

Assessment of Southeast Alaska's Estuarine and Coastal Ecosystems



Katharine Miller
NMFS Alaska Fisheries Science Center

Orientation

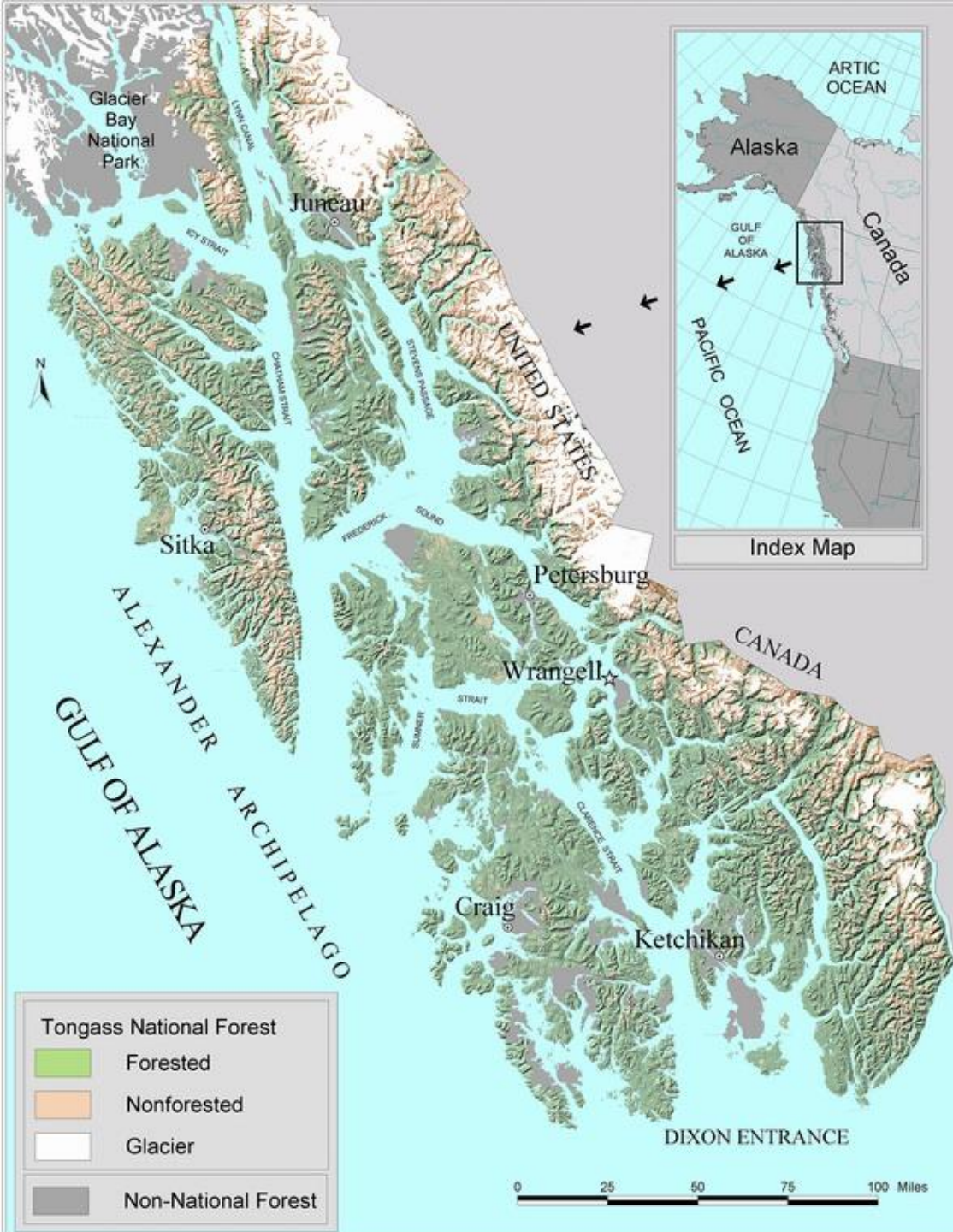
Initial Assessment
Limited to SE Alaska
Alexander Archipelago

