

Building Consensus through Collaboration in Marine Spatial Planning

Ken Buja
November 2015

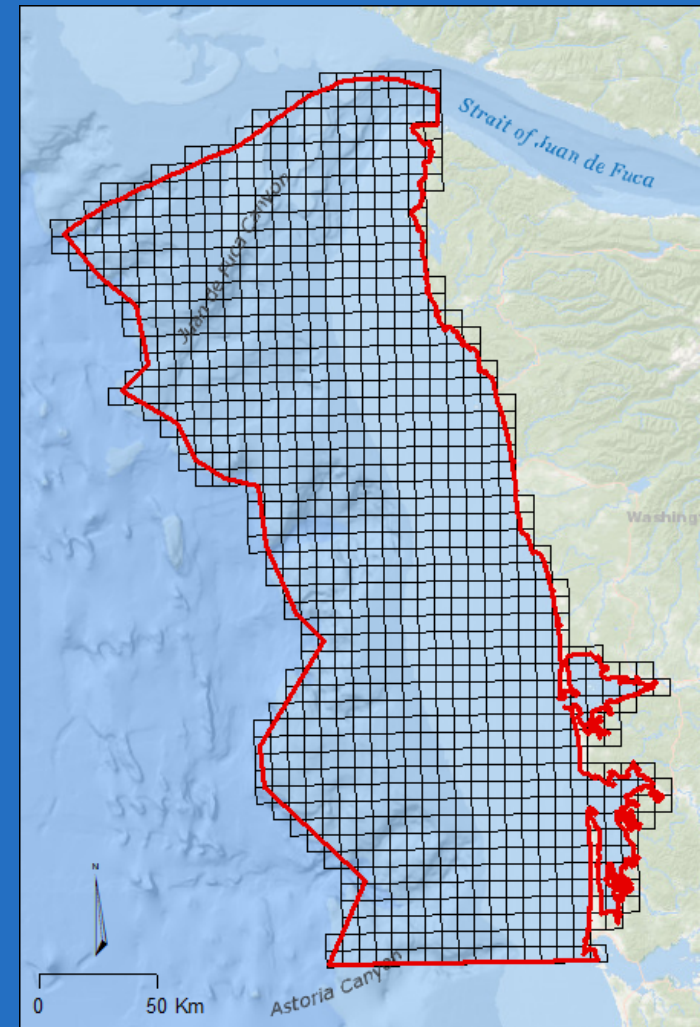


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Washington State Study Area

- Project AOI defined by WA Marine Spatial Planning study area
- 700 fathoms to shoreline “zone”.
- Based Standard OCS blocks of 4.8 x 4.8 km (3 x 3 mi)
- 996 grid cells

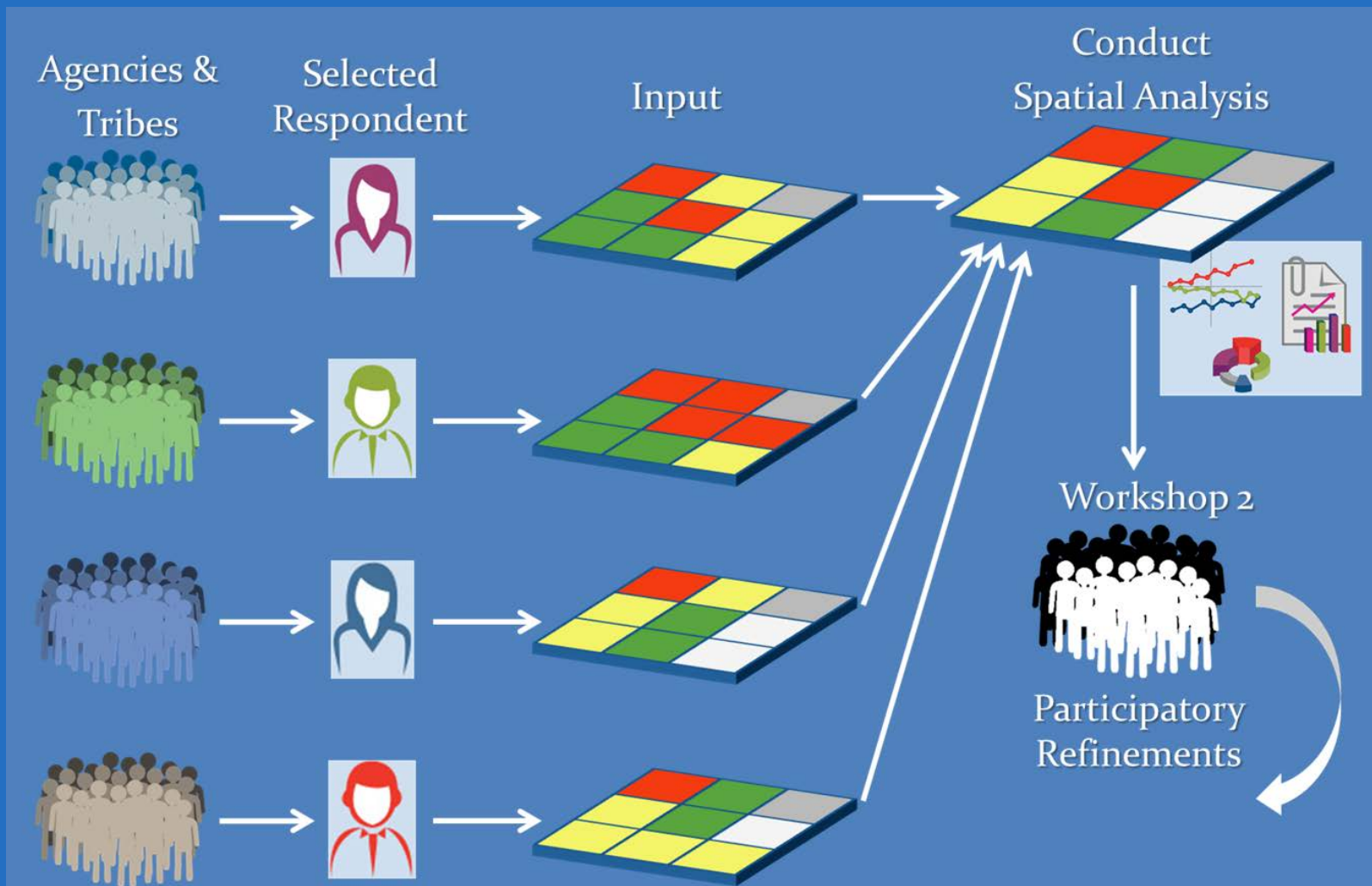


Planning for the What, When, and How

- *There are **Not** sufficient resources to map the entire Pacific Coast.*
- Not all areas have the same informational needs or level of importance.
- Data gaps exist or existing information may be adequate.
- Identifying priority locations that maximizes the use of limited resources and so as to strengthen support.
- Embrace common collection standards, shared data, and shared resources.
- A cohesive community is more effective— the Whole is bigger than the Sum of the parts.
- **Identify the highest priority locations across the entire community!**



