

Sue Saupe ~ Cook Inlet Regional Citizens Advisory Council

Nearshore Biophysical Habitat Mapping: The Alaska ShoreZone Program from a Cook Inlet Perspective

Knowledge of the spatial distribution of shoreline features and habitats in Alaska can be critical for making coastal resource management decisions, identifying essential fish habitat, planning for and responding to oil spills, and a myriad of other uses. The Alaska ShoreZone program has been providing physical and biological characterizations of Alaskan shorelines since the first surveys in Cook Inlet in 2001. Based on aerial imaging surveys, this classification, inventory, and mapping system provides on-line access to photographs and a searchable geospatial database of features such as shoreline morphology, sediment substrate, beach exposure, and “biobands” such as eelgrass, canopy kelps, salt marshes, and numerous other biotic habitat descriptors.

In addition to ShoreZone’s robust collection of online accessible data and digital imagery, several demonstration projects - developed as companions to the Alaska ShoreZone Program - have become integrated components of the new “flex” website hosted by NOAA Fisheries. Data and imagery from the Kenai Peninsula and Cook Inlet locales will be used to demonstrate these web-accessible tools, as well as the Cook Inlet Response Tool, a demonstration project that integrates ShoreZone habitat imagery and data with other resource data, real-time data sensors, and forecast models.

Nearshore Biophysical Habitat Mapping:
*The Alaska ShoreZone Program from
a Cook Inlet Perspective*

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Cook Inlet Regional Citizens Advisory Council



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ShoreZone

- Oblique video and imagery
- “broad brush at relatively low cost” – 300 at 60
- Products are georeferenced on-line imagery and searchable data



A photograph of a rocky coastline. In the foreground, there are large, dark, jagged rock formations. The water is a deep blue-green color. In the background, a steep hillside is covered with a dense forest of evergreen trees. The sky is overcast and grey.

Standardized mapping within shore “units”
characterizes habitat along-shore and across-shore

- morphology
- substrate
- exposure
- stability
- dimensions (width, length, slope)
- man-made features
- debris accumulations

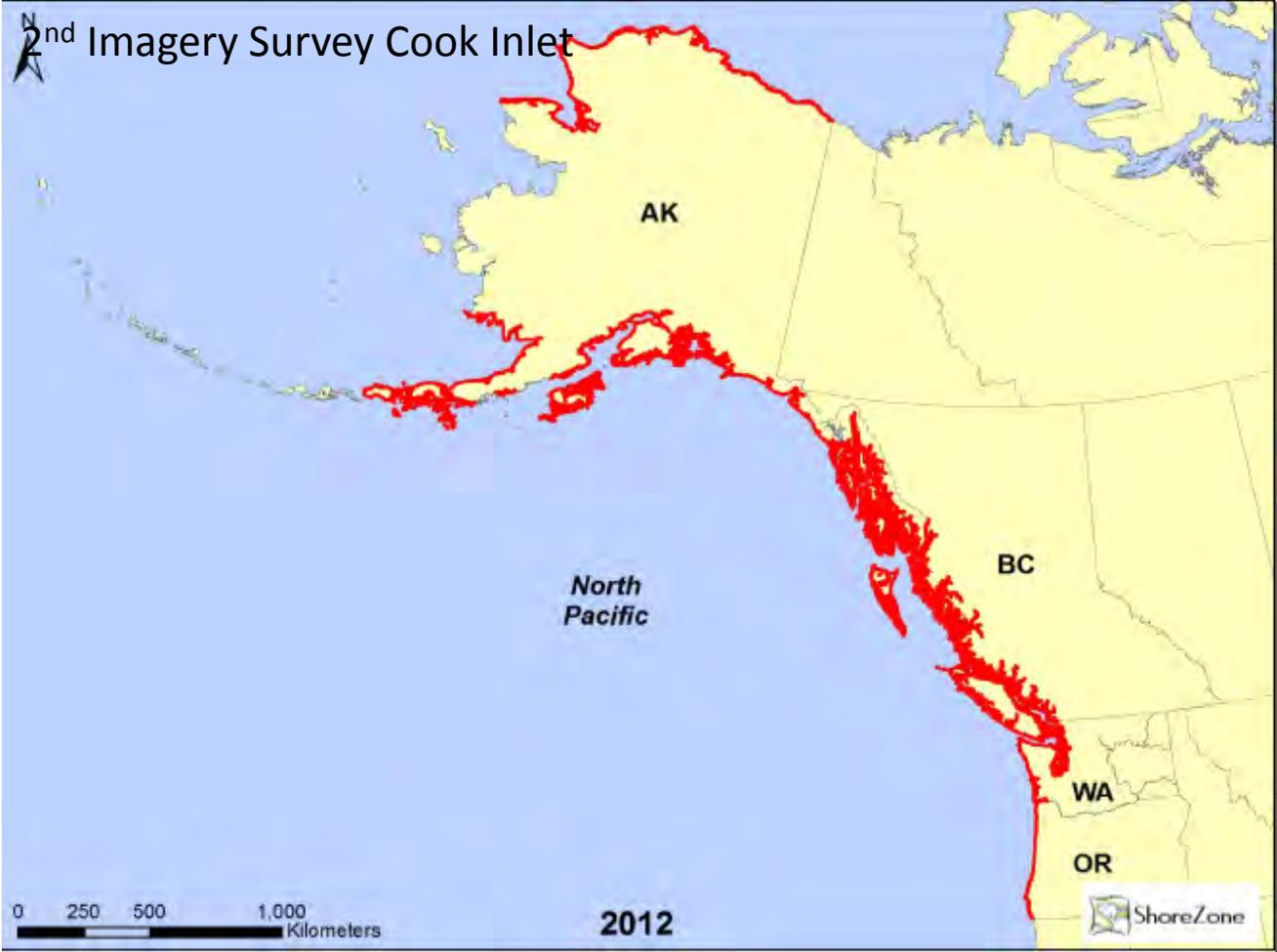
Describe alongshore and cross-shore geomorphology



