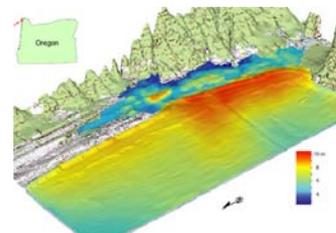
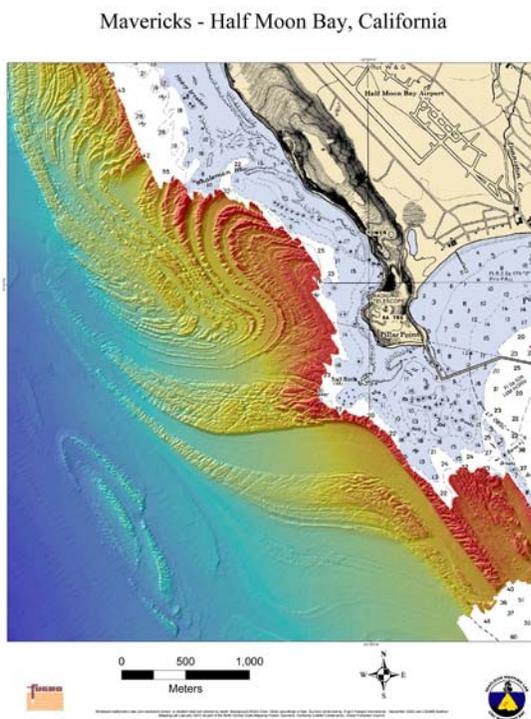
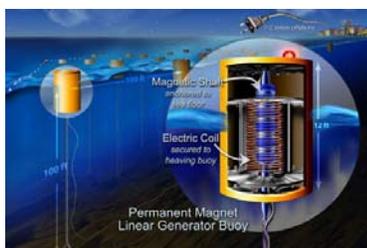


# West Coast Governors' Agreement on Ocean Health: Seafloor Mapping Action Coordination Team Final Work Plan

Released May 2010



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**Cover Images** (clockwise from upper left):

- 1) Rockfish (Washington Department of Fish and Wildlife).
- 2) Half Moon Bay, California with high resolution bathymetry data and NOAA nautical chart, survey data collected by California State University at Monterey Bay and Fugro International.
- 3) Eroding coastline, California.
- 4) Tsunami inundation modeling in Oregon using high resolution bathymetric data.
- 5) Wave energy buoys (artist’s rendering).

# Seafloor Mapping Action Coordination Team Final Work Plan

## West Coast Governors' Agreement Priority Area 6:

*Expand ocean and coastal scientific information, research and monitoring.*

## West Coast Governors' Agreement Action 6.3:

*Complete a seafloor map of the bathymetry, benthic substrate, relief, geology, and habitat of all state tidelands and submerged lands out to three miles.*

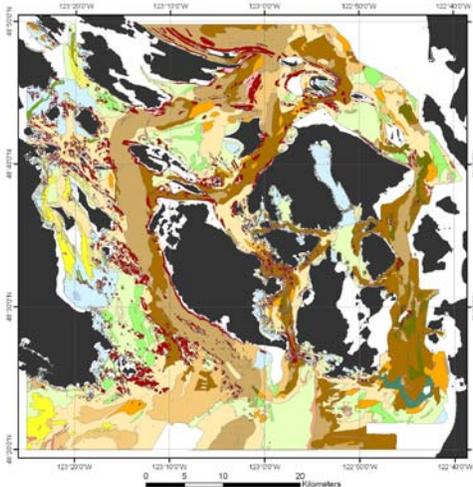
## Introduction

Mapping the seafloor along the West Coast will provide critical information to support sustainability of ecosystems and economic infrastructure. High-resolution technologies now allow very detailed mapping of bathymetry, benthic substrate, relief, geology and habitat of the seafloor. While some mapping has occurred along the West Coast, much of the region still lacks comprehensive maps to support improved management of marine resources and coastal communities.

