

THE WASHINGTON COASTAL ATLAS AND THE INTERNATIONAL COASTAL ATLAS NETWORK: CONNECTING TO THE ICAN PROTOTYPE

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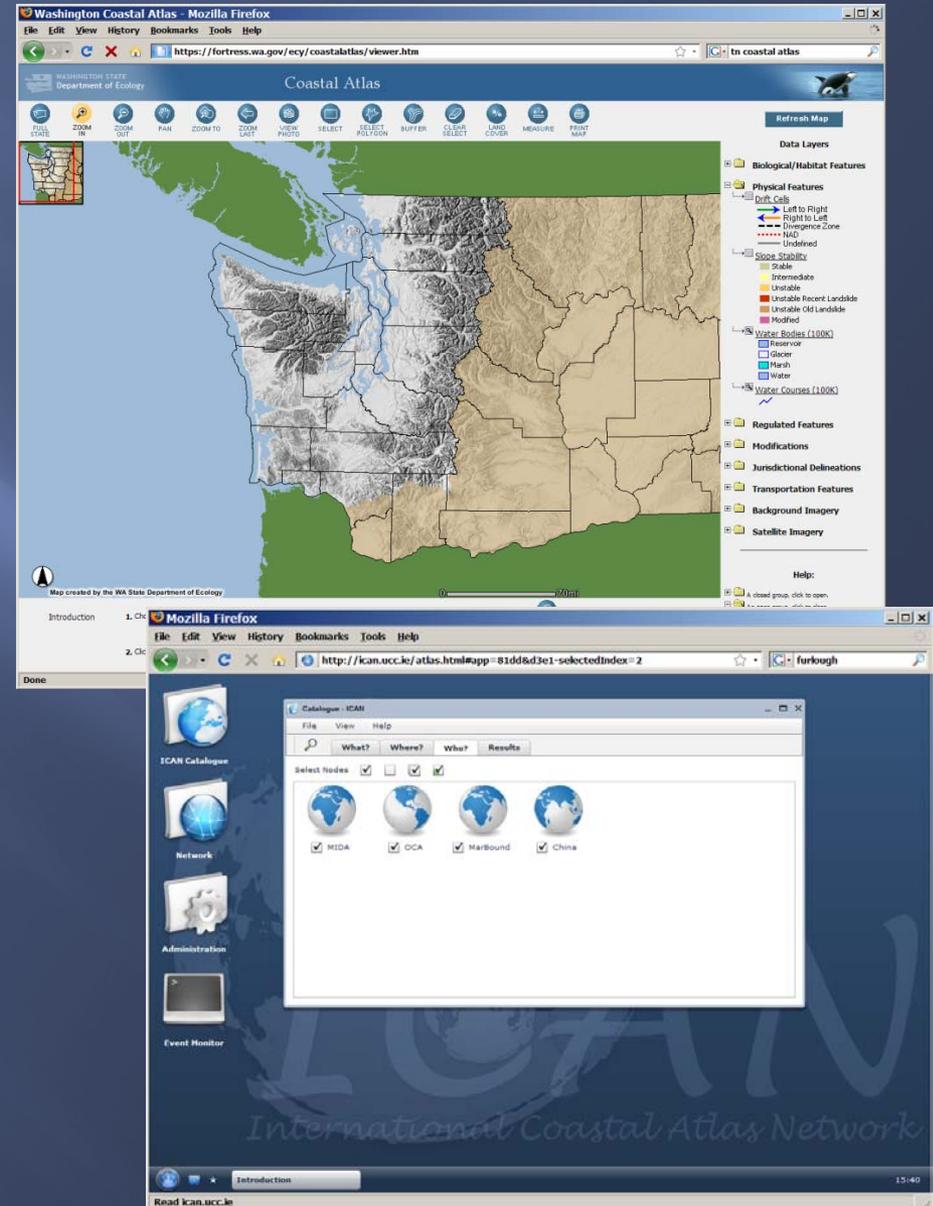
Washington State Dept. of Ecology

Olympia, WA



Outline

1. Washington Coastal Atlas
2. ICAN Atlas Mediator Prototype
3. Connecting the WA Coastal Atlas to the ICAN Prototype
4. Conclusions



