Biological Surveys
- Hydro/Bathy surveys
- Arctic
- survey_priorities2_national/NGS_RSD_topobathy_lidar_FY15
- survey_priorities2_national/CBO_fy14

National Coastal Mapping Strategy Long Range Plans

- NOAA Coast Survey Planned Survey Areas FY15-17
- USGS Topo Lidar FY15 FY16
- USACE JALBTCX Topobathy Lidar HSS Aerial Photog 13-19
- NOAA Digital Imagery Aerial Photo 2014-2019 (NGS/RSD)
- NOAA CSCAP Aerial/Satellite 2014-2019 (NGS/RSD)
- NOAA NGDC DEMs
- NOAA Topobathy Lidar FY15 Key West (NGS RSD)
- FEMA Topo Lidar Plans FY15-17
- JALBTCX/JALBTCX_2014_2016_2017_NCMP_Planned

Alaska IFSAR Status

- USGS_Alaska_ifSAR_Data_Availability_Status 2014

UAS Pilot NERRS Grand Bay

- GRAND BAY NERR
 - NWS SE River Forecast Center Boundaries
 - Grand Bay Boundaries 2003
 - Sea Turtle Habitat
 - CCAP Regional Land Cover 2006
 - CCAP/CCAP_landcover_2006
- DEM areas
- survey_priorities2_national/gbner_1mi_buffer
- survey_priorities2_national/South_grant_reduced_3dep

National Coastal Mapping Strategy 1.0

Component 3: Common Standards

- **What lidar Quality Levels are:**
 - A means of consistently comparing specifications across agencies and coordinating acquisition to meet cross-agency needs
 - A primary component of a specification
 - Specified in terms of vertical uncertainty (“accuracy”), point density, and equivalent nominal point spacing
- **What lidar Quality Levels are *not*:**
 - A complete specification, in and of themselves
 - Reason: full agency specs for coastal lidar typically include a number of additional components, such as QA/QC requirements, formats for deliverables, ancillary data requirements, etc.