Conceptual Process

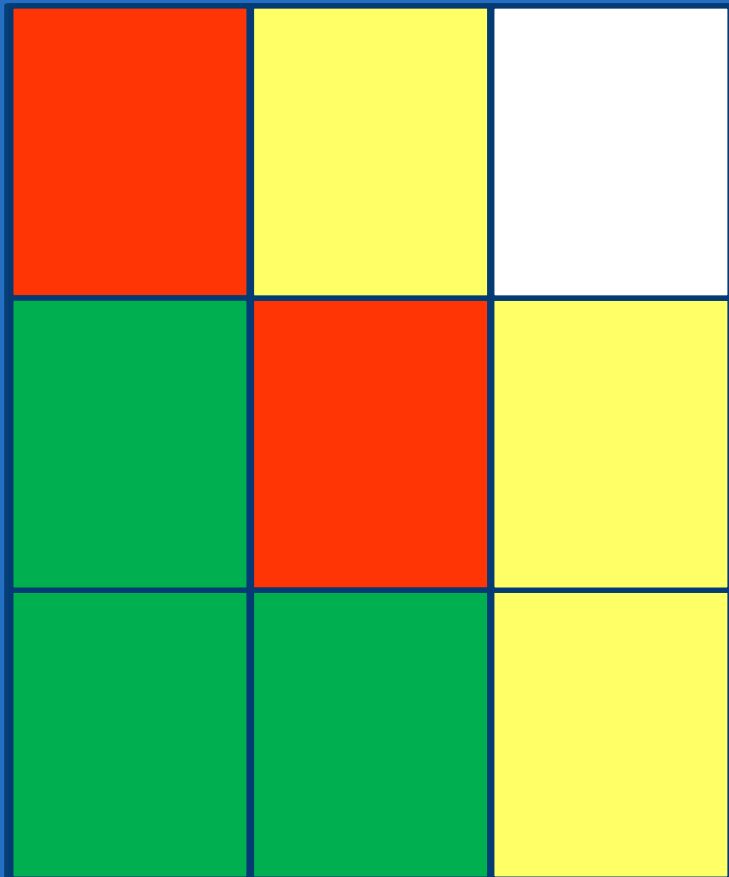


Respondents

- NOAA Olympic Coast NMS
- NOAA PMEL
- NOAA NMFS West Coast Regional
- NOAA NMFS Groundfish Research
- NOAA NMFS Ecosystem Science
- NOAA Office of Coast Survey
- USGS Pacific Coast & Marine Science Center
- USCG District 13
- EPA Region 10
- Navy Northwest region
- BOEM - Pacific Region
- USACE Geospatial Section
- Quileute Nation
- Quinault Indian Nation
- WA Dept of Ecology
- WA Dept of Fish and Wildlife
- WA Dept of Natural Resources
- WA Emergency Management Division



Respondent Input



Priority:

- A relative measure of the need for seafloor mapping information for a grid cell.
- (High, Medium, Low, or None)
- Limited High and Medium votes (1/3 ea.)

Management Issue:

- Overarching management issue (by grid cell) driving the “Priority” designation.
- 14 Set choices. Must choose one.

Ranking Criteria:

- Describes the Management Issue further.
- 8 Set choices. Must Choose one.
- Optional Ranking Criteria 2 and 3.



Prioritization Tool: Data Layers

The screenshot displays the NOAA NCCOS Washington State Prioritization Tool. On the left, a 'Data Layers' panel lists various data sources with checkboxes and expandable menus. The 'NOAA NCCOS - Inventory of S' layer is checked. Below it, several sub-layers are listed, including 'Study Area', 'Groundtruthing', 'Data Type', and various 'WA MSP' and 'OSU' layers. At the bottom of the panel are 'Prioritization' and 'Change Background Map' buttons. The main map area shows a bathymetric view of the Strait of Juan de Fuca, with a yellow outline defining the study area. Labels on the map include 'Juan de Fuca Canyon', 'Astoria Canyon', 'Strait of Juan de Fuca', 'Victoria', 'Washington', and 'Olympic'. A scale bar indicates 40km and 30mi, and a depth marker of 3070 is visible. A help icon (?) is in the top right corner of the map area.


Data Layers

- NOAA NCCOS - Inventory of S
- Study Area
- Groundtruthing
- Data Type
- Primary Sensor Type
- Secondary Sensor Type
- Elevation Quality
- Intensity Quality
- Habitat Map Product
- Data Time Period
- WA ECY - ShoreZone Inventor
- WA MSP - Human Uses: AIS
- WA MSP - Human Uses: Partic
- WA MSP - Marine Boundaries
- WA MSP - Marine Life & Habit
- WA MSP - Marine Life & Habit
- WA MSP - Physical Oceanogr
- OSU - Seafloor Mapping Data
- OSU - Predicted Outcrop

Prioritization
Change Background Map



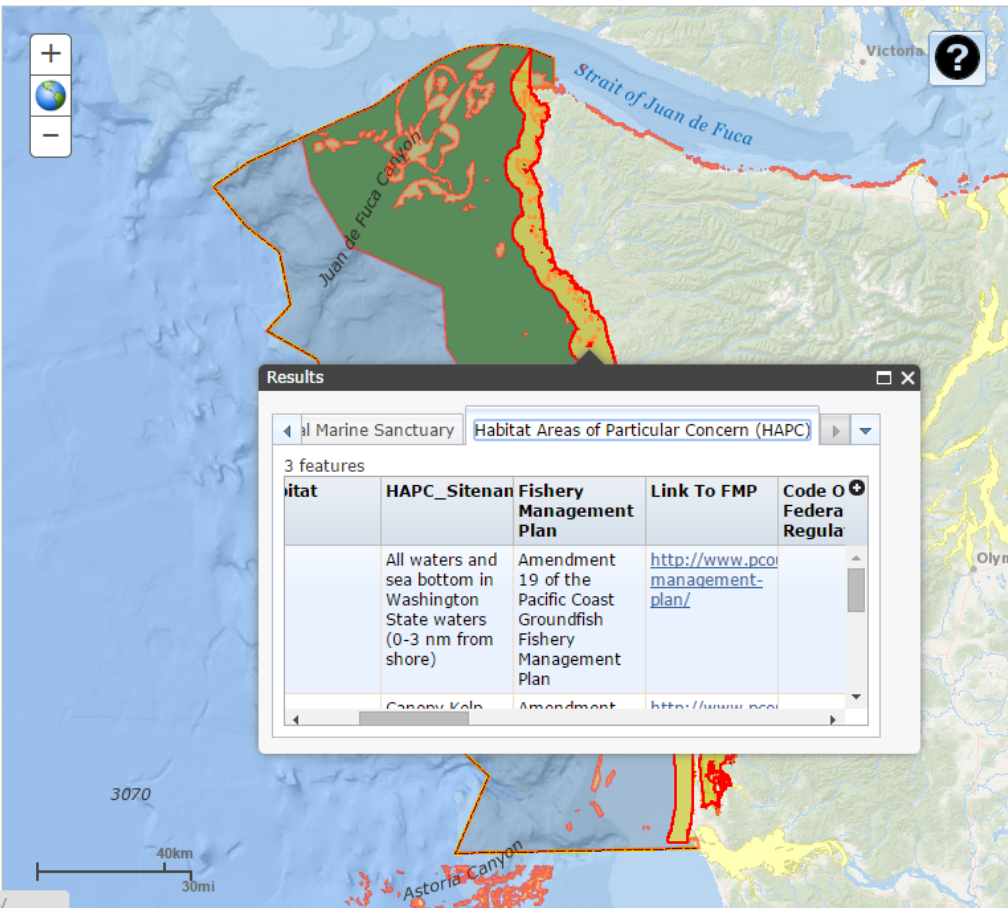
Prioritization Tool: Data Query


NCCOS

Washington State Prioritization Tool

Data Layers

- Mining and Mineral Extraction
- Ocean Dumping
- WA MSP - Marine Boundaries**
- Essential Fish Habitats
- Marine Protected Area Fish Inv
- Olympic Coast National Marin**
- WA MSP - Marine Life & Habit
- WA MSP - Marine Life & Habit
- WA MSP - Physical Oceanogra
- OSU - Seafloor Mapping Data
- OSU - Predicted Outcrop
- OSU - Physiographic Habitat
- OSU - Primary Lithologic Seal
- OSU - Seafloor Induration
- NOAA NMFS - Habitat Areas o**
- Habitat Areas of Particular C**
- NOAA NMFS - EFH Areas Prot
- Undersea Feature Place Name