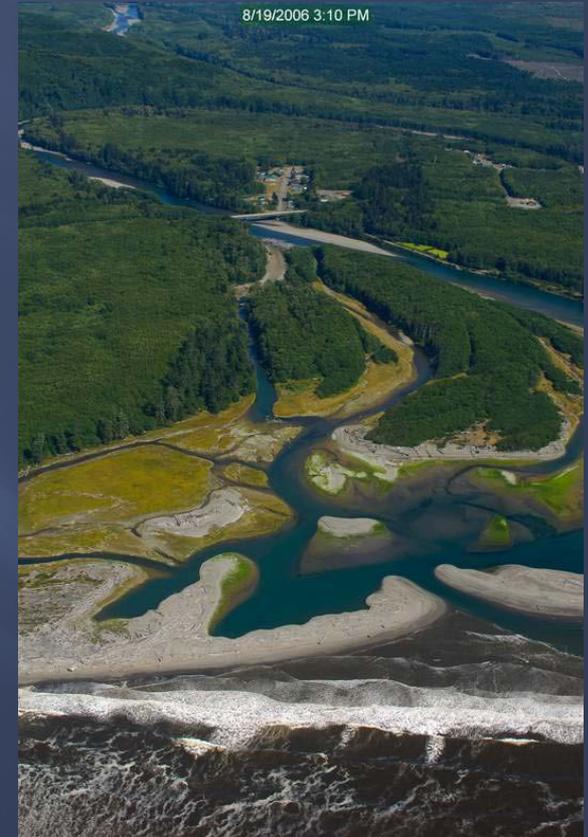
Washington Coastal Atlas

The screenshot shows the Washington Coastal Atlas homepage in a Mozilla Firefox browser window. The address bar displays the URL <http://www.ecy.wa.gov/programs/sea/sma/atlas>. The page header includes the Department of Ecology logo and navigation links for Home, About Us, Environmental Education, Public Input, News, and Employment. A search bar is located in the top right. The main content area features a large banner for the Washington Coastal Atlas, followed by a 'COASTAL ATLAS HOME' section with links for Start Mapping, Tips for Using Site, and Useful Links. Below this is a 'Start Mapping' section with a map icon and text describing the atlas's purpose. Further down are sections for 'Tips for Using this Site' and 'Useful Links'. At the bottom, there are logos for Washington State Department of Natural Resources and NOAA Coastal Services Center, along with footer information including 'Access Washington' and copyright details.

- Established in 1995
- Created to assist local governments with Shoreline Management Planning
- Audience
 - Local Governments
 - Fed/State/Tribal govts.
 - Research, policy, planning
 - General public

Purpose of the Atlas

- ▣ To make relevant information easily available for use in coastal and shoreline resource planning and management.
- ▣ Examples:
 - View current or historic aerial photos of project sites
 - Gather info prior to inspections or other field work
 - Quickly prepare maps to inform a variety of audiences on specific topics or projects
 - Document shoreline violations