- ~ 435 miles
- 1,100 islands
- ~ 36,000 km shoreline

Circulation driven by

- Topography/bathymetry
- Freshwater
- Winds
- Tides

Map courtesy of the US Forest Service



Logging



ts to H



Urban Development

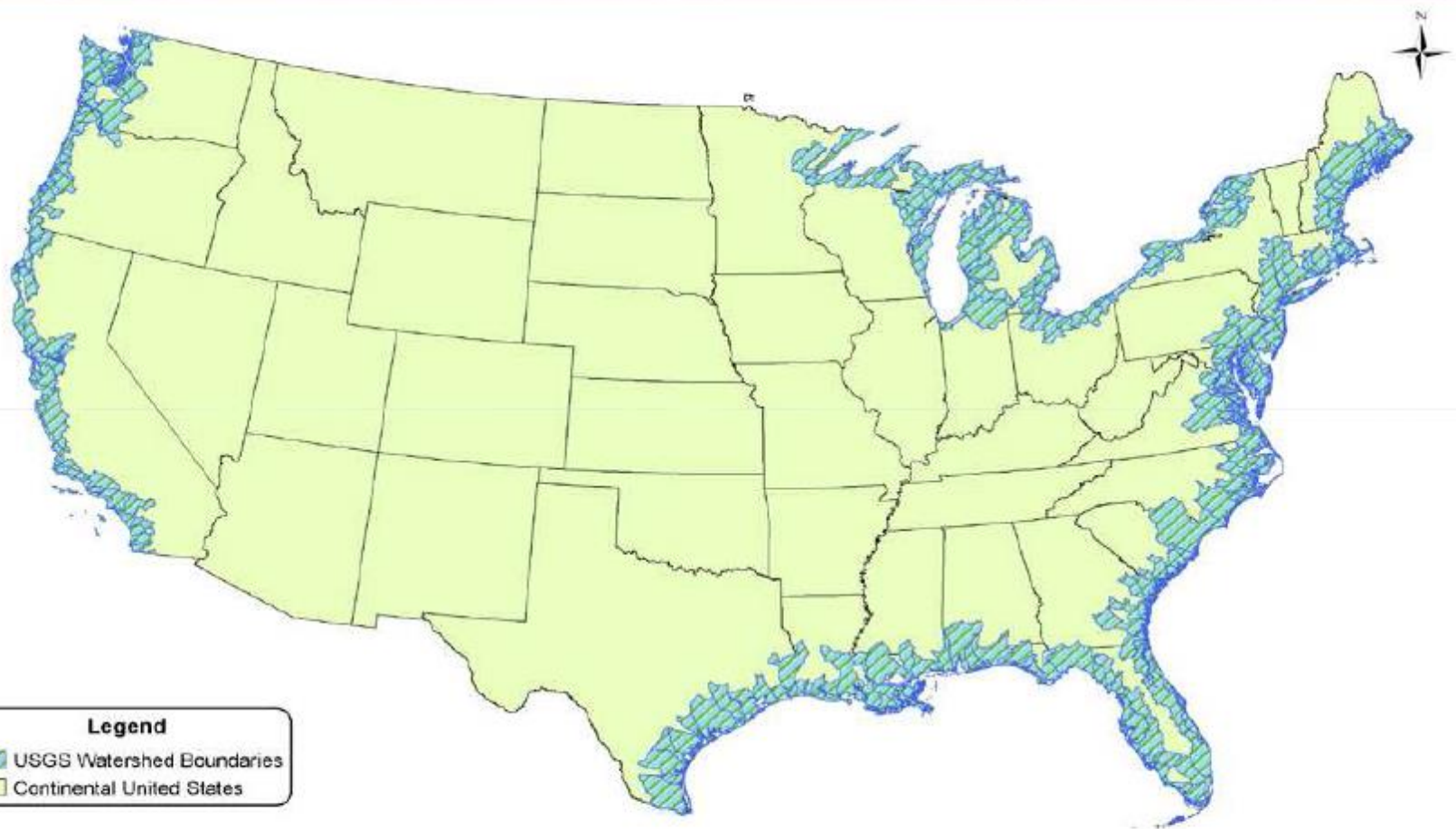


Mining





Contaminated Sites

AK Coastal Assessment - NFHAP



Legend

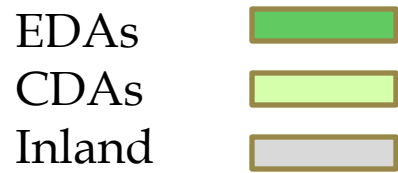
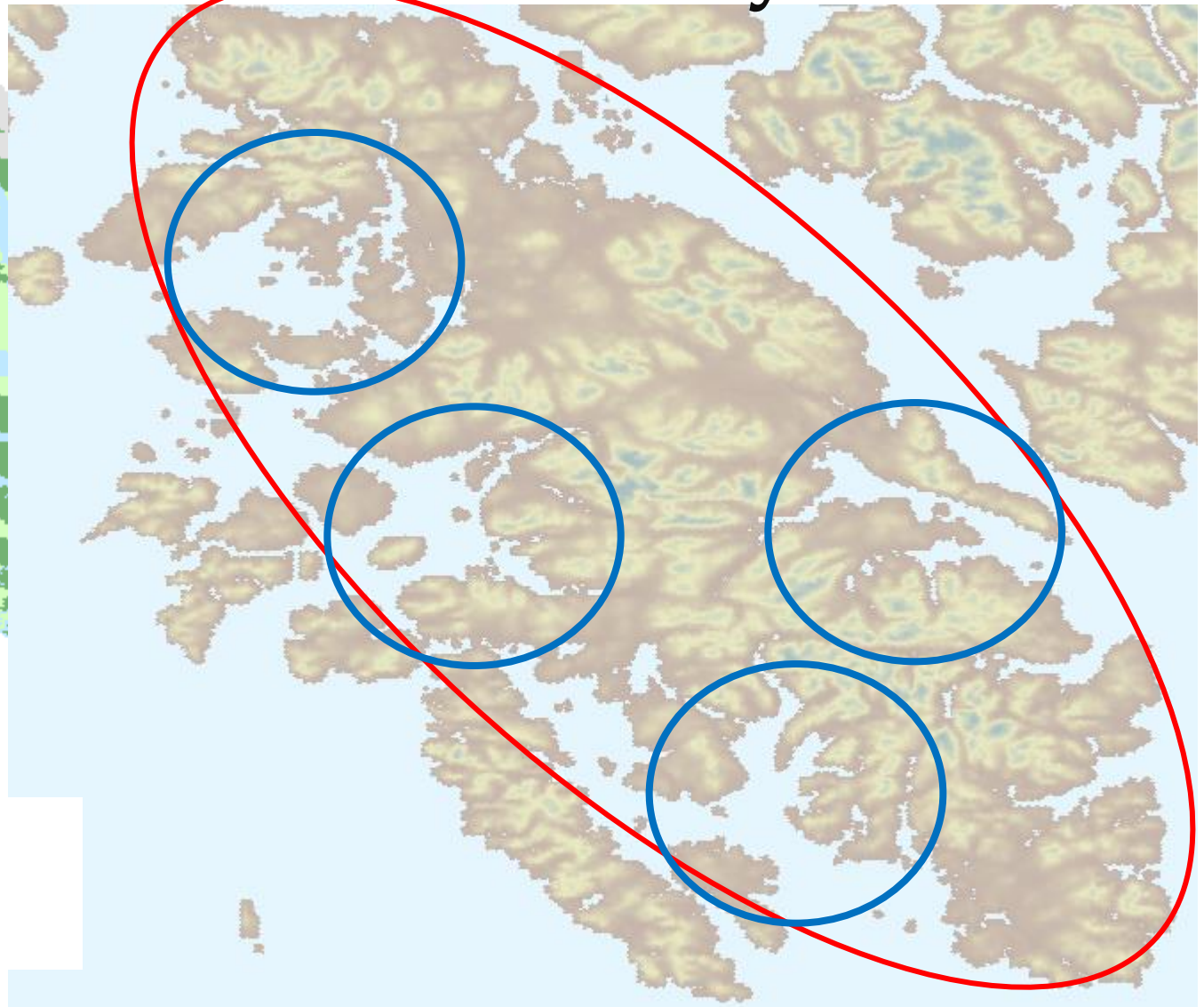
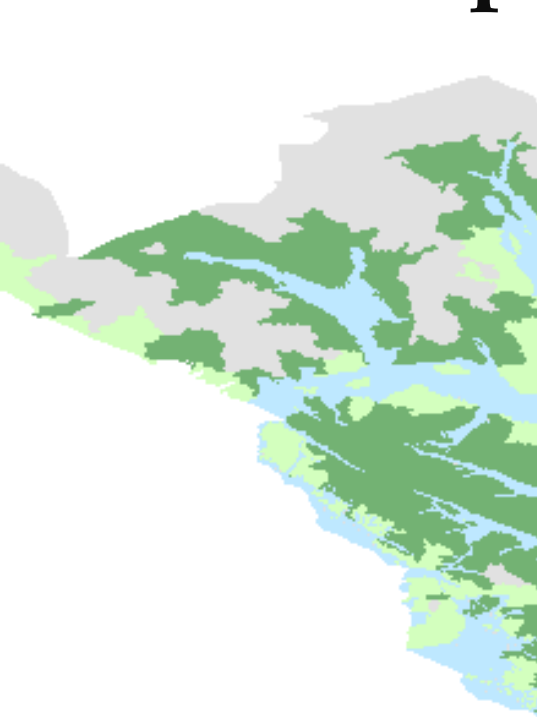
-  USGS Watershed Boundaries
-  Continental United States

Map Prepared By:
NOAA National Marine Fisheries Service
Office of Habitat Conservation
Habitat Protection Division