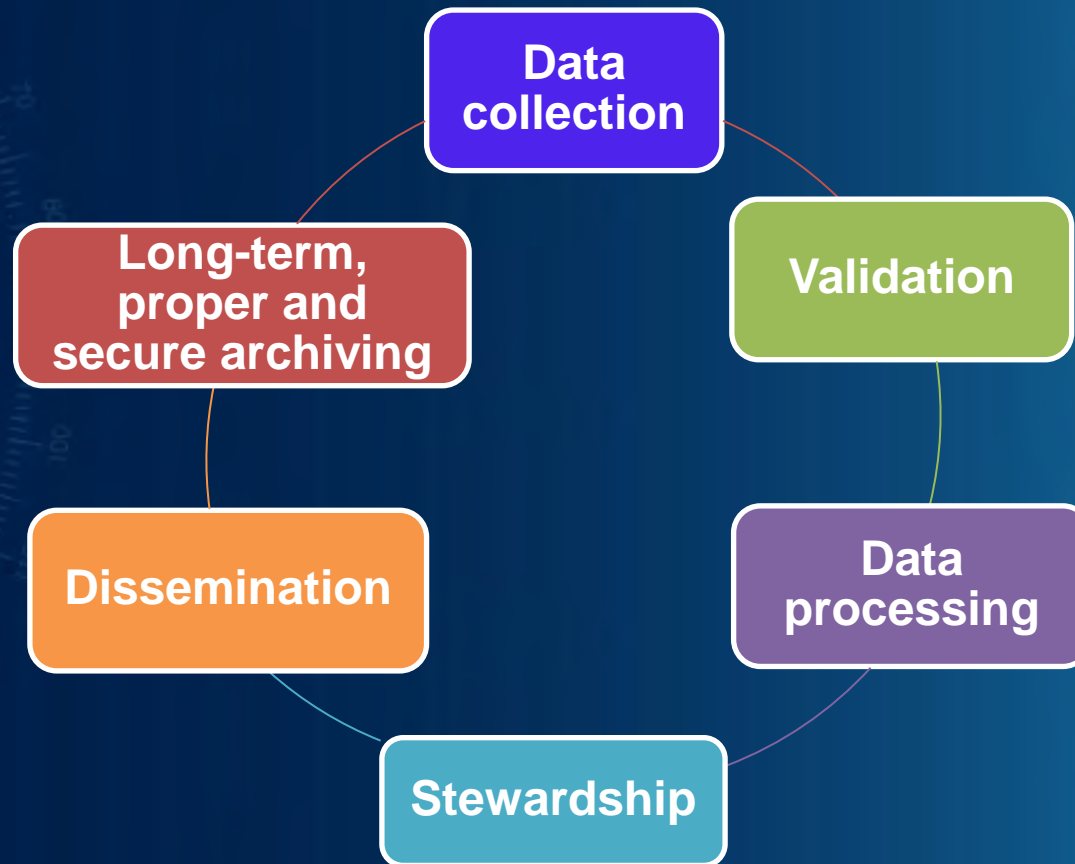
National Coastal Mapping Strategy 1.0

Component 3: Common Standards

Bathy Lidar Quality Level	Source	Vertical RMSE, (m)	Nominal Pulse Spacing (m)	Point Density (pt/m ²)	Corresponding 3DEP/topo-lidar QL
QL1 _B	Bathy or Topo-Bathy Lidar	$0.095 + 0.00275D$	0.7	2.04	QL2 (note: D=0 for land)
QL2 _B	Bathy or Topo-Bathy Lidar	$0.095 + 0.00275D$	2.0	0.25	No exact match
QL3 _B	Bathy or Topo-Bathy Lidar	$0.185 + 0.00275D$	2.0	0.25	RMSE equivalent to QL3
QL4 _B	Bathy or Topo-Bathy Lidar	$0.185 + 0.00275D$	5.0	0.04	RMSE equivalent to QL3; Point density equivalent to QL4 and QL5
QL5 _B	Bathy or Topo-Bathy Lidar	$0.463 + 0.00275D$	5.0	0.04	Point density equivalent to QL4 and QL5

National Coastal Mapping Strategy 1.0

Component 4: Common data management procedures



*"Whole Life
Cycle" Data
Approach*

National Coastal Mapping Strategy 1.0

Component 5: Consensus on targeted research and development

- Topographic /bathymetric lidar and other coastal mapping technologies are rapidly evolving
- Federal coastal mapping R&D programs critical
- Smart to leverage one another's capabilities and stretch limited research dollars

- Mutual interest areas include:
 - New sensor technologies (to improve quality and timeliness of data collection)
 - Algorithms (to process raw data and create usable data and products)
 - New uses of the data (e.g., coastal management and science questions)