Coordination with State Entities

Dept. Natural Resources

Dept. Fish & Wildlife

Puget Sound Partnership

Community Trade & Economic Development

Parks

Recreation & Conservation Office

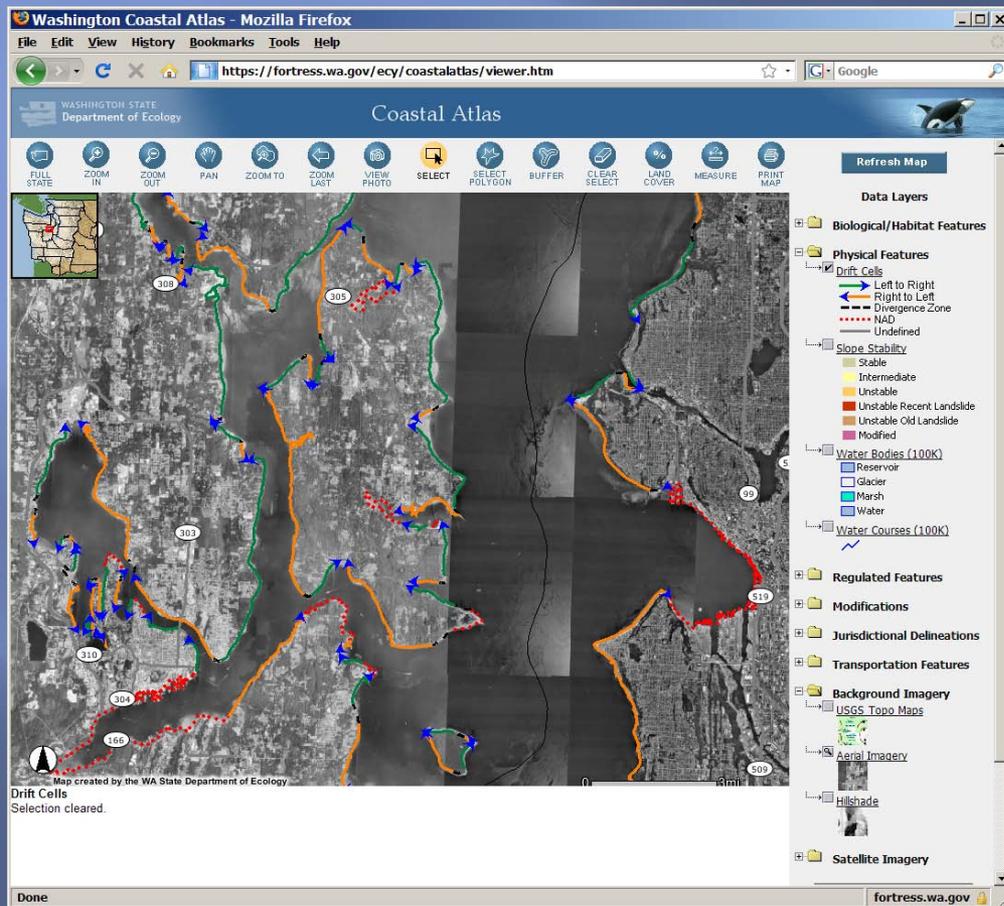
Dept. of Health

Dept. of Transportation

NW Indian Fisheries Commission

Data from Ecology, DNR, WDFW, NOAA C-CAP, DOH
& others

Technology



- ❑ ESRI ArcIMS 9.2
- ❑ ArcSDE 9.2: Data, simplified metadata
- ❑ MS SQL Server 2005
- ❑ IIS Server, Apache Tomcat 5.5
- ❑ ASP.NET v2.0 (Coastal Image Viewer and Land Cover Tool)

Data Available

▣ Biological/Habitat Features

- Wetlands
- Historic Estuary Maps
- Pocket Estuaries
- Dunegrass, Surfgrass
- Kelp, Eelgrass
- Salt Marsh
- Low Marsh

▣ Physical Features

- Drift Cells
- Slope Stability
- Water Bodies (100k)
- Water Courses (100k)

▣ Regulated Features

- Commercial Shellfish
- Flood Zone
- Drinking Water Wells
- Category Water (5, 4C, 4B, 4A, 2, 1)

▣ Modifications

- Piers and Docks
- Shore Modification

▣ Jurisdictional Delineations

- Watershed (WRIA) Boundaries
- Sub Basins
- Counties
- Cities
- Township/Range/Section

▣ Transportation Features

- Major Roads
- Streets
- Railroads

▣ Background Imagery

- USGS Topo Maps
- Aerial Imagery
- Hillshade
- Nautical Charts

▣ Satellite Imagery

- Land Use/Land Cover 1991, 1996, 2001

▣ Other Imagery

- Oblique shoreline photos 1976-77, 1992-'97, 2000-02, 2006

WASHINGTON STATE Department of Ecology Coastal Atlas 

 FULL STATE
  ZOOM IN
  ZOOM OUT
  PAN
  ZOOM TO
  ZOOM LAST
  VIEW PHOTO
  SELECT
  SELECT POLYGON
  BUFFER
  CLEAR SELECT
  LAND COVER
  MEASURE
  PRINT MAP

Refresh Map



Data Layers

- Biological/Habitat Features
- Physical Features
- Regulated Features
- Modifications
- Jurisdictional Delineations
- Transportation Features
- Background Imagery
 - Nautical Chart
 - USGS Topo Maps
 - Aerial Imagery
 - Hillshade
- Satellite Imagery

Help:

- A closed group, click to open.
- An open group, click to close.
- A hidden layer, click to make visible.
- A visible layer, click to hide.
- A visible layer, but not at this scale.

 Map created by the WA State Department of Ecology

0 90mi

Introduction

1. Choose Data Layers to display from right hand menu and then click **Refresh Map**. If layer is not visible,  until features are displayed.

2. Click on tools such as ,  or  for further instructions and information in this window.

Modifications to the Environment

WASHINGTON STATE Department of Ecology Coastal Atlas

Refresh Map

Data Layers

- Biological/Habitat Features
- Physical Features
- Regulated Features
- Modifications
 - Piers and Docks (#)
 - 0 - 6
 - 5 - 35
 - 34 - 122
 - Shore Modification (%)
 - 0 - 21
 - 20 - 71
 - 70 - 100
- Jurisdictional Delineations
- Transportation Features
- Background Imagery
- Satellite Imagery

Help:

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Pan Tool

Allows the user to re-center or move around the map by **1)** Clicking on the Map and, while holding down the left mouse button, **2)** Dragging the Map View across the screen. Release the mouse button when the map is centered at the desired location.