0 150 300 600 Miles

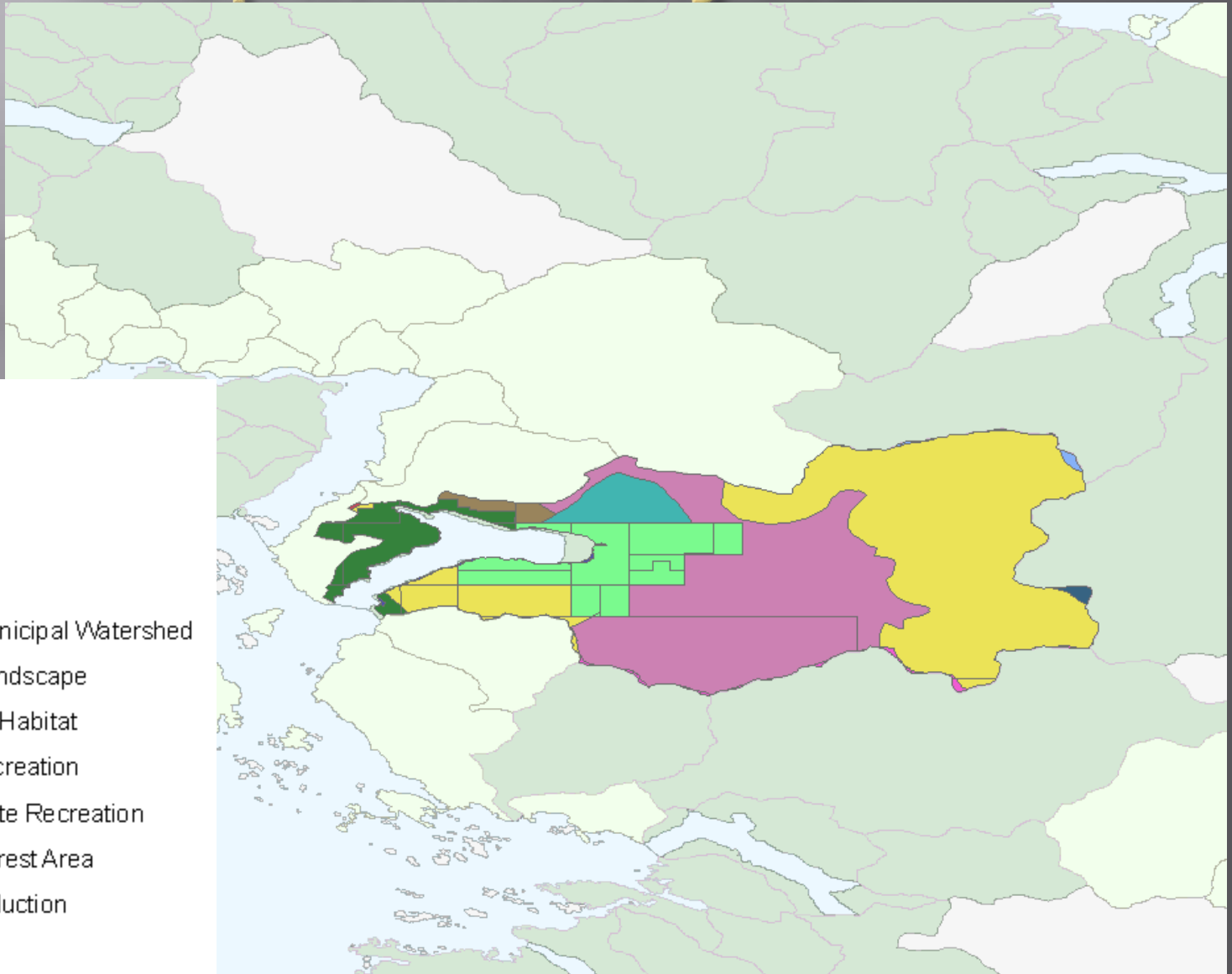
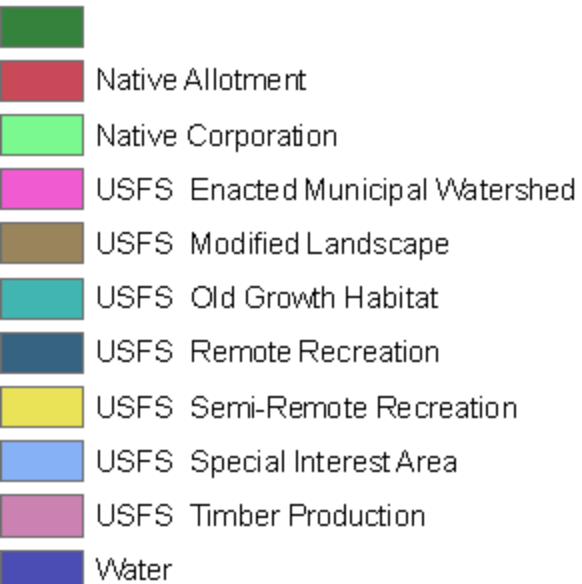