Results

Marine Sanctuary: **Habitat Areas of Particular Concern (HAPC)**

3 features

Habitat	HAPC_Sitenan	Fishery Management Plan	Link To FMP	Code O Federa Regula
	All waters and sea bottom in Washington State waters (0-3 nm from shore)	Amendment 19 of the Pacific Coast Groundfish Fishery Management Plan	http://www.pcoi.org/management-plan/	
	Canyon Kelp	Amendment	http://www.pcoi.org/	

www.pcoi.org/groundfish/fishery-management-plan/




Prioritization Tool: User Login

The screenshot displays the NCCOS Washington State Prioritization Tool interface. At the top left is the NOAA NCCOS logo. The top right corner features the text "Washington State Prioritization Tool". On the left side, there is a "Data Layers" panel with a "Priorization" layer selected and a "Log on" button. The main map area shows a bathymetric map of the Strait of Juan de Fuca, with labels for "Juan de Fuca Canyon", "Strait of Juan de Fuca", and "Astoria Canyon". The map also shows the coastline of Washington state and parts of British Columbia, Canada, with labels for "Victoria", "Washington", and "Olympia". A scale bar at the bottom left indicates 40km and 30mi. A question mark icon is visible in the top right corner of the map area.



Prioritization Tool: User Tools

 **NCCOS** Washington State Prioritization Tool

Data Layers

Prioritization

Welcome Ken Tester

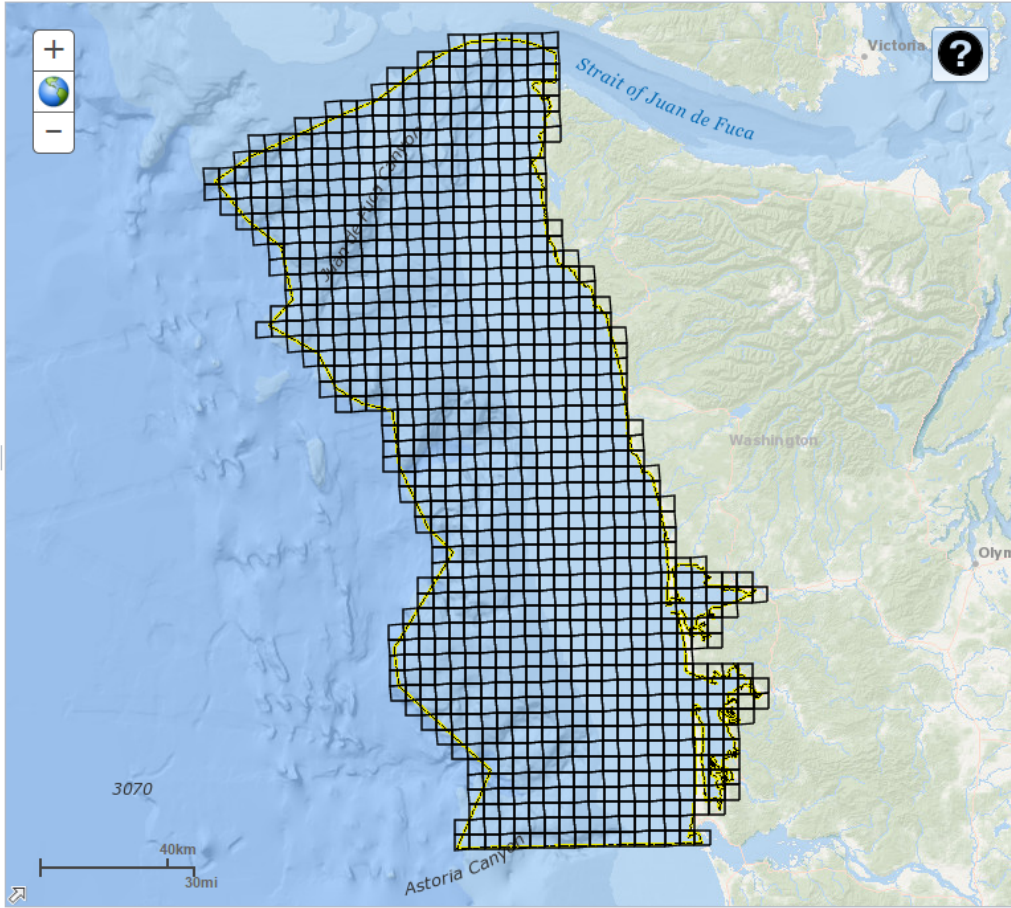
Priority cell counts

Priority	Current	Selected
High	0	0
Medium	0	0
Low	0	0
None	996	193
Total	996	193

Change attribute display
Priority

Priority


- None
- High
- Medium
- Low



Map features: +, - (Zoom), ? (Help), 3070, 40km, 30mi (Scale), Astoria Canyon, Strait of Juan de Fuca, Washington, Victoria, Olym



Prioritization Tool: User Selection

 **NCCOS** Washington State Prioritization Tool

Data Layers

Prioritization

Welcome **Ken Tester**

Priority cell counts

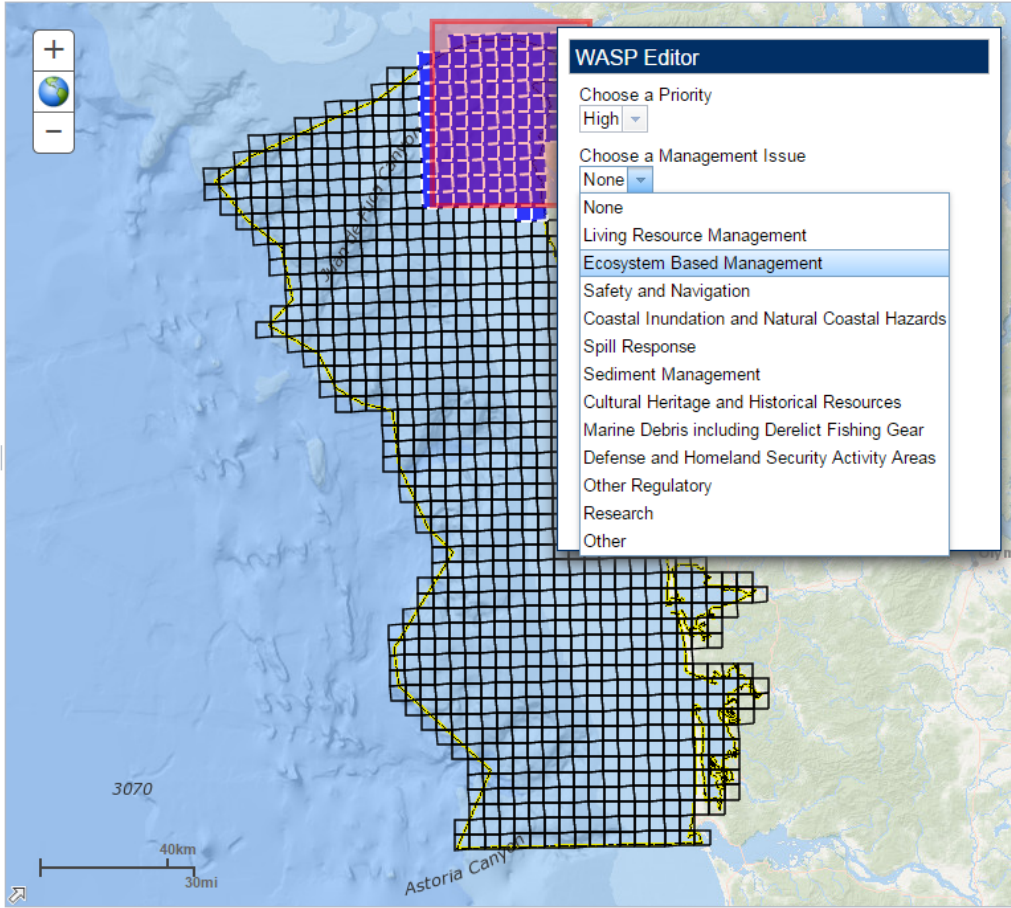
Priority	Current	Selected
High	0	0
Medium	0	0
Low	0	0
None	996	95
Total	996	95