- Splash zone Lichen (VER)
- Wetland grasses, herbs, sedges (PUC)
- Dune Grasses (GRA)
- Barnacles (BAR)
- Rockweed (FUC)
- Green Algae (ULV)
- Bleached Reds (HAL)
- Blue Mussels (BMU)
- Surfgrass (SUR)
- Alaria (ALA)
- Soft brown kelps (SBR)
- Dark brown kelps (CHB)
- Eelgrass (ZOS)
- Dragon Kelp (ALF)
- Bull Kelp (NER)

Describe alongshore and cross-shore biological habitat (biobands)

2nd Imagery Survey Cook Inlet



http://mapping.fakr.noaa.gov/szflexbeta/ Alaska ShoreZone

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Layer Legend Layer Query Task Management

Show all layers in service

Shore Zone Layers

- Still Photos
- Video Flightline

Derived ShoreZone Attributes

- Habitat Class
- BC Class
- Biological Wave Exposure

Response Attributes

Video Snapshots

Photo Snapshots

Unit Description Table

Scale is too large. Zoom in further to see Units.

Ocean1 Internet access

7:32 PM 4/14/2013

NOAA Fisheries administering and serving ShoreZone data and imagery

http://mapping.fair.noaa.gov/szflexbeta/ Alaska ShoreZone

Google lands end homer

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Layer Legend Layer Query Task Management

Show all layers in service

Shore Zone Layers

- Still Photos
- Video Flightline
- Derived ShoreZone Attributes
 - Habitat Class
 - BC Class
 - Biological Wave Exposure
- Response Attributes
 - Environmental Sensitivity
 - Oil Residency Index (ORI)
 - 1 Short persistence; days to weeks
 - 2 Short persistence; weeks to months
 - 3 Moderate persistence; weeks to months
 - 4 Moderate persistence; months to years
 - 5 Long persistence; months to years
- Biological Attributes

Unit ID: 04/07/1000/0

Length: 224
 Habitat Class: 32: Semi-Exposed/Mobile/Sediment
 Biological Wave Exposure: Semi-Exposed
 Oil Residency Index (ORI): 3 Moderate persistence; weeks to months
 BC Class: Platform w gravel and sand beach, wide (12)
 ESI: Exposed wave-cut platforms in bedrock, mud, or clay (2A)
 Splash Zone: Wide (greater than 5m)
 Alaria: Patchy
 Soft Brown Kelps:
 Bleached Red Algae:

Video Snapshots

Lat: 59 25' 29" N Lon: 153 46' 27" W

5925N4989 15346W4518
185813 1028925-65

Photo Snapshots

Lat: 59 25' 30" N Lon: 153 46' 21" W

Unit Description Table

Units for viewable region. Total Unit Count: 13

Unit ID	Length	Habitat Class	Biological Wave Exposure	Oil Residency index (ORI)	BC Class	Environmental Sensitivity	Splash Zone
04/07/0994/0	580	30	SE	3	12	2A	
04/07/0995/0	412	30	SE	1	2	2A	M
04/07/0996/0	194	40	SP	2	2	2A	M
04/07/0997/0	630	30	SE	1	2	2A	W
04/07/0998/0	2,178	30	SE	1	2	2A	W
04/07/0999/0	643	30	SE	1	2	2A	W
04/07/1000/0	224	32	SE	3	12	2A	W
04/07/1001/0	1,084	30	SE	1	2	2A	W
04/07/1002/0	3,035	20	E	1	2	2A	W
04/07/1003/0	286	20	E	2	12	2A	W
04/07/1004/0	331	20	E	2	12	2A	W

4:54 PM
4/15/2013

http://mapping.fakr.noaa.gov/szflexbeta/ Alaska ShoreZone

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My company's internal W... Remote E-mail Access

ShoreZone FishAtlas ShoreStation

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Layer Legend Layer Query Task Management

Show all layers in service

- Bleached Red Algae
- Alaria
- Soft Brown Kelps
- Dark Brown Kelps
- Seagrass Biobands
- Surfgrass
- Canopy Kelp Biobands
- Bull Kelp
- Dragon Kelp
- Giant Kelp
- Unit Boundaries

Boundary Marker

- Mapped Shoreline
- Mapped
- Surveys
- ANP

Unit Description Table

Scale is too large. Zoom in further to see Units.

Latitude: 58.49921 Longitude: -152.05403

100 km
50 mi

5:04 PM
4/15/2013

Shore station Database

- Observed species assemblages
- Geomorphic features
- Query (and download) data at site, local, and regional scales
- Photo documentation



http://mapping.fakr.noaa.gov/szflex/beta/ Alaska ShoreZone

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ShoreZone FishAtlas ShoreStation Overlay ShoreZone Alaska Base

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ShoreStation Regions ShoreStation Locales ShoreStation Stations

