West Coast
Coastal Atlas
Workshop
APRIL 23-24, 2009 • SEATTLE, WA

PROCEEDINGS OF THE WEST COAST COASTAL ATLAS WORKSHOP

Alaska

British Columbia

Washington

Oregon

California

Workshop Participants

Back row: Cindy Hartmann Moore, Tim Nyerges, George Graettinger, Amy Merten, Marla Steinhoff, Benjamin Shorr, Darby Veeck, Mandy Lindeberg, Steve Lewis, Charles Steinbeck, Will McClintock, John Harper, Tanya Haddad. **Middle row:** Jena Carter, Jordan Gass, Christina Hoffmann, Jo Smith, Jennifer Hennessey, Janelle Kueck, Kathy Taylor, Dawn Wright. **Front row:** Emilio Mayorga, Greg Benoit, Megan Wood, Mary Morris, Liz O'Dea, Andy Lanier, Becky Smyth, Ken Pierce, Deborah Purce

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I. Introduction

The West Coast Coastal Atlas Workshop was hosted by the Washington State Department of Ecology and NOAA Coastal Services Center at the NOAA Western Regional Center in Seattle, WA from April 23 to 24, 2009. The workshop brought together over 30 participants (in person and via conference call/WebEx) from Alaska, British Columbia, Washington, Oregon and California and representing state coastal zone management programs, state universities, four branches of NOAA, private consulting firms, and non-governmental organizations. This was the first time a meeting like this had been held on the west coast and most of the participants had never met each other prior to the workshop

The goals of the workshop were to:

- ***increase contact among existing and emerging coastal web atlas efforts on the west coast,***
- ***inform each other of our future plans and data gaps,***
- ***and explore opportunities for collaboration.***

> ***Note****: It is not the ultimate goal of this group's coordination efforts to create a single unified web atlas for the West Coast of North America, but rather to increase communication and collaboration between individual coastal web atlas projects.*

The workshop was designed to meet these goals in a structured way. On Day One, coastal web atlases and web mapping applications were introduced to participants through presentations and discussion. On Day Two structured discussions focused on related efforts such as collaborative groups and relevant legislation, regional information needs, data coordination and group priorities. The end result was a list of next steps that the group could undertake for continued discussions and potential collaboration.

The purpose of this report is to summarize the discussions held during the West Coast Coastal Atlas Workshop and to highlight the priority data gaps, potential solutions and opportunities for collaboration identified during the workshop.

II. Applications Represented

Numerous coastal web atlases and other web mapping applications were represented at the workshop. PDF copies of all the presentations are available as separate documents associated with this report. Here is the list of applications represented (click to follow links). More information on each application is provided in the appendices:

Alaska ShoreZone (http://www.fakr.noaa.gov/maps/szintro.html)

B.C. Pacific Coast Resource Atlas (http://cmnbc.ca/atlas_gallery/pacific-coastal-resources-atlas-british-columbia)

B.C. Coastal Resource Information Management System
(http://ilmbwww.gov.bc.ca/cis/coastal/others/crimsindex.htm)

Washington Coastal Atlas
(http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html)

SalmonScape (http://wdfw.wa.gov/mapping/salmonscape/index.html)

Oregon Coastal Atlas (http://www.coastalatlas.net/)

California Ocean Uses Atlas (http://mpa.gov/pdf/helpful-resources/factsheet_atlasdec08.pdf)

Southern California MarineMap Tool (http://marinemap.org/marinemap/)

NOAA Multipurpose Marine Cadastre
(http://www.csc.noaa.gov/mbwg/htm/multipurpose.html)

NOAA Legislative Map (http://csc-s-maps-q.csc.noaa.gov/legislativeatlas/index.html)

NOAA Emergency Response Management Application
(http://www.crrc.unh.edu/erma/index.html)

International Coastal Atlas Network (ICAN) (http://www.icoastalatlas.net)

There are other similar efforts on the west coast which were not represented at the workshop. They include:

Oregon North Coast Explorer (http://northcoastexplorer.info/index.aspx)

North Coast MIS Interactive Map
(http://nrsisa2.humboldt.edu:8399/Marine_Information_System_Map/mapviewer.jsf?width=783&height=756)

California Coastal Atlas (http://californiacoastalatlas.net/)

III. Other Related Efforts

During discussion on Day Two of the workshop participants identified cross-border collaborations, coastal mapping applications, and other related efforts that were not represented at the workshop. Some of these include:

- The West Coast Governor's Agreement (http://westcoastoceans.gov/) ,
- Pacific Coast Collaborative (Pacific Coast Collaborative),
- The International Coastal Atlas Network (ICAN: http://www.icoastalatlas.net),

- Applications for connecting or advertising coastal atlases: ICAN prototype, Google Maps, Google Earth, Virtual Earth,
- ShoreZone: available for AK, BC and WA - extension to OR & CA?
- West coast IOOS efforts (http://ioos.noaa.gov/partners/regional.html),
- Extension of the California LIDAR mapping effort to other states,
- Data Net: National Science Foundation funding program to support projects improving data access among groups of scientists, as well as to the public,
- and Digital Coast (NOAA): plans exist to connect with ICAN.

IV. Regional Data Needs

Through a series of structured discussions, workshop participants identified, categorized and prioritized coastal atlas data needs for the west coast of North America (Tables 1 & 2).

Table 1: List of high priority data needs identified and categorized by Coastal Atlas workshop participants.

Physical	Human	Biological	Data Integration /Communication
Bathymetry; seamless topo/bathy & LIDAR	High use areas – consumptive and non-consumptive	Habitat: +10 to -20 (and deeper)	ICAN framework for atlas connections – KML footprint of coastal atlases
Substrate types	Socioeconomic data – activity value	Population data	Continued coastal atlas communication – ICAN west coast forum, listserv
Shoreline & shoreline dynamics	Shoreline and marine alterations	Biogeographic assessments	Common basemap (classification, cartography, framework)
Oceanographic processes/regime	Cadastral scale ownership data		Outreach to advertise data/atlases, and promote user capability
			Metadata - guidance on appropriate use
			Guidelines for connectivity
			Data interoperability/standards – developer ease
			Participation & partnering: Google, Virtual Earth applications
			Data peer review and criteria for review

Table 2: Comprehensive list of data needs identified by Coastal Atlas Workshop participants.

Regional data needs	Common data requests from users/partners	What information would you like regional neighbors to collect/share?
Basemap to define components – standard data set symbolization	Habitat change over time – baseline data needed	Russia/AK border – standardize data, ontology
Physical, biological mapping, socioeconomic data	Interoperability of data – academia	MMS (Mineral Management Service) nearshore data made available
Biophysical ocean zone – seamless shoreline mapping, standardized	Seafloor habitat, kelp data – MPA design	Navy data
Comprehensive, baseline shoreline mapping	Cadastral scale ownership data	Trans-boundary plans for threats such as oil spills
Document and provide available data, outreach: advertise and communicate atlas information	Integrate data for planning, decision-making	FERC – alternative energy spatial footprints, electrical transmission lines, pipelines
0-20m depth substrate data to define habitat	High-resolution bathymetry	Data collected by energy companies who are applying for permits in coastal environment
Outer coast of WA data, & BC information	Interns & graduate students	Army Corps LIDAR data and derived products
-10 to +10m LIDAR data	Ocean uses data (non-consumptive), translate uses into management decision tools	Commercial and recreational fishing grounds baseline for CA, OR & WA
Communicate data needs amongst group	Estuaries habitat mapping	Puget Sound vertical profiling buoy from NANOOS
Bathymetric mapping, habitat typing	Make resource information and products more available to local planners	Venus & Neptune Ocean Observing Systems with vertical profiling, etc., soon available (Aug '09?)
ICAN and IOOS connection to consume data easily	Students with GIS background, skills	
Standards and interoperability that are easy to use	Make IOOS data accessible via tools for discovery and usage	
Regional climate data	Access to ERMA, mechanism to update Environmental Sensitivity Index data	
Locations for publication of data	Benthic habitat data, accurate SLR maps, LIDAR	
0-20m depth substrate data , 0.5-1m resolution	Repeating data surveys	
Coastal armoring	Estuary bathymetry data	
ESHA (Environmentally Sensitive	Use ShoreZone for change	

Habitat Areas)	detection?
High resolution (10m, 100m?), non-consumptive ocean use data	Attribute inquiries (metadata), eelgrass mapping
Information links to data and documents related to data	Higher scale resolution, more frequent data collection
1-5m resolution map of Territorial Sea	Data misinterpretation issues
Accessible pelagic habitat data	Seafloor habitat
Coastal hazards, SLR projections, repeated shoreline surveys to see change over time	Bathymetric data
Spatially represent fisheries populations	Integrating ocean uses for zoning and decision-making
Bathymetric data 46N, estuary bathymetry	Regional scale maps, data
	Pelagic biology data
	Tools for management decisions
	Data to support conservation, mitigation decisions
	High-res mapping of coastline – North slope AK

V. Next Steps

In addition to producing the comprehensive and priority data needs listed above, a list of "next steps" was compiled and specific tasks were identified by the group.I In many cases, individuals volunteered to carry these out. Specific next steps and commitments include:

a. **Establish a peer review process for atlas data.**
   This task was determined to be too big to tackle at the current workshop, but is something to keep on the radar screen going forward as we develop our coordination and interoperability. Consensus was that data peer review is a good future goal and could be a topic for a possible 2012 ICAN/ West Coast Coastal Atlas workshop.

b. Identify "backbone data" in terms of common datasets across atlas applications.

As a next step toward achieving this task, a matrix of atlas data and features will be compiled. It will include the data needs identified at the workshop and information about existing coastal atlas features derived from the presentations and atlas summaries created by participants. This tool will enable comparison of existing datasets and atlas features and will facilitate continued evaluation of the importance and feasibility of different datasets as candidates for a common set of "backbone" data. The Washington State Department of Ecology team will compile the data matrix. (*Kathy Taylor, Deborah Purce, Janelle Kueck*)

c. Produce case studies illustrating how and why atlases are used, how data are served up and what data are served.

Various workshop participants commented on the potential value of identifying use-case examples for coastal atlas datasets as a resource for both atlas managers and for potential users interested in how different data might be used in real world cases. The analogy of a Digital Coast in action was discussed, where real world examples would be presented of how data are being used in our agencies and what the results are; anecdotal stories of how people use coastal atlases; or how a person or group goes through the process of using the data, from download to decision-making. Timely topics for possible case studies were identified, such as:

- erosion in Columbia River estuaries between OR & WA,
- use of marine cadastres between states,
- Invasive species in the Puget Sound / Georgia Basin,
- Oil spill events across AK & BC,
- Marine maps for MPAs,
- Alternative energy.

Representatives from the University of Washington and NOAA Coastal Services Center volunteered to identify relevant case studies. (*Tim Nyerges, Becky Smyth, Christina Hoffman & Megan Wood*)

d. Explore a connection to the West Coast Governors Agreement & the Pacific Coast Collaborative.

Priority Data needs and next steps efforts will be reported back to the West Coast Governors Agreement (WCGA) with an effort to identify and target information to appropriate WCGA workgroups. (*Jennifer Hennessey, WA Department of Ecology*)

Proceedings from the workshop will be shared with the Pacific Coast Collaborative. (*WA Department of Ecology team)*

e. Develop a common ontology.

Representatives from ICAN, the California Coastal Commission and Oregon Coastal Management Program will work to develop a common ontology catalog with the goal of making datasets more compatible across atlas applications. It will be useful to provide a definition of what an ontology is, why people should care, and what tools are available. This effort will be aided by existing ontologies available from the Marine Metadata Interoperability project, http://www.marinemetadata.org, and ICAN.(*Dawn Wright, Greg Benoit, Andy Lanier*)

f. Define the role of ICAN in this coordination effort.

ICAN will be able to support current and future efforts by hosting on its portal (http://ican.science.oregonstate.edu):

- workshop proceedings and presentation files (see below),
- a listserve for communication purposes among the atlas efforts,
- a discussion forum for developers (e.g., so they can share computer code to assist with interoperability),,
- and summary lists of data and local atlas ontologies.

ICAN will also look forward to welcoming additional atlas groups into its membership and interoperability prototype activities, especially after formalizing its own organizational and membership structure further during its fourth workshop in November 2009, in Trieste, Italy. (*Dawn Wright, Tanya Haddad, Liz O'Dea*)

g. Identify funding sources and broader resources to maintain and expand atlases.

Investigate:

- IDIQ contracts for extending ShoreZone surveys to Oregon and California. Upcoming California LIDAR flights might even be cost-shared with a California ShoreZone survey. Oregon has already put in a funding proposal, but approximate cost for California might be $85,000-90,000, including flights, mapping, helicopter fuel, and SQL database preparation. (*Cindy Hartmann Moore*)
- NOAA contracts. (*Becky Smyth*)
- WCGA working groups specific to coastal atlases that could apply for funding. (*Jennifer Hennessey*)

h. Identify options for outreach and marketing of atlases.