Change attribute display

Priority

Priority

- None
- High
- Medium
- Low



WASP Editor


Choose a Priority
High

Choose a Management Issue
None

- None
- Living Resource Management
- Ecosystem Based Management**
- Safety and Navigation
- Coastal Inundation and Natural Coastal Hazards
- Spill Response
- Sediment Management
- Cultural Heritage and Historical Resources
- Marine Debris including Derelict Fishing Gear
- Defense and Homeland Security Activity Areas
- Other Regulatory
- Research
- Other



Prioritization Tool: User Selection

 **NCCOS** Washington State Prioritization Tool

Data Layers

Prioritization

Welcome **Ken Tester**

Priority cell counts

Priority	Current	Selected
High	95	0
Medium	0	0
Low	0	0
None	901	0
Total	996	0

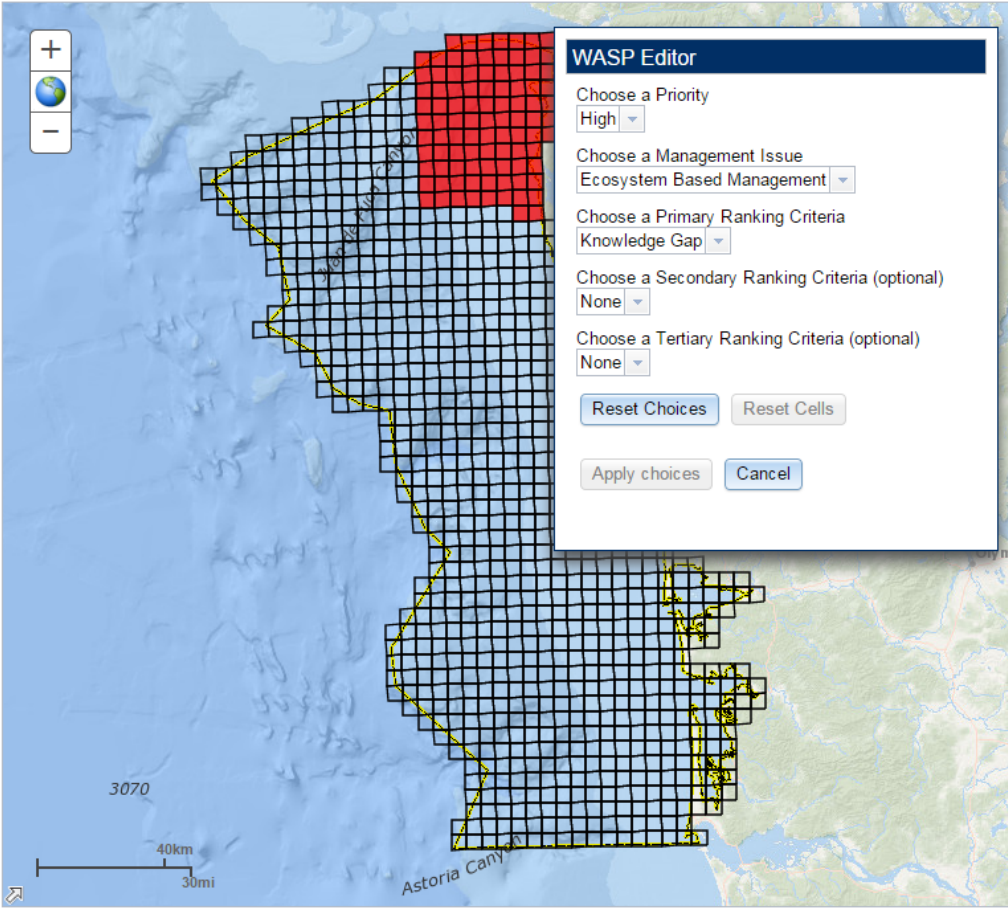
Change attribute display

Priority

Priority

- None
- High
- Medium
- Low

Change Background Map



WASP Editor

Choose a Priority

Choose a Management Issue


Choose a Primary Ranking Criteria

Choose a Secondary Ranking Criteria (optional)

Choose a Tertiary Ranking Criteria (optional)