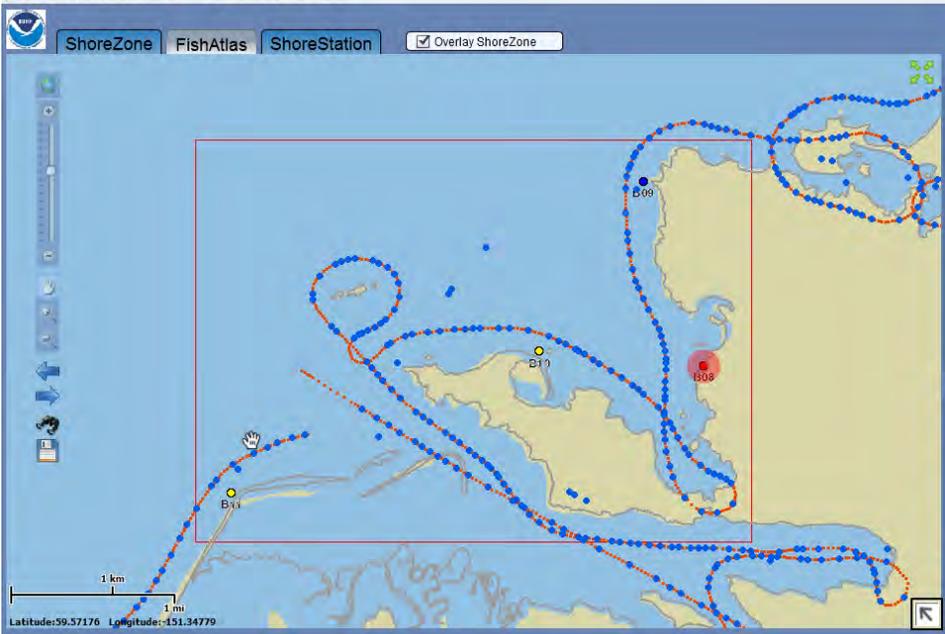
Locales: BioBand: Species: Total: 407

Geographic Name	Station Id	EXP BIO	BC Class	Date Sampled	Photos	Species	Profile
Sitkinak Island, Ca...	KDK_05_086	E	Platform with gra...	June 24, 2005			
Kodiak Island, Kag...	KDK_05_087	SP	Sand flat	June 25, 2005			
Kodiak Island, Kag...	KDK_05_088	E	Rock Ramp, narr...	June 25, 2005			
Kodiak Island, Kag...	KDK_05_089	SP	Cliff with gravel/s...	June 25, 2005			
Kodiak Island, Japa...	KDK_05_090	SE	Ramp with gravel...	June 25, 2005			
Kodiak Island, Japa...	KDK_05_091	SE	Sand & gravel flat...	June 25, 2005			
Cook Inlet, Kachem...	CI_03_27	P	Ramp with gravel...	July 2, 2003			
Cook Inlet, Kachem...	CI_03_28	SP	Ramp with gravel...	July 3, 2003			
Cook Inlet, Kachem...	CI_03_29	SP	Cliff with gravel b...	July 3, 2003			
Cook Inlet, Kachem...	CI_03_30	P	Gravel flat, wide	July 3, 2003			
Cook Inlet, Kachem...	CI_03_31	P	Gravel flat, wide	July 3, 2003			
Cook Inlet, Kachem...	CI_03_33	P	Cliff with gravel b...	July 3, 2003			
Cook Inlet, Kachem...	KBAY_08_02	SP	Ramp w gravel &...	July 1, 2008			
Cook Inlet, Kachem...	KBAY_08_03	SE	Rock Cliff	July 1, 2008			
Cook Inlet, Kachem...	KBAY_08_04	SE	Gravel flat wide	July 2, 2008			

Data: Shore Station:

Photos: No Image Loaded

Windows Taskbar: 10:19 PM 4/16/2013



Data

Photos

Peterson Bay, Inner Kachemak Bay, B08, Kelp, .

Pictures: 50

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FishAtlas Statewide Queries

Submit Clear FishAtlas Home

Area
 Statewide
 Group By Region
 Group By Locale
 Group By Site

Fish
 All Species
 Select a Species

Habitat
 All Habitats
 Group by Habitats
 Select a Habitat

Habitat key
 ● Bedrock
 ● Eelgrass
 ● Kelp
 ● Sand-Gravel

FishAtlas Regions FishAtlas Locales FishAtlas Sites Temperature Data Eelgrass Maps

Locales: Inner Kachemak Bay Habitat: Species Filter Total: 4

Site	Region	Locale	Location	Lat	Long	Habitat	Photos	Seine Data
B09	southcentral Ala:	Inner Kachemak Bay	Peterson Bay	59.5945	-151.2793	Bedrock		
B08	southcentral Ala:	Inner Kachemak Bay	Peterson Bay	59.5782	-151.2687	Kelp		
B10	southcentral Ala:	Inner Kachemak Bay	Peterson Bay	59.5795	-151.2974	Sand-Gravel		
B11	southcentral Ala:	Inner Kachemak Bay	China Poot Bay	59.567	-151.3511	Sand-Gravel		