Tasks geared toward promoting awareness of coastal atlas applications include:

- Produce proceedings of the workshop and make presentations and summary sheets available on the ICAN website. (*WA Department of Ecology team*)

  - Generate a short set of PowerPoint slides providing an overview of the West Coast Coastal Atlas Workshop and outcomes.(*WA Department of Ecology team*)
    - Create an official west coast coastal atlas listserv with discussion archive to the web forum. (*Tanya Haddad*)
    - Create KML or KMZ files of footprint maps of all the west coast coastal atlases to allow integration with Google Earth. *(Andy Lanier)*
    - Write news items for both the ICAN and Marine Metadata Interoperability portals. *(Dawn Wright)*

i. Options for continued collaboration as a group going forward.

- Organize a short WebEx meeting, in June to report progress on identified tasks (*NOAA CSC and others*).
- Gauge interest in a possible West Coast Coastal Atlas Annual Meeting – invite other atlases/efforts that weren't represented this year.
- Identify other groups and individuals who should be involved in coordinating efforts. For example, continue seeking related efforts for the west coast of Mexico, especially Baja. (*all parties will solicit appropriate names)*

VI. Conclusions

The workshop succeeded in meeting the goals which were set out prior to the meeting:

- Participants saw firsthand many different coastal web atlases and web mapping applications developed by their neighbors in Alaska, British Columbia, Washington, Oregon, and California.

- Presentations describing each coastal atlas or web mapping application were given and valuable discussion followed each one.

- The managers of each coastal web atlas application produced a brief summary document following a prescribed format in order to share information (appended).

- The group participated in a valuable exchange of information via structured discussions identifying:
  - possible ties with other regional, national, and international efforts,
  - west coast data and information needs,
  - challenges in data coordination,

- and possible next steps in coastal atlas coordination on the west coast.

- Meeting people in person set the stage for future collaborative opportunities.

VII. Appended documents

a. Agenda
b. Participants
c. Coastal Atlas Summary Sheets
d. Coastal Atlas Comparison Spreadsheet
e. Workshop Photos

Workshop Discussion Facilitators:

Becky Smyth – NOAA Coastal Services Center

Jennifer Hennessey – Washington Department of Ecology

Dawn Wright – Oregon State University

Kathy Taylor – Washington Department of Ecology

Jena Carter – The Nature Conservancy

Tanya Haddad – Oregon Coastal Management Program

Darby Veeck – Washington Department of Ecology

Deborah Purce – Washington Department of Ecology

Megan Wood – NOAA Coastal Services Center

West Coast Coastal Atlas Workshop Agenda

April 23-24, 2009
Day 1: Coastal Atlas Presentations, 9:00 am – 5:00 pm
Day 2: Discussion Sessions, 8:30 am – 3:30 pm

Workshop goals:

1) Increase contact among existing and emerging coastal atlas efforts on the west coast
2) Inform each other of our future plans and data gaps
3) Explore opportunities for collaboration

Objectives:

1) Identify existing and future coastal atlas efforts to connect with
2) Discuss connection of coastal atlases to the West Coast Governors' Agreement (WCGA)
3) Identify and prioritize information needs and overlap between projects/regions
4) Determine how to meet the identified needs
5) Discuss challenges and possible solutions to data sharing and project partnering
6) Make connections between groups that can collaborate and partner to fill needs
7) Determine how to go about connecting with other, unrepresented efforts

Day 1

Time	Item		Presenter
8:40	*Shuttles Depart Hotel*		Deborah Purce (Q's – 360-927-3303)
9:00	*Welcome & Introductions (Coffee!)*		Kathy Taylor & Becky Smyth
9:15	**Washington Coastal Atlas** (WA)	45 min	**Kathy Taylor** *WA Department of Ecology*
10:00	**SalmonScape** (WA)	30 min	**Kenneth Pierce** *WA Department of Fish & Wildlife*
10:30	*Break*	15 min	
10:45	**Alaska ShoreZone** (AK)	45 min	**Mandy Lindeberg** *NOAA National Marine Fisheries Service*
11:30	**British Columbia ShoreZone (Etc.)** (BC)	30 min	**John Harper** *Coastal and Oceans Resources Inc.*
12:00	***Emergency Response Management Application ERMA (****Multi-region****)***	30 min	**Amy Merten** NOAA Office of Response & Restoration
12:30	LUNCH	60 min	Pre-Ordered Box Lunches Available on Site
1:30	**Oregon Coastal Atlas** (OR)	45 min	**Tanya Haddad** *OR Coastal Management Program*
2:15	**MarineMap Decision Support System** (CA)	30 min	**William McClintock** *UCSB Marine Science Institute*
2:45	**California Ocean Uses Atlas** (CA)	30 min	**Jordon Gass** *NOAA National MPA Center*
3:15	*Break*	15 min	
3:30	**Multipurpose Marine Cadastre** **Legislative Atlas** (Multi-region)	30 min	**Christina Hoffman** *NOAA Coastal Services Center*
4:00	**International Coastal Atlas Network** (Multi-region)	45 min	**Dawn Wright & Liz O'Dea** *Oregon State University; WA Department of Ecology*
4:45	*Wrap-up*	15 min	
5:00	*Adjourn*		Shuttles to hotel
5:45	Meet at The Ram restaurant, University Village for dinner and networking		Shuttle departs hotel 5:40 pm OR see included map for walking directions (0.3 miles, about 4 mins)

Day 2

Time	Item	Facilitator
By 8:00	*Check out and store luggage (if departing today)*	Deborah Purce (Q's: 360-927-3303)
8:10	*Shuttle Departs Hotel*	Deborah Purce
8:30	*Reconvene (Coffee!)*	
8:45	**DISCUSSION I** – Other Efforts Objectives: (1) Identify other existing and future coastal atlas efforts to connect with (2) Discuss connection of coastal atlases to the West Coast Governors' Agreement (WCGA) habitat mapping action plan (3) Discuss connection of coastal atlases to other important and regional initiatives (ICAN, Digital Coast, TNC)	Jennifer Hennessey & Dawn Wright
10:00	*Break*	
10:15	**DISCUSSION II** – Regional Information Needs Objectives: (1) Identify information needs (regionally and/or state by state) (2) Identify project/region overlaps in information needs and priorities (3) Prioritize information needs (if time permits)	Kathy Taylor & Jena Carter
12:00	(Working) LUNCH Possible activities: • Continued connections/discussion from the previous session • Test ICAN survey questions (written handout)	
1:00	**DISCUSSION III** – Data Coordination Objectives: (1) Discuss limitations, challenges and possible solutions to technology issues, data sharing and project partnering (2) Make connections between groups that can collaborate and partner to fill needs (3) Determine how to go about connecting with other efforts	Tanya Haddad & Darby Veeck
2:30	**DISCUSSION IV** – Next steps Objectives: (1) Review the previous discussions with the goal of determining group priorities and potential (2) Plan next steps for the group	Becky Smyth & Kathy Taylor
3:30	*Adjourn*	
Evening	*Group activity and/or dinner for those staying in Seattle*	Deborah Purce & Megan Wood

West Coast Coastal Atlas Workshop Participant List

April 23rd- 24th 2009 – Seattle, WA

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Coastal Atlas Summary Sheets

1. Alaska ShoreZone
2. BC Pacific Coast Resource Atlas
3. BC Coastal Resource Information Management System
4. Washington Coastal Atlas
5. Oregon Coastal Atlas
6. California Ocean Uses Atlas
7. S. California MarineMap Tool
8. NOAA Multipurpose Marine Cadastre
9. NOAA Legislative Atlas
10. International Coastal Atlas Network (ICAN)

ALASKA SHOREZONE

URL http://www.alaskafisheries.noaa.gov/maps

Purpose of application

Alaska ShoreZone provides an online searchable inventory of oblique low-altitude aerial imagery (video and high resolution stills) of the coastal zone integrated with detailed classification of geomorphic and biological features. The standardized ShoreZone system was employed in the 1980s and 1990s to map coastal features in British Columbia and Washington State (Howes et al. 1994; Berry et al. 2004). ShoreZone was brought to Alaska in 2001 as a tool for first responders and lessons learned from the *Exxon Valdez* oil spill. Coastal habitat mapping of Alaska is a huge undertaking but the Alaska ShoreZone program has been successful through a growing list of partners including non-profit organizations, federal and state agencies. Currently the Alaska ShoreZone project provides a spatial framework for coastal habitat assessment on local and regional scales and is utilized by scientists, managers, first responders, education, and the general public.

Geographic extent

As of March 2009, Alaska ShoreZone imagery has been acquired for 44,915 km of shoreline of which 32,574 km has been mapped (~50%). Completed regions include Kodiak, Cook Inlet, Kenai Peninsula, Prince William Sound, and portions of northern and southern Southeast Alaska. The extent of ShoreZone imagery for Washington State, British Columbia, and Alaska is 84,915 km of coastline.

Target audience

Federal and state agencies, private and non-profit organizations, local and Tribal governments, universities, and the public.

Data included

Thematic data (by shore unit; downloadable in shape files):

- Shore types based on geomorphology (British Columbia Class – 35 classifications)
- Environmental Sensitivity Index (ESI – 27 classifications)
- Biological classification (Habitat Class - combines biological exposure and substrate)
- Biological communities and/or species (biobands)
- Oil Residency Index (1-5)
- Invasive Green Crab Index (0-4)

Distinguishing features

Oblique georeferenced aerial Imagery of shoreline at low tide (downloadable)

- Video (3 second intervals; two resolutions)
- Stills (resolution 300 PPI)
- Currently serving up ~ 3 million images (terabytes of data)

Nearshore Fish Atlas of Alaska

- The Alaska ShoreZone online platform was used to integrate the Nearshore Fish Atlas of Alaska. This data set spans over 10 years of beach seine catch data

containing more than 800 hauls and 98 different species of fish. The data can be queried and downloaded from the spatially explicit ShoreZone platform in a multitude of ways from lengths of individual fish, specific locations, dates, and habitat types to larger scale regional catches. Site photos and a fish photo library are also available.

Technology used

- WebGIS: ArcIMS 9.3 (upgrading to ArcGIS Server 9.3)
- Database: ArcSDE 9.3 with Oracle 10.2 (upgrading with Microsoft SQL Server 2005)
- Server: IIS with JRun 4.0
- Other: ASP (upgrading to ASP.NET 2.0)
- NOAA is partnering with the University of Alaska Fairbanks Super Computing Center, Geographical Information Network Alaska (GINA) to help serve up imagery and have redundancy.

Atlas support

The Alaska ShoreZone product is served up and managed by the Alaska Regional Office Analytical Team, NOAA Fisheries. Coastal imagery and ShoreZone habitat mapping are produced by Coastal and Ocean Resources, Inc. and Archipelago Marine Research, LTD. The Alaska ShoreZone partner funds are managed by a combination of the Alaska Regional Office, NOAA Fisheries and The Nature Conservancy.

Challenges encountered

- Keeping up with upgrades, compatibility, and changing personnel.
- Data management and QA/QC between partners
- Pressures to add other data sets regardless of funding or function.
- Managing small contributions from multiple agencies and organizations.
- Securing long term funding.

Lessons learned

- Develop specific tools for partners/users and funding and support will follow.
- Communicating product to new users and potential partners.
- Underestimating in-kind services by partners.
- Underestimating supply and demand.

Future directions

- In the middle of upgrading technology for web product.
- Continue imagery and mapping until Alaska's coastline is complete.
- Develop specific tools for user groups such as first responders.
- Add supporting data sets such as the Alaska Shore Station database (on the beach).
- Develop an International ShoreZone data set so management issues across borders and large scale comparisons can be made from Washington State, British Columbia, and Alaska.

British Columbia's Coastal Resource Information Management System - (CRIMS)

URL: http://webmaps.gov.bc.ca/imf5/imf.jsp?site=dss_coastal

Purpose of Application

To provide a platform to display and query information related to coastal communities along the British Columbia marine coastline

Geographic Extent

The Coastal Resource Information Atlas covers 29,000 km of coastline from the southern tip of Vancouver Island to Stewart at the head of Portland Canal.