High-resolution seafloor mapping and associated products will aid coastal and ocean management areas such as: modeling tsunamis, flood inundation and sea-level rise; characterizing and identifying marine habitats; selecting appropriate sites for renewable ocean energy projects; identifying geological hazards and sediment transport pathways; improving circulation models; enhancing safe and efficient marine transportation; and monitoring environmental changes such as habitat restorations. As indicated by Action 6.3, seafloor mapping is needed along the West Coast in all marine waters, both nearshore and deeper waters.

In addition, the habitat mapping products from seafloor mapping will aid completion of Action 2.1, which focuses on mapping marine and estuarine ecological communities throughout West Coast waters.

Given its broad applications and uses, seafloor mapping has many potential partners and data users including federal agencies, tribes, states, academic institutions, non-governmental organizations, coastal citizens, various marine industries and businesses, and the general public. Several federal agencies have mandates, missions, and important roles in seafloor mapping. Recently passed federal legislation on coastal and ocean mapping (Ocean and Coastal Mapping Integration Act of 2009) also promotes the need for seafloor mapping coordinated through the Interagency Working Group on Ocean and Coastal Mapping.



Seafloor habitat map of the San Juan Islands, Washington derived from high-resolution multi-beam sonar seafloor data. Courtesy of Tombo Institute/Sea Doc Society and Moss Landings Marine Lab.

As indicated in the West Coast Governors' Agreement (WCGA) Action Plan, each state is at various stages regarding seafloor mapping. California's mapping effort was well underway until budget freezes temporarily halted this largely state bond-funded work until recently; data collection has now been partially re-initiated. Some federally supported mapping and product development also continues in California.<sup>1</sup> Washington is developing a strategic mapping plan, and assessing and prioritizing data gaps, leveraging existing planned work, and pursuing additional resources for new mapping. Oregon has completed its mapping plan and is similarly pursuing resources for mapping, particularly areas under consideration for marine reserves and ocean energy projects.<sup>2</sup> Mapping efforts in Washington and Oregon were recently boosted when the U.S. Navy agreed to rescind its security restriction on release of high-resolution bathymetric data north of 46°N latitude.

## WCGA ACT work plan summary

The WCGA Seafloor Mapping Action Coordination Team (ACT) will foster coordination of mapping along the West Coast, establish diverse partnerships, and leverage resources necessary to achieve mapping throughout the region. Through this regional partnership, the states will aim to set joint standards, agree on common products, define high priority areas, and estimate a timeline for completion. The West Coast Governors' Agreement Action Plan set a goal of completing the seafloor map of the West Coast states' waters by 2020.

The WCGA Seafloor Mapping ACT draft work plan includes several essential elements for a successful seafloor mapping effort, including:

- data collection and processing
- groundtruthing
- data products
- communication and outreach

To be truly useful for coastal managers and stakeholders, the West Coast seafloor mapping effort must include all of these elements, not just data collection. Groundtruthing is the process of obtaining samples and images of the sea bed, needed to verify and document substrate character and lithology for development of habitat and geology maps and other useful products. A series of standard data products will be developed from the data such as seafloor character and habitat maps, geology maps (including faults and other important features), bathymetry, photos from groundtruthing videos, and perspective views of key features. These products provide an easy way to view and understand the data as well as integrate it with other information to support decision-making and education about marine resources. Communication and outreach will be essential to obtain mapping funds, develop partnerships,



Students at California State University at Monterey Bay collect seafloor data. Courtesy of CSUMB seafloor mapping lab.

<sup>1</sup> California currently has 75 to 80% of its state waters mapped with more data collection underway.

<sup>2</sup> Recent state and federal funding secured for mapping in Oregon will result in mapping of approximately 44 percent of Oregon's state waters, a significant increase from the 5 percent mapped at the time the WCGA Action Plan was released in 2008.

and coordinate mapping in the region. This includes coordinating with other WCGA ACTs where seafloor mapping will assist in outcomes for their work plans.

The WCGA Seafloor Mapping ACT envisions a strategy that seeks to develop data products as mapping and data processing and groundtruthing is completed for geographic sub-regions. The table below provides an overview of the major work plan tasks.