National Coastal Mapping Strategy 1.0

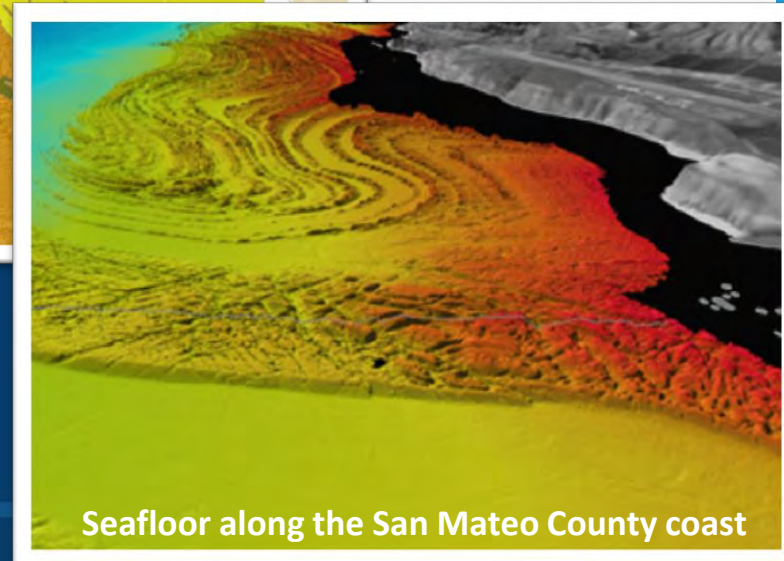
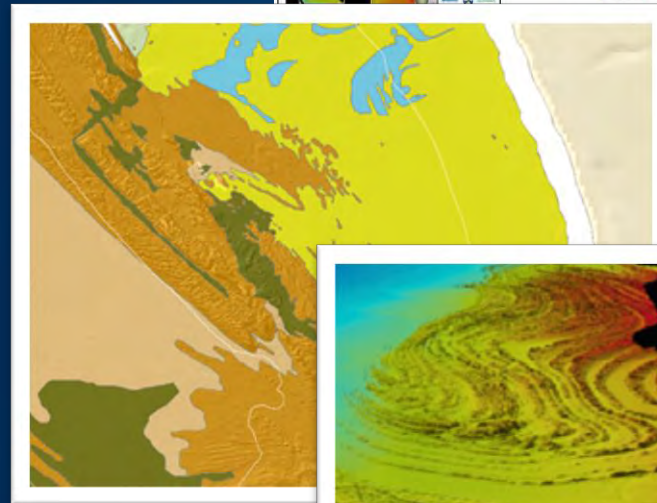
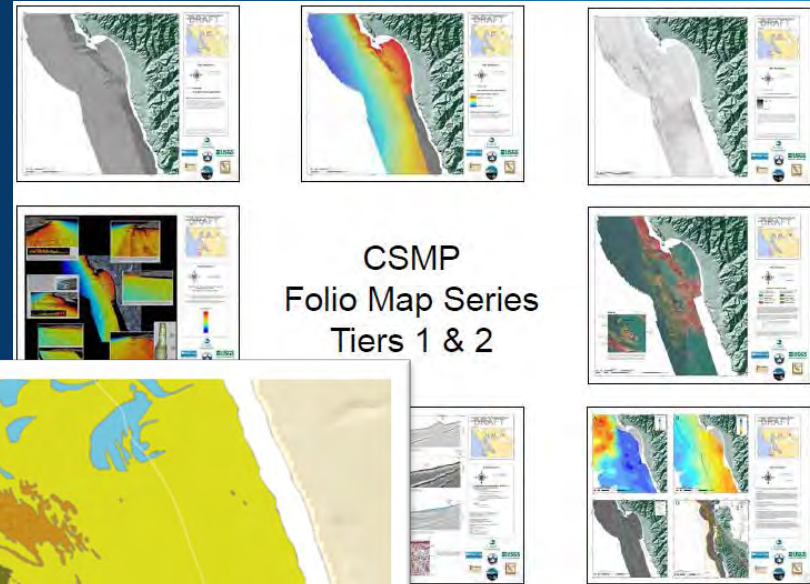
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Bringing us a step closer
to becoming
a 3D NATION

National Coastal Mapping Strategy 2.0

- Will build on 1.0 to incorporate bathymetry, other data/technologies
- Will seek to emulate successes like the CA Seafloor Mapping Project:
 - Initially a comprehensive coastal/marine geologic and habitat base map series for CA State waters
 - Ended up much more
- Many partners, including:
 - State of CA
 - NOAA
 - USGS
 - Fugro
 - USACE
 - Academia





Interagency Working Group On **Ocean And Coastal Mapping**

Questions?