Target Audience

Its primary audience was to provide information to aid spill response teams in the event of an oil spill in coastal BC. The application has since morphed into a multi facetted application that services not only spill response but other resource areas such as coastal planning, identifying Marine protected areas, industrial marine use areas, and aquaculture

Data included (general categories)

Information On:

- Shore zone information (type, class, wave exposure, oil residency index, form and material, bio-banding, habitat classification
- Biological resources
- Commercial resources
- Recreational resources
- Human Use resources
- Information related to Off shore Oil and Gas exploration
- Aquaculture

Aquaculture	Fulmars, Shearwaters and Petrels	**Biophysical Shoreline Classification**	Scallops	Coastal cruising routes
Finfish capability	Geese and Swans	Coastal Class	Sea Cucumber	Disposal facilities
Finfish farms	Great Blue Heron	Repetitive Shoreline Type	Shrimp	Divesites
Fresh water farms	Gulls	Shoreline Habitat Class	Squid	Ferry Routes and terminals
Processors	Loons and Grebes	Exposure Classification	Red and Green Sea Urchins	Kayak routes
Shellfish capability	Shorebirds	Biological Banding	**Recreational Fisheries**	Kayak destination points
Shellfish Farms	Nesting Sites	Form and Material	Crab	Marinas
Shellfish hatcheries	**Marine Mammals Distribution**	Shoreline video	Finfish (Sport Salmon)	Marine Hazards
Marine Plants and Other Bio Resources	California Sealions	35mm and Digital biota slide imagery	Groundfish	Marine Industries
Kelp	Dall's Porpoises	**Commercial Fisheries**	Prawn	Moorage
Eelgrass	Gray Whales	Anchovy	Scallops	Navigational Aids
Sponge Reefs	Harbour Porpoise	Crab	Squid	Offshore Oil and Gas
Marine Eco-sections/Units	Harbour Seals	Geoduck	**Other Fisheries**	Bedrock
Benthic	Harbour Seal Haulouts	Goose Barnacles	Clam Beaches	Climate Stations
Pelagic	Humpback Whales	Groundfish	Herring Spawn	Exploration Potential
Birds Distribution	Killer Whales	Herring Food and Bait	Salmon and Juvenile herring holding areas	Exploratory Wells
Alcids	Northern Fur Seal	Herring Roe	Eulachon	Faults
Bald Eagles	Pacific White Sided Dolphins	Octopus	**Human Use**	Seismic lines
Black Oystercatchers	Sea Otters	Prawn	Airports	Tanker exclusion zone
Cormorants	Sealion Haulouts	Salmon Net	Anchorages	Active tenures
Diving Ducks	Sealion Rafting Areas	Salmon Trawl	Boat Launches	Territorial Limit
Dabbling Ducks	Stellar Sealions		Campsites	

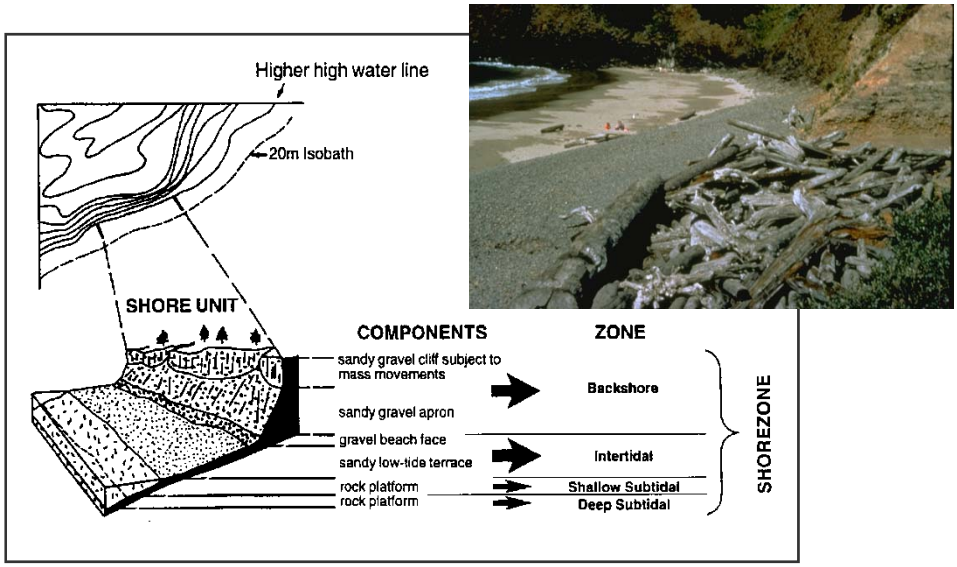
Distinguishing Features

Shorezone Information: Where a shoreline can be subdivided into smaller pieces, and the characteristics of each piece is described, recorded and classified. British Columbia's shoreline is subdivided into pieces where the morphology, sediment texture and dynamic physical processes do not vary in the along-shore direction (morpho-dynamic homogeneity). These alongshore units are dubbed 'shoreunits'. Shoreunits are further subdivided into across-shore components, which are categorized into zones. British Columbia's shoreline was mapped and classified between 1995 and 2002. For more information on the mapping and classification process, please refer to the following documents:

British Columbia's Biological Shore-zone mapping System
http://www.ilmb.gov.bc.ca/risc/pubs/coastal/bioshore/index.htm

British Columbia's Physical Shore-zone Mapping System
http://www.ilmb.gov.bc.ca/risc/pubs/coastal/pysshore/index.htm

BC Biophysical Shore-Zone Mapping – A Systematic Approach to Characterize Coastal Habitats in the Pacific Northwest
ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/rpts/BCBiophysicalShore-ZoneMapping.pdf



Technology used

- **WebGIS:** ArcIMS 9.1
- **Database:** ArcSDE 9.1 and Oracle 10G
- **Server:** Apache 2.2 with Apache Tomcat 5.5
- **Other:** GeoAnimator (GOA) Oracle Application Server

Site Support (financial/institutional)

The Coastal Resource Information Management System was produced by the Spatial Analysis Branch of GeoBC of the Integrated Land Management Bureau, Ministry of Agriculture and Lands. Original funding for the project was from the Nestucca Oil Spill Fund which launched the data collection and video capture of all the coastline of British Columbia from 1995 to 2000. Ongoing funding comes from revenue from outside sources (private industry) and other ministerial support. The site and data updates are maintained by the Spatial Analysis Branch of GeoBC

Challenges encountered

- Long term and limited funding
- Executive support as executives change
- Data gaps
- Acquisition of data from third party sources
- Data maintenance
- Changing standards and infrastructure
- Remoteness of British Columbia hampers data gathering and costs of acquiring video imagery of the BC coastline
- Significant First Nations and local community needed to be involved
- Biological richness of intertidal environment played havoc on classifications (each area had its own unique characteristics)

Lessons Learned

- Original focus of the application was for Oil Spill Response but found many users interested in the information so needed to adjust for a wider audience
- Eventually the money dries up so identify what to do next

Future Directions (ongoing and future improvements)

- Upgrading the site to a Microsoft Virtual Earth interface with limited data query ability
- Found most people do their analysis off-line so no need to have the complex ability that the site currently has
- Data layers will all be Web Feature Service Interface standard (WFS) that can be served up to other sites
- Make the site easier to use for the general public
- Updates and new data layers from third parties incorporated into the site

Pacific Coastal Resources Atlas
for
British Columbia

URL: *http://www.shim.bc.ca/atlases/Coastal/Coastal_public.htm*
URL: (souther gulf islands): *http://www.shim.bc.ca/atlases/gulfislands/*

Purpose of application

The Pacific Coastal Resources Atlas (PCRA) for British Columbia, Canada, was developed in response to the expressed need for an easily accessible information source that can be used by anyone with an interest in Coastal Marine Resources Planning. Government agencies, Regional and Community Governments and NGO's are able to access the best available coastal resources datasets; all interest groups will be "working from the same page" of information. The system allows authorized users to add new information (in a timely manner) as it becomes available using "on-line" data entry tools.

To date, both freshwater and coastal resources fishery information has been housed in a huge variety of data warehouses; some of these are digital, some are available in hardcopy form only, and much of our coastal resources knowledge still remains in the form of unwritten Traditional Ecological Knowledge. Amalgamating these sources around a single access point (using access agreements and links to a variety of data servers) will streamline coastal planning processes. The benefits to Governments and Communities are significant; requests for existing information from Government agencies will be greatly reduced (with associated cost savings) – community members will have a greater sense of ownership and stewardship of natural resources and will be better informed when resource use conflict decisions are being made.

A number of government and non-government web sites distribute selected coastal resources data and maps specific to a particular species or habitat. The data presented is often in different formats and, on occasion, may not be consistent. The Community Mapping Network (CMN) initiative is presently the only system that allows password-authorized entry of new information using web-based mapping tools. Although there is a lot of information about British Columbia's coastal resources in the various data warehouses, there is a much larger area of the BC coast for which no information exists! The cost of doing detailed surveys in this huge coastal area would be phenomenal, (at a recent conference at the Institute of Ocean Sciences one participant estimated it would take 60+ years using the best available technology just to accurately map the BC coastal seafloor and inshore). The ability to map additional coastal resources using local knowledge (including new agency-sourced information) will greatly assist BC residents in making responsible resource use decisions.

The importance of metadata used in the PCRA approach is stressed. Online tools allow for the input of new information that come from a variety of sources with an associated variety of accuracy, (as is the case with most existing information sources). The system allows anyone who views the maps and data reports to review the sources of the information and the relative accuracy of the observations. As time goes on, any information that has not been adequately field-truthed will be subjected to more detailed examination and up-dated appropriately. In the meantime, "suspected presence" (of any species or habitat) is better than no information at all as coastal resource use planning decisions are being considered.

The Pacific Coastal Resources Atlas is designed to streamline the collection and dissemination of marine habitat and fishery resource information for coastal BC. The goal of the system is to create an easily accessible source of spatially georeferenced marine habitat and resource information. Although the individual databases and GIS layers may reside on different computers

in a range of agency data warehouses, the PCRA system is designed to make all of the information accessible to information users and providers at one specific location through the internet.

There are many uses for spatially georeferenced marine habitat and fishery information. Some examples of the business needs for this information include:

- Habitat referrals for foreshore leases and licences;
- Oil spill contingency planning and response;
- Community shoreline planning and zoning;
- Provincial coastal planning;
- Provincial and Federal Marine Protected Area analysis;
- Fisheries research which looks for correlation of marine resources with habitat.

The Pacific Coastal Resources Atlas is available through the Community Mapping Network at www.cmnbc.ca (CMN). The Community Mapping Network was created to share a wealth of natural resource information and maps with communities in British Columbia, Canada. Government and community natural resource information is integrated and made accessible through a user friendly, interactive mapping system called Autodesk Mapguide. A series of servers are utilized to share the workload for serving province-wide topographical base maps, high resolution orthophotography, Charts and selected resource information. Maps and natural resource information are "web-served" to assist communities and local governments with landuse planning, to promote conservation and protection of sensitive habitats and to raise awareness and respect for ecological values.

Geographic extent

Coverage includes the entire coast of British Columbia, but many data sets are site specific. For example some data is from Washington State while others are for species and habitats for only certain areas.

Target audience

Target audience: the public, local and senior governments, First Nations, Industry, Stewardship Groups.

Data included (general categories)

Categories include: coastal shorezone mapping, herring spawn, significant concentrations of fish and invertebrates, anecdotal information for commercial, aboriginal and sport fisheries, salmon migration routes, fish habitat features including kelp, eelgrass, salt marshes, tidal flats, marine mammal sitings, distribution of fisheries based on commercial landings, clam beds, rare and endangered species and other layers.

Distinguishing features

Over 30 online data entry tools are available with username and password protection. Links to shoreline video and still photos are available for the southern Gulf islands. The site is hosted by a non profit organization.

Technology

Autodesk Mapguide, microsoft access, Drupal content management system, clipstream video player.

Atlas support

Support for atlas development is opportunistic for adding new data and new functionality. No specific funding for ongoing support and management is available.

Challenges encountered

Challenges include funding, getting updates, consolidating information, collecting new information in the field, getting people to use the atlas and understand its value. Also, a challenge is to link information sources together so users can better understand trans-boundary issues such as oil spill impacts.

Lessons learned

Oline data entry tools are not being used as initially envisioned, and there has not been enough communication about the value and existence of the existing systems.

Future directions

The application is currently being re-formatted into a new "open source" version of Autodesk mapguide. More focus will be placed on data collection where there is interest such as sand lance and eelgrass and contaminants mapping and specific areas of the coast where projects need support such as the Strait of Georgia and PNCIMA areas. Use of oblique still photos is being considered.

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Washington Coastal Atlas Summary

URL: *http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html*

Purpose of application

The Washington Coastal Atlas (WCA) provides geographically linked information to support informed management of Washington's marine shorelines. Originally developed to help local governments develop Shoreline Master Programs, the Coastal Atlas is now a broadly useful tool that is heavily used by other programs and agencies to support research, permitting, planning, land management, and policy development.

Geographic extent

The WCA covers the marine shoreline of Washington's outer coast, the shoreline and open waters of Puget Sound and the estuarine portion of the Columbia River.

Target audience

State agencies, local and Tribal governments, federal agencies, researchers, consultants, and interested citizens.

Data included (general categories)

Number of data sets: 60 [layers in .mxd. Does not include individual images.]

Information on:

- Habitat features such as wetlands and eelgrass,
- Physical features such as drift cells and slope stability,
- Regulated features such as flood plains
- Shoreline modifications such as piers and docks, and
- Jurisdictional delineations such as cities and watersheds.

Distinguishing features

Oblique aerial photos of the shoreline:

- Photos of marine and freshwater shorelines are available for viewing and can be downloaded directly from the Coastal Atlas web site.
- Decades of oblique aerial photos of the marine shorelines are also included in the Atlas; these can be used to determine changes in shorelines and shoreline development over time.

Land cover changes over time

- The Atlas provides information on land cover changes over time, and it is easy to determine changes in forest cover and impervious surface, between 1991, 1996, and 2001 for all of western Washington at a county, watershed and subbasin scale.