Prioritization Tool: User Selection

 **NCCOS** Washington State Prioritization Tool

Data Layers

Prioritization

Welcome **Ken Tester**

Priority cell counts

Priority	Current	Selected
High	95	0
Medium	0	0
Low	0	0
None	901	0
Total	996	0

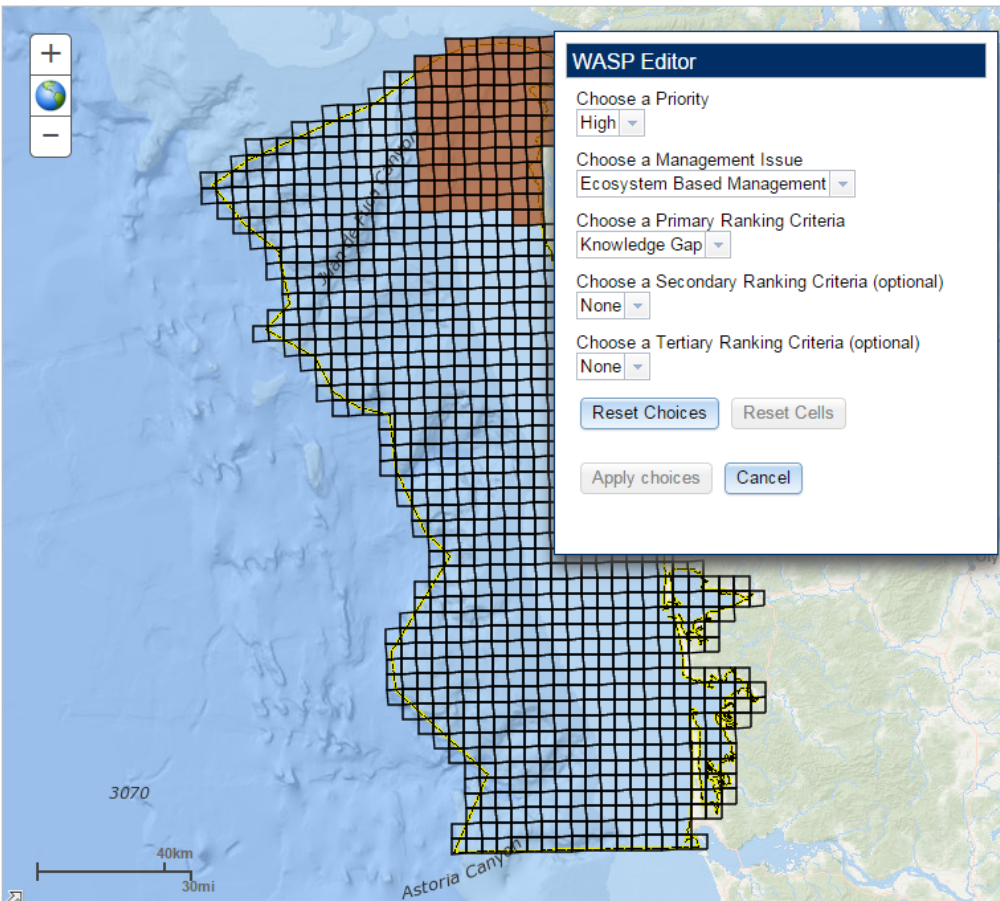
Change attribute display

Primary Criteria

Primary Criteria

- None
- Multiple Use Conflict
- Managed Areas
- Knowledge Gap

Change Background Map



WASP Editor

Choose a Priority
High

Choose a Management Issue
Ecosystem Based Management

Choose a Primary Ranking Criteria
Knowledge Gap

Choose a Secondary Ranking Criteria (optional)
None

Choose a Tertiary Ranking Criteria (optional)
None



Respondent Priorities: Chi-Square Analysis

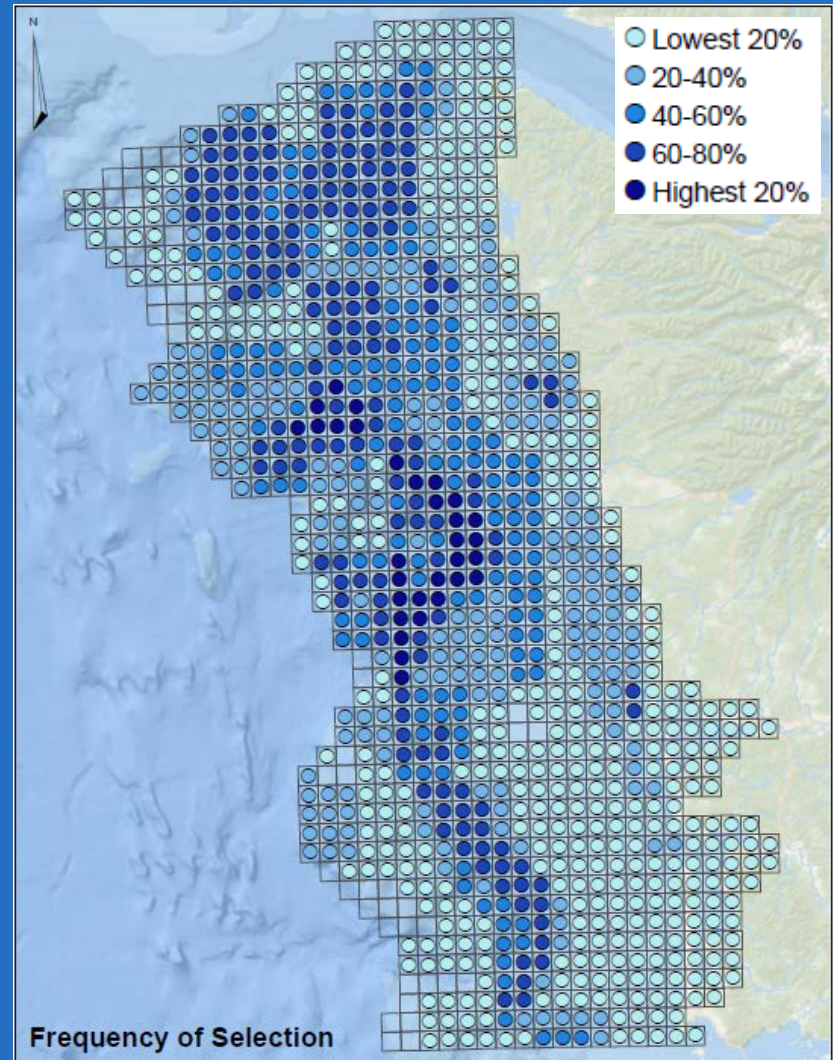
	None	Low	Med	High	Σ	Primary Criteria		None	Low	Med	High	Σ	Primary Criteria
No Response Given						-	Safety and Navigation						<i>Multiple use conflict</i>
Count	4408	0	0	0	4408		Count	0	360	60	61	481	<i>High use areas</i>
Total %	32.0	0.0	0.0	0.0	32.0		Total %	0.0	2.6	0.4	0.4	3.5	
Expected	1469.9	1161.0	882.3	894.8			Expected	160.4	126.7	96.3	97.6		
Cell Chi^2	5873.1	1161.0	882.3	894.8			Cell Chi^2	160.4	429.6	13.7	13.7		
Ecosystem Based Management						<i>Managed areas</i>	Other						<i>Other important areas</i>
Count	0	1401	1123	846	3370	<i>Knowledge gap</i>	Count	0	382	0	0	382	
Total %	0.0	10.2	8.2	6.1	24.5	<i>Significant natural areas</i>	Total %	0.0	2.8	0.0	0.0	2.8	
Expected	1123.7	887.6	674.5	684.1			Expected	127.4	100.6	76.5	77.5		
Cell Chi^2	1123.7	296.9	298.2	38.3			Cell Chi^2	127.4	786.9	76.5	77.5		
Living Resource Management						<i>Potential infrastructure</i>	Spill Response						<i>Significant natural areas</i>
Count	0	53	772	877	1702	<i>Knowledge gap</i>	Count	0	256	76	13	345	
Total %	0.0	0.4	5.6	6.4	12.4	<i>Significant natural areas</i>	Total %	0.0	1.9	0.6	0.1	2.5	
Expected	567.5	448.3	340.7	345.5		<i>Other important areas</i>	Expected	115.0	90.9	69.1	70.0		
Cell Chi^2	567.5	348.6	546.1	817.7			Cell Chi^2	115.0	300.1	0.7	46.4		
Coastal Inundation and Natural Coastal Hazard						<i>Existing infrastructure</i>	Defense and Homeland Security						<i>Other important areas</i>
Count	0	786	322	470	1578	<i>Other important areas</i>	Count	0	269	0	0	269	
Total %	0.0	5.7	2.3	3.4	11.5		Total %	0.0	2.0	0.0	0.0	2.0	
Expected	526.2	415.6	315.9	320.3			Expected	89.7	70.9	53.8	54.6		
Cell Chi^2	526.2	330.0	0.1	69.9			Cell Chi^2	89.7	554.1	53.8	54.6		
Other Regulatory						<i>Potential infrastructure</i>	Not a Priority for Management						<i>None</i>
Count	0	0	260	259	519		Count	132	0	0	0	132	
Total %	0.0	0.0	1.9	1.9	3.8		Total %	1.0	0.0	0.0	0.0	1.0	
Expected	173.1	136.7	103.9	105.4			Expected	44.0	34.8	26.4	26.8		
Cell Chi^2	173.1	136.7	234.6	224.1			Cell Chi^2	175.9	34.8	26.4	26.8		
Sediment Management						<i>Knowledge gap</i>	Marine Debris						<i>Managed areas</i>
Count	0	9	31	176	216		Count	0	112	0	0	112	
Total %	0.0	0.1	0.2	1.3	1.6		Total %	0.0	0.8	0.0	0.0	0.8	
Expected	72.0	56.9	43.2	43.8			Expected	37.3	29.5	22.4	22.7		
Cell Chi^2	72.0	40.3	3.5	398.3			Cell Chi^2	37.3	230.7	22.4	22.7		
Research						<i>Knowledge gap</i>	Insufficient Information						-
Count	0	0	113	94	207		Count	53	0	0	0	53	
Total %	0.0	0.0	0.8	0.7	1.5		Total %	0.4	0.0	0.0	0.0	0.4	
Expected	69.0	54.5	41.4	42.0			Expected	17.7	14.0	10.6	10.8		
Cell Chi^2	69.0	54.5	123.6	64.3			Cell Chi^2	70.6	14.0	10.6	10.8		

 significantly *less* than expected
 significantly *more* than expected
 > 10% of all responses