### Major Work Plan Tasks

<b>Task</b>	<b>Deliverables</b>	<b>Budget need*</b>	<b>Timeline</b>
1 - Data Collection and Processing	1.1 – 1.4 Gap analysis and prioritization, establish data standards and partnerships.	\$200K for gap analysis \$100K for partner development and stakeholder process	2009
	1.5. Conduct high resolution bathymetry, nearshore, and backscatter mapping.	\$52M for deeper waters \$4M for intertidal	2015
	1.6 Conduct groundtruthing surveys.	\$13M	2017
2 - Data Management	2.1 Agreement with NOAA National Geophysical Data Center (NGDC) for data storage.	\$130K/yr	2009
	2.2 Determine models for sharing processed data.	\$300K/yr to develop/maintain data-serving portals	2009-2010
	2.3 Define regional archive scheme for video groundtruthing data.	\$150K/yr to develop/maintain linked databases	2009-2010
	2.4 Annual infrastructure upgrades.	\$100K/yr	2009
3 – Product Development	3.1 Complete comprehensive GIS-ready map products.	\$20M	ongoing through 2020
	3.2. Develop and release timely products within 9 months of data collection and processing.		ongoing through 2017
	3.3 Final products available within two years of data collection.		ongoing through 2020

4 – Communication and Outreach	4.1- 4.2 WCGA Executive Committee promotes mapping to federal administration, Congress, and agencies.	\$75K/yr	2009
	4.3 Develop fact sheet and web presence.		2009
	4.4 Develop workshops for users and stakeholders.	\$50K	2009-2010
	4.5 Develop other materials for formal education setting.	\$300K	2010-2012

\*Costs are approximate, more details are provided on these estimates in the work plan, including a breakdown by state.

This work plan was initiated prior to passage of the federal stimulus package (American Recovery and Reinvestment Act (ARRA) of 2009) and the 2009 federal budget. ARRA provided \$30 Million to NOAA for hydrographic surveys. NOAA developed a spending plan, which designated resources for seafloor mapping in areas along the West Coast.<sup>3</sup> Through the 2009 federal budget, NOAA contributed \$6.5 Million and \$5 Million for data collection in California and Oregon, respectively. Meanwhile, the U.S. Geological Survey provided \$1.4 Million through its 2009 budget toward data collection, analysis, and product development in the three states. These recent contributions greatly assist the region toward meeting the goal of comprehensive seafloor mapping. However, the overall effort still requires extensive funding to complete mapping as envisioned by this work plan. In addition, current state budget processes and availability of other resources may influence the work plan. The Seafloor Mapping ACT will review and revise this work plan as appropriate based on these various factors.

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<sup>3</sup> Of this amount, \$4.4M was awarded to NOAA hydrographic services contractors for surveys in California and Washington.

## Sources of Potential Funding

As mentioned above, pending funds for seafloor mapping may influence the seafloor mapping work plan. The list below is meant only to provide ideas of existing programs where funding may assist with seafloor mapping for the West Coast region. Funding strategies for mapping in each state will likely vary. A more detailed listing of potential partners is included in the work plan under each task area.

### Federal agencies

- Department of Commerce
  - NOAA: Office of Coast Survey, Office of National Marine Sanctuaries, National Marine Fisheries Service, Fisheries Science Centers, National Geophysical Data Center, and Coastal Services Center
- Department of Interior
  - US Geological Survey (USGS)
  - Minerals Management Service
  - US Fish and Wildlife Service
  - National Park Service
- Department of Energy
- Department of Defense
  - US Army Corps of Engineers
  - US Navy/Department of Defense
  - U.S. Coast Guard

### States

- Marine land management agencies
- State coastal zone management programs
- Fish and wildlife agencies

### Academic institutions

### Other

- Tribes
- Foundations
- Non-governmental organizations
- Various marine industry organizations and hydrographic survey businesses

## Task Descriptions

The following table describes the details for each task in the WCGA’s Seafloor Mapping ACT work plan. For each task, the work plan provides the major steps and outcomes, timelines, partners, resources needed, and challenges and recommendations.