Technology used (web GIS, server, database, content management system?)

- **WebGIS:** ArcIMS 9.2
- **Database:** ArcSDE 9.2 and Microsoft SQL Server 2005
- **Server:** IIS Server with Apache Tomcat 5.5
- **Other:** ASP.NET 2.0 is used for the Coastal Image Viewer and the Land Cover Tool.

Atlas support (financial/institutional)

The Washington Coastal Atlas has been produced and is maintained by Washington Department of Ecology staff. Other state agencies have contributed staff time and small amounts of funding for specific components. Funding for work on the Coastal Atlas comes from state funds and from Washington's NOAA OCRM Coastal Zone Management grant. Both revenue sources have been diminishing while the number of users and the amount of information served is increasing.

Challenges encountered

- Securing long term funding commitments
- Setting up data sharing agreements
- Critical gaps in existing information relevant to coastal and marine issues
- Constantly changing technology
- Constantly evolving web standards
- Pressures to extend the geographic scope beyond coastal areas to serve non-coastal needs
- Broad user base

Lessons learned

- Understand the business needs of the targeted audience and have open dialog with users
- Gain support from executive management,
- Clearly articulate use and importance of Atlas to managers in related programs and agencies
- Communicate with occasional users about new information and features
  Market the Atlas to new audiences and potential stakeholders

Future directions (ongoing and future improvements?)

Planned improvements to the Atlas include:

- upgrading atlas technology,
- adding 2006 land cover data,
- increasing the number of natural resource data layers, and
- updating the existing data layers.

Work on the Coastal Atlas is taking several new directions:

- Incorporating information showing public access to all of Washington's marine shorelines into the Atlas.
- Exploring options for incorporating more ocean information
- The Washington Coastal Atlas is joining its neighbor, the Oregon Coastal Atlas (www.coastalatlas.net), as a part of the International Coastal Atlas Network (ICAN: http://ican.science.oregonstate.edu/). The group is developing a data interoperability prototype to collaborate among coastal atlases and share data for coastal management on a regional and international level.
- A redesign to make the Atlas to be more information rich and less cartographic centered.

Other:

See pages 9-26 of the Coastal Atlases Report for additional information you may want to include in your summary: http://dusk.geo.orst.edu/cmrc/Cork06_CoastalWebAtlas_FinalReport_web.pdf

Oregon Coastal Atlas

URL: *Http://www.coastalatlas.net*

Purpose of Application

The Oregon Coastal Atlas is a venue for sharing data, information and analysis tools with decision makers and constituents of the Oregon coastal zone. There are four main functional areas that the OCA provides:

- **Search** (of data archives),
- **Learn** (about coastal places and issues),
- **Tools** (for working on coastal problems), and
- **Maps** (for browsing and visualizing coastal data and information).

Geographic extent

The extent of the OCA covers the entire Oregon coastal zone which encompasses the full drainages of the coast range (except the Columbia and Umpqua & Rogue basins) on the terrestrial side, and the 3 nautical mile territorial sea plus an ocean stewardship area which extends out to the toe of the slope, on the marine side. We don't cut data at these boundaries however, so if a data set is larger, we allow it to extend outside of this zone. For regional context, the extent from (-132, 39) to (-116, 53) is the full footprint of the displayed area of interest in our online map interface.

Target audience

The target audiences are the decision makers and constituents of the Oregon coastal zone. These are comprised of: local planners, state & federal agency staff, tribal governments, researchers, consultants, and interested citizens.

Data included (general categories)

The OCA contains two areas where data can be counted: the searchable data archive, and the interactive map interfaces. There are over 3500 individual datasets in the searchable data archives, not all of which are available to be browsed in the interactive mapping portion. In the interactive mapping portions of the OCA, data sets are organized around informational themes or focused landscape settings. The intent is that this list of organized data collections presented in the interactive maps will grow over time. Currently there are 9 focused collections in place, with 3 more in the current planning stages. For technical reasons (primarily speed), we prefer to have a larger number of data collections with a smaller number of data sets per collection, than the reverse.

Distinguishing features

- Length of deployment (6-7 years)
- Integrated framework that goes beyond online maps
- Directory of Tools, both internal and external

Technology used

- **Web GIS:** Minnesota Mapserver
- **Database:** MySQL and PostGIS
- **Server:** Apache 2.x
- **Other:** Joomla CMS is used overall backend administration; GeoNetwork is being used in a test bed fashion as part of the ICAN prototype project.

Atlas support (financial/institutional)

Initially the OCA was funded with seed funding from the NOAA Coastal Services Center, followed by National Science Foundation funding that formalized the foundational partnership between the Oregon Coastal Management Program, Oregon State University and Ecotrust. When the 3 year NSF grant ended, OCMP opportunistically continued funding with a few targeted grants, and then finally incorporated the project into its standing CZM funding as part of its ongoing outreach to CZ constituents.

Challenges encountered

Project stewardship over time was in question before OCMP decided to maintain funding for the Atlas. Other challenges have included occasional confusion from potential partners about what relationship the Atlas could have with other coastal/marine online IMS sites. Technical challenges have varied over time. In the old days, cross browser incompatibility was a big limiter of what could be deployed. Networking between the various partners was also challenging. Many of those types of challenges have been vastly improved because of the adoption of standards across software vendors and partners. A lingering challenge is migration of new and legacy content of all types (geospatial data, analysis tools, and other web content) into the Atlas. We have a large backlog of information that could be included, but are limited by time and money.

Lessons learned

- Many lessons about user needs and interface design
- Utility of various tool types for various audiences
- Long term statistics can be analyzed for Atlas trends

Future directions

- Continue enhancing mapping interfaces
- Improve search experience, from query to results
- Incorporate new tools / data sets (e.g. current efforts with Ocean data)
- Fully deploy GeoNetwork, fully connect to ICAN
- Potential migration of metadata to ISO
- Increase number of public WxS services
- Increase use of embedded maps
- Increase use of PostGIS for analysis in online tools

MarineMap Decision Support Tool

http://marinemap.org/marinemap

Purpose of the Application

The MarineMap Decision Support Tool is for use by the Marine Life Protection Act Initiative (MLPAI) to design prospective marine protected areas (MPA) in California state waters. Non-technical stakeholders use MarineMap to draw prospective MPAs, assemble them into arrays (groups), generate reports on MPA size, habitat representation and fisheries impacts, and share MPAs and arrays with other MarineMap users.

Geographic Extent

The data currently displayed in MarineMap are primarily limited to the Southern California Bight (i.e., from Point Conception to the US / Mexico border). However, the database, which includes data beyond what is displayed in the web-based application, includes data from all of California state waters (from shoreline to 3 nautical miles.

Target Audience

MarineMap was designed for non-technical users involved in the Marine Life Protection Act Initiative. Stakeholders represent a wide spectrum of interests including recreational and commercial fishermen, divers, surfers, conservationists, agency representatives, scientists, teachers, artists, tribal representatives, etc. All of these users are interested in designing marine protected areas in California.

Data included

Base maps	MLPA Study region boundary Coastline Terrestrial region and features Nautical charts Graticule of latitude and longitude
Physical and Bathymetric	Bathymetric imagery (where available) Depth contours Submarine features Coastal watersheds Land cover, land use patterns
Biological/Habitats	Shoreline habitats (rocky intertidal, sandy beach, marsh, etc) Kelp forests Estuaries and associated habitats (eelgrass, marsh) Hard bottom habitats (characterized by depth zone: 0-30m, 30-100m, 100-200m, >200m) Soft bottom habitats (characterized by depth zone: 0-30m, 30-100m, 100-200m, >200m) Submarine canyons Upwelling zones Seabird and marine mammal colonies and haulouts
Cultural	Towns, cities Roads and infrastructure Harbors, ports Coastal access points Geographic names

Consumptive uses	Commercial fishing data (logbook data, etc) Areas of importance to commercial fisheries (Proprietary Ecotrust study) Recreational fishing data (Commercial-passenger fishing vessel data, etc) Areas of importance to recreational fisheries (Proprietary Ecotrust study) Mariculture operations
Non-consumptive uses	Dive sites Kayaking areas Wildlife viewing areas
Existing coastal and marine managed areas	E existing MPAs Fishery closures Coastal protected areas

Distinguishing Features

We believe the MarineMap decision support tool and underlying data represent one of the most complete sets of geospatial information available for California state waters. Furthermore, data are represented in such a way to be easily accessed by a variety of users. And, for a limited subset of those data, users may analyze how much of those layers are captured within prospective MPA boundaries that they draw.

Technology Used

MarineMap is built on open source software including Postgres/PostGIS, MapServer, GeoServer, OpenLayers, Ext, Geodjango, and Ubuntu Linux (Apache web server). We also host an ArcSDE geodatabase running on a separate Windows 2003 Server box which is integrated with the system but not necessary for the application to work. The SDE server is simply a legacy system that we have not yet converted to a Redhat Linux / Postgres SDE setup.

Atlas Support

Our operation is currently supported by the Resources Legacy Fund Foundation. We are seeking further collaborations with new ocean planning processes but, beyond 2011, we have no financial support in place. The Marine Science Institute at UCSB, where MarineMap is hosted, is supportive of our endeavors as long as we maintain funding from outside sources.

Challenges Encountered

Currently, we have no good metadata server. We maintained an ArcIMS metadata server for some time but felt that had many shortcomings. We are seeking advice on a good way to publish our metadata, preferably using open source technologies.

Lessons Learned

Open Source technologies are a joy to work with. Performance is unparalleled.

Future Directions

We are actively seeking collaborations with groups involved in spatial marine planning around the world. We anticipate that this will lead to using MarineMap in at least a handful of new geographies in the upcoming two years. Over the next six months we anticipate moving from OpenLayers to the Google Earth API.

California Ocean Uses Atlas Project

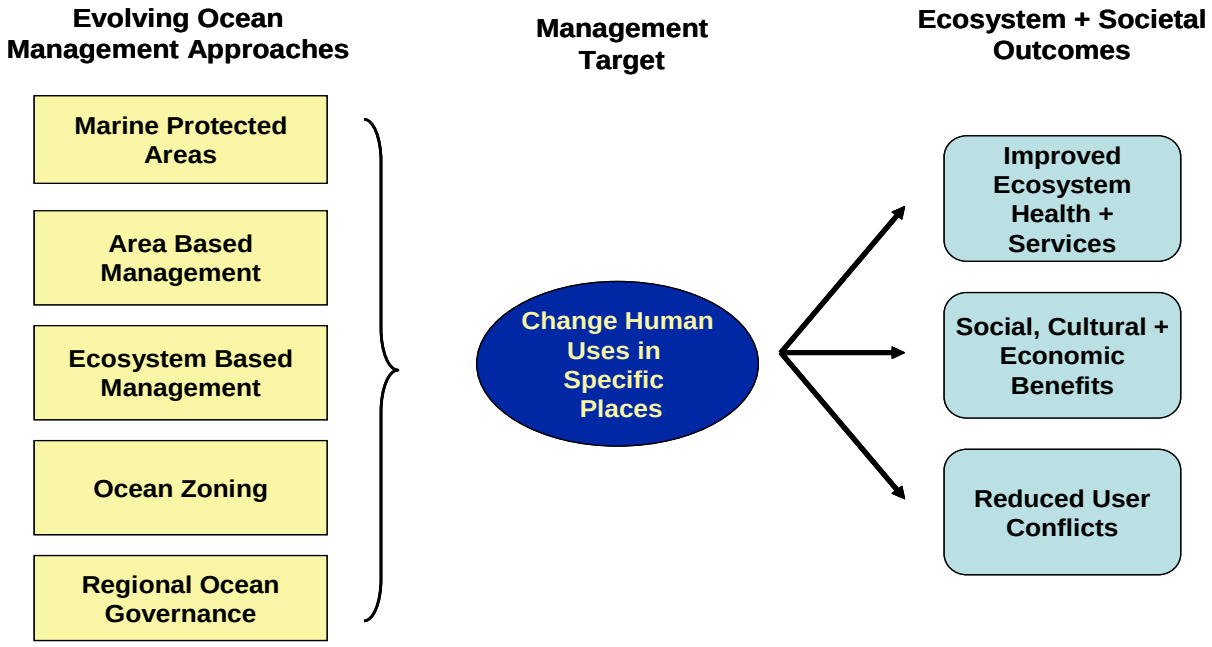
A Public-Private Partnership between NOAA's MPA Center and Marine Conservation Biology Institute

www.mpa.gov

The **California Ocean Uses Atlas** is an innovative public-private partnership between NOAA's Marine Protected Areas Center (MPA Center) and Marine Conservation Biology Institute (MCBI). Funded by grants from the Gordon and Betty Moore Foundation and the Resources Legacy Fund, the Atlas project fills a critical information gap in ocean management by mapping, for the first time, the full range of significant human uses of the ocean in state and federal waters off the coast of California. Maps of ocean uses will be created by regional experts through participatory GIS workshops in four regions throughout the state. Data, maps and analytical products will be made available to state and federal agencies and to all interested parties.