Spatial Units for Analysis



Spatial Analysis

Katlian Bay EDA Land Ownership










Spatial Analysis

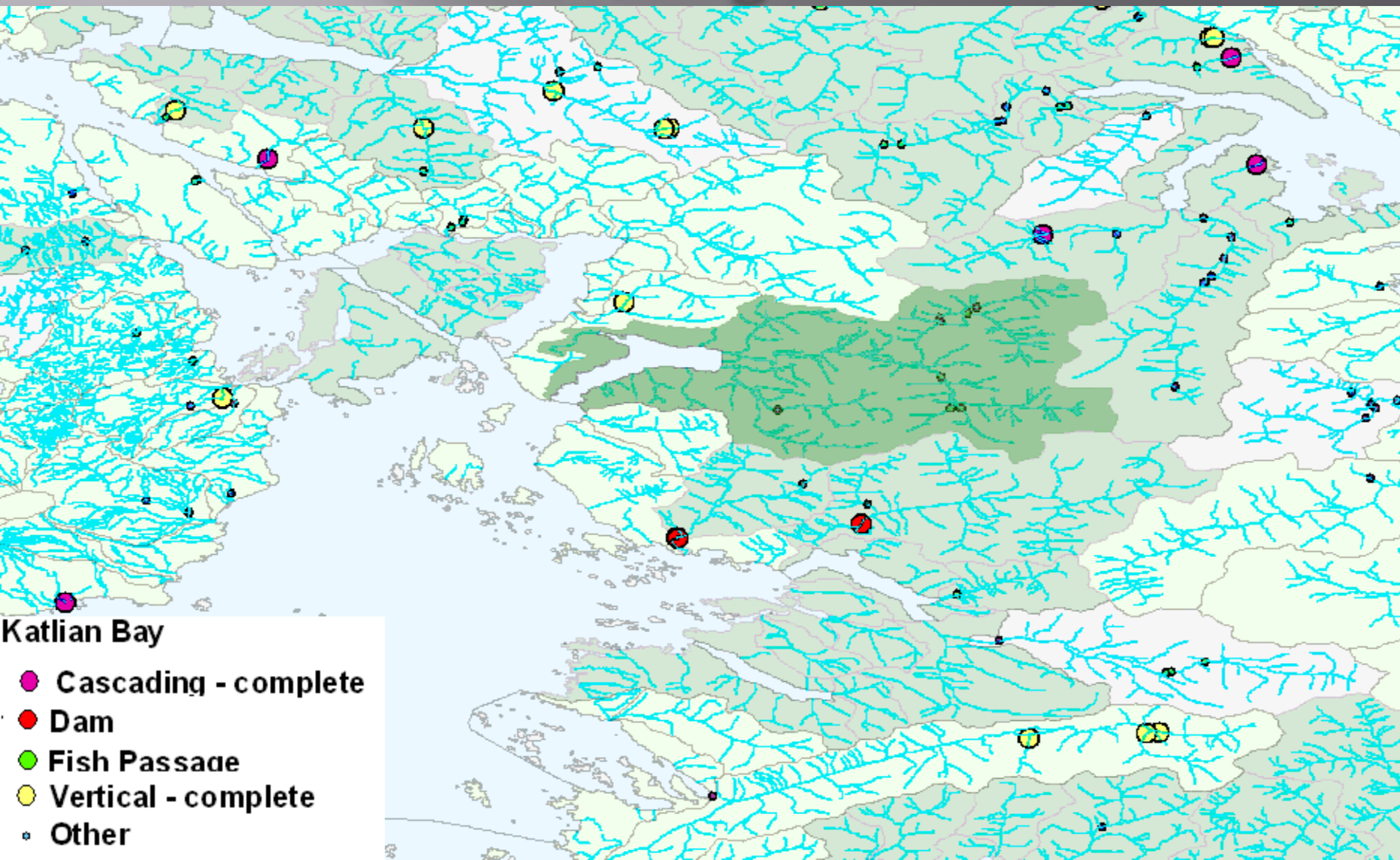


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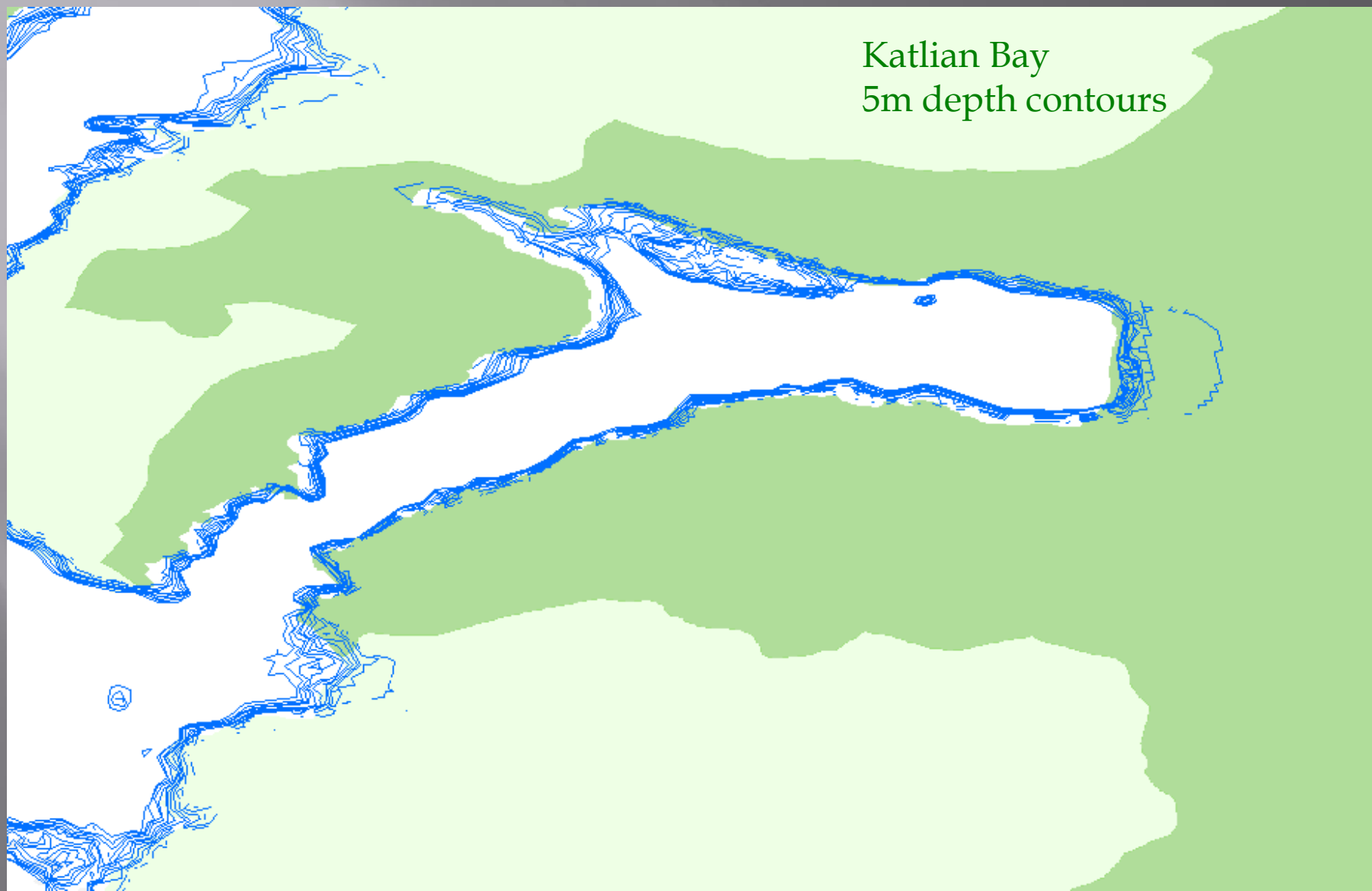
Katlian Bay EDA Wetlands

-  Estuarine and Marine Deepwater
-  Estuarine and Marine Wetland
-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Riverine

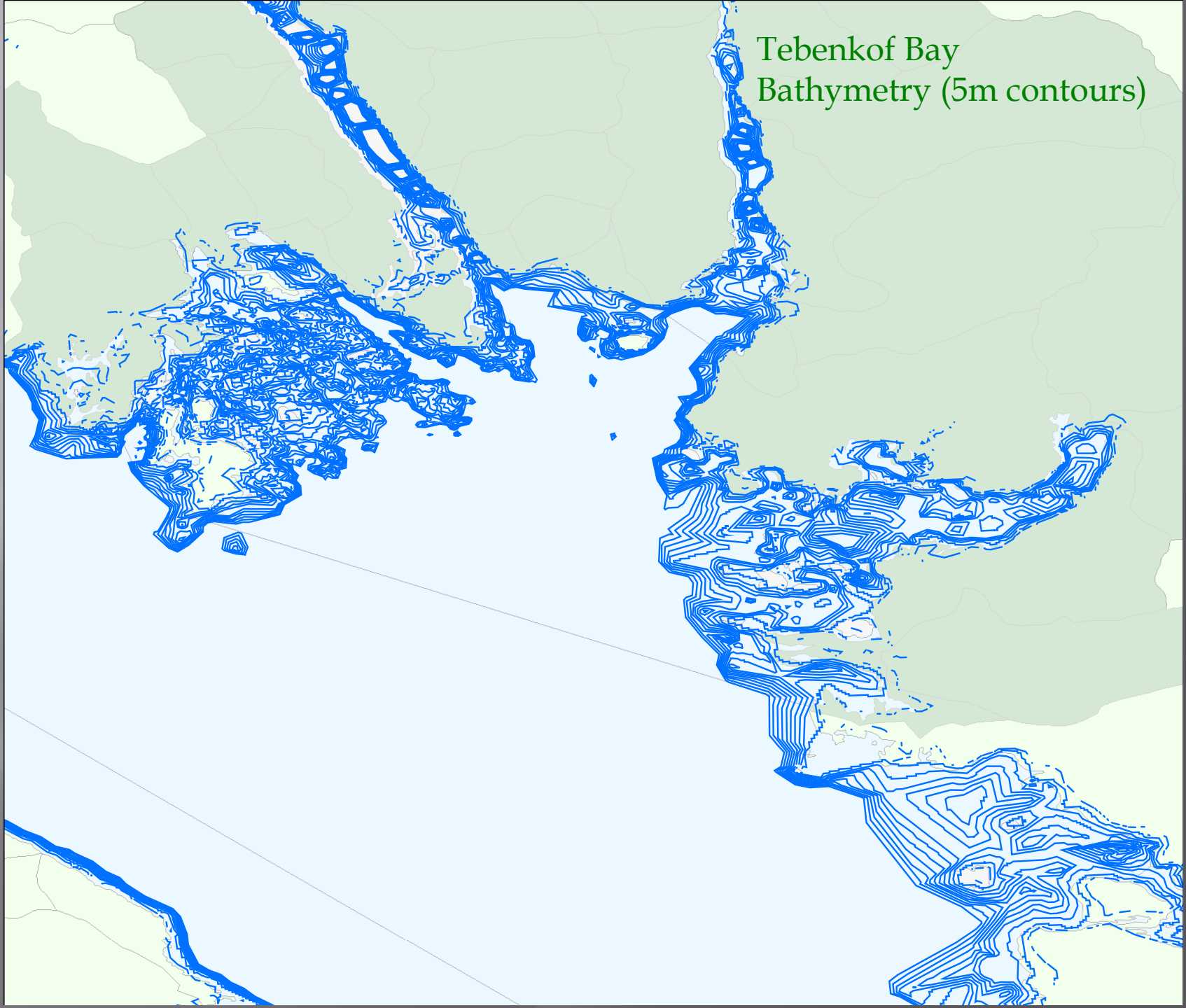
Spatial Data – Streams Fish Passage Barriers



Bathymetry



Tebenkof Bay
Bathymetry (5m contours)