Task 1	Data Collection and Processing
Major Steps, Products and Outcome(s)	<ol style="list-style-type: none"> <li>1. Conduct gap analysis. Identify mapped and unmapped areas. Document data quality in mapped areas with metrics such as acquisition hardware, acquisition specifications, data resolution and date of acquisition.</li> <li>2. Identify mapping stakeholders. Prioritize areas that need to be mapped first based on stakeholder input.</li> <li>3. Establish data standards (including minimum baseline) based on the information needs of stakeholders.</li> <li>4. Identify strategic partnerships needed to complete seafloor mapping, data processing, and product development. Develop partnership and coordinate activities with the U.S. Interagency Working Group on Ocean and Coastal Mapping.</li> <li>5. Conduct mapping and data processing– high-resolution bathymetry with backscatter – in all State waters from ~10 m isobath to 3-mile limit.</li> <li>6. Collect groundtruthing surveys (video camera surveys, bottom sampling) in all State waters</li> <li>7. Conduct nearshore and shoreline mapping (0-~10 m isobath) for all State coastlines using lidar and other technologies. Different approaches will clearly be required in different locations.</li> <li>8. Collect high-resolution, seismic-reflection (subbottom) surveys in high priority areas.</li> </ol>
Timelines - Qualified based on likely resources and State strategies	<ol style="list-style-type: none"> <li>1. Complete gap analysis in all three states in 2009.</li> <li>2. Complete prioritization of unmapped areas in 2009.</li> <li>3. Establish data standards in 2009.</li> <li>4. Develop and establish partnerships in 2009. Continue to add partners until mapping and product development is completed.</li> <li>5. Complete high resolution bathymetry and backscatter mapping in all State waters by 2015.</li> <li>6. Complete groundtruthing surveys by 2017.</li> <li>7. Complete high-resolution and shoreline mapping by 2015.</li> <li>8. Complete high-resolution, seismic-reflection (subbottom) surveys in high-priority areas by 2017.</li> </ol>