Why Now, Why California?

Faced with increasing pressures from a growing variety of ocean uses, California, Oregon and Washington are actively pursuing innovative, integrated approaches to conserving the California Current Ecosystem and the ecological services it provides. These rapidly growing, evolving initiatives include new marine protected area networks, ecosystem-based management, marine spatial planning, ocean zoning and regional ocean governance. While differing in scale and emphasis, all focus fundamentally on managing patterns of human use within specific areas in the hopes of achieving certain ecological and/or societal objectives.



Notable recent advances have occurred in building tools, strategies and support for regional ocean conservation, especially on the west coast. Still missing from this picture, however, is robust information about the main driver of ecosystem health and services: human use patterns. Without better and more comprehensive data on patterns and significance of ocean uses, our ability to effectively design, justify and evaluate place-based marine management measures will continue to be compromised.

continued on back

NOAA's National Marine Protected Areas (MPA) Center's mission is to facilitate the effective use of science, technology, training, and information in the planning, management, and evaluation of the nation's system of marine protected areas. The MPA Center works in partnership with federal, state, tribal, and local governments and stakeholders to develop a science-based, comprehensive national system of MPAs. These collaborative efforts will lead to a more efficient, effective use of MPAs now and in the future to conserve and sustain the nation's vital marine resources.

Office of Ocean and Coastal Resource Management, NOAA Ocean Service, 1305 East West Hwy (N/ORM), Silver Spring, MD 20910

Like most places, California lacks comprehensive data reflecting the full range of human uses of the ocean. Instead, we know a little about a few, typically extractive, uses in a few places (e.g. commercial and recreational fishing). Our practical knowledge of how, when, and where people use California's ocean remains the most poorly understood and imperfectly applied piece of the ocean management puzzle. The need for better data on human use patterns was highlighted recently as a high priority by the California, Washington and Oregon Tri-State Governor's agreement.

What Will Be Produced?

The Atlas Project will produce three related outputs between January 2008 and September 2009:

- ***Regional Maps of Ocean Uses*** - Drawing upon the experience and knowledge of regional experts in ocean use and management throughout the state, the project will develop and provide to ocean managers and the interested public comprehensive GIS maps and analytical products reflecting the variety of ocean uses in state and federal waters in regions used by California's Marine Life Protection Act Initiative (MLPAI).

- ***Sustainability Plan for Long-Term Mapping of Changes in Ocean Uses*** - Working with a variety of federal and state agencies, including the MLPAI's new Monitoring Enterprise, the Atlas project will develop plans to ensure the sustainable collection and management of ocean use data as part of a broader ocean monitoring effort in California.

- ***Design Criteria for Online Mapping Tool*** - Working with federal and state agencies and private organizations in California, the Atlas project will convene an expert workshop to develop design criteria for a web-based mapping tool that will allow individual users and stakeholders to participate directly and easily in planning for managing ocean uses.

How Will the Products be Disseminated and Used?

The California Ocean Uses Atlas Project was designed specifically to inform ongoing management and policy decisions among federal and state agencies responsible for ocean ecosystems in California. Potential applications and clients of Atlas products include the MLPAI, federal MPA initiatives, fisheries management actions, ocean energy siting, and regional ocean governance. To this end, all data and products will be delivered to key agencies as they are completed and will be made available to any interested parties via various publicly accessible web sites.

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Legislative Atlas

URL: http://csc-s-maps-q.csc.noaa.gov/legislativeatlas/index.html

Purpose of application

The Legislative Atlas supports regional ocean and coastal management efforts by displaying spatial data for state and federal laws and jurisdictional boundaries. The atlas also allows users to search through legislative summaries of laws applicable in their regions. This information is provided through Internet mapping applications, providing access to on-line analytical tools.

Geographic extent

Federal Georegulations – Lower 48, Hawaii
State Georegulations – Gulf of Mexico, Hawaii, California, Maine, Massachusetts, New Hampshire

Target audience

The Legislative Atlas can help coastal and ocean resource managers make sense of the complex jurisdictional and regulatory system and identify potential gaps in the current management framework.

Data included (general categories)

- Boundaries: U.S. EEZ, Federal-State Line, Contiguous Zone, Territorial Sea, Limit of '8(g) Zone', National Marine Sanctuaries
- Agency Regions, Districts and Planning Areas (e.g. EPA, FEMA,MMS, Army Corps)
- Federal Legislation (e.g. Clean Water Act, ESA, Magnuson-Stevens Fisheries Conservation Act)
- Base Layers: Cities, States, Topography, Bathymetry

Distinguishing features

- State and federal legislative summaries (as well as links to full-text versions in the U.S. Code and Code of Federal Regulations)
- Federal agency and programmatic information
- Downloadable spatial data and metadata
- On-line mapping
- Allows users to search an online database of coastal and ocean legislation, according to geographic area, issue of interest, or management agency.

Technology used (web GIS, server, database, content management system?)

- **WebGIS**: ArcIMS 9.2
- **Database**: ArcSDE 9.2 and Microsoft SQL Server 2005
- **Server**: IIS Server with Apache Tomcat 5.5

Atlas support (financial/institutional)

NOAA Coastal Services Center

Future directions (ongoing and future improvements?)

State georegulations are in development for Oregon, Washington, Connecticut, Rhode Island, and portions of New York.

Outer Continental Shelf Mapping Initiative
Multipurpose Marine Cadastre

URL: http://www.csc.noaa.gov/mbwg/htm/multipurpose.html

Purpose of application

The goal of the Outer Continental Shelf (OCS) Mapping Initiative is the identification of OCS locations of Federally-permitted activities; obstructions to navigation; submerged cultural resources; undersea cables; offshore aquaculture projects; and any area designated for the purpose of safety, national security, environmental protection, or conservation and management of living marine resources.

The repository of this data will be the Multipurpose Marine Cadastre - an integrated submerged lands information system consisting of legal, e.g., property ownership or cadastre, physical, and cultural information in a common reference framework.

Geographic extent

United States outer continental shelf and state waters.

Target audience

Implementation of the Multipurpose Marine Cadastre will allow Minerals Management Service (MMS) managers and technical staffs, at Federal agencies; coastal States; local, territorial, and tribal governments; private industry; and the academic community, to directly access information and resources necessary to promote and conduct good ocean governance.

Data included (general categories)

- National Baseline
- Shoreline(s)
- Submerged Lands Act Boundaries
- Territorial Sea Boundaries
- Official Protraction Diagram & Leasing Maps
- Maritime boundaries and zones
- Marine Managed Areas (MMA's)
- Marine Protected Areas (MPA's), Parks, Refuges, Sanctuaries, etc.
- Administrative Boundaries
- Additional supporting data themes

Distinguishing features

- **Data Portal**: Data are available in several common file formats such as ESRI and KML, and as Web services
- **U.S. Marine Cadastre Data Viewer:** Data can be viewed through both ArcIMS and Google Earth applications
- **Technical Services:** Web Mapping and Support Services

Technology used (web GIS, server, database, content management system?)

- **WebGIS**: ArcIMS 9.2
- **Database**: ArcSDE 9.2 and Microsoft SQL Server 2005
- **Server**: IIS Server with Apache Tomcat 5.5

Atlas support (financial/institutional)

Minerals Management Service, Federal Geographic Data Committee Marine Boundary Working Group

Future directions (ongoing and future improvements?)

The MMC project team is currently evaluating a number of data sets for possible inclusion in the web mapping application. Data considered include human use data as well as a variety of habitat and biodiversity datasets.

International Coastal Atlas Network (ICAN)

URL: ***http://icoastalatlas.net or http://ican.science.oregonstate.edu***

Purpose of Network

ICAN is a newly founded, informal group of organizations with the mission to share experiences and to find common solutions to coastal web atlas (CWA) development (e.g., user and developer guides, handbooks and articles on best practices, information on standards and web services, expertise and technical support directories, education, outreach, and funding opportunities, etc.). The long-term view is for global-level operational interoperability, which will evolve as the ICAN community strives to increase awareness of the opportunities that exist for increased coastal and marine data sharing among policy makers and resource managers as strategic users of a CWA. ICAN participants seek to play a leadership role in forging international collaborations of value to the participating nations, thereby optimizing regional governance in coastal zone management. A major goal is to help build a functioning digital atlas of the worldwide coast based on the principle of shared distributed information. To further these objectives ICAN has identified a range of activities in the areas of technical implementation, atlas assessment, outreach, training, and participation in scholarly communities, and strategic planning and funding, all available on its web site.

Geographic Extent

The coverage of ICAN is intended to be global but current coverage of the fledgling network is mostly on the U.S. west and east, and northern Europe, with nodes emerging in Africa and the Caribbean. For a full list of partners, see http://ican.science.oregonstate.edu/ican_members.

Target Audience

U.S. state and federal agencies, non-governmental organizations, European Commission, regional and national coastal data centers and networks, researchers, consultants, and interested citizens.

Data Included (general categories)

Our network includes ~35 organizations from over 10 nations, all with very similar datasets to the coastal atlases featured at this workshop.

Distinguishing Features

A proof-of-concept atlas interoperability prototype (aka mediator catalogue to demonstrate how coastal web atlases from different parts of the world can be linked together and how users may ultimately conduct queries across a range of atlases. The mediator uses ontologies to connect metadata databases built from local atlases. In this prototype, each atlas maintains its own independent ontologies of their coastal erosion data, which are then mapped to the ICAN global coastal erosion ontology. These ontologies work behind-the-scenes to simplify searching of multiple atlases at once. See http://ican.ucc.ie

Technologies used in Prototype

- **Open Source Catalog Application:** GeoNetwork
- **Ontology Builder:** Protégé or CMAP
- **OGC Web Services:** Catalogue Services for the Web (CSW) via GeoNetwork, Web Mapping Service (WMS), in future Web Feature Service (WFS)

Atlas Support (financial/institutional)

ICAN was founded by an initial partnership between the Davey Jones Locker Marine GIS Lab of Oregon State University and the Coastal and Marine Resources Centre of the University College Cork, Ireland. Our institutional support has great increased to over 20 people volunteering their time to serve on the ICAN technical, atlas assessment, strategic planning and governance working groups. We have been sustained thus far by funding from the U.S. NSF, the Irish National Development Plan, the Marine Institute (Ireland) and its Marine RTDI Networking & Technology Transfer Initiative, and the European Environment Agency. Funding thus far has only been for international workshop hosting and travel. We continue to seek longer-term funding for salaries and computing resources in addition to the travel.

Challenges Encountered

Very similar to individual atlas projects:

- Securing long term funding commitments
- Critical gaps in existing information relevant to coastal and marine issues
- Constantly changing technology and evolving web standards
- Broad user base

Lessons Learned

ICAN has learned much from the three international workshops that it has held thus far ("Potentials and Limitations of Coastal Web Atlases"—aka ICAN 1—Cork, Ireland, 2006; "Coastal Atlas Interoperability"—aka ICAN 2—Corvallis, Oregon, 2007; "Federated Atlases: Building on the Interoperable Approach" —aka ICAN 3—Copenhagen, Denmark, 2008). In particular, please see the accompanying ICAN SWOT summary from ICAN 1. As an initiative ICAN has shown thus far that there is a great interest and need for such a network and that the specific goals and work of ICAN have great value and potential. There are many avenues for members of the ICAN community to engage in outreach, marketing, and positioning within existing broad initiatives. A critical lesson thus far is that while the technical activities of ICAN (e.g., our ambitious interoperability prototype) are critically important, ICAN is also all about education, outreach and general capacity building regarding coastal web atlases.

Future Directions

- ICAN 4 Workshop, Adriatico Guest House, International Centre for Theoretical Physics, UNESCO University, Trieste, Italy, November 16-20, 2009
- Obtaining long-term financial support
- Officially incorporating as a more formal organization at ICAN 4 where we will roll out final implementation structures on governance (including formal procedures for receiving **new members**), strategic planning, and technical activities so that ICAN can formally incorporate as an organization.

Important References

See ICAN-related presentations at Coastal GeoTools 2009, http://csc.noaa.gov/geotools/sessions/tuesdayam.html#1 and other ICAN publications at http://ican.science.oregonstate.edu/biblio . To download our workshop reports:
ICAN 1 – Potential and Limitations of Atlases - http://ican.science.oregonstate.edu/node/47
ICAN 2 – Coastal Atlas Interoperability - http://ican.science.oregonstate.edu/node/46
ICAN 3 – Federated Coastal Atlases - http://ican.science.oregonstate.edu/ican3_final_rpt
See also our handbook (in preparation) on coastal web atlas design and implementation - http://ican.science.oregonstate.edu/handbook

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS FOR COASTAL WEB ATLASES

From: O'Dea, L., Cummins, V., Wright, D., Dwyer, N. and Ameztoy, I., *Report on Coastal Mapping and Informatics Trans-Atlantic Workshop 1: Potentials and Limitations of Coastal Web Atlases*, University College Cork, Ireland, 75 pp., 2007.