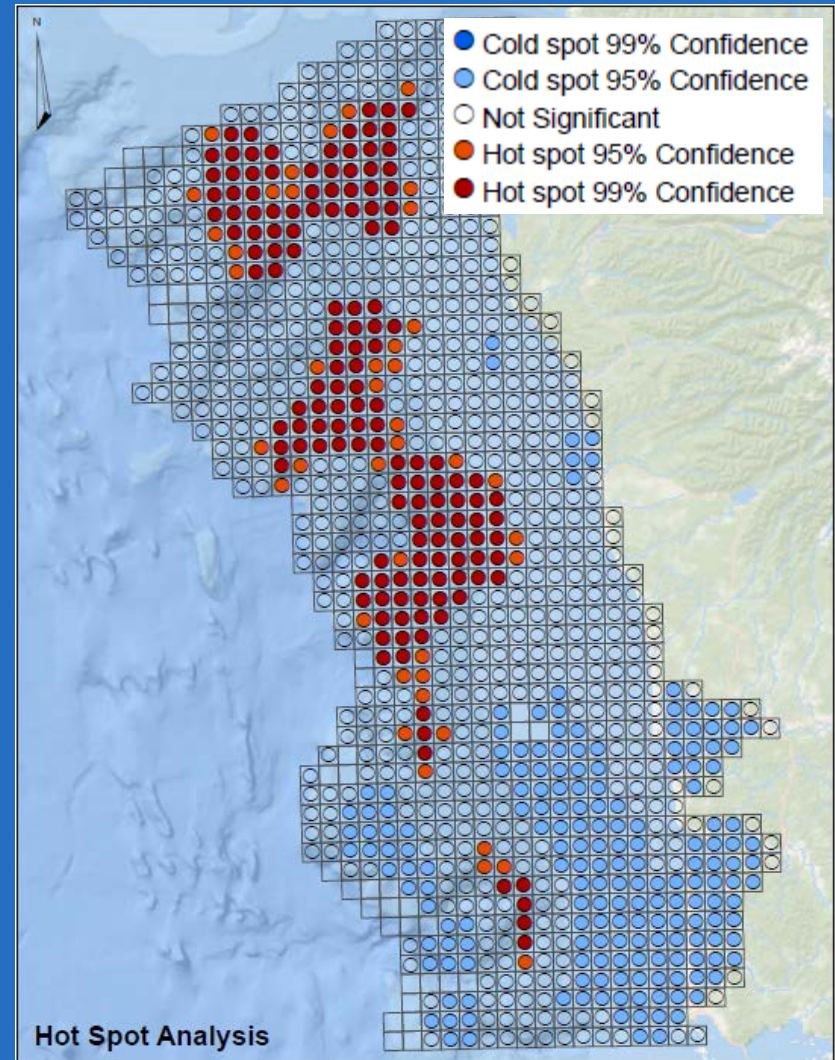
Frequency of Selection

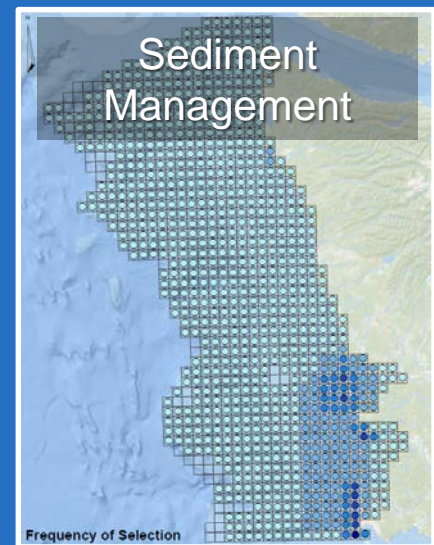
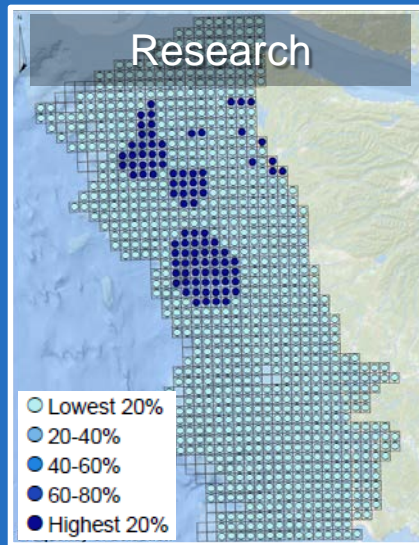
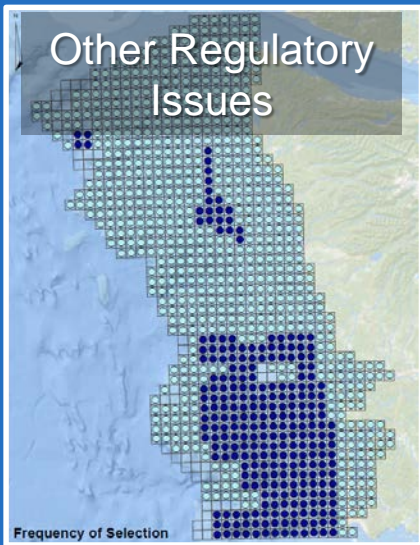
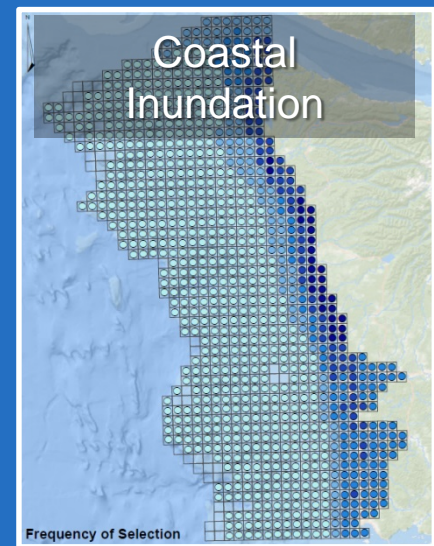
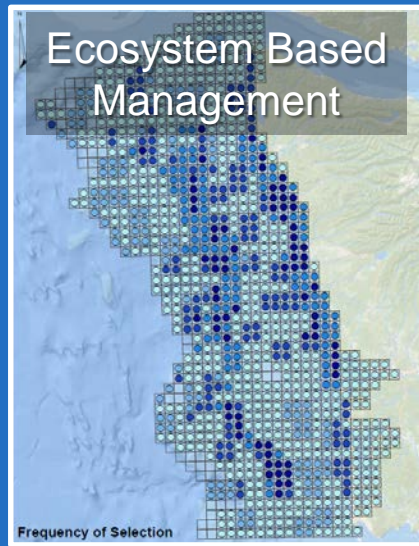
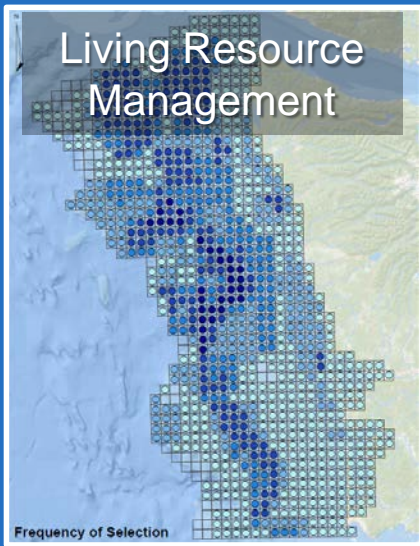
- Cumulative frequency of “high priorities”
- Ranging from 0-18 (18 possible responses)
- Results classified into five percentile groups