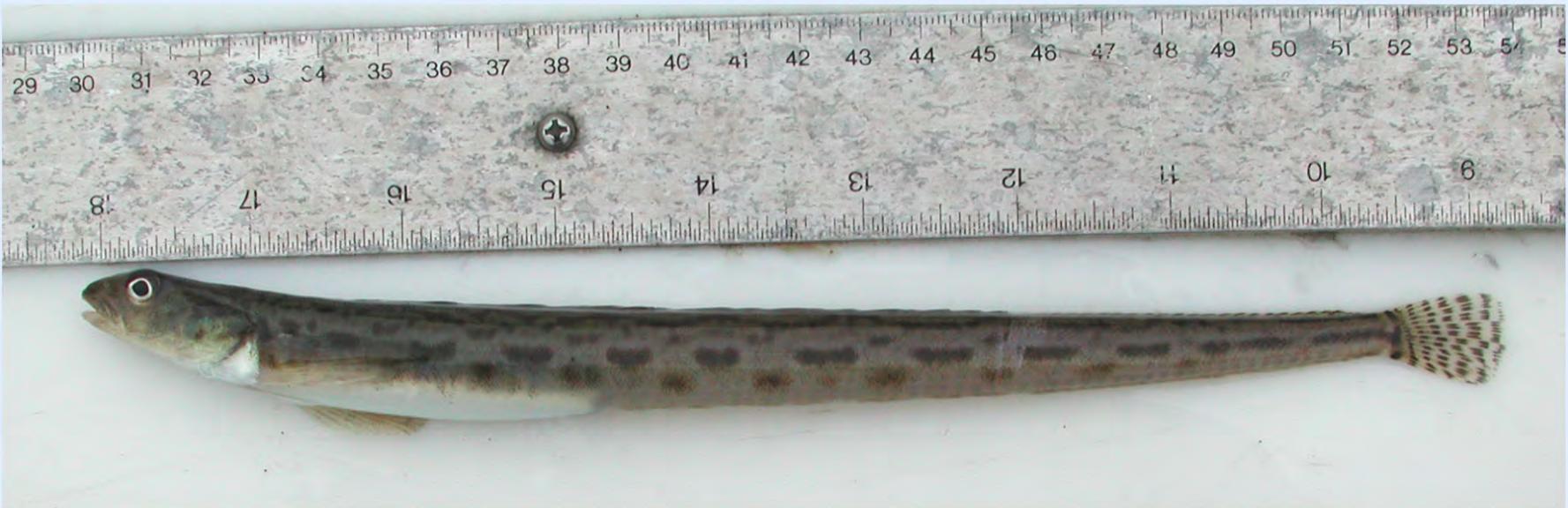
Seine Data for Inner Kachemak Bay, southcentral Alaska, Peterson Bay, B08

FMP Species Forage Fish All Fish Filter Date: Total: 15

Species	Date	Catch	Average Length	# Measured	FMP	Forage
Pink salmon	7/3/2008	87	62.7	50	Yes	No
Juvenile greenling	7/3/2008	30	55.5	30	No	No
Saffron cod	7/3/2008	17	183.1	17	No	No
Whitespotted greenling	7/3/2008	7	64.5	7	No	No
Masked greenling	7/3/2008	4	135	4	No	No
Snake prickleback	7/3/2008	3	192	3	Yes	No
Silverspotted sculpin	7/3/2008	3	40	3	Yes	No
Pacific cod	7/3/2008	2	171	2	Yes	No
Frog sculpin	7/3/2008	2	157.5	2	Yes	No
Coho salmon	7/3/2008	2	90	2	Yes	No
Crescent quannel	7/3/2008	2	0	2	Yes	No
Saitfin sculpin	7/3/2008	1	138	1	Yes	No
Juvenile cod	7/3/2008	1	42	1	No	No
Chum salmon	7/3/2008	1	75	1	Yes	No



juveniles and adults (91-320 mm)



juvenile (239 mm)

Cook Inlet Response Tool

Cook Inlet Response Tool

The Cook Inlet Response Tool (CIRT) is a data integration & visualization product designed to assist responders in the event of an oil spill or other event. This interactive web-based tool combines:

- GIS spatial data layers
- Real time observations
- Model nowcast/forecasts for winds, waves, and ocean circulation,
- ShoreZone video and imagery
- The tool was developed in collaboration with the Cook Inlet Regional Citizens' Advisory Council (CIRCAC), the Alaska Ocean Observing System (AOOS), and the National Oceanic and Atmospheric Administration (NOAA).



Cook Inlet was selected for the demonstration project because many of the needed datasets are mature, and the area is tractable. The application is scalable so that other areas in Alaska and the nation will benefit.

Data Layer Catalog

The Data Layer Catalog is a listing of the information currently available through CIRT, along with human-readable metadata, links to sources, etc. The Catalog provides a metadata search interface for CIRT as well as the abilities to quickly explore individual datasets and queue multiple data layers into CIRT's Interactive Ocean Portal.



Go to search

Watch video tutorial

Interactive Ocean Portal

The CIRT Interactive Ocean Portal displays map-projected data in and around Cook Inlet. It has a library of data layers that include meteorological models (e.g., wind, waves and currents), habitat and species information from field-based mapping projects, ShoreZone imagery and video, real-time sensors, and more.