Partners	<p><b><u>State Agencies and bodies:</u></b></p> <p><b><u>California:</u></b> CA Ocean Protection Council, State Coastal Conservancy, California Geological Survey, CA Department of Fish and Game, CA State Parks, CA State Lands Commission, CA Boating and Waterways</p> <p><b><u>Oregon:</u></b> OR Department of Fish and Wildlife, OR Department of Geology and Mineral Industries, Department of State Lands, Department of Land Conservation and Development, Ocean Policy Advisory Council, Office of the Governor, Coastal Caucus, Oregon Parks and Recreation Dept.</p> <p><b><u>Washington:</u></b> WA Department of Natural Resources, WA Department of Ecology, WA Department of Fish and Wildlife, Puget Sound Partnership, Emergency Management Division (WA Military Dept.), Northwest Straits Commission</p> <p><b><u>Federal Agencies:</u></b> U.S. Geological Survey, NOAA Office of Coast Survey, NOAA National Marine Fisheries (NW and SW Fisheries Science Centers), NOAA Office of National Marine Sanctuaries, NOAA IOOS Program Office, NOAA Coastal Services Center, NOAA National Geophysical Data Center, Minerals Management Service, Fish and Wildlife Service, Army Corps of Engineers, US Navy/Department of Defense, Environmental Protection Agency, U.S. Coast Guard, Department of Energy</p> <p><b><u>Other governmental:</u></b> Numerous coastal tribes, Northwest Indian Fisheries Commission, Canadian Hydrographic Service, Geological Survey of Canada, Parks Canada, Canadian Department of Fisheries and Oceans, local county and city governments, ports</p> <p><b><u>Non governmental organizations:</u></b> Coastal States Organization, The Nature Conservancy, Surfrider Foundation, philanthropic donor organizations (e.g., Packard Foundation, Pew Foundation, and Moore Foundation), Sea Doc Society, Tomolo Institute, Marine Conservation Biology Institute, SCCOOS, CeNCOOS, NANOOS, and MBARI.</p> <p><b><u>Private sector:</u></b> Seafloor mapping contractors, fishing community, shipping industry, vessel providers, ocean energy companies, energy utilities.</p> <p><b><u>Academic institutions:</u></b> California State University at Monterey Bay, Oregon State University, University of Washington, Friday Harbor Laboratories (FHL), Scripps Institution of Oceanography, Moss Landing Marine Labs, others.</p>
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<p>Resources Needed (indicate existing, new or mix)</p>	<p>General needs:  Funding, including in-kind support from stakeholders  Mapping vessels (institution-owned, leased and donated)  State-of-the-art mapping and data processing tools (ongoing costs)  Dedicated staff, including support from undergraduate and graduate students</p> <p><u>Approximate costs:</u></p> <ol style="list-style-type: none"> <li>1. Gap analysis (completed in CA; partly done in OR, WA): \$200K</li> <li>2. Stakeholder process and partnership development: \$100K</li> <li>3. Conduct mapping and data processing, bathymetry and backscatter: \$50M  CA - \$25M (~\$18M already committed, state-funded work was temporarily halted and has been recently partially resumed)  OR - \$8M (~ \$7.00M in state and federal funds already secured)  WA - \$19M</li> <li>4. Groundtruthing surveys (video camera transects and groundtruthing): \$13M  CA - \$7M (includes areas mapped before CA State Waters Mapping Program)  OR - \$2M  WA - \$4M</li> <li>5. Intertidal and shoreline mapping: \$4M  Needs major gap analysis, but collecting nearshore mapping, where possible, is a priority. Army Corps of Engineers will be collecting a considerable amount of shoreline West Coast data in 2009-2010.</li> </ol> <p>Note: Estimated costs “per unit” of mapping may vary based on a large number of parameters such as water depth (shallower water = more time and increased cost), use of different mapping platforms, amounts of matching and leveraged funds, state-determined timetables for project completion, variations in the mix of mapping by different private, government, and academic entities, etc. The Oregon Plan is based largely on an academic model that does not rely on commercial contractors.</p>
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<p>Recommendations and Challenges</p>	<p><b><u>Recommendations:</u></b></p> <ol style="list-style-type: none"> <li>1. Identify and obtain needed funding.</li> <li>2. Coordinate NOAA and other federal mapping priorities and plans with WCGA mapping priorities.</li> <li>3. Follow different state-based sea-floor mapping strategies but keep goals similar.</li> <li>4. Expand mapping beyond 3-mile limit, acknowledging importance of adjacent federal waters in state coastal zone and fisheries management, especially the need to capture contiguous habitat areas, geohazards, and alternative energy. This mapping should be evaluated on a case-by-case basis with state partners.</li> </ol> <p><b><u>Challenges:</u></b></p> <ol style="list-style-type: none"> <li>1. Insufficient funding to complete mapping.</li> <li>2. Data acquisition in many shallow nearshore areas (e.g., wave-exposed coasts) is costly at this scale and presents a major technological challenge. However, it is still a priority to gather nearshore data, where funding, techniques, and partnerships are available to collect seafloor data efficiently.</li> </ol>
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<b>Task 2</b>	<b>Data Management</b>
Major Steps, Products and Outcome(s)	<ol style="list-style-type: none"> <li>1. Develop and sustain partnership with NOAA National Geophysical Data Center (NGDC) for storing and disseminating raw and processed data.</li> <li>2. Develop data serving portals – For example, the USGS (map products, usSEABED), regional Ocean Observing Systems (e.g., PaCOOS Habitat portal); CSUMB; state agencies, including relevant state coastal atlases.</li> <li>3. Maintain and (or) develop linked databases for groundtruthing data (camera, video, sediment samples) with similar, accessible formats. Much sediment sample information (USGS usSEABED and PaCOOS) is now available.</li> <li>4. Develop dynamic systems to allow easy incorporation of new mapping data and upgrades of data-storage technology. Develop partnerships with other groups (e.g., NSF-supported data infrastructure projects) to keep pace with technology.</li> </ol>
Timelines - Qualified based on likely resources and state strategies	<ol style="list-style-type: none"> <li>1. Formalize submission agreement with NOAA National Geophysical Data Center (NGDC) for storage of raw and processed bathymetry and backscatter data for California, Oregon, and Washington - 2010.</li> <li>2. Define models for on-line sharing and dissemination of processed bathymetry and backscatter data, ideally through partnering agreements that will build on existing assets with universities, state and federal agencies, and the private sector, 2009-2010.</li> <li>3. Define regional archive scheme for video groundtruthing data, 2009-2010.</li> </ol>
People/Expertise/ Partners	<p>NOAA – National Geophysical Data Center  USGS, NOAA and other federal agencies – Geospatial One Stop, USGS Coastal and Marine Geology Program  Regional Ocean Observing Systems (SCCOOS, CeNCOOS, NANOOS, PACOOS)  tribes, Northwest Indian Fisheries Commission  private sector entities (e.g., Google)  academic institutions (e.g., CSUMB, OSU, UW, FHL, MLML)  state agencies, coastal atlases  non-profit organizations and other regional or local initiatives (e.g., Tombolo/SeaDoc Society, San Luis Obispo Science and Ecosystem Alliance, Partnership for Interdisciplinary Studies of Coastal Oceans, Packard Foundation, Oceana, The Nature Conservancy)  philanthropic donor organizations</p>