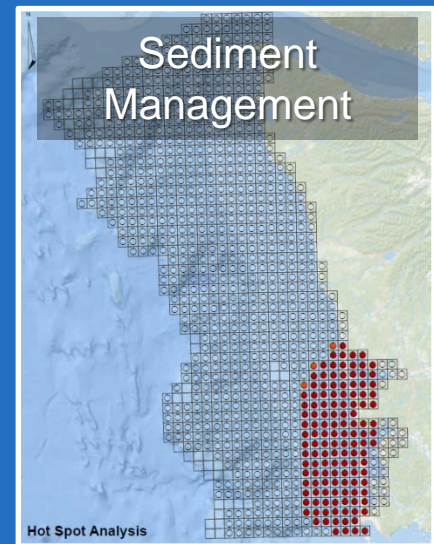
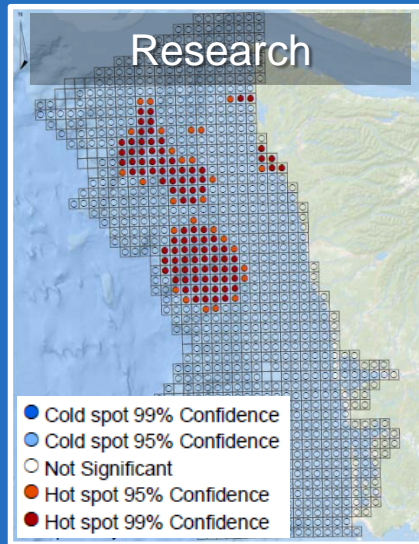
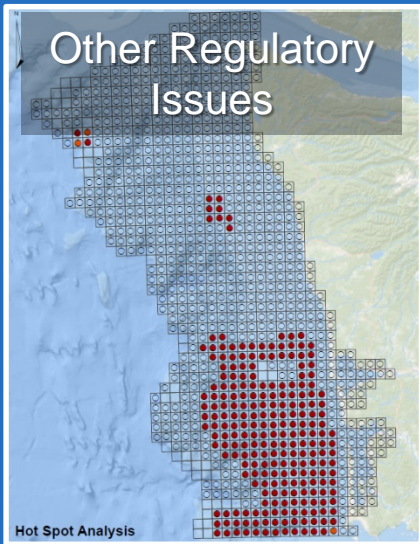
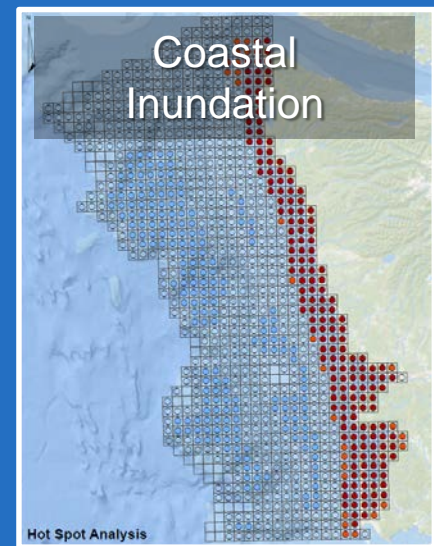
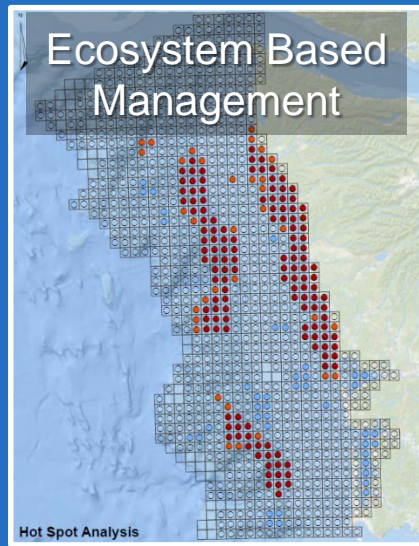
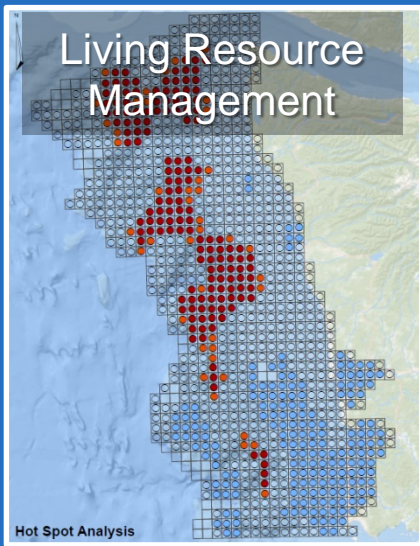


Hot Spot Analysis

- Analyze points within the context of neighboring features
- Statistically significance when a high value point is surrounded by other features with high values
- Local sum is compared to the sum of all points on the maps
- Hot Spot where a local sum is very different than expected local sum