Contact:
ashley.chappell@noaa.gov



Interagency Working Group On **Ocean And Coastal Mapping**

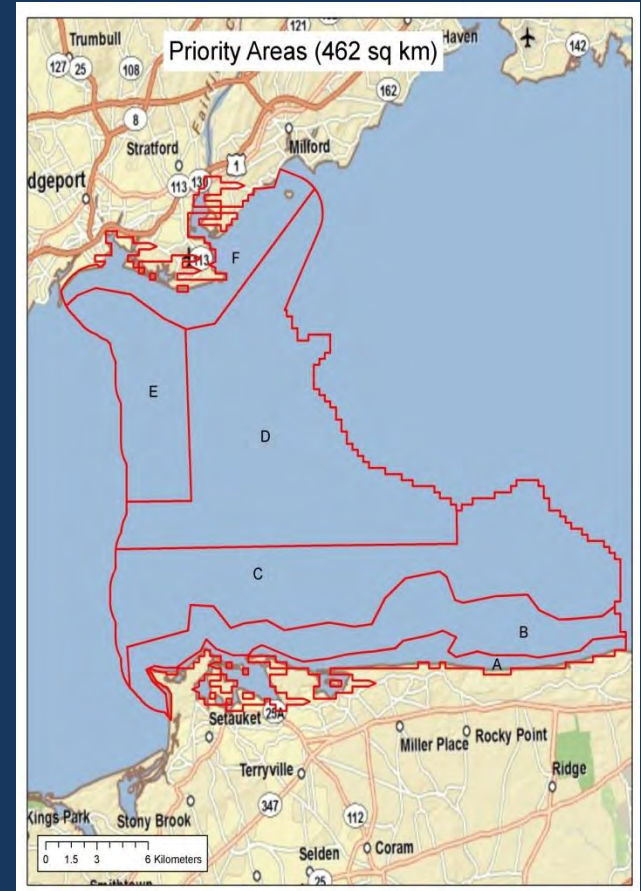


Back-up

Long Island Sound

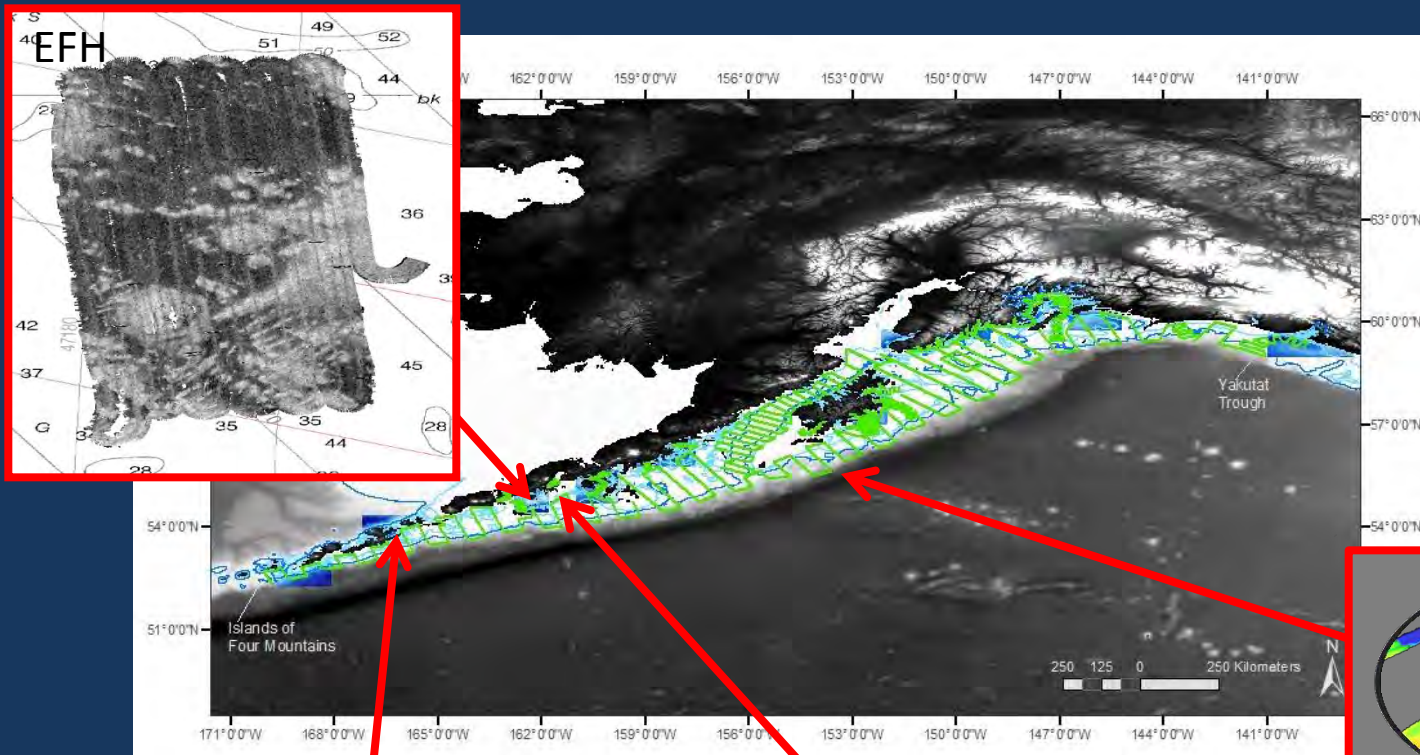
LIS Study requested NOAA assistance

- Led mapping prioritization workshop
- Providing expertise
- Common data acquisition guidelines
- Standards facilitate data re-use
- Map products:
 - Benthic habitats and ecological processes
 - Physical and geochemical sedimentary environments
- Efficiency gains and cost savings

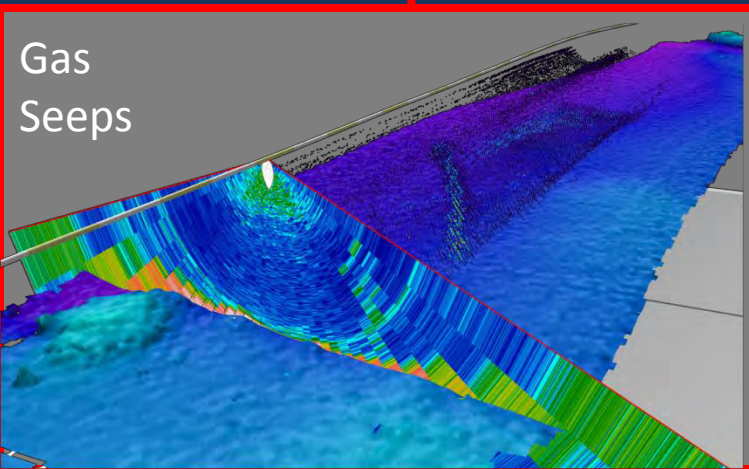
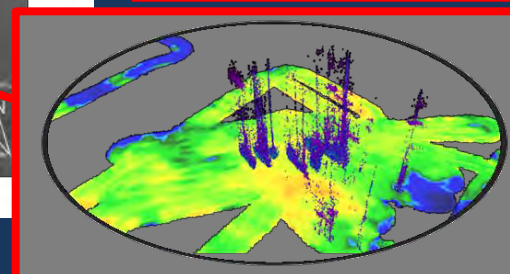


Oscar Dyson - Multipurpose Surveying

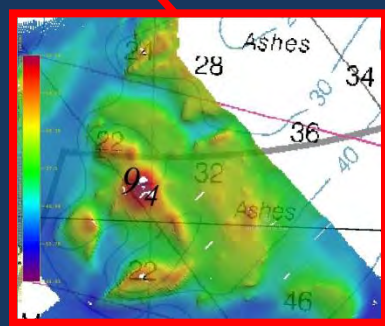
NOAA AFSC acoustic/trawl pollock stock assessment



Untrawlable Habitat



Gas Seeps



Dangers to Navigation



Critical Tools:

- Fisheries Echo Sounder (EK 60)
- Multibeam (ME-70)
- Augmenting w/trained personnel

Arctic Mapping

Working with USCG on Trackline Surveys

- Healy, Buoy Tenders as mapping Vessels of Opportunity
- Technical support and expertise
- Hands-on direction and training
- Ship Trackline Guidance
- Abbreviated Survey Reporting documents
- Future planning for expanding USCG capabilities in Arctic surveying efforts



NOAA

INTEGRATED OCEAN AND
COASTAL MAPPING (IOCM)
UNITED STATES DEPARTMENT OF COMMERCE

*“Map Once,
Use Many Times”*