<p>Resources Needed (indicate existing, new or mix)</p>	<p>General needs:  Funding, including in-kind support from stakeholders  Institutional continuity – talented and dedicated data management/archiving staff  <u>Massive</u> data storage capacity  <u>Massive</u> on-line data serving capability  Stable data management platforms  Metadata standards</p> <p><u>Approximate costs:</u>  1. NOAA NGDC data management - \$130K/yr  2. Develop/maintain data-serving portals - \$300K/yr (above existing support)  3. Develop/maintain linked databases for groundtruthing data - \$150K/yr  4. Annual infrastructure upgrade costs - \$100K/yr</p>
<p>Recommendations and Challenges</p>	<p><b><u>Recommendations:</u></b>  1. Develop and formalize continuous and stable data management and serving systems.  2. Identify, invest in and maintain robust data servers and back-up systems.  3. Develop state-based data repositories and data serving capabilities.  4. Consider data management a very high priority requiring continuous stable funding.</p> <p><b><u>Challenges:</u></b>  1. Developing and maintaining capability to manage enormous amounts of data.  2. Developing and sustaining stable funding to support data management and archiving.</p>

Task 3	Product Development
Major Steps, Products and Outcome(s)	<ol style="list-style-type: none"> <li>1. Develop comprehensive, publicly available seafloor mapping data set in GIS-ready format.</li> <li>2. Develop web-based applications and interface (e.g., interactive map development).</li> <li>3. Develop seamless bathymetric/topographic digital elevation models.</li> <li>4. Produce comprehensive map “folios” for major areas in states (e.g., to include bathymetry, backscatter, perspective views, groundtruthing data, seafloor character and habitat maps, seismic-reflection data and interpretations, geology). Priority areas would be defined in stakeholder process.</li> <li>5. Develop visualization products for stakeholders and educators (e.g., fly-throughs).</li> <li>6. Continue to develop new products and identify creative applications for mapping data. For example, fusion of mapping data with detailed biological surveys or oceanographic data (e.g., circulation, sediment transport), 4-D map visualizations, integration with Google Earth/Oceans.</li> </ol>
Timelines - Qualified based on likely resources and state strategies	<ol style="list-style-type: none"> <li>1. Complete development of comprehensive GIS-ready map products for California, Oregon, and Washington (ongoing through 2020).</li> <li>2. Develop and release timely products within 9 months of data collection and processing (ongoing through 2017).</li> <li>3. Make final products available within two years of data collection, including groundtruthing.</li> </ol>
People/Expertise/ Partners	<p>Numerous federal, state, local, and academic entities will be producing important products from these data consistent with their mandates and/or would be vehicles for distributing informational products and maps. These include but are not limited to the following:</p> <p><b><u>State agencies and bodies:</u></b> state coastal atlases  <u>California:</u> CA Geological Survey, CA Department of Fish and Game, CA State Parks  <u>Oregon:</u> OR Department of Fish and Wildlife, OR Department of Geology and Mineral Industries  <u>Washington:</u> WA Department of Natural Resources, WA Department of Ecology, WA Department of Fish and Wildlife</p> <p><b><u>Federal agencies:</u></b> U.S. Geological Survey Western Coastal and Marine Geology Team/Program, NOAA Office of Coast Surveys, NOAA National Marine Fisheries (NW and SW Fisheries Science Centers), NOAA Office of National Marine Sanctuaries, NOAA IOOS Program Office, NOAA Coastal Services Center, NOAA National Geophysical Data Center, NOAA Office of Response and Restoration, NOAA National Weather Service, Minerals Management Service, NASA (e.g., World Wind)</p>