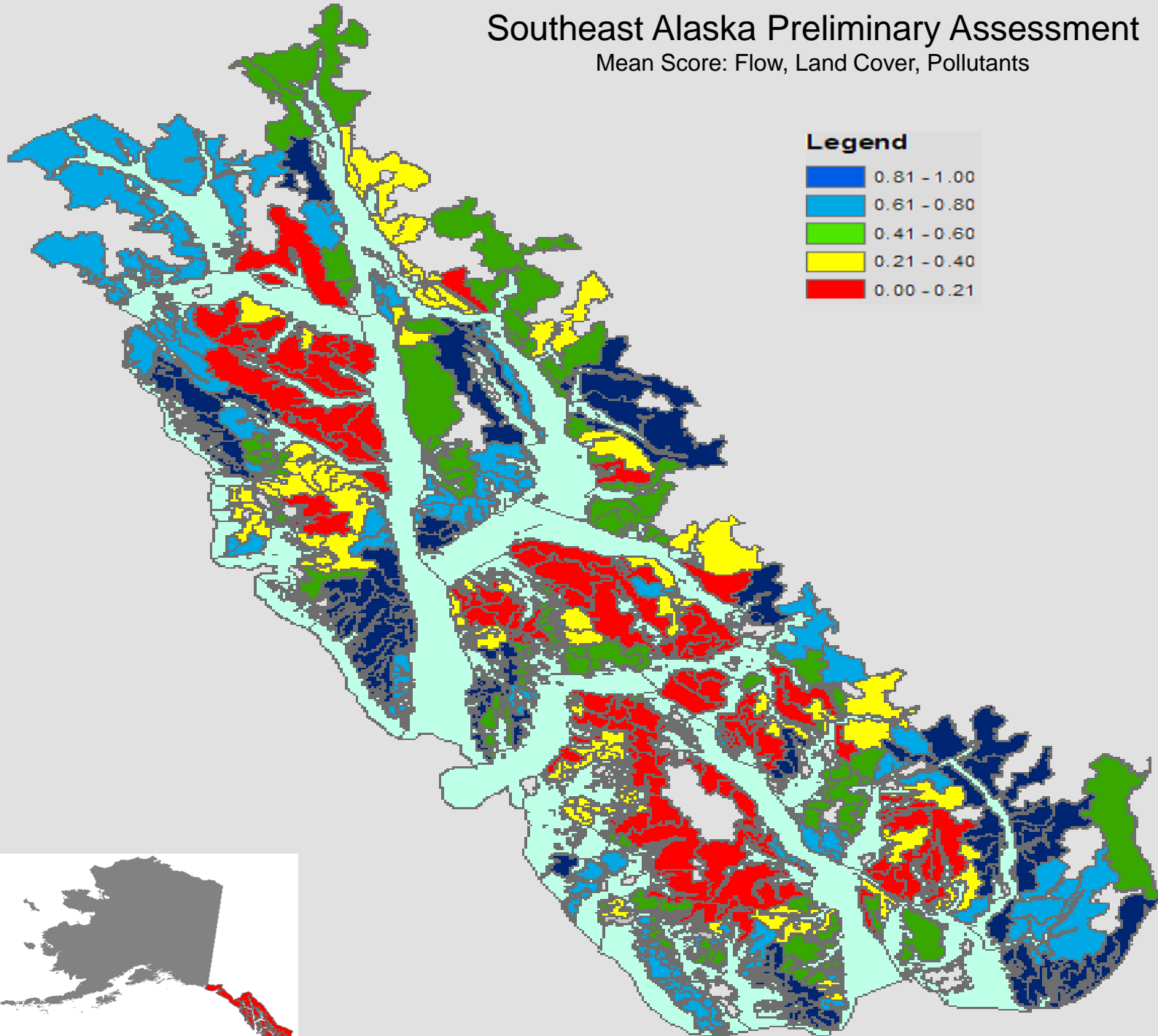
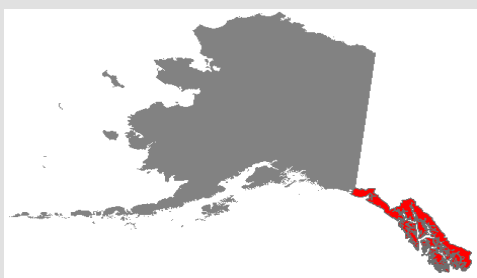
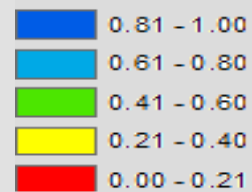
Category	Threat / stressor	Indicator (Comprehends single-or groups of descriptive variables)	Variables	Data Source/AK	Coverage
Connectivity	Coastal construction: Dams, dikes, roads (stormwater), Dredging	Area accessible to fish	Barriers Structures Passages/corridors	USACE / NID Tongass Streams NHD	national SEAK national
Hydrology / Oceanography		Freshwater inflow	Salinity	AOOS	partial
		Tidal flow	Temperature - Ice Alteration/Discharge Water exchange/depth-tide height ratio	AOOS	partial
		Degree of estuarine channelization	Hydrodynamics / current velocity, ,	ShoreZone ESI	AK
		Extent of shoreline armoring	Substrate composition Benthic habitat loss Turbidity		NOAA/NOS, SeaWIFS
		Land use/cover	Nutrient load contamination road density	Land Use/Mgmt - VEG ADEC Contam Sites/NPDES ADOT (calc)	AK AK
		Water clarity	Sediment load, suspended matter	USGS/USACE/Regional?	
		Water Quality	Eutrophication	Nutrient input	Nutrient level Chlorophyll a water clarity dissolved oxygen
Harmful Algal Blooms (HABs)	Frequency & degree of HABs				national
Geomorphology	Dredging, Sedimentation, Erosion	Status of Soft bottom habitat	Area, compositon of soft sediment	ShoreZone	AK
		Status of Hard Bottom Habitats	Area, composition of hard substrates	ShoreZone	AK
Biotic Habitats	Habitat loss	Status of Coastal Wetlands	Area, composition of marsh	NWI	national
		Status of Submerged Aquatic Vegetation (SAV)	Area, diversity, density of seagrass Area, diversity, density of macro algae	ShoreZone, MMS	AK
		Status of habitat forming invertebrates	Area, diversity, density of coral reefs Area, diversity, density epibenthic bivalves		
Environmental Contamination	Pollution	Chemical contamination of sediments	Point/no-point discharge	EMAP	SEAK (H)
		Chemical contamination in fish and mollusks	(Shell)fish contaminant load		
Biodiversity	Food web alterations	Non-indigenous and invasive species	Number of species, abundance	USGS/NAS	
		Plankton density	Zooplankton biomass	COPEPOD-HOFU-DAT, BISERP	partial
		Benthos community	Benthic Invertebrate Index	NOAA/NBI: EPA/EMAP	

Variables	Source
Barriers Dam heights	NHDPlus USACE: National Inventory of Dams
Salinity River Alternation/discharge Water exchange Tidal/Inlet Data Temperature- Trends	NOAA: Coastal Assessment Framework USGS – Gages (Limited) NOAA: Coastal Assessment Framework NOAA: Coastal Assessment Framework NOAA: Oceanographic Data Center
Road density Contamination Point source discharges	Federal Highway Administration EPA: Toxic Release Inventory EPA: NPDES
Land Cover/Land Change	NOAA: Coastal Change Analysis Program
DO Chl a Water clarity	NOAA: Nat'l Estuarine Eutrophication Assessment
Submgd Aquatic Vegetation Habitat forming invertebrates	Seagrass Database TNC
Shellfish contamination Sediment toxicity Tissue Contaminants Benthic Invertebrates	NOAA: Coastal Monitoring and Assessment EPA: Coastal Condition Report (Central AK only) EPA: Coastal Condition Report (Central AK only) EPA: Coastal Condition Report (Central AK only)