During this workshop, four working groups were established to identify issues related to atlas **design**, **data**, **technology** and **institutional capacity**. Each working group focussed its discussion by carrying out a Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis. Examination of the various points which were raised by the four working groups led to the identification of a number of cross-cutting issues, listed in the table below.

STRENGTHS	WEAKNESSES
1. **Standards and specifications** are maturing and **gaining wide acceptance**. 2. International and national **regulations are driving the need** for data and encouraging their availability. 3. Academic institutions and research organisations can take advantage of **emerging technologies** to design innovative products. 4. Development of **web atlases can aid in collaboration** between institutions and sharing of methods.	1. **Metadata is often inadequate**, inaccurate or out of date. 2. **Data management is difficult** due to the large quantities of data, difficult-to-support formats and their appearance on multiple portals. 3. **Data access limitations**, licencing and desire to recoup costs are restrictive. 4. There are **limitations** in the ability to **display** certain data types and to perform **data analysis**.
THREATS	**OPPORTUNITIES**
1. The **Google Earth paradigm** challenges atlas developers to meet design expectations of users. 2. **Data policies and IPR** impair accessibility and re-use of data. 3. **Erratic funding** affects the ability to develop and maintain atlases and leads to staff turnover issues. 4. **Credibility**: Atlases may not meet actual user needs and expectations; data quality may be poor; changing technologies may be disruptive.	1. **Community building and collaboration** can leverage the expertise of atlas developers. 2. **E-Gov and SDI initiatives** are helping to increase interest in CWAs among policy makers and regulators. 3. Atlases enable **identification of data gaps** and provide the ability to **pull resources together** to fill gaps and improve data. 4. Use **emerging technologies**, including Open Source and OGC standards, to enhance data sharing, presentation and online analysis.

CONSIDERATIONS FOR ATLAS DEVELOPMENT

The design and usability of an atlas are keys to its success. An atlas should clearly communicate its purpose, be visually appealing, be kept as simple as possible, use efficient technology and management systems and have a flexible design to enable growth and change over time. Ultimately its success relies on the atlas users, so efforts should be made regularly to ensure that it meets the needs of those users. An output of the workshop was a list of considerations for atlas design and implementation on topics such as data content and display, metadata, atlas interface, atlas tools, technology, user feedback and support for maintenance and future developments.

CONCLUSIONS AND RECOMMENDATIONS

The following table provides a summary of the report's conclusions and recommendations.

CONCLUSIONS	RECOMMENDATIONS
1. CWAs provide a range of data related services.	Methods for **providing additional CWA services** should continually be explored to better meet user needs.
2. CWAs in the United States and Europe are using similar technologies and standards.	**Collaboration** among American and European researchers should be actively supported in order to advance CWA design and implementation.
3. New legislation and policies are driving the production of quality coastal datasets and improved data availability.	**The CWA community must provide input to policy development** to help raise awareness of issues, including data accessibility. Methods for **effective outreach to decision makers** must be improved.
4. Data cost and intellectual property considerations can limit data availability in an atlas.	CWA developers and data managers should develop a collective approach to **inform policy makers of limitations** that **data cost, licensing and IPR issues** impose on users
5. Much data is still inaccessible or of variable quality.	Data owners should be encouraged to **devote resources to properly cataloguing their data** and improving data quality.
6. Consolidation of international standards and specifications is making development easier.	CWA **developers must be aware of the latest standards and specifications** and strive towards their implementation. **Data providers** should also be encouraged to **implement them**.
7. CWAs use cutting edge technology to develop effective web resources.	CWA developers should **keep informed of emerging technologies** and look for opportunities to implement them.
8. DBMSs are crucial for efficient content management.	**Efficient, flexible and easy to use spatial data management systems** need to be used for improved content management.
9. A common ontology for coastal and marine data is necessary.	The CWA community should **be informed about ontology developments** and consider implementing them.
10. Google Earth and other virtual globes revolutionised public expectations of geospatial data visualisation.	The CWA community needs to **evaluate the impact** of such viewers on their own initiatives and determine if there is the **potential to work with or incorporate elements** of virtual globes in next version CWAs.
11. Existing CWAs offer limited functionality for analysis and value added outputs.	CWAs should **offer a suite of analysis tools and value added outputs.** Developers should explore the utility of various technologies to help in development.
12. Existing atlases are sometimes too complicated for general audiences.	Development must be **responsive to user needs.** Developers should **consider designing multiple versions** to offer a range of services. **Regular user feedback** is crucial for atlas success.
13. The erratic nature of funding can compromise maintenance and ongoing CWA development.	Different **financial models need to be examined** to determine the best methods for continued CWA support, such as **sponsorship**, **subscriber-only areas** and **spin-off initiatives**.
14. Ongoing dissemination and publicity of CWAs is important to atlas success.	**Regular methods** should be explored for **effective outreach** such as **Email lists, publicity, events, brochures, giveaways** and **other innovative ideas** to increase awareness.
15. There is limited capacity to measure the impact of CWAs.	Better methods need to be developed in **how to measure impacts of CWAs** in the coastal community.
16. The emergence of CWAs has resulted in a growth of expertise in CWA design.	It is vital to **develop links** within the CWA community **to enhance collaboration, build on lessons learned and identify best practise.**

West Coast Coastal Atlas Comparison Spreadsheet

Jurisdiciton	Name	Purpose of Application	Intended Audience	Lead Agency	Primary Contact Information
Alaska	Alaska ShoreZone	Habitat assessment on local and regional scales, a tool for first responders to oil spills	Federal/State agencies, private and non-profit organizations, local and Tribal governments, universities, and the public	Alaska Department of Natural Resources	Mandy Lindeberg NOAA Fisheries Auke Bay Labs
British Columbia	Coastal Resource Information Management System	Provide a platform to display and query information related to coastal communities along the BC marine coastline	Primary: spill response teams. Secondary: coastal planners, MPA decision makers, marine industry, aquaculture	GeoBC	Carol Ogborne, Integrated Land Management Bureau, Ministry of Agriculture and Lands
British Columbia	Pacific Coastal Resources Atlas	To streamline the collection and dissemination of marine habitat and fishery resource information for coastal BC	Public, local/senior governments, First Nations, industry, stewardship groups	Fisheries and Oceans Canada	Brad Mason Fisheries and Oceans Canada
Washington	SalmonScape	Assist those involved in on the ground salmon recovery projects help planners, pinpoint priority habitat restoration projects that will do the most good in recovering salmon populations	natural resource biologists, transportation planners, students	WA Dept of Fish and Wildlife	Ken Pierce WA Dept of Fish and Wildlife
Washington	Washington Coastal Atlas	Informed management of marine shorelines. Useful in research, permitting, planning, land management and policy development	State/federal agencies, local and Tribal governments, researchers, consultants, and interested citizens	Department of Ecology	Kathy Taylor Department of Ecology
Oregon	Oregon Coastal Atlas	Sharing data, information and analysis tolls with decision makers and constituents of the Oregon coastal zone.	Decision makers: local planners, state & federal agency staff, tribal governments, researchers, consultants, and interested citizens	Oregon Coastal Management Program	Tanya Haddad Oregon Coastal Management Program
California	California Ocean Uses Atlas Project	To determine areas of ocean use, both consumptive and non-consumptive.	State/federal agencies, all interested parties	NOAA's Marine Protected Areas Center and Marine Conservation Biology Institute	Jordan Gass National MPA Center (NOAA)
California	Southern California MarineMap Decision Support Tool	_	non-technical users involved in the Marine Life Protection Act Initiative, stakeholders	California Coastal Commission / Marine Science Institute (UCSB)	Will McClintock Marine Science Institute (UCSB)

Name	Distinguishing Features	Data Included
Alaska ShoreZone	• Oblique georeferenced aerial imagery of shoreline at low tide • Near shore fish atlas of AK	• Shore types based on geomorphology (British Columbia Class - 35 classification) • Environmental Sensitivity Index (ESI - 27 classification) • Biological Classification (Habitat Class - combines biological exposure and substrate) • Biological communities and/ species (biobands) • Oil Residency Index (1-15) • Invasive Green Crab Index (0-4)
British Columbia (CRIMS)	• A shoreline can be subdivided into smaller pieces, and the characteristics of each piece is described, recorded and classified. • Shore units are subdivided into across-shore components, which are categorized into zones.	• Shore zone information (type, class, wave exposure, oil residency index, form and material, bio-banding, habitat classification • biological resources • commercial resources •recreational resources •human uses resources • information related to off shore oil and gas exploration • aquaculture
British Columbia (PCRS)	• Hosted by a non-profit organization. • 30 online data entry tools • Links to shoreline video and still photos for the southern Gulf islands.	• coastal shorezone mapping • herring spawn • significant concentrations of fish and invertebrates • anecdotal information for commercial, aboriginal and sport fisheries • salmon migration routes • fish habitat features including kelp, eelgrass, salt marshes, tidal flats, marine mammal sightings, distribution of fisheries based on commercial landings, clam beds, rare and endangered species and other layer
Washington Salmon-Scape	• able to see data by watershed, county boundary and user-defined areas • contains information on fish stock distribution and status, juvenile fish monitoring, habitat characteristics and stream blockages that impede fish passage	• 1:24,000 scale hydrography layer with standardized stream segments • Salmon & Steelhead Stock Inventory (SaSi) distribution and status • Elevation • Gradient • Barriers • ESA listing units (ESU) • Intertidal Forage Fish Spawning Habitat
Washington Coastal Atlas	Oblique aerial photos of the shoreline: • Photos of Marine and freshwater shorelines can be downloaded directly from the Coastal Atlas website. • Decades of oblique aerial photos of the marine shorelines, can determine changes in shorelines and shoreline development over time. Land cover changes over time: • Information of land cover changes over time for all of western WA.	• habitat features such as wetlands and eelgrass • physical features such as drift cells and slope stability • regulated features such as flood plains • shoreline modification such as piers and docks • jurisdictional delineations such as cities and watersheds
Oregon Coastal Atlas	• Length of deployment (6-7 years) • Integrated framework that goes beyond online maps • Directory of tolls, both internal and external	• 3500 individual datasets in the searchable data archives (not all available to be browsed in the interactive mapping portion)
California Ocean Uses Atlas	• Regional maps of ocean uses. • A web-based mapping tool that will eventually allow individual users and stakeholders to participate directly and easily in planning for managing ocean uses.	• GIS maps and analytical products reflecting the variety of ocean uses in state and federal water
California MarineMap Tool	• Data represented in a way that is easily accessed by a variety of users. • Users can analyze how much of the data layers are captured within prospective MPA boundaries that they draw.	• base maps (MLPA study region boundary, nautical charts, etc.) • Physical and bathymetric (depth contours, submarine features, etc.) • biological/habitats (shoreline habitats, kelp forests, estuaries, etc.) • cultural (towns, cities, road and infrastructure, etc.) • consumptive and non-consumptive uses •existing coastal and marine managed areas

Name	Challenges Encountered	Lessons Learned
Alaska ShoreZone	• keeping up with upgrades, compatibility, and changing personnel • data management and QA/QC between partners • pressure to add other data sets regardless of funding or function • managing small contributions from multiple agencies and organizations • securing long term funding	• develop specific tools for partners/users and funding and support will follow • communicating product to new users and potential partners • underestimating in-kind services by partners • underestimating supply and demand
British Columbia (CRIMS)	• long term and limited funding • executive support as executives change • data gaps • acquisition of data from third party sources • remoteness of BC hampers data gathering and costs of acquiring video imagery of the coastline • significant First Nations and local community needed to be involved • biological richness of intertidal environment played havoc on classifications	• Original focus of the application was for oil spill response but found many users interested in the info so needed to adjust for a wider audience • eventually the money dries up so identify what to do next
British Columbia (PCRS)	• funding • getting updates • consolidating information • collecting new information in the field • getting people to use the atlas and understand its value • linking information sources together so users can better understand trans-boundary issues such as oil spill impacts	• online data entry tools are not being used as initially envisioned • there has not been enough communication about the value and existence of the existing systems
Washington Salmon-Scape	–	–
Washington Coastal Atlas	• Securing long term funding commitments • Setting up data sharing agreements • critical gaps in existing information relevant to coastal and marine issues • Constantly changing technology • Constantly evolving web standards • Pressures to extend the geographic scope beyond coastal area to serve non-coastal needs • Broad user base	• understand the business needs of the targeted audience and have open dialog with users • gain support from executive management • clearly articulate use and importance of Atlas to managers in related programs and agencies • communicate with occasional users about new information and features • market the Atlas to new audiences and potential stakeholders
Oregon Coastal Atlas	• Past: cross browser incompatibility, networking between various partners • Present: migration of new and legacy content of all types, large backlog of information that could be included, but are limited by time and money	• many lessons about user needs and interface design • utility of various tool types for various audiences • long term statistics can be analyzed for Atlas trends
California Ocean Uses Atlas	•Significant investments –Purchase of hardware –Requirements for data serving •Abundance of “Best Available Data” •Participant buy-in –Trust –Group dynamics •Data validation –How do we compare results with other data sources?	•The methodology works •Vital to find the right mix of people to attend workshop •Capture qualitative information from discussions •All uses of interest have to be mapped –Aggregated uses are more useful than individual uses
California MarineMap Tool	• no good metadata server	Open Source technologies are a joy to work with. Performance is unparalleled.