	<p><b>Other governmental agencies:</b> Numerous coastal tribes, Northwest Indian Fisheries Commission, Canadian Hydrographic Service, Geological Survey of Canada, Parks Canada, Canadian Department of Fisheries and Oceans, local county and city governments, and marine resource committees (Washington)</p> <p><b>Ocean Observing Systems:</b> SCCOOS, CeNCOOS, NANOOS</p> <p><b>Other regional and local initiatives:</b> San Luis Obispo Science and Ecosystem Alliance, Port Orford Ocean Resource Team, and Northwest Straits Initiative.</p> <p><b>Private sector:</b> Seafloor mapping contractors, Google, fishing community, shipping industry, vessel providers, ocean energy companies, energy utilities.</p> <p><b>Academic institutions:</b> California State University at Monterey Bay, Oregon State University, University of Washington/Friday Harbor Laboratories, Scripps Institution of Oceanography, and Moss Landing Marine Labs.</p>
Resources Needed (indicate existing, new or mix)	<p>General needs:</p> <ul style="list-style-type: none"> <li>Funding, including in-kind support from stakeholders</li> <li>Institutional continuity – talented and dedicated product development staff</li> <li>Ongoing training opportunities for staff as well as end users of the information</li> <li>High resolution data for product development</li> <li>Infrastructure to support product development and distribution</li> <li>Outreach strategy to link products and users/stakeholders</li> </ul> <p>The estimated cost of completing the major product development steps outlined above is \$20M.</p>
Recommendations, Challenges	<p><b>Recommendations:</b></p> <ol style="list-style-type: none"> <li>1. Engage user community to help design and refine products.</li> <li>2. Develop, sustain, and evolve map product standards.</li> <li>3. Develop partnerships with private sector for product distribution, use of new technologies.</li> <li>4. Develop sea-floor mapping internships in federal and state agencies and academia to develop broader mapping community.</li> </ol> <p><b>Challenges:</b></p> <ol style="list-style-type: none"> <li>1. Securing adequate funding.</li> <li>2. Limited expertise and training opportunities to undertake work on this scale.</li> <li>3. Investments for product development are commonly overlooked or funded at “the back end” due to funding shortfalls. Without sufficient investments, development of important interpretive products (e.g., benthic habitat maps) may significantly lag data collection or (worst case) not be completed.</li> <li>4. Developing the appropriate applications for resource managers often requires considerable outreach. Some product development will be reliant on the acquisition of other data sets (e.g. sea-level rise models).</li> </ol>