Physical Data

Refresh Map



Data Layers

- Biological/Habitat Features**
- Physical Features**
 - Drift Cells**
 - Left to Right
 - Right to Left
 - Divergence Zone
 - NAD
 - Undefined
 - Slope Stability**
 - Stable
 - Intermediate
 - Unstable
 - Unstable Recent Landslide
 - Unstable Old Landslide
 - Modified
 - Water Bodies (100K)**
 - Reservoir
 - Glacier
 - Marsh
 - Water
 - Water Courses (100K)**
 -
- Regulated Features**
- Modifications**
- Jurisdictional Delineations**
- Transportation Features**
- Background Imagery**
- Satellite Imagery**

Map created by the WA State Department of Ecology

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Metadata

Department of Ecology GIS Geographic Information System GIS Layer Information

Layer Name:	Slope Stability
Description:	The digital maps presented here were originally published as hard copy maps in the Coastal Zone Atlas of Washington between 1978 and 1980. Although the Atlas has been out of print for many years, the maps contain information that remain the basis for local planning decisions. After receiving multiple requests for electronic versions of portions of the Atlas, an effort was made to scan, georeference and digitize aspects of the Atlas, beginning with the slope stability maps. These maps indicate the relative stability of coastal slopes as interpreted by geologists based on aerial photographs, geological mapping, topography, and field observations.
Source:	Washington State Department of Ecology, Shorelands and Coastal Zone Management Program
Scale:	1:100,000
Date:	2004

No attribute records found for layer slp_stblty

Refresh Map

Data Layers

- Biological/Habitat Features
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 - Right to Left
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WASHINGTON STATE
Department of Ecology

FULL STATE ZOOM IN ZOOM OUT

Map created by the WA State De

Allows the user to re-center or move around map is centered at the desired location.

Allows the user to re-center or move around map is centered at the desired location.

Land Use/Land Cover

- FULL STATE
- ZOOM IN
- ZOOM OUT
- PAN
- ZOOM TO
- ZOOM LAST
- VIEW PHOTO
- SELECT
- SELECT POLYGON
- BUFFER
- CLEAR SELECT
- LAND COVER
- MEASURE
- PRINT MAP

Refresh Map

Data Layers



Report on Percent Cover of Forest Canopy

Impervious Surface Report

Report on Percent Impervious Surface

Forest Canopy

The percentage of impervious surface is a measure of the amount land covered by constructed materials, roofing, metal, concrete, and asphalt. Areas covered by vegetation (either natural or cultivated) or other water, bare land, or snow, were not counted as impervious surface.

Areas with greater percentages of impervious surface may include heavily built-up urban centers and constructed surfaces in suburban and rural areas. Some of the structures contributing to high impervious include high density residential dwellings, shopping centers, factories, industrial complexes, highways runways.

Areas with lower percentages may have fewer urban centers and large buildings and more area covered or other cover types.

The values reported reflect an average amount of impervious surface across the area of land selected (sub or watershed (WRIA). The amount of impervious surface is reported as a percentage of the total area.

The change in the percentage of impervious surface over time indicates how much of the other land cover converted into impervious surface.

While this information is useful in identifying regional landscape patterns, it is not intended to be used to land use decisions at a fine scale of individual parcels.

County Name	% Impervious Surface 1991	% Impervious Surface 1996	% Impervious Surface 2001	% Change in Impervious Surface 1991-1996	% Change in Impervious Surface 1996-2001	% Change in Impervious Surface 1991-2001
Pierce	4.8	5.1	5.4	6.2	5.8	12.5

The percentage of forest canopy is a measure of the amount of area covered by woody vegetation greater than 6 meters (20 ft) in height. This includes:

- evergreen forest (e.g. Douglas fir, western red-cedar, western hemlock),
- deciduous forest (e.g. red alder, oak, big-leaf maple),
- mixed forest (e.g. evergreens and deciduous), and
- forested wetlands (e.g. sitka spruce).

The values reported reflect an average forest canopy across the area of land selected (sub-basin, county, or watershed (WRIA), because the amount of forest canopy cover is reported as a percentage of the total area.

The change in the percentage of forest canopy cover over time indicates how much forest was converted into other land cover types (reductions in percent forest cover) or the amount of reforestation of previously non-forested area (increases in forest percent forest cover).

The data used in this analysis have an overall accuracy of 85 percent. While this information is useful in identifying regional landscape patterns, it is not intended to be used to make specific land use decisions at a fine scale of individual parcels.

County Name	% Forest Canopy Cover 1991	% Forest Canopy Cover 1996	% Forest Canopy Cover 2001	% Change in Forest Canopy 1991-1996	% Change in Forest Canopy 1996-2001	% Change in Forest Canopy 1991-2001
Pierce	56.0	55.0	53.0	-2.0	-4.0	-5.0

Technical Information:

- Bare Land/Unconsolidated Shore
- Water