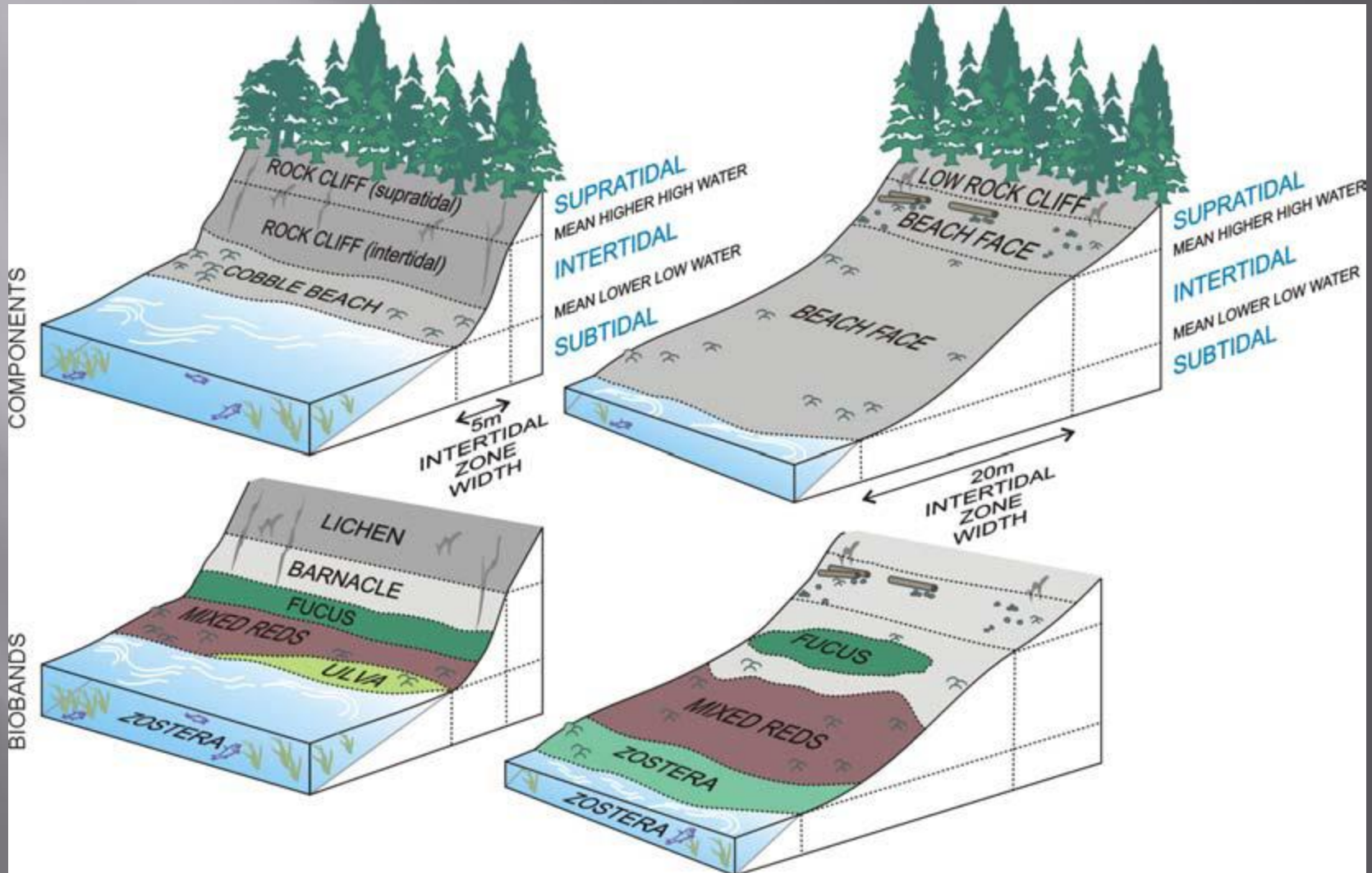
Southeast Alaska Preliminary Assessment

Mean Score: Flow, Land Cover, Pollutants

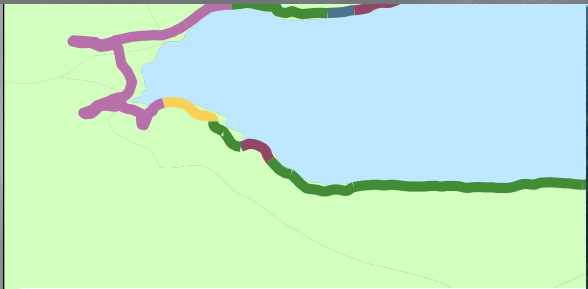
Legend












AK ShoreZone Data



Coastal Habitat



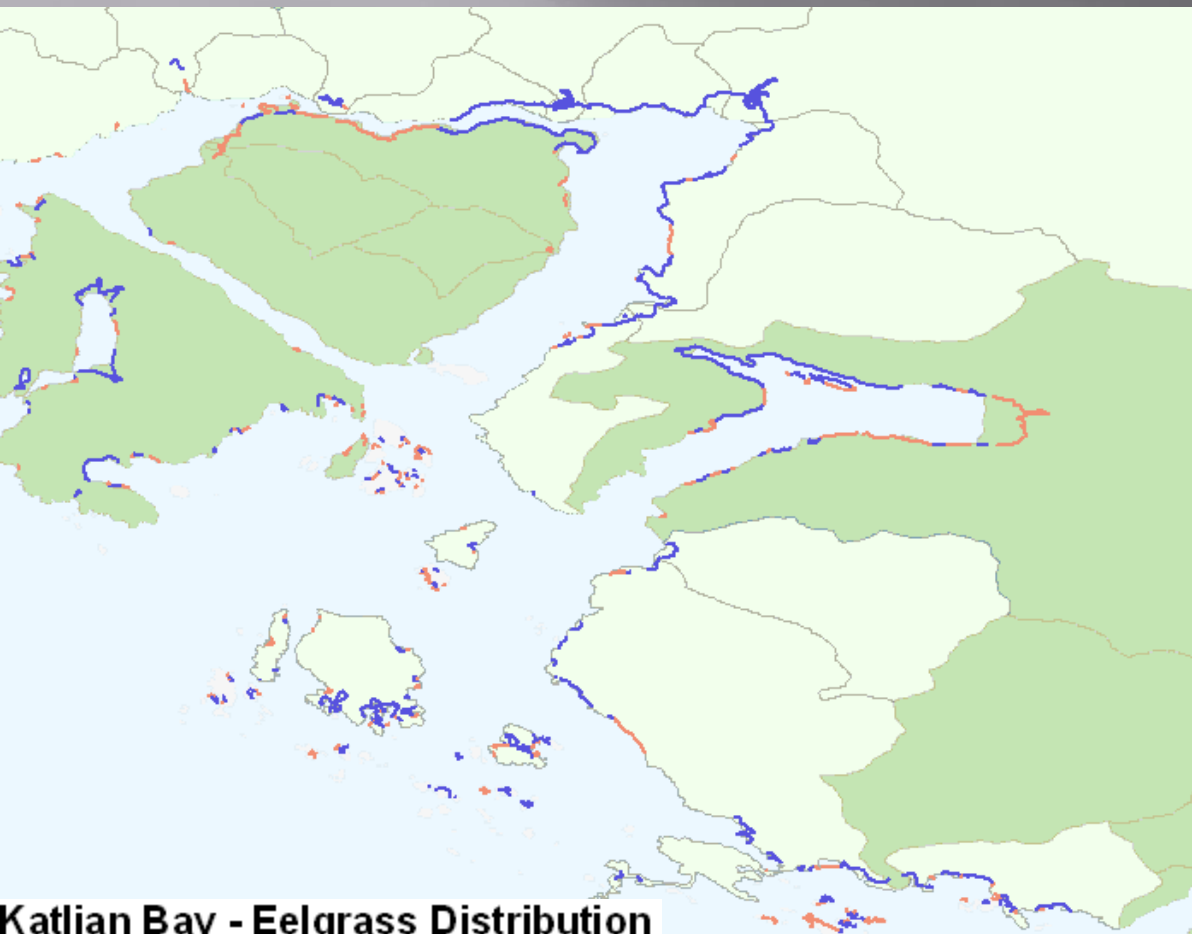
Substrate	
	Rock (BC Class 1-5)
	Rock and Gravel (BC Class 6-10)
	Rock and Sand/Gravel (BC Class 11-15)
	Rock and Sand (BC Class 16-20)
	Gravel (BC Class 21-23)
	Sand/Gravel (BC Class 24-26)
	Sand/Mud (BC Class 27-30)
	Organic Shoreline (BC Class 31)
	Other (BC Class 32-35)