<b>Task 4</b>	<b>Communication, Education and Outreach</b>									
Major Steps, Products and Outcome(s)	<ol style="list-style-type: none"> <li>1. Demonstrate the value of seafloor mapping for a variety of coastal zone management issues. Emphasizing the impacts on local/regional/national economy and importance for forecasting and mitigating the impacts of climate change. Network with other WCGA ACTs to show value of sea-floor mapping to their focus.</li> <li>2. Educate the WCGA Executive Committee and provide materials for outreach and promotion.</li> <li>3. Identify and develop seafloor mapping “champions,” who can articulate and promote all aspects of seafloor mapping to stakeholders and funding sources.</li> <li>4. Begin discussion of the value to states of mapping beyond the limits of state waters; similarly discuss value of mapping in adjacent Canada and Mexico, including relevance of international mapping standards.</li> <li>5. Develop web presence for seafloor mapping at the WCGA level.</li> <li>6. Develop fact sheets and other promotional material – “Seafloor and coastal mapping – why do we care?”</li> <li>7. Develop and host workshops to promote use of maps, technology transfer, and develop “fusion” products and applications with variety of partners and facilitate connection of data and information to academia, K-12 schools, and coastal managers.</li> <li>8. Develop educational materials for K-12 and community colleges (work with WCGA education ACT and others such as West Coast Sea Grant entities).</li> <li>9. Develop partnership and coordinate activities with the U.S. Interagency Working Group on Ocean and Coastal Mapping.</li> </ol>									
Timelines - Qualified based on likely resources and state strategies	<ol style="list-style-type: none"> <li>1. WCGA Executive Committee, State representatives and (or) other champions should promote seafloor mapping to new federal administration ASAP – including DOC Secretary Locke, NOAA Administrator Lubchenco and other new NOAA appointees, DOI Secretary Salazar, and agency directors: USGS Director and Department of Interiors Science Advisor Marcia McNutt, and MMS Liz Birnbaum.</li> <li>2. WCGA Executive Committee, State representatives and (or) other champions should promote seafloor mapping to Congress ASAP.</li> <li>3. Develop fact sheet and web presence (WCGA level) in 2009 – (Note: Fact sheet completed in 2/09).</li> <li>4. Develop workshops for users and stakeholders, 2009-2010.</li> </ol>									
People/Expertise /Partners	<u>Groups targeted for promotion/outreach/workshops:</u> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">WCGA Executive Committee</td> <td style="width: 50%;">tribes</td> </tr> <tr> <td>Congress, state legislatures</td> <td>fishing community</td> </tr> <tr> <td>new federal administration</td> <td>shipping industry</td> </tr> <tr> <td>state agencies</td> <td>coastal communities (including ports)</td> </tr> </table>		WCGA Executive Committee	tribes	Congress, state legislatures	fishing community	new federal administration	shipping industry	state agencies	coastal communities (including ports)
WCGA Executive Committee	tribes									
Congress, state legislatures	fishing community									
new federal administration	shipping industry									
state agencies	coastal communities (including ports)									

	coastal zone management community non-governmental organizations, foundations academia	offshore/nearshore alternative energy interests aquariums general public
Resources Needed (indicate existing, new or mix)	<ol style="list-style-type: none"> <li>1. Funding for outreach/promotion staff for web presence, fact sheets, etc. \$75K/yr.</li> <li>2. Funding to support WCGA seafloor mapping workshops for users and stakeholders. \$50K/yr.</li> <li>3. Funding to support development of K-12 and college-level educational materials, classroom activities and curriculum in the three states and a regional, central educational website focused on seafloor mapping data, includes money needed for data storage, technology infrastructure. Potential partners include West Coast Sea Grant institutions or National Science Foundation funding – \$300K.</li> </ol>	
Recommendations and Challenges	<p><b><u>Recommendations</u></b></p> <ol style="list-style-type: none"> <li>1. Incorporate seafloor mapping into action plans of all other WCGA ACTs.</li> <li>2. Educate WCGA and other “champions” through targeted briefings (with scientists providing fact sheets and other materials). Pursue comprehensive and coordinated sea-floor mapping promotion to federal and state agencies, executives, and legislatures.</li> <li>3. Educate users through data fusion and product development workshops; make users aware that seafloor mapping expertise and advice is available from the ACT and mapping community.</li> <li>4. Develop a seafloor mapping page on the WCGA web site; update regularly with new imagery and graphics, and link to other related sites (e.g., Geospatial one-stop, NGDC, various NOAA and USGS sites).</li> <li>5. Develop a suite of education tools with WCGA Ocean Education and Literacy ACT. Potential funding sources or partners for these activities include National Science Foundation or Sea Grant.</li> <li>6. Create seafloor mapping internships in universities and government agencies.</li> </ol> <p><b><u>Challenges</u></b></p> <ol style="list-style-type: none"> <li>1. Education of federal and state funding bodies.</li> <li>2. Education of resource and coastal zone management community.</li> <li>3. Development of good public interface (internet, workshops, etc.) for outreach and education.</li> <li>4. Coordinating time, staff, and funding across many agencies and groups to conduct effective outreach.</li> </ol>	

## **Appendix A – Seafloor Mapping Factsheet**