Launch Ocean Portal

Watch video tutorial

Browser window showing the Cook Inlet Response Tool (CIRT) interface. The URL is <http://data.aos.org/maps/cirt/#y=h&l=3f8a53>. The interface displays a map of the Cook Inlet region in Alaska, overlaid with a grid of vector arrows representing sea water velocity. The map includes geographical features like Tustumena Lake, Kenai Fjords National Park, and Kachemak Bay State Park. A legend on the right side lists data layers: Sensors (Tide predictions, Web cams), SHOREZONE Geographic Response Strategies, and Raster layers (PRINCE WILLIAM SOUND (PWS) REGIONAL OCEAN MODELING SYSTEM (ROMS) FORECAST 3 KM X 3 KM (GULF OF ALASKA), Sea Water Velocity [m/s]). The Sea Water Velocity layer is active, showing a color scale from 0.000001 to 5.1500 m/s. The time period is set to Wed Apr 17 06:00:00 2013 UTC. The map shows a grid of white arrows on a blue background, with various colored markers (red, green, blue) and numbers (e.g., 18, 20, 23, 25, 27, 28, 31, 32, 33) indicating sensor locations. A 'Data filter' button is visible in the legend. The bottom of the screen shows a Windows taskbar with the time 10:49 PM on 4/16/2013.

Map
& Photo

Legend



SWCI-10 Rocky Cove and Sunday Creek looking west.

-  Free-oil Containment and Recovery, Shallow Water
-  Exclusion Booming
-  Deflection Booming
-  Protected-water Boom
-  Bears in Area, Guards Needed

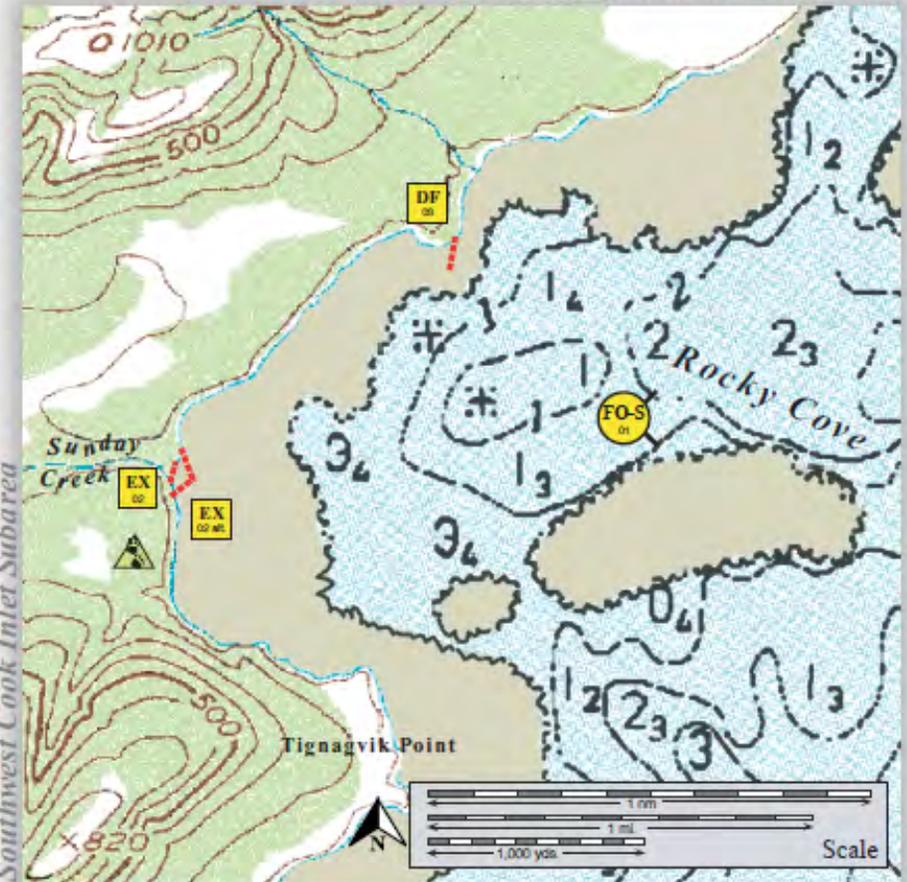


SWCI-10-02 Sunday Creek looking west.