Shorezone - Biobands

Zone	Bioband Name	Database Label	Colour	Diagnostic Indicator Species
Supratidal	Splash Zone	VER	Black or bare rock	Encrusting black lichens
	Dune Grass	GRA	Pale blue-green	<i>Leymus mollis</i>
	Sedges	SED	Bright green to yellow-green	<i>Carex lyngbyei</i> <i>Carex</i> spp.
	Salt Marsh	PUC	Light or bright green	<i>Puccinellia</i> sp. Other salt-tolerant herbs and grasses
Upper to Mid-Intertidal	Barnacle	BAR	Grey-white to pale yellow	<i>Balanus</i> sp. <i>Semibalanus</i> sp.
	Rockweed	FUC	Golden-brown	<i>Fucus</i> sp.
	Green Algae	ULV	Green	<i>Ulva</i> sp. Other small green algae
	Blue Mussel	BMU	Black or blue-black	<i>Mytilus trossulus</i>
	Bleached Red Algae	HAL	Olive, golden or yellow-brown	Bleached foliose or filamentous red algae <i>Palmaria</i> sp. <i>Odonthalia</i> sp.
Lower Intertidal and Nearshore Subtidal	Red Algae	RED	Dark to bright red or pink (corallines)	<i>Odonthalia</i> sp. <i>Neorhodomela</i> sp. <i>Palmaria</i> sp. Other foliose red algae, and other coralline algae
	Alaria	ALA	Dark brown	<i>Alaria</i> sp.
	Soft Brown Kelps	SBR	Yellow-brown, olive brown or brown.	<i>Saccharina latissima</i> <i>Cystoseira</i> sp.
	Dark Brown Kelps	CHB	Dark chocolate brown	Stalked <i>Laminaria</i> sp. <i>Cymathaere</i> sp. Other bladed kelps
	Surfgrass	SUR	Bright green	<i>Phyllospadix</i> sp.
	Eelgrass	ZOS	Bright to dark green	<i>Zostera marina</i>
Sub-tidal	Dragon Kelp	ALF	Golden-brown	<i>Alaria fistulosa</i>
	Bull Kelp	NER	Dark brown	<i>Nereocystis luetkeana</i>

Habitat



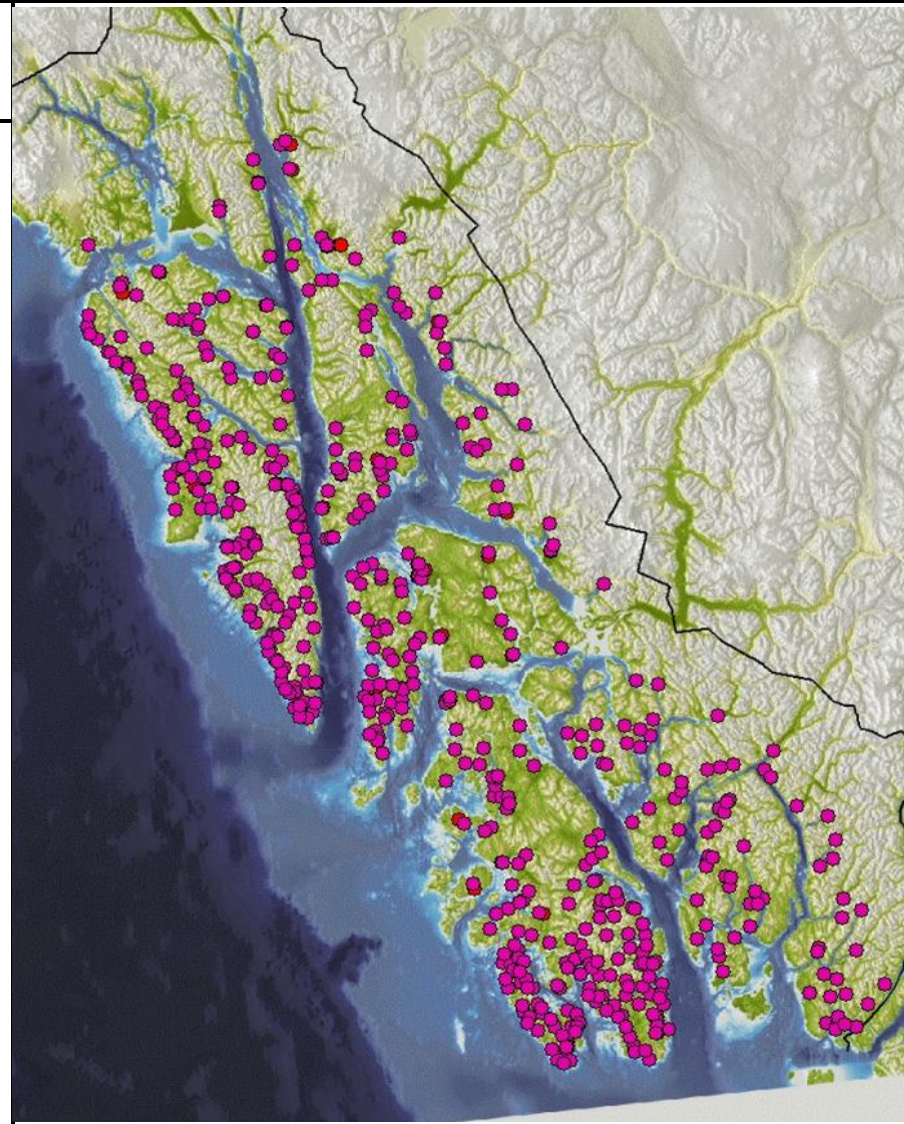
Katlian Bay - Eelgrass Distribution

- Continuous
- Patchy



Linking Habitat to Resources

FISH SPECIES	Life Stage	% Present Correct	% Absence Correct	AUC
Shiner perch				
<i>Cymatogaster aggregata</i>	A/J	100	87	0.94
Lingcod				
<i>Ophiodon elongatus</i>	J	100	85	0.93
Pink salmon				
<i>Oncorhynchus gorbuscha</i>	J	86	77	0.85
Chum salmon				
<i>Oncorhynchus keta</i>	J	82	81	0.85
Pacific cod				
<i>Gadus macrocephalus</i>	J	78	78	0.84
Butter sole				
<i>Isopsetta isolepis</i>	J	75	74	0.84
Kelp greenling				
<i>Hexagrammos decagrammus</i>	J	81	70	0.82
Starry flounder				
<i>Platichthys stellatus</i>	A/J	86	63	0.77
Rock sole				
<i>Lepidopsetta sp.</i>	J(a)	72	63	0.77
Dolly varden				
<i>Salvelinus malma</i>	A(j)	72	63	0.76
Yellowfin sole				
<i>Limanda aspera</i>	J(a)	72	63	0.75
Silverspot sculpin*				
<i>Blepsias cirrhosus</i>	J	67	69	0.75
Sockeye salmon				
<i>Oncorhynchus nerka</i>	J	69	66	0.74