Name	Server/Software Technology	Future Directions	Current Focus: Textual or Map Content
Alaska ShoreZone	• WebGIS: ArcIMS 9.3 • Database: ArcSDE 9.3 with Oracle 10.2 • Server: IIS with Jrun 4.0 • Other: ASP	• in the middle of upgrading technology for web product • continue imagery and mapping until AK's coastline is complete • develop specific tool for user groups such as first responders • add supporting data sets such as the AK Shore Station database (on the beach) • develop an International ShoreZone data set so management issues across borders and large scale comparisons can be made from WA, BC, and AK	Both
British Columbia (CRIMS)	• WebGIS: ArcIMS 9.1 • Database: ArcSDE 9.1 with Oracle 10G • Server: Apache 2.2 with Apache Tomcat 5.5 • Other: GeoAnimator (GOA) Oracle Application Server	• upgrading the site to a Microsoft Virtual Earth interface with limited data query ability • found most people do their analysis off-line so no need to have the complex ability that the site currently has • data layers will all be Web Feature Service Interface standard (WFS) that can be served up to other sites • make the site easier to use for the general public • updates and new data layers from third parties incorporated into the site	–
British Columbia (PCRS)	• Autodesk Mapguide • Microsoft Access • Drupal Content Management System • clipstream video player	• currently being reformatted into a new "open source" version of Autodesk mapguide • more focus will be placed on data collection where there is interest such as sand lance and eelgrass and contaminants mapping • use of oblique still photos is being considered	Map
Washington Salmon-Scape	• WebGIS: ArcIMS 9.2 • Database: ArcSDE 9.2 and Microsoft SQL Server 2000 • Server: IIS with Apache Tomcat 5.5	• Increased data download availability • New gradient and geomorphology attributes • Spatial Queries	Map
Washington Coastal Atlas	• WebGIS: ArcIMS 9.2 • Database: ArcSDE 9.2 and Microsoft SQL Server 2005 • Server: IIS with Apache Tomcat 5.5 • Other: ASP.NET is used for the Coastal Image Viewer and the Land Cover Tool	Planned improvements: • upgrading atlas technology • adding 2006 land cover data • increasing the number of natural resource data layers • updating the existing data layers Work on the Coastal Atlas is taking several new directions: • incorporating information showing public access to all of WA's marine shorelines • exploring options for incorporating more ocean information • the WA Coastal Atlas is joining its neighbor, the OR Coastal Atlas, as part of ICAN • a redesign to make the atlas more information rich and less cartographic centered.	Map
Oregon Coastal Atlas	• Web GIS: Minnesota Mapserver • Database: MySQL and PostGIS • Server: Apache 2.x • Other: Joomla CMS is used overall backend administration	• continue enhancing mapping interfaces • improve search experience, from query to results • incorporate new tools / data sets (e.g. current efforts with Ocean data) • fully deploy GeoNetwork, fully connect to ICAN • potential migration of metadata to ISO • increase number of public WxS services • increase use of embedded maps • increase us of PostGIS for analysis in online tools	–
California Ocean Uses Atlas	Software •ESRI ArcGIS 9.2 •ESRI ArcSketch 1.2 Extension Hardware •E-Beam Electronic Whiteboard •Sympodium Digital Tablet Data •Basemap	•Complete California Workshops •What can we do with the data? –Explore additional use aggregation combinations –Consider comparisons between California regions •Expand Atlas project to other areas •With more workshop time, the methodology can be expanded to map more discrete use categories and at a finer scale •Use this process to tell the use story throughout the US	Map Content
California MarineMap Tool	•Open source software including Postgres/PostGIS • MapServer, GeoServer, •Openlayers •Ext •Geodjango •Ubuntu Linux	–	–

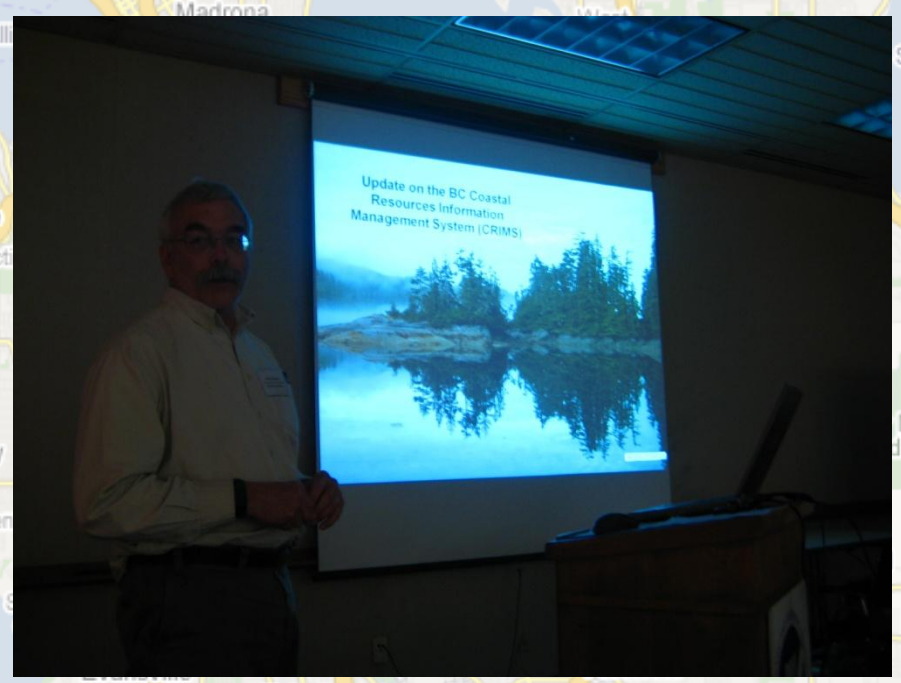
Name	Geographic Extent	Inland Extent	Marine Extent	Limits to Number of Displayed Layers	Available Layers determined by zoom?	Public Access
Alaska ShoreZone	Kodiak, Cook Inlet, Kenai Peninsula, Prince William Sound, and portions of northern and southern Southeast AK	None	near shore - super tidal to inter tidal	3 attribute layers	Data not scale dependent, mapped lines visible when zoomed into an area with an extent less than 450km.	No
British Columbia (CRIMS)	Southern tip of Vancouver Island to Stewart at the head of Portland Canal (29,000 km)	_	_	_	_	No
British Columbia (PCRS)	Entire coast of BC (some data sets are site specific)	Roads, hydrology maps with fish distribution for entire province.	Most species and habitat mapping is within 50 KM	No Limits	Yes	no
Washington Salmon-Scape	All of WA state	All of WA state	_	_	Yes	No
Washington Coastal Atlas	WA's outer coast, shoreline and open waters of Puget Sound and the estuarine portion of the Columbia River	As far east as the Cascade Crest	_	No Limits	No	No
Oregon Coastal Atlas	Entire Oregon coastal zone which encompasses the full drainages of the coast range (except the Columbia, Umpqua and Rogue basins)	_	_	_	_	Yes
California Ocean Uses Atlas	All of CA state	N/A	_	N/A	N/A	No
California MarineMap Tool	Southern California Bight (from Point Conception to the US / Mexico border)	N/A	_	N/A	N/A	No

Name	Collaboration Ideas	Name	Additional Contacts	Name	Additional Suggested Resources/Comments
British Columbia; Pacific Coast Resource Atlas	I believe we can collaborate in many ways to improve information to our client base and create seamless datasets across borders: 1) improve mapping initiatives related to species and habitats that are of concern such as invasive species, salmon, marine mammals, and eelgrass beds; 2) potentially help oil spill response, our understanding of and tracking of dead zones, contaminants, and monitoring climate change; 3) benefit by learning about each other's standards and methods for mapping such as photo-interp techniques for mapping impervious surfaces, geo-referenced video, and still digital photos and web based tools; 4) build a library of coastal documents and sources of information in an online searchable catalogue; and 5) I would like to see a team of coastal experts build a common system that integrates key map layers and databases (one attempt at this is www.cec.org)	**British Columbia (CRIMS)**	**Charlie Short**, Marine Planning Office, Integrated Land Management Bureau, Province of British Columbia: Short@gov.bc.ca **Karen Topelko**, Ministry of Environment, Oceans and Marine Fisheries Division, Province of British Columbia: Karen.Topelko@gov.bc.ca **Doug Biffard**, BC Parks, Ministry of Environment, Province of British Columbia: Doug.Biffard@gov.bc.ca	**British Columbia (PCRA)**	**The Pacific Coastal Resources Atlas for British Columbia:** http://www.cmnbc.ca/atlas_gallery/pacific-coastal-resources-atlas-british-columbia; **Shorekeepers Atlas:** http://www.cmnbc.ca/atlas_gallery/shorekeepers-atlas; **Eelgrass Bed Mapping Atlas:** http://www.shim.bc.ca/atlases/eelgrass/main.htm; **The Georgia Basin Habitat Atlas:** http://www.cmnbc.ca/atlas_gallery/georgia-basin-habitat-atlas; **The South Gulf Islands Atlas:** http://www.cmnbc.ca/atlas_gallery/southern-gulf-islands; **Fraser River Estuary Management Plan Atlas:** http://www.cmnbc.ca/atlas_gallery/fraser-river-estuary-management-plan-atlas; **North American Environmental Atlas:** http://www.cec.org/naatlas/
Washington Coastal Atlas	I would like to suggest ocean information -- particularly seafloor substrate and benthic habitat info – for consideration as a priority topic for coordination. Re: Washington Coastal Atlas. Work on the Coastal Atlas is taking the following new directions: • incorporating information showing public access to all of Washington's marine shorelines into the Atlas, and • the Washington Coastal Atlas is joining its neighbor, the Oregon Coastal Atlas (www.coastalatlas.net), as a part of the International Coastal Atlas Network (ICAN: http://ican.science.oregonstate.edu/). The group is developing a data interoperability prototype to collaborate among coastal atlases and share data for coastal management on a regional and international level. • working with managers of other coastal atlas-type applications on the west coast to increase communication and coordination regarding data and technical information.	**Washington Coastal Atlas**	**Deborah Purce**, NOAA Coastal Management Fellow, WA Department of Ecology: dpur461@ecy.wa.gov **Dan Sau**l, GIS Manager/Analyst/Programmer, WA Department of Ecology: dsau461@ecy.wa.gov **Darby Veeck**, GIS Technician, WA Department of Ecology: dvee461@ecy.wa.gov **Liz O'Dea**, GIS Technician, WA Department of Ecology: lode461@ecy.wa.gov **Tim Strickler**, GIS Specialist, WA Department of Natural Resources: Tim.Strickler@dnr.wa.gov	**Washington Salmon-Scape**	–
				Oregon Coastal Atlas	**Regional OOS projects (NANOOS, ORCOOS, PACOOS) Technical contact for PACOOS:** Christopher Romsos; Faculty Research Assistant Oregon State University; College of Oceanography and Atmospheric Sciences cromsos@coas.oregonstate.edu
Oregon Coastal Atlas	We should keep in regular contact, and I like the idea of an in person meeting in the Spring if possible. I'd really like this group to work hand in hand with the ICAN regional assessment process too, so that our time is well spent on both efforts.				
California Ocean Uses Atlas	–	**California Ocean Uses Atlas**	–	**California Ocean Uses Atlas**	–
California MarineMap Tool	–	**California MarineMap Tool**	–	**California MarineMap Tool**	–

West Coast
Coastal Atlas
Workshop
APRIL 23-24, 2009 • SEATTLE, WA

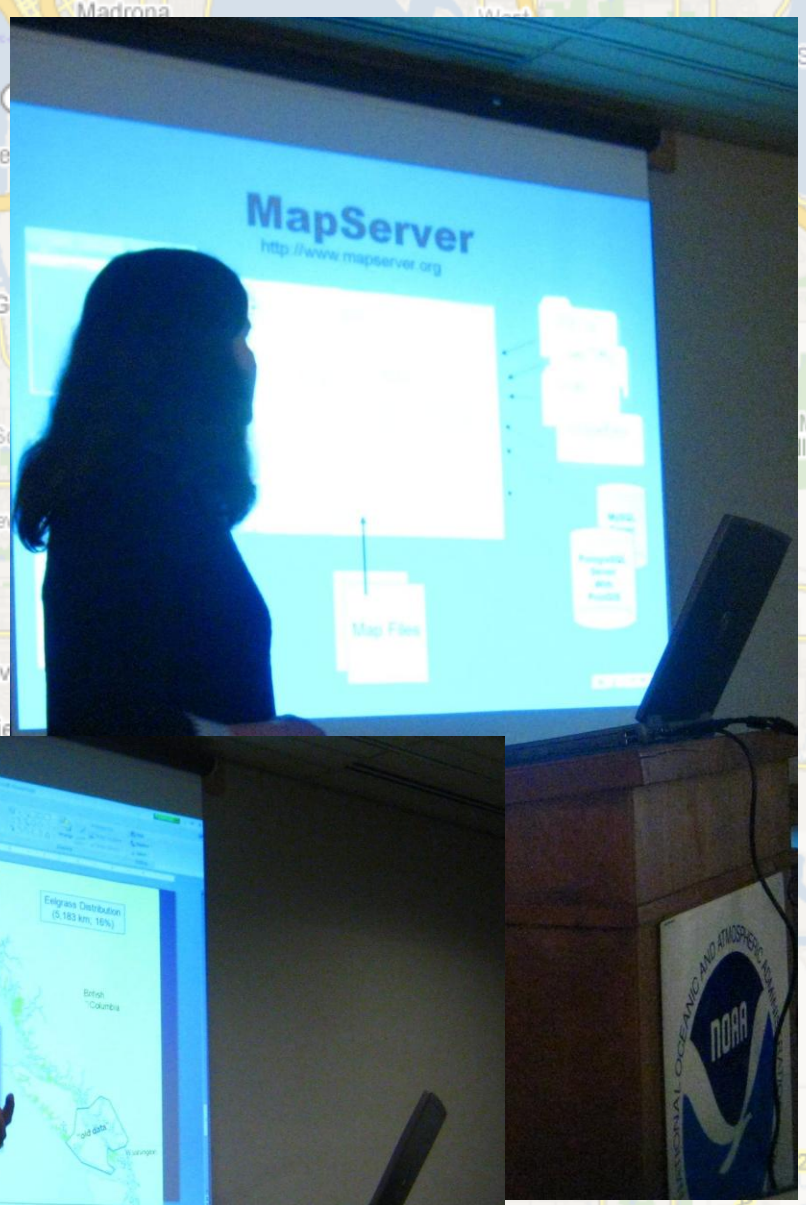
Workshop Photos


ShoreZone Protocols: Shore Types


Update on the BC Coastal
Resources Information
Management System (CRIMS)

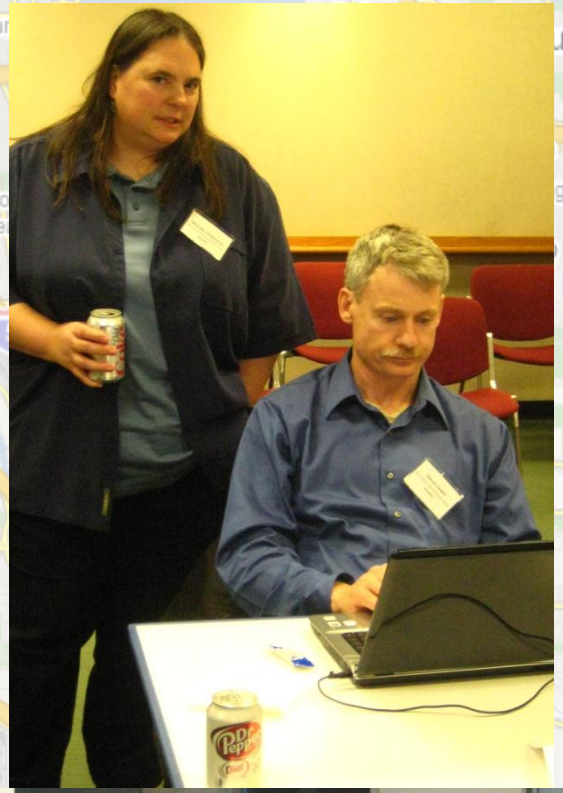

Dawn Wright


NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE


MapServer
http://www.mapserver.org
Map Files
NOAA

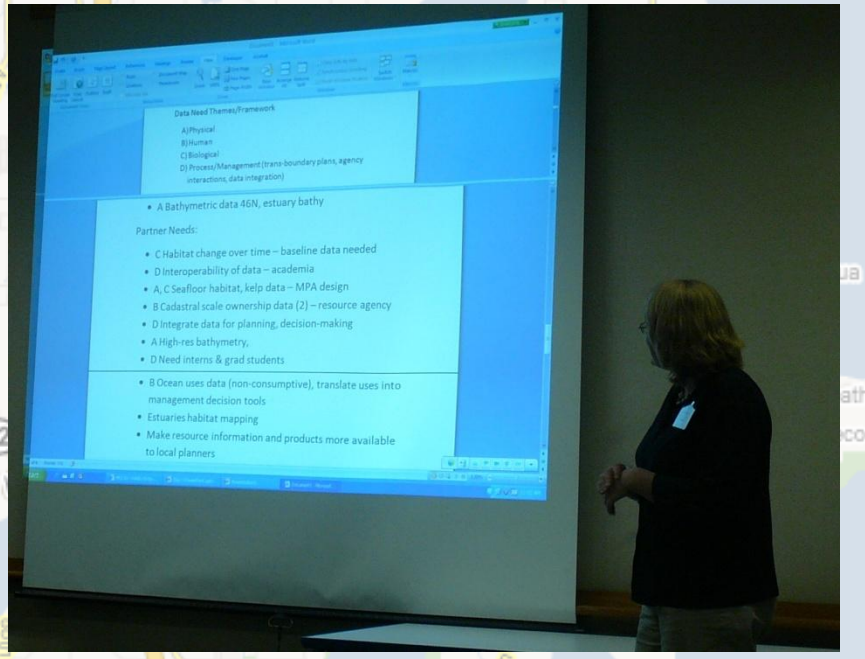

Eelgrass Distribution
(5,183 km, 16%)
British Columbia
ShoreZone is a primary data source
collected to a standard
georeferenced imagery is data


Benjamin Shorr
NOAA Office of Response & Restoration
Washington
Tanya Haddad
Coastal Management Program
Oregon



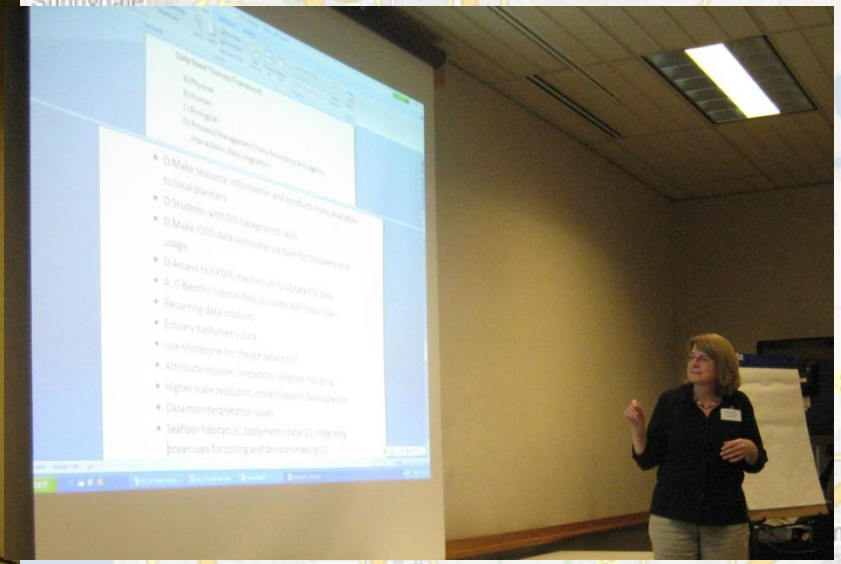

collect/share?
• Russia/AK border – standardize data, ontology
• MMS (Mineral Management Servic nearshore data made available
Kathy Taylor


NOAA


Data Need Themes/Framework
A) Physical
B) Human
C) Biological
D) Process/Management (trans-boundary plans, agency interactions, data integration)
• A Bathymetric data 46N, estuary bathy
Partner Needs:
• C Habitat change over time – baseline data needed
• D Interoperability of data – academia
• A, C Seafloor habitat, kelp data – MPA design
• B Cadastral scale ownership data (2) – resource agency
• D Integrate data for planning, decision-making
• A High-res bathymetry,
• D Need interns & grad students
• B Ocean uses data (non-consumptive), translate uses into management decision tools
• Estuaries habitat mapping
• Make resource information and products more available to local planners


NOAA

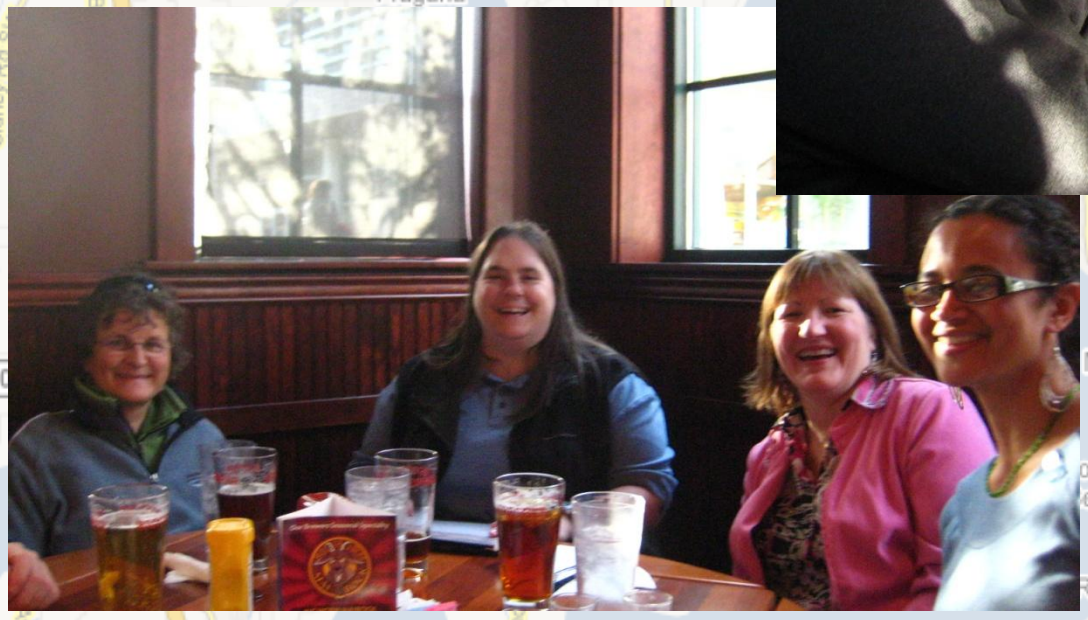

Digital Coast: Legislative Atlas Web Site
Spatial Data Download
Most data sets available in
Keyhole Markup Language
Google Earth
Connect directly to data
(WFS)
ture Service



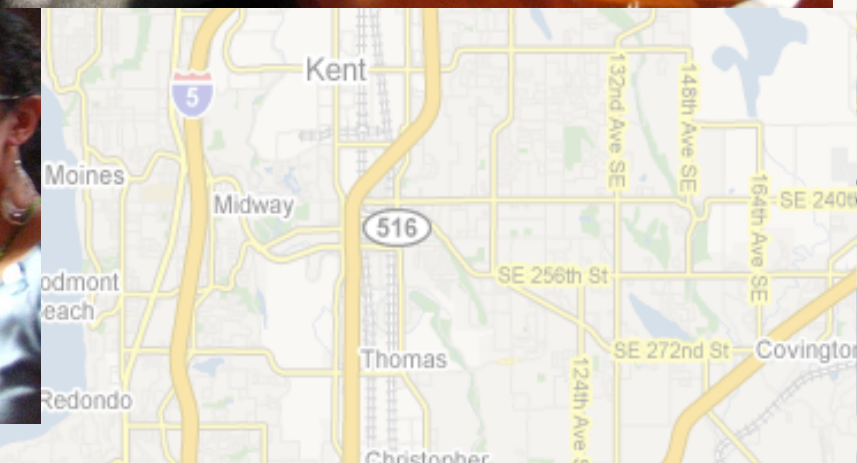
Evansville
Tukwila
Renton
Riverton
Heights
Sunnydale
Redondo
509
599
518
405


Seven Days of Value
HEINZ


HEINZ




Madrona
Atlantic
West Bellevue
Bellevue
Beaux Arts Village
Woodbridge
99
90
Mercer Island
Factoria
405
Eastgate
South Seattle
Lake Heights
Hilltop
Seward Park
Georgetown
Hazelwood


Kent
5
Moines
Midway
516
SE 256th St
Thomas
SE 272nd St
Redondo
132nd Ave SE
148th Ave SE
164th Ave SE
124th Ave SE


R.A.M.
M.V.P.


MVP


RAM

Back row: Cindy Hartmann Moore, Tim Nyerges, George Graettinger, Amy Merten, Marla Steinhoff, Benjamin Shorr, Darby Veeck, Mandy Lindeberg, Steve Lewis, Charles Steinbeck, Will McClintock, John Harper, Tanya Haddad. **Middle row:** Jena Carter, Jordan Gass, Christina Hoffmann, Jo Smith, Jennifer Hennessey, Janelle Kueck, Kathy Taylor, Dawn Wright. **Front row:** Emilio Mayorga, Greg Benoit, Megan Wood, Mary Morris, Liz O'Dea, Andy Lanier, Becky Smyth, Ken Pierce, Deborah Purce

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