Geographic Response Strategies for Southwest Cook Inlet Subarea

Sunday Creek, SWCI-10

Center of map at 59° 26.7' N Lat., 153° 43.4' W Lon.





U.S. Coast Guard

Alaska ShoreZone

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Layer Legend | Layer Query | Task Management

Show all layers in service

- Sedges
- Salt Marsh Vegetation
- Barnacles
- Rockweed
- Blue Mussels
- Green Algae
- Red Algae
- Bleached Red Algae
- Alaria
- Soft Brown Kelps
- Dark Brown Kelps
- Seagrass Biobands
- Surfgrass
- Cañon/Kelp/Rhizoids

Unit ID: 05/05/0063/0

Length: 231
 Habitat Class: 21: Exposed/Partially Mobile/Sediment or Rock and Sediment
 Biological Wave Exposure: Exposed
 Oil Residency Index (ORI): 3 Moderate persistence; weeks to months
 BC Class: Ramp w gravel beach (9)
 EST: Exposed rocky cliffs with boulder talus base (1C)
 Splash Zone: Wide (greater than 5m)
 Blue Mussel: Continuous
 Red Algae:
 Alaria: Continuous
 Dark Brown Kelps:
 Surfgrass: Patchy
 BullKelp: Continuous

Latitude: 57.09338 Longitude: 153.10693

Unit Description Table

Units for viewable region. Total Unit Count: 31

Unit ID	Length	Habitat Class	Biological Wave Exposure	Oil Residency Index (ORI)	BC Class	Environmental Sensitivity	Splash Zone
05/05/0056/0	846	21	E	2	28	7	
05/05/0057/0	457	21	E	3	9	1C	W
05/05/0058/0	347	21	E	3	7	2A	W
05/05/0059/0	780	21	E	3	7	2A	W
05/05/0060/0	843	21	E	3	6	2A	W
05/05/0061/0	245	21	E	3	9	1C	W
05/05/0062/0	429	21	E	3	21	6B	W
05/05/0063/0	231	21	E	3	9	1C	W
05/05/0064/0	130	21	E	3	6	1C	W

Video Snapshots

Lat: 57° 5' 28" N Lon: 153° 6' 43" W

5705N4785 15306W725
 172413 Q105-31-2

Photo Snapshots

Lat: 57° 5' 31" N Lon: 153° 6' 31" W

“...primarily comprised of mixed sand and gravel beaches.”

Show all layers in service

- Environmental Sensitivity Index (ESI)
- Oil Residency Index (ORI)
 - 1 Short persistence; days to weeks
 - 2 Short persistence; weeks to months
 - 3 Moderate persistence; weeks to months
 - 4 Moderate persistence; months to years
 - 5 Long persistence; months to years
- Biological Attributes
 - SplashZone; Black Seaside Lichen bioband
 - Dune Grass, Sedges, and Salt Marsh Vegetation
 - Dune Grass
 - Sedges
 - Salt Marsh Vegetation

Video Snapshots

Lat: 57 6' 18" N Lon: 153 5' 23" W



5706N3017 - 15305W3908
172531 Q105-31-28

Low

Photo Snapshots

Lat: 57 6' 20" N Lon: 153 5' 23" W



Data Integration/Visulaization

The screenshot displays the Cook Inlet Response Tool (CIRT) interface. The top section features a map of Cook Inlet with red and blue stream lines. A legend on the right lists layers: 'Anadromous Salmon' and 'Anadromous Waters Catalog'. Below the map, a media viewer shows a video and a photo of the inlet area. The video player includes a 'Sync map with media' checkbox and a 'View original' link for the photo.

5708N0825 15301W4399
173153 Q105-31-28

57.134708,-153.023648 View original

“Several anadromous streams are also in the general area. There have been two locations identified where measures can be taken to protect two known salmon streams in the immediate area.”



Meanwhile...
more than 12
hours later...

Kulluk Photos U.S. Coast Guard

On-line Tools

- <http://alaskafisheries.noaa.gov/shorezone/>
 - SZ Data and Imagery, Shore Stations, Fish Atlas, Documentation
- www.shorezone.org
 - SZ Partner Activities, Tutorials, Documents, Blog, News
- www.aoots.org
 - Cook Inlet Response Tool
- saupe@circac.org
 - If questions....