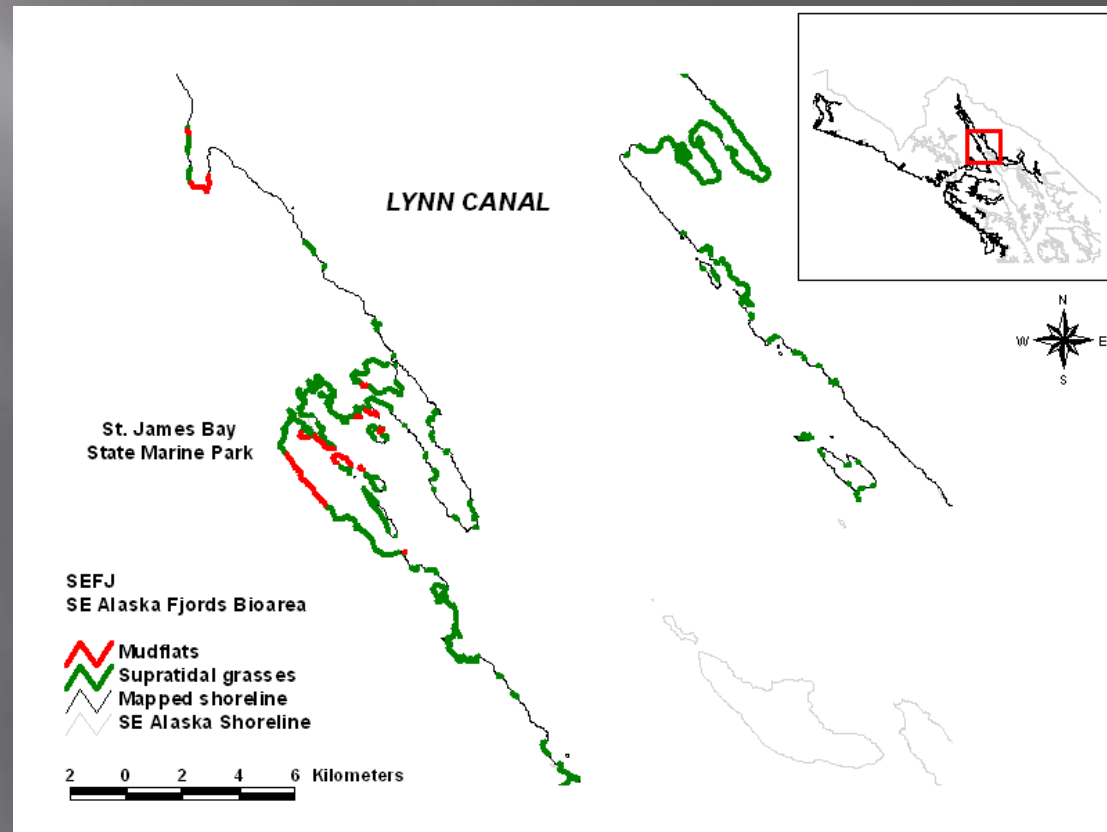


Predictive Modeling

Critical habitat attributes mapped in ShoreZone



European Green Crab
Carcinus maenas



Summary

- ▣ AK Coastal Assessment
 - Paralleled national effort
 - Focused on anthropogenic impacts
- ▣ Ongoing analysis and modeling activities
 - Species distribution models
 - Areas of concern – special consideration
- ▣ Further development
 - Data gaps
 - Research/data collection opportunities - Collaboration
 - Tool for prioritizing restoration/habitat protection

Questions?



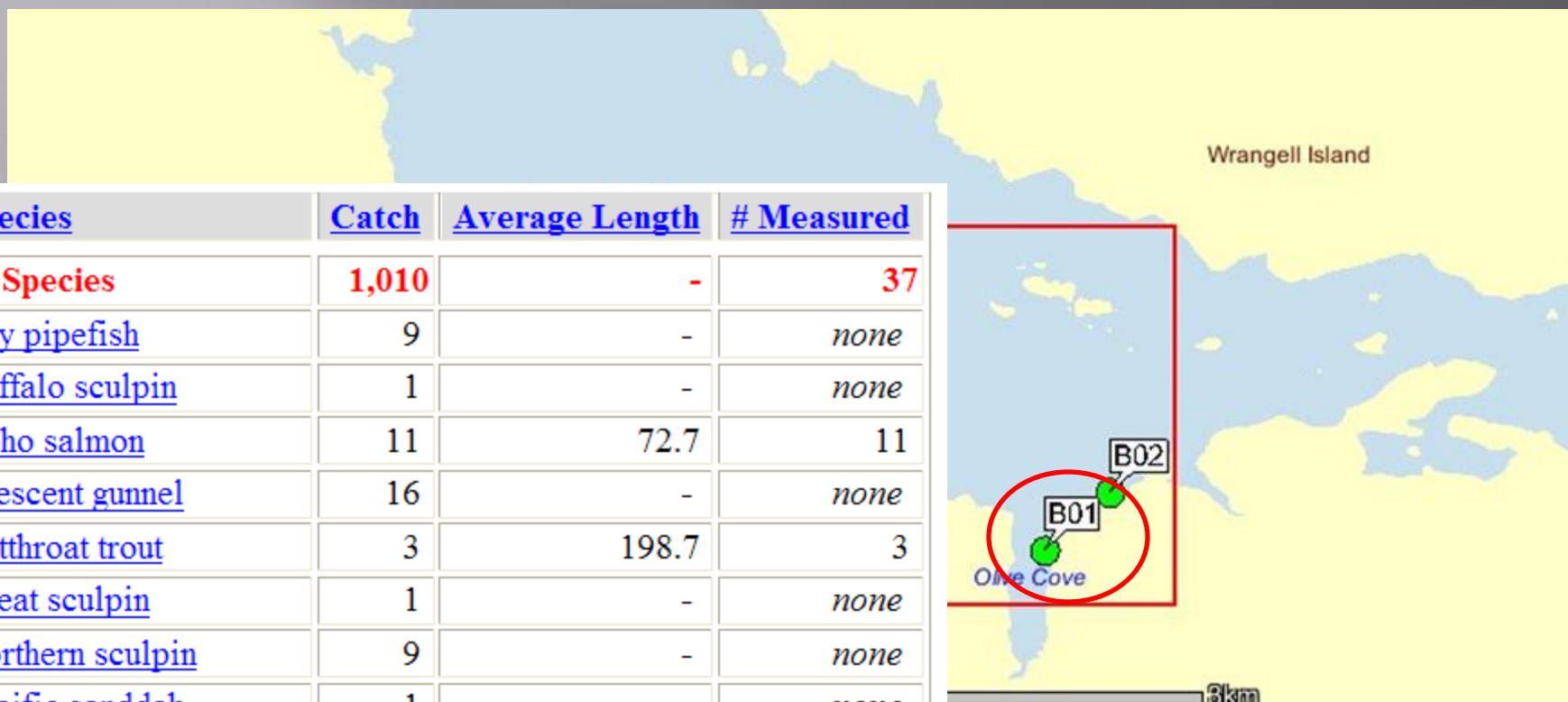
Nearshore Fish Atlas



1998 – Present
538 seine hauls
79 species



Nearshore Fish Atlas



<u>Species</u>	<u>Catch</u>	<u>Average Length</u>	<u># Measured</u>
All Species	1,010	-	37
Bay pipefish	9	-	<i>none</i>
Buffalo sculpin	1	-	<i>none</i>
Coho salmon	11	72.7	11
Crescent gunnel	16	-	<i>none</i>
Cutthroat trout	3	198.7	3
Great sculpin	1	-	<i>none</i>
Northern sculpin	9	-	<i>none</i>
Pacific sanddab	1	-	<i>none</i>
Pacific staghorn sculpin	10	-	<i>none</i>
Shiner perch	565	75.7	23
Snake pricklyback	9	-	<i>none</i>
Threespine stickleback	370	-	<i>none</i>
Tubesnout	5	-	<i>none</i>

<u>Species</u>	<u>Catch</u>	<u>Site Photos</u>	<u>Seine Data</u>
13	1,010		2000
12	196		2000
7	71		2000
4	40		2000