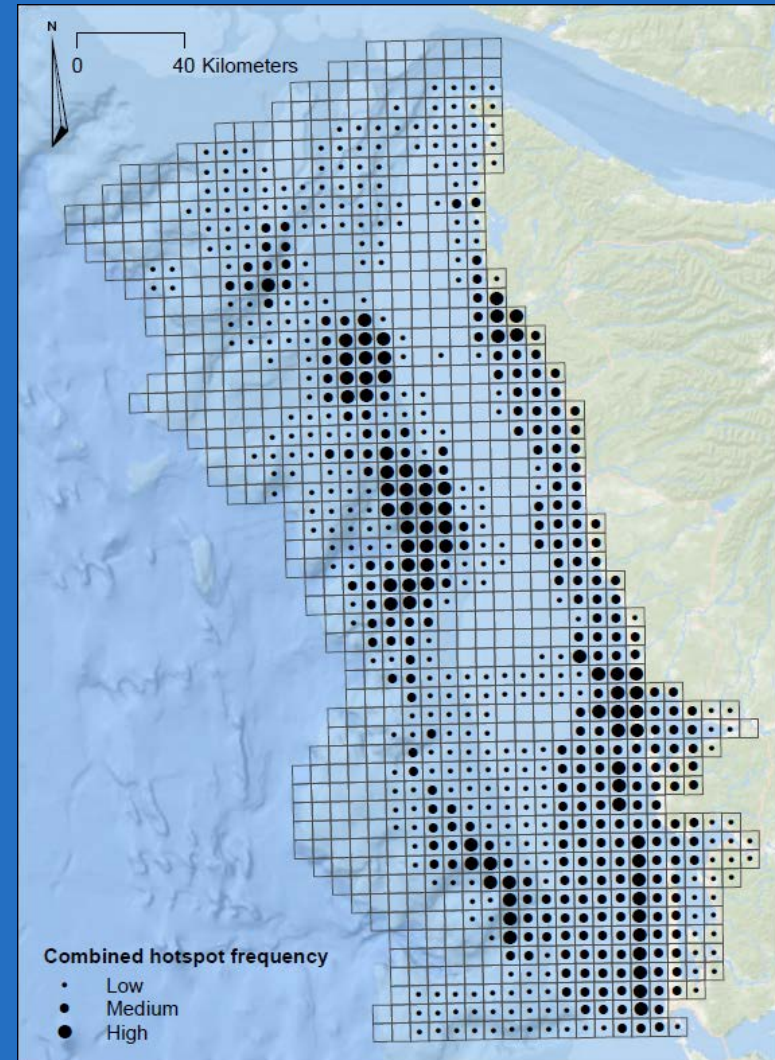






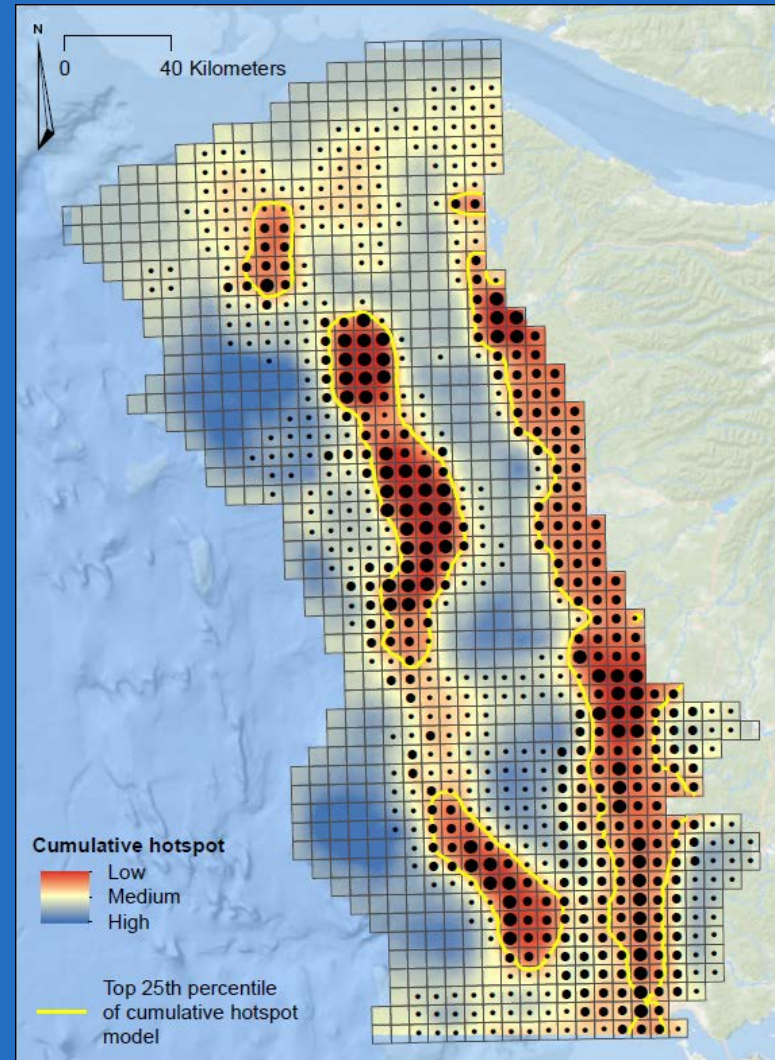
Combined Significant Management Issues

- The number of times a specific location identified as a “statistically significant” hot spot
- Ranging from 0 (location was never identified as a hot spot) to 6 (location was identified as a hot spot in all maps)
- Results classified into three groups to view spatial pattern



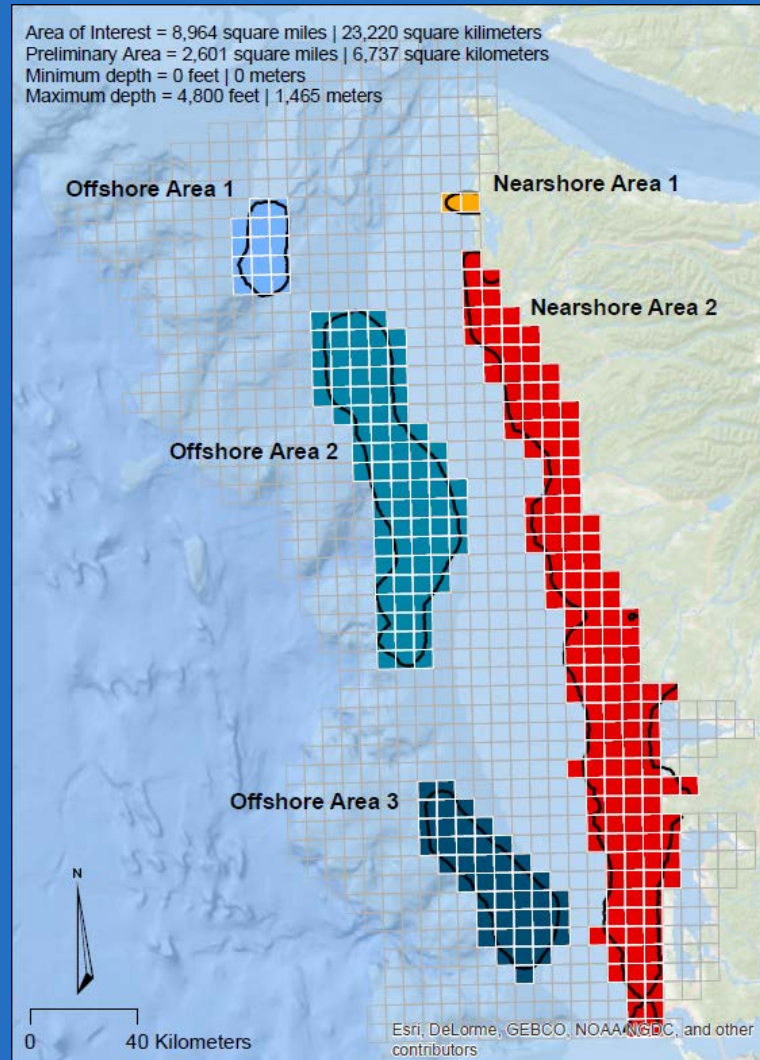
Combined Significant Management Issues

- Heat map model of cumulative hot spots
- Red where hot spot frequency was high, blue where low
- Plotted a line around top 25th percentile of the model
- Served as a starting point for preliminary priority mapping area discussions



Preliminary Mapping Priority Areas

- **Offshore Area 1**
4% of entire area
6% of high priority selections
- **Offshore Area 2**
8% of entire area
13% of high priority selections
- **Offshore Area 3**
4% of entire area
6% of high priority selections
- **Nearshore Area 1**
0.2% of entire area
0.6% of high priority selections
- **Nearshore Area 2**
15% of entire area
27% of high priority selections



Priority Area Modification Considerations

Depth Range (m)	Coverage (km ² /day)
0-10	0.7
10-20	5.0
20-50	11.7
50-100	25.0
100-200	50.0
200-500	83.9
500-1500	338.1

Area	Area (sq km)	Depth	Collection Days	Processing Days	Sub-Total	Total
Nearshore 1	10	0-10	14.2	42.5	56.6	61.0
	1	10-20	0.2	0.5	0.7	
	11	20-50	0.9	2.8	3.7	
Nearshore 2	416	0-10	593.9	1781.7	2375.6	3260.7
	547	10-20	109.4	328.2	437.6	
	1293	20-50	110.5	331.6	442.1	
	33	50-100	1.3	4.0	5.3	
Offshore 1	143	100-200	2.9	8.6	11.5	13.9
	41	200-500	0.5	1.5	1.9	
	41	500-1500	0.1	0.4	0.5	
Offshore 2	632	100-200	12.6	37.9	50.6	69.8
	315	200-500	3.8	11.3	15.0	
	358	500-1500	1.1	3.2	4.2	
Offshore 3	6	50-100	0.2	0.7	0.9	39.3
	357	100-200	7.1	21.4	28.6	
	178	200-500	2.1	6.4	8.5	
	109	500-1500	0.3	1.0	1.3	



Seafloor Mapping Product Types

Seafloor Mapping Product Categories	Nearshore	Offshore
Beach Morphology	13%	N/A
Seafloor Topography and Texture	42%	45%
Seafloor Geomorphology	15%	20%
Sediment Environment	7%	2%
Subsurface Environment	3%	7%
Sediment Texture	11%	15%
Seafloor Ecology	10%	11%



Recommendations

- Set up Washington Seafloor Mapping Working Group
- Solicit and encourage collaboration on data collection
- Use NOAA's National Centers for Environmental Information data centers for archiving and data dissemination
- Use Sea Sketch to broadcast future seafloor mapping area



Any questions?

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<http://coastalscience.noaa.gov/projects/detail?key=167>



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