Spatial Data Working Session Summary Report

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Summary report compiled by Jennifer Hennessey with assistance from Christina Cairns, Deborah Purce, and Jackie Chandler. Many thanks to all three for their help running the working session as well as preparing and reviewing this document.

Key Findings and Recommendations

The overall goal established for this meeting was to provide input to the Washington Marine Spatial Planning report and recommendations on spatial data. Two specific objectives of the meeting were to:

1. Understand key types of spatial data needed to support marine spatial planning in Washington, including addressing priorities for adjacent federal waters.
2. Understand barriers and potential solutions to data accessibility and sharing to support MSP efforts in Washington.

The following are some of the key findings and recommendations from the participants in this working session on spatial data.

Priority data needs

Participants selected the following priority types of spatial data needed to support marine spatial planning in Washington (for full list of data types, see detailed notes on page 16):

- Bathymetry-topography
- Fisheries
- Habitats
- Conservation/regulated areas
- Water quality
- Oceanographic processes
- Marine fish
- Geomorphic characterization
- Endangered species
- Ownership

In particular, top votes across the teams went to the following data types: Bathymetry-topography, Fisheries, Habitats, and Conservation/regulated areas. However, many participants acknowledged that having the full list of data would be most helpful to support marine spatial planning.

Additional data needs to aid marine spatial planning

The groups suggested several additional data types to the draft list provided at the workshop and provided more details for some of the existing types of spatial data. Some of the major additional data types or refinements included:

- Water quality: pathogens, Harmful Algal Blooms, dissolved oxygen, acidification, turbidity, temperature, salinity, and areas with significant water quality problems
- Climate shifts
- Hydrography: freshwater quantity
- Geology: geomorphic characterizations (nearshore-shoreline), sub-surface geology, sediment quality and depth
- Habitats: mitigation areas
- Restoration sites: current and future
- Marine fish habitat and fisheries: forage fish spawning habitat, larval assemblage and dispersal data

- Biological elements: marine invertebrates, planktonic communities, invasive Species
- Acoustics (noise/sound)
- Human Uses: research activities, wildlife watching, self-defined marine traffic routes, boater pump-outs/nearshore toilets, areas of refuge, and viewscape (aesthetics)
- Endangered Species Act species: life histories and critical habitats
- Other management or regulated areas: shoreline management designations (local shoreline master programs), use authorizations for extractive resources, leases, other existing spatial plans, emergency management areas, and jurisdictions
- Demographic and socio-economic information for ports, communities & human uses

Some participants felt all of the spatial data listed generally supported a broad range of planning issues. However, others indicated that certain types of data were especially useful for a broad range of planning issues. These generally useful data types included: oceanographic processes, energy resources in the ocean, bathymetry-topography, seafloor type, habitats, fisheries, shipping lanes, tribal use areas, ownership, conservation/regulated areas, shoreline designations under shoreline master programs, and geological processes.

Data sharing and data access

Participants discussed the barriers and needs for accessing and sharing spatial data to advance marine spatial planning. The following were some key recommendations:

- Create a centralized on-line place to search for, download, and view spatial data and coordinate GIS data in the state with a GIS Council and central library/catalog.
- Establish data standards for metadata and data, including scale and resolution.
- Establish peer-review and Quality Assurance/Quality Control processes to screen data.
- Provide resources to collect, create, and manage spatial data at all levels.
- Develop levels of data accessibility to protect sensitive data and explore data aggregation for public viewing.
- Give open access to data and provide a transparent process.
- Develop data use agreements, legal protections for data providers, document intended data uses, consult on appropriate data-sharing, and establish government-to-government relationships.
- Have original authors/owners maintain data and use compatible data formats.
- Develop an open-access, decision-support tool with temporal and spatial variability in data and ability to do multi-objective analyses. Identify specific objectives for the tool before building it.
- Utilize web services for sharing data.

Background on the Working Session on Spatial Data

Purpose and goals

On July 13, 2010, an interagency team, the State Ocean Caucus, sponsored a working session on spatial data. The meeting was coordinated and hosted by the Department of Ecology. The working session was designed to provide input to the State Ocean Caucus on spatial data needs, priorities and issues for marine spatial planning in Washington. This interagency team is charged with developing a report and recommendations to the Washington Legislature on marine spatial planning by December 15, 2010.

More specifically, the overall goal established for the meeting was to provide input to the Washington Marine Spatial Planning report and recommendations on spatial data. Two specific objectives of the meeting were to:

3. Understand key types of spatial data needed to support marine spatial planning in Washington, including addressing priorities for adjacent federal waters.
4. Understand barriers and potential solutions to data accessibility and sharing to support MSP efforts in Washington.

Audience and attendees

The working session was designed for coastal and ocean resource managers, marine users and stakeholders, and data translators and integrators. The interagency team solicited an initial list of about 70 people to invite to the working session, but encouraged invitees to pass the invitation along to others who might be interested. Over 30 people attended across this broad spectrum of interests, including local, state, tribal and federal agencies; marine users and stakeholders; and data translators and integrators, including university researchers and consultants with experience analyzing spatial data and using Geographic Information Systems (GIS).

Structure

Much of the working session was dedicated to fostering and gathering input from attendees through facilitated small group discussions. Summaries of the findings and recommendations from these groups were reported back to the larger group. A couple presentations provided necessary context and information for preparing for these conversations. A copy of the agenda for the spatial data working session is included here for reference.

Agenda - July 13, 2010

Spatial Data Working Session:

What spatial data is needed for marine spatial planning?

Washington Dept. of Ecology Headquarters
300 Desmond Drive
Lacey, Washington

Goal: Provide input to the Washington Marine Spatial Planning report and recommendations on spatial data

- ✓ Understand key types of spatial data needed to support marine spatial planning in Washington, including addressing priorities for adjacent federal waters.
- ✓ Understand barriers and potential solutions to data accessibility and sharing to support MSP efforts in Washington.

Time	Agenda Item
10:00 – 10:30	Welcome *Bob Nichols, Governor's office* Marine Spatial Planning: Washington State context & process Review purpose and agenda for working session on spatial data *Jennifer Hennessey, Washington Dept. of Ecology*
10:30 – 11:40	Breakout I: Identifying and Prioritizing Spatial Data for Marine Spatial Planning
11:40 – 12:00	Summarize and report results from small group discussions
12:00 – 1:00	Lunch on your own -- *Ecology cafeteria or other options*
1:00 – 1:20	Understanding Data Access and Sharing Needs for Marine Spatial Planning Overview - *Jennifer Hennessey* Examples of Data Access and Sharing issues from the state, regional, and national level *Christina Cairns, NOAA Coastal Services Center*
1:20 – 2:45	Breakout II: Accessing and Sharing Data A) Data Access Issues and Needs B) Data Sharing Issues and Needs
2:45 – 3:00	Break
3:00 – 3:20	Summarize and report results from small group discussions
3:20 – 3:30	Summary and Next Steps

Marine Spatial Planning Overview
Jennifer Hennessey, Washington Department of Ecology

Jennifer Hennessey from Washington Department of Ecology presented some overall context on marine spatial planning and the legislative report and process. She also provided reviewed the purpose and agenda for the spatial data working session and the instructions for the morning breakout session on data needs and priorities.

Jennifer provided the definition of Marine Spatial Planning (MSP) as a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine environments to achieve ecological, economic, and social objectives. She described it as a process designed to better coordinate resource management and typically used to address new, expanding or conflicting uses in the marine environment. There are many steps to the planning process, but the process relies on spatial data as a foundation for developing a plan.

MSP is being discussed at the federal, regional and state level. In particular, Jennifer highlighted the interim national framework for coastal and marine spatial planning and a new state law passed to help define how the process should work in Washington.

Washington's state law

Enacted in March 2010, Washington's new state law does two primary things. First, it directs an interagency team to recommend an approach to marine spatial planning through an interagency team in a report due to the legislature by December 15, 2010. Second, if federal or non-state funds are received to do planning, it directs the state to conduct marine spatial planning. This second part of the law outlines the basic planning process, key planning principles and considerations, and main elements to be included in the plan. The law states that a comprehensive plan should cover all of Washington's marine waters and include the following elements:

- Ecosystem assessment and indicators
- Series of maps
- Recommendations for uses and priorities in federal waters
- Renewable energy framework
- Management measures & implementation strategy

Jennifer indicated the legislative report was the current focus of the interagency team, the State Ocean Caucus. The interagency team is meeting regularly to summarize information and examine key questions about marine spatial planning in Washington and to develop recommendations on next steps for advancing marine spatial planning. She outlined the major public process elements for the report including a survey, the spatial data working session, and a public comment period in September on the draft report.

Some of the key questions the report is seeking to answer are: 1) What are the gaps in management that marine spatial planning can or should seek to fill? 2) What are the key spatial

data needs for doing marine spatial planning? 3) How to conduct marine spatial planning in a way that integrates into existing management plans, including goals and objectives? The second question is the focus of the spatial data working session.

Working session on spatial data

Jennifer reviewed the goals and agenda for the working session on spatial data. As mentioned earlier, the overall goal was to: provide input to the Washington MSP planning report on spatial data. In addition, the specific objectives for the day were to:

- ✓ Understand key types of spatial data needed to support marine spatial planning in Washington, including addressing priorities for adjacent federal waters.
- ✓ Understand barriers and potential solutions to data accessibility and sharing to support MSP efforts in Washington.

Overview for morning small group discussions: Breakout I

The homework sent out prior to the meeting outlined some potential planning issues that a marine spatial plan would address as well as some types of spatial data that might support planning for those potential issues (for full list of planning issues and data types considered by the group, see notes from Breakout Session I, pp. 16-21). These two lists were enlarged on posters for each group to look at and add information. Jennifer described the focus for the morning breakout sessions as doing three things:

1. Identify additional types of spatial data necessary to support Marine Spatial Planning.
2. Identify which data types support a broad range of planning issues.
3. Prioritize top spatial data types needed to support Marine Spatial Planning.

Summary of Breakout I:
Data needs and priorities for marine spatial planning

1. Identify additional types of spatial data necessary to support Marine Spatial Planning.

The groups suggested several additional data types that would aid marine spatial planning and provided more details for some of the existing types of spatial data. Some of the major additional data types or refinements included:

- Water quality: pathogens, Harmful Algal Blooms, dissolved oxygen, acidification, turbidity, temperature, salinity, and areas with significant water quality problems
- Climate shifts
- Hydrography: freshwater quantity
- Geology: geomorphic characterizations (nearshore-shoreline), sub-surface geology, sediment quality and depth
- Habitats: mitigation areas
- Restoration sites: current or future

- Marine fish habitat and fisheries: forage fish spawning habitat, larval assemblage and dispersal data
- Other biological elements: marine invertebrates, planktonic communities, invasive species
- Acoustics – noise/sound
- Human Uses: research activities, wildlife watching, self-defined marine traffic routes, boater pump-outs, areas of refuge, and viewscape (aesthetics)
- Endangered Species Act species: life histories and critical habitats
- Other management or regulated areas: shoreline management designations (local shoreline master programs), use authorizations for extractive resources, leases, other existing spatial plans, emergency management areas, and jurisdictions (including outside of 3 nautical miles)
- Demographic and socio-economic information for ports, communities & human uses

For more details, please see the Breakout I notes for each team provided later in this report.

2. Identify which data types support a broad range of planning issues.

Team #1 identified the following data types as supporting a broad range of planning issues:

- Oceanographic processes
- Energy
- Bathymetry-topography
- Seafloor type
- Habitats
- Fisheries
- Shipping lanes
- Tribal use areas
- Ownership
- Conservation/regulated areas
- Shoreline zones under shoreline master programs

Team #2 ran out of time to identify which data types would support broad versus general planning issues, but agreed to only prioritize those data types that applied to a broad range of issues.

Team #3 found that most of the data types reflected in the human and biological categories would be useful across a range of planning issues. For the physical/chemical category, this team agreed that oceanographic processes, bathymetry-topography, seafloor type and geological processes were all generally helpful data types for planning.

3. Prioritize top spatial data types needed to support Marine Spatial Planning.

The teams selected the following top priority types of spatial data needed to support marine spatial planning:

- Bathymetry-topography
- Fisheries
- Habitats
- Conservation/regulated areas
- Water quality
- Oceanographic processes
- Marine fish
- Geomorphic characterization (nearshore-shoreline)
- Endangered Species Act-listed species
- Ownership

In particular, top votes across the teams went to the following data types: Bathymetry-topography, Fisheries, Habitats, and Conservation/regulated areas.

Each member of the teams selected what they felt would be the three most important data types for supporting marine spatial planning. The teams then compiled this information to determine the top data needs for their group.

Team #1 - spatial data types, in order of priority (individuals ranked types #1 to 3), were:

1. Fisheries
2. Conservation/regulated areas
3. Geological processes

However, the data types receiving the most overall votes in this group were:

1. Fisheries
2. Conservation/regulated areas
3. Habitats

Team # 2 – spatial data priorities were:

1. Bathymetry-topography
1. Habitats
2. Oceanographic processes, marine fish, ESA-listed species, conservation/regulated areas, and ownership were all tied with two votes.

Team #3 – spatial data priorities were:

1. Bathymetry-topography (high resolution)
2. Habitats, Water Quality, and Geomorphic characterization (nearshore-shoreline) were all tied with three votes.

The detailed notes written up later in this report provide information on other priority data types that received votes during this process.

Other comments

Other considerations and needs brought up in these discussions related to gathering and analyzing spatial data for marine spatial planning included:

- Model for integrating data for ecological sustainability
- Consideration of temporal component of various data types. For example, some data might be more useful to planning efforts when displayed by seasonal occurrence or abundance rather than annual averages.
- Consideration of potential conflicts in 3D space.
- Consideration of spatial resolution for the intended purpose – when is it appropriate to go to a smaller scale?
- Citizen Science Data.

Finally, a couple groups also noted other planning issues that could be addressed with a marine spatial plan such as military activities, recreational uses, fisheries and environmental restoration projects.

Experiences with Data Discovery, Sharing and Accessibility
Christina Cairns, NOAA Coastal Services Center

Christina Cairns from NOAA Coastal Services Center (CSC) discussed experiences with data sharing, access, and discovery from the national, regional and state perspective. Due to CSC's work in developing geospatial tools, particularly the Multipurpose Marine Cadastre, they have gained insight into accessing and sharing data at the national, state, and regional levels.

National Perspective

Christina discussed barriers to data sharing at the national level and solutions that CSC has found to overcome these barriers. First, some data are proprietary or just not that readily available due to technology challenges (i.e. - vessel tracking data like the Automated Information Systems (AIS) info, fisheries catch data, legacy data files). CSC suggests that those seeking data consider committing resources to purchasing some datasets, hiring consultants to process data if need be, or investing in building tools that will help process the information more efficiently. In addition, some data are restricted for homeland security concerns. For example, CSC has had difficulty acquiring an authoritative and broad coverage of where power plants are. To solve this, CSC staff recommend building relationships with a partner, maybe by starting out sharing information that is less sensitive even if it's not a high priority. The hope is that eventually the contacts made will be able/willing to go to bat internally and make an argument for sharing data, as well as work together to explore ways to share more sensitive data.

Related to data sharing is facilitating access to relevant data (i.e., for CMSP). The "outreach and sharing of info" idea is not always in the mission statement of potential data partners. Data seekers must be aware of the time commitment being asked of partners, and be flexible in time lines. In addition, those leading the data collection effort must be willing to shoulder the largest portion of the data manipulation and standardization burden, particularly if that's what it takes to build the partnership (i.e., CSC's work with electronic nautical chart data bundling is a good example). Spend time to network and find specific people within the agency/group who are willing to help out, even if the agency doesn't have a policy or reputation of being open with their data. Many of these barriers to data sharing and access are thematic whether they are encountered at the national, regional or state level.

State Perspective

Christina then presented findings from a workshop in California in which state resource managers and technical staff discussed their difficulties and ideas for data sharing and improved data management. It was noted that in California, certain sensitive or confidential datasets, such as fishing catch data, are legally protected by non-disclosure agreements, making access to this information infeasible. One potential solution is to bundle individual datasets, such as the 3-vessel minimum rule that California employs for its fisheries catch data, or publish them at a higher resolution to avoid violating these agreements. To facilitate data sharing, workshop participants suggested that state contracts include a binding clause requiring all research results produced using state funds be public information and contain metadata with the original author's name and contact information. This latter requirement is also meant to assure academic researchers and others that their authorship of their original research and resulting data layers will be perpetually associated. Again, state contributors stressed the importance of building and fostering working relationships among agencies, as well as nongovernmental organizations and academic institutions, that possess relevant data. It was suggested that agencies dedicate "data diplomats" for improved interagency communication and to facilitate easier transfer of data files and information. To foster a collaborative data sharing environment and facilitate these relationships, it is essential that the state, through either its Chief Information Officer or Geographic Information Officer, demonstrate support and leadership for geospatial data management and sharing.

A large portion of the workshop focused on methods and tools for data sharing and discoverability. One commonly acknowledged solution is the requirement of metadata for all datasets using adopted standards, such as FGDC standards. Another idea put forward is the adoption of a data "ontology", or common language that data users and creators share. With an ontology, data seekers as well as search engines can identify and understand what a dataset represents with minimum confusion as to what certain terms mean. This may be set forward in a data dictionary or terms of reference for a group of users, such as state agencies. Various options were set forward for data management and sharing tools, including a data clearinghouse, web portal, simple data viewer, decision-support tool, and a search engine. Key to choosing a data tool is to decide whether it should be based on GIS or open source software and whether access should be limited or public. It is also helpful to organize a data sharing

solution by resource, theme, and/or agency. Again, state leadership in the form of a mandate and resources is needed to ensure compatibility, guarantee user buy-in, and facilitate information exchange.

Regional Perspective

Several lessons have also been learned working at the regional level through regional ocean governance groups, such as the West Coast Governors' Agreement (WCGA) and the Northeast Regional Ocean Council (NROC). While efforts at the regional scale are less mature, they are encountering similar and significant challenges. Inherently, stewardship for CMSP data is spread across many different partners, including state and federal agencies, academic institutions, and nongovernmental organizations, making data gathering a lengthy and resource-intensive process. The cost to link together heterogeneous data providers in a dynamic data sharing architecture also frequently exceeds resources available. Additional resources, tools or innovative ideas are often necessary. Individual state efforts to acquire, manage, and share data usually drive priorities – typically there are no resources to change those patterns to match the priorities and methods in an adjacent state, complicating regional scale efforts. There is also a reluctance to re-engineer or reformat others' data to create a value added or integrated data product as the product may become out of date very quickly when a change or update is made by the original provider. State and local data is typically geared toward highly-specialized purposes; re-tasking data for other purposes is time-consuming and challenging. High priority data resources (e.g., bathymetry) often take many years to collect and process. Due to the various state efforts, existing data is often patchy and the methods of data collection change, making it challenging to build a seamless region-wide data resource. While these are significant challenges, regional ocean governance bodies, CSC, NOAA, and others are working toward ways around them to facilitate data sharing and access across state boundaries.

Summary of Breakout II: Accessing and Sharing Data

Team A: Data Access

This group expressed frustration and challenges with accessing and using spatial data. It often requires searching several different agencies and locations for data, although some noted that certain agencies have good consolidated lists of spatial data – the Pacific States Marine Fisheries Commission regulation datasets provides a good model. The group noted that data confidentiality can prevent further data sharing beyond the original data collector. There also are not adequate incentives or mandates for sharing data. Often data sets might not be at the right scale for decision-making. Web-mapped data can be hard to work with, since users can't download the data directly.

What's preferred or needed for data access?

Create a centralized place to search for, download, and view spatial data and coordinate GIS data in the state with a GIS Council and central library/catalog – Participants expressed a need to have more of a centralized entity or a GIS council, which may include GIS librarian, so you can have someone to go to as well as a centralized place to search for spatial data. Participants would like the ability to both view and download the data within the library/catalog (or other tools). Multiple, flexible searching options would also be helpful, for example, being able to search by location, timeframe and keywords. Abstracts that concisely summarize metadata would be helpful in reducing search and review time of data sets. They also noted the need for better communication, coordination, and education about spatial data and data sharing in the state, which could also be served through the central GIS function. A specific idea was to establish a bulletin board for people looking for particular data sets.

Give open access to data and provide a transparent process – Data should be openly accessible to everyone and have a transparent process so participants understand what data is available, where the data is from, and how the data has been processed. In dealing with sensitive or confidential data that cannot be released to the public, aggregating data or creating levels of security for accessing and displaying this information. However, the transparent process would also allow the public to understand how that sensitive data has been processed.

Develop data standards and establish peer-review and Quality Assurance/Quality Control processes – A peer-review process would be helpful to have for establishing the data standards for all the data sets used for marine spatial planning, including resolution and minimum criteria for use. Peer review would also be important for assessing scenarios used as part of the planning process and determining how to use older data to forecast future conditions. This would also be helpful in determining which data set to use when multiple versions are available. Quality Assurance/Quality Control processes should be set up for the data. Finally, ground-truthing methods and citations are needed for remote sensing data and should be included in metadata.

Provide resources to collect, create, and manage data at all levels - Participants acknowledged that collecting, creating and managing data requires resources (funding). Participants noted that these resources are needed across various scales and levels, including local levels. Specifically, there is a need to convert paper data to digital formats.

Use consistent data formats and web services – Participants liked the use of web services for accessing dynamic and updated datasets that allow for authoritative authorship, ownership, and updated. Consistent and compatible data formats would be easier, but participants also noted that several formats of the same data are sometimes needed. Participants noted that E00 files were particularly problematic to work with.

Provide temporal, 3-dimensional, and time-series data – Participants would like be able to access data sets with three-dimensional or temporal variability. In addition, knowing about and being able to access data with multiple time-series can be useful.

Team B: Data Sharing

Barriers

Data sharing efforts encounter many barriers, such as identifying the audience (although this was later acknowledged to be a process rather than a barrier), developing appropriate formats for users, and overcoming a lack of communication, awareness, or trust about data and among programs and offices. Participants expressed significant concern about potential misuse of data. Some may be reluctant to share academic or project data as a result. Confidential data can also make sharing of data very challenging and may require permissions. Government to government relationships need to be established, particularly with tribes. Often, there are not resources identified or available for publishing or sharing data sets as part of the data collection project. Housing and maintaining data across agencies can also pose challenges.

Solutions to data sharing barriers

The participants recommended the following solutions to the data sharing barriers discussed:

- Establish data standards for metadata and scale/resolution of data
- Establish central data catalog with a spatial index for available data and provide resources to locate data
- Establish peer review process to screen data and protect veracity of products
- Develop data use agreements, legal protections for data providers, document intended data uses, consult on appropriate data-sharing, and establish government-to-government relationships
- Improve communication through advertising, training, and data discovery methods such as sharepoint and layer files

Preferred methods for sharing data

Public website, sharepoint/FTP, data catalogs, and web services – most data sharers prefer these types of methods for sharing data, but many noted that they are moving toward using web services. Examples provided included the Olympic Sanctuary's website, Salmon Watershed Technical Advisory Committee, and the Coastal Atlas (a data viewer).

Original authors maintain data – data sharers prefer to have the original authors maintain the data and have it sent to or be discovered by a tool or portal to be shared.

Peer review and levels of accessibility – data sharers indicated a need for a peer review process as well as establishing different levels of access to data.

File formats – shapefiles are the most common, but also make data available for download in KML, TIF, GIS-raster, vector (Shapefile, geoclasses).

Establish a two-way interactive process between data providers and data users to understand what file formats, resolution, scale, etc. are most useful and build trust that data will not be misused or misrepresented.

Functions and Traits for sharing data

Enable data viewing, analysis and sharing through a tool. Participants would like to be able to do all of these things in one location.

Develop an open-access, decision-support tool with temporal and spatial variability and ability to do multi-objective analyses. Participants felt it was important that stakeholders and the public be able to access data. They also indicated providing data with temporal and spatial variability may be important for marine spatial planning.

Establish process for developing tool, including vetting data. It is important to identify objectives first, and then build the tool to meet those objectives. A group should vet the methodologies for data management, including field data acquisition and sharing.

Next Steps

Jennifer Hennessey wrapped up the working session by summarizing some of the common elements from the day. She also outlined the next steps for the marine spatial planning report, which include:

- Write and share summary report from working session, including with participants and the State Ocean Caucus.

- State Ocean Caucus reviews information and determines initial recommendations on spatial data and data management.

- State Ocean Caucus begins compiling basic data inventory based on the revised list of spatial data needs for marine spatial planning. Jennifer requested participants' assistance in identifying people in their organization who could help fill out this inventory. This inventory may or may not be completed before the draft report is released for public comment in early September.

- State Ocean Caucus prepares draft report by early September and provides opportunity to comment, including distributing to working session participants.

Detailed notes from Breakout I

Spatial data needs posters

The following are copies of the suggested edits made to the list of potential data types by each team. The bold text represents added wording, strike-through indicates deletions, and the parentheses indicate the total number of votes each data type received during the prioritization exercise (regardless level of priority assigned by individuals).

Potential Spatial Data types needed to support Marine Spatial Planning – Team #1

Physical/Chemical	**Biological**	**Human**	
o Oceanographic processes: upwelling, eddies, fronts **(3)** o Energy: waves, currents, wind speed **(1)** o Bathymetry-topography (water depth and land elevation) **(1)** o Sediment transport: drift cells o Water quality **– Habitats, freshwater quantity (3)** o Seafloor type: substrate **(3)** o Geological processes: methane vents and hydrates, faults, submarine and shoreline landslides (slope stability), and inundation **data**	o Marine mammals: migration routes, haul-outs o Coastal and marine birds: migration routes, nesting and feeding areas o Marine fish **-- local vs. pelagic species** o Habitats across shoreline, intertidal, nearshore, benthic, pelagic areas: aquatic vegetation, biogenic features (corals/sponges), wetlands, dunes, **kelp, eelgrass (4)** o Fish and shellfish stocks **(1)** o ESA-listed	*Human Uses & Managed Areas* o Aquaculture areas **(1)** o Fisheries: commercial & recreational **(5)** o Recreational use areas: surfing/diving/swimming, boating (water trails, mooring areas, launches), public access sites, and other major uses, **public toilets/boater pump-outs** o Shipping lanes o Conservation/regulated areas: Essential Fish Habitat, reserves, sanctuaries, wildlife refuges, parks, and other marine protected areas, **critical habitat, restoration sites (PRISM) (ESA) (4)** o Tribal use areas o Culturally and historically significant sites o Military ~~zones~~ **boundaries/training areas** o Ownership – **Tidelands (2)** o Emerging marine uses:	*Human Infrastructure* o Navigation buoys o Ports and marinas o Telecommunication, fiber-optic and power cables o Dredge material disposal sites**, military disposal sites** o Waste water and other utility outfalls o Scientific research equipment and cables o Transmission lines and power substations o Over-water structures and shoreline alterations (hardening, jetties, groins, etc.) o **Shoreline Development (i.e. Land use Zones)**

important for risk management (flooding - storm surge-tsunamis)**(2)** o **Sub-surface geology** o **Sea Surface Temperature Thermocline** o **Salinity** o **Dissolved Oxygen Levels (Ecology data)**	species**(1)** o **Larval fish assemblages/ Planktonic communities** o **Marine invertebrates** o **Invasive Spp.**	preliminary permits for proposed energy projects o **Shoreline Zones under Shoreline Master Program (1)** o **Other existing spatial plans in Washington (Willapa) (1)** o **Jurisdictions outside of 3 nm (PFMC)** o **Conservation Priority areas (i.e. TNC) (1)** o **Emergency management areas (i.e. oil spill response and prevention plan areas** o **Economic benefits/income areas from human uses (NOAA data)**	

Potential Spatial Data types needed to support Marine Spatial Planning Team – Team #2

Physical/Chemical	**Biological**	**Human**	
o Oceanographic processes: upwelling, eddies, fronts, **atmospheric (2)** o Energy: waves, currents, wind speed, **other extractive resources oil, mining, data quantifying energy resource with temporal & spatial information** o Bathymetry-	o Marine mammals: migration routes, haul-outs, **species densities, core feeding areas, rookeries** o Coastal and marine **fish &** birds: migration routes, nesting and feeding areas o Marine fish **(2)** o Habitats	*Human Uses & Managed Areas* o Aquaculture areas o Fisheries: commercial & recreational o Recreational use areas: surfing/diving/swimming, boating (water trails, mooring areas, launches), public access sites, and other major uses. **Wildlife watching (whales, marine birds)** o Shipping lanes; **Self defined routes – Traffic (1)** o **Where research is going on, who is doing it and who is funding it**	*Human Infrastructure* o Navigation buoys, **other buoys** o Ports and marinas o **Port by Port social economic analysis - - growth & sustainability of ports** o Telecommunication, fiber-optic and power cables o Dredge material disposal sites o Waste water and other utility outfalls**, fate of non-collected stormwater**

topography (water depth and land elevation) **(6)** o Sediment transport: drift cells o **Sediment quality** o Water quality**/chemistry dissolved oxygen, carbon dioxide, acidification, turbidity** o Seafloor type: substrate, **substrate depth (1)** o Geological processes: methane vents and hydrates, faults, submarine and shoreline landslides (slope stability), and inundation (flooding/storm surge/tsunamis) o **Intertidal mapping to shallow subtidal (substrate, bathymetry, habitats)**	across shoreline, intertidal, nearshore, benthic, pelagic areas: aquatic vegetation, biogenic features (corals/sponges), wetlands, dunes. **(6)** o Fish and shellfish stocks o ESA-listed species **& critical habitats (2)** o **Forage fish spawning habitat (plus deep water)** o **Larval specification quantification, monitoring & modeling (1)** o **Larval source & sink data** o **Noise sound** o **Invasive/nonatives Flora & Fauna (1)** o **Fish & Shellfish diseases**	o Conservation/regulated areas: Essential Fish Habitat, reserves, sanctuaries, wildlife refuges, parks, and other marine protected areas **(2)** o Tribal use areas **(1)** o Culturally and historically significant sites o Military zones o Ownership **(2)** o Emerging marine uses: preliminary permits for proposed energy projects o **Noise/Sound** o **Better mapping of habitat types and resources uses (1)** o **Places of refuge for ships in distress** o **Use authorization for extractive resources**	o Scientific research equipment and cables o Transmission lines and power substations o Over-water structures and shoreline alterations (hardening, jetties, groins, etc.) **dikes, tide gates (1)**

Other considerations:

- **Model for integrating data for ecological sustainability (once we have it all)!!**
- **Temporal component of various data types (1)**
- **Potential conflicts in 3D space.**
- **Spatial resolution for the intended purpose.**
- **Citizen Science Data.**

Potential Spatial Data types needed to support Marine Spatial Planning – Team #3

Physical/Chemical	**Biological**	**Human**	
o Oceanographic processes: upwelling, eddies, fronts**, tides (1)** o Energy: waves, currents, wind speed o **High-resolution** bathymetry-topography (water depth and land elevation) **(5)** o Sediment transport: drift cells o Water quality: **Pathogens (human & animal, HABs), significant problem areas (e.g. dissolved oxygen) (3)** o Seafloor type: substrate o Geological processes: methane vents and hydrates, faults,	o Marine mammals: migration routes, haul-outs **(1)** o Coastal and marine birds: migration routes, nesting and feeding areas **Endangered, threatened, and declining species** o Marine fish: **Salmon migration, Forage fish spawning areas (2)** o Habitats across shoreline, intertidal, nearshore, benthic, pelagic areas: aquatic vegetation, biogenic features (corals/sponges), wetlands,	*Human Uses & Managed Areas* o Aquaculture areas o Fisheries: commercial & recreational **level of use/importance (2)** o Recreational use areas: surfing/diving/swimming, boating (water trails, mooring areas, launches), public access sites, and other major uses. **(1)** o **Federal/Commercial** Shipping lanes **and anchorages (1)** o Conservation/regulated areas: Essential Fish Habitat, reserves, sanctuaries, wildlife refuges, parks, and other marine protected areas, **mitigation areas** o **Restoration sites (current & potential) (1)** o Tribal use areas **(1)** o Culturally and historically significant sites o Military zones o Ownership**: leases (1)** o Emerging marine uses: preliminary permits for	*Human Infrastructure* o Navigation buoys **aids and markers (1)** o Ports and marinas **and related infrastructures (1)** o Telecommunication, fiber-optic and power cables o Dredge material disposal sites o Waste water and other utility outfalls o Scientific research equipment and cables o Transmission lines and power substations **(particularly relates to planning issues for renewable energy, oil and gas, and telecommunication & power cables)** o Over-water structures and shoreline alterations (hardening, jetties, groins, etc.)

submarine and shoreline landslides (slope stability), and inundation (flooding/storm surge/tsunamis) o **Geomorphic characterization (nearshore - shoreline) (3)** o **Climate Shifts: oceanographic patterns (Pacific Decadal Oscillation/El Nino Southern Oscillation), sea level rise, impacts to other category. (1)** o **Hydrography (river/streams)** o **Shoreline Definitions**	dunes.**(3)** o Fish and shellfish stocks, **nursery grounds (1)** o ESA-listed species, **Life history strategies (1)** o **Biodiversity modeling (habitat & SPP.)**	proposed energy projects o **Viewscape** o **Demographic Data: population & socio-economic characterization** o **Marine Debris locations** o **Jurisdiction**	

Planning issues posters

The following list of potential planning issues was provided for use as a guide for the discussion on the types of spatial data needed.

What issues might be planned for with a Marine Spatial Plan?

Marine Spatial Planning could address, but is not limited to, emerging new uses, expanding existing uses, or resolving conflicts among existing uses for issues such as:

1. Aquaculture, shellfish
2. Aquaculture, offshore fish and other such as net pens
3. Bio-prospecting: gathering and use of marine life for research or medicinal purposes
4. Marine Transportation
5. Oil and gas, including pipelines
6. Protection or conservation of sensitive environmental areas for habitats, plants or animals
7. Renewable Ocean Energy*
8. Scientific research and equipment: buoys, cables, etc.
9. Sediment removal, placement or disposal such as from dredging activities
10. Telecommunication or power cables
11. Other

*required by marine spatial planning law, Substitute Senate Bill 6350

Team #1 did not add anything to the list of issues, while teams #2 and #3 suggested adding that a marine spatial plan could also address the following issues:

- Underutilized & new fisheries/natural resources
- Military Activities
- Recreation & Tourism activities
- Siting for nuclear power activities
- Climate change

Teams #1 and #3 also suggested adding environmental restoration to issue six, so that it would read “Protection, restoration, or conservation of sensitive environmental areas for habitats, plants, or animals.”

Detailed notes from Breakout II: Data access and sharing

The following detailed notes are transcribed directly from flip chart notes taken during the breakout discussions on data access and data sharing. Participants were asked to self-select into either the data access or the data sharing group. The data access team focused on the perspective from data users, including how they currently access spatial data, preferred methods for accessing data, and what types of access might be needed for marine spatial planning. The data sharing team focused on the perspective from data holders, including barriers to sharing data, preferred methods for sharing data, and what functions or traits are needed in spatial data sharing tools.

Team A: Data Access

- Generate individual reports based on selected data = would like
- Bulletin board = looking for x, posting data sets
- Ongoing resources for data management and coordination
- Different scales needed for different decisions -- explicitly state data use limitations for a min. data resolution.
- What's the incentive to share data? Soln. council/coordinator, soliciting information
- Peer-review process needed/data standards
- Remote sensing model data needs citations for ground-truthing = who and what methods
- How to use older data to forecast future conditions? Time scale might not match/scenarios
- Need to upgrade paper data to digital format (I.D. data sets, and money to update)
- Planning process needs peer review for scenarios/data
- Access the needs to be openly and transparently available to data
- Confidentiality PFMC model lumping – high resolution model for process
- QA/QC (Quality Assurance/Quality Control) process for data
- Status Map to identify important areas – Conditions analysis (t-sheet, PSP analyses) and sediment core data (e.g. flora & faunal changes contaminant source changes)
- Web-mapped data = can view, but not download for further analysis – maybe because data owner doesn't want misuse of data (often not in metadata)
- B.C. = sub regional, local, first nations data
- 2-D isn't good enough for some decisions such as water depths
- Bathymetry temporal (seasonal, etc.) variability
- Ambient sound (navy?) ORCA network & PNNL (site-specific) – Navy training Range authorization will provide to NOAA
- Ortho-imagery multiple
- Multiple versions of similar data which one to use?
- Navy gave to Sanctuary bathymetry
- Money to collect and create data at all levels including local
- Viewer capabilities as well data download
- Data discovery, catalogue preview of metadata and thumbnail of shape file

- University of Idaho Gap analysis on one website
- Data time-series which have multiple data sets
- Search different ways visual, keyword, source, year, etc.
- Collect and search capability is lacking – centralized
- Have to go to each agency for data
- PSMFC – regulation datasets – a good model (WA, OR, CA)
- Metadata is lacking (for when sharing)
- Concise metadata (abstract)
- Proprietary data contacts and MM
- GIS – GIS librarian Council – diverse members interest, levels of government (MRC-like) – Coordinated to tackle issues STOS
- Communicate, coordinate and educate
- EOO files – Data Format & compatibility issues
- Resolution and data-poor sets decision-making or reverse too detailed
- Data confidentiality can prevent further data sharing (original money can access but no one else)
- Web services for dynamic and updated datasets to allow for authoritative authorship/updating
- Wrong scale of data

Team B: Data Sharing

Barriers:

- Identifying formats to reach all users
- ID'ing audience –
    - Usually defined by mandate
    - Resources N/A to do this often
- Standardization of:
    - Metadata
    - Scale/resolution
    - Research methods
- Intra-agency barriers:
    - Communication within programs and offices
    - Data discoverability and awareness
- Solutions
    - Advertising/training
    - "layer files" sent to staff
    - Sharepoint wiki with search crawler
- Inter-Agency:
    - Housing data (both intra/inter)
    - Who? – How much to build/maintain
    - Public reluctance to share academic/project data
        - Potential mis-use of data

- Confidential data,
  e.g., stock assessment data,
  Tribal data
- Solutions:
  - Data use agreement
  - Legal protection to providers
  - Document the intended end use of data
  - Consultation on appropriate data-sharing practices
  - Government to government effort
- Time
  - GIS users don't have time to verify/validate data sets
  - Need data steward
  - Bad data, out-of-date data
- Solution:
  - Peer review team screens data and protects veracity of product
- Resources to publish and locate data
- No central data repository listing available data
- Geodata governing is one solution

Preferred Methods

- Shapefile format most common
- Public website (e.g. Olympic Sanctuary's site)
- Download data in KML, TIF, GIS-raster, vector (Shapefile, geoclasses)
- SharePoint/FTP-type sites
- Data catalog with a purpose and link to data and type of data ID'd
- SWTAC – Salmon Watershed Technical Advisory committee
- Coastal Atlas -- Viewer
- Original authors maintain data
- Sent to tool/portal
- Moving toward web services
- Different tiers of accessibility
- Peer review process
- Two-way interactive process – give and take between providers and users

Functions and Traits

- Multi-objective analysis
- Decision-support tool
- Temporal as well as spatial capability
- Available to all, info access
- Allows stakeholder participation
- Data transparency
- Tools versus methodologies

- Methodology determines tools: ID objectives, then build tool
- Methodology ties data to tool
- Tool categories – Viewer, Analysis (DST) and Data sharing
- Need committee to vet process/data to methodology
- Field data acquisition – guidelines on data collection, sharing e.g. e-log books
- Temporal variability may be important to include
- Season variation, maps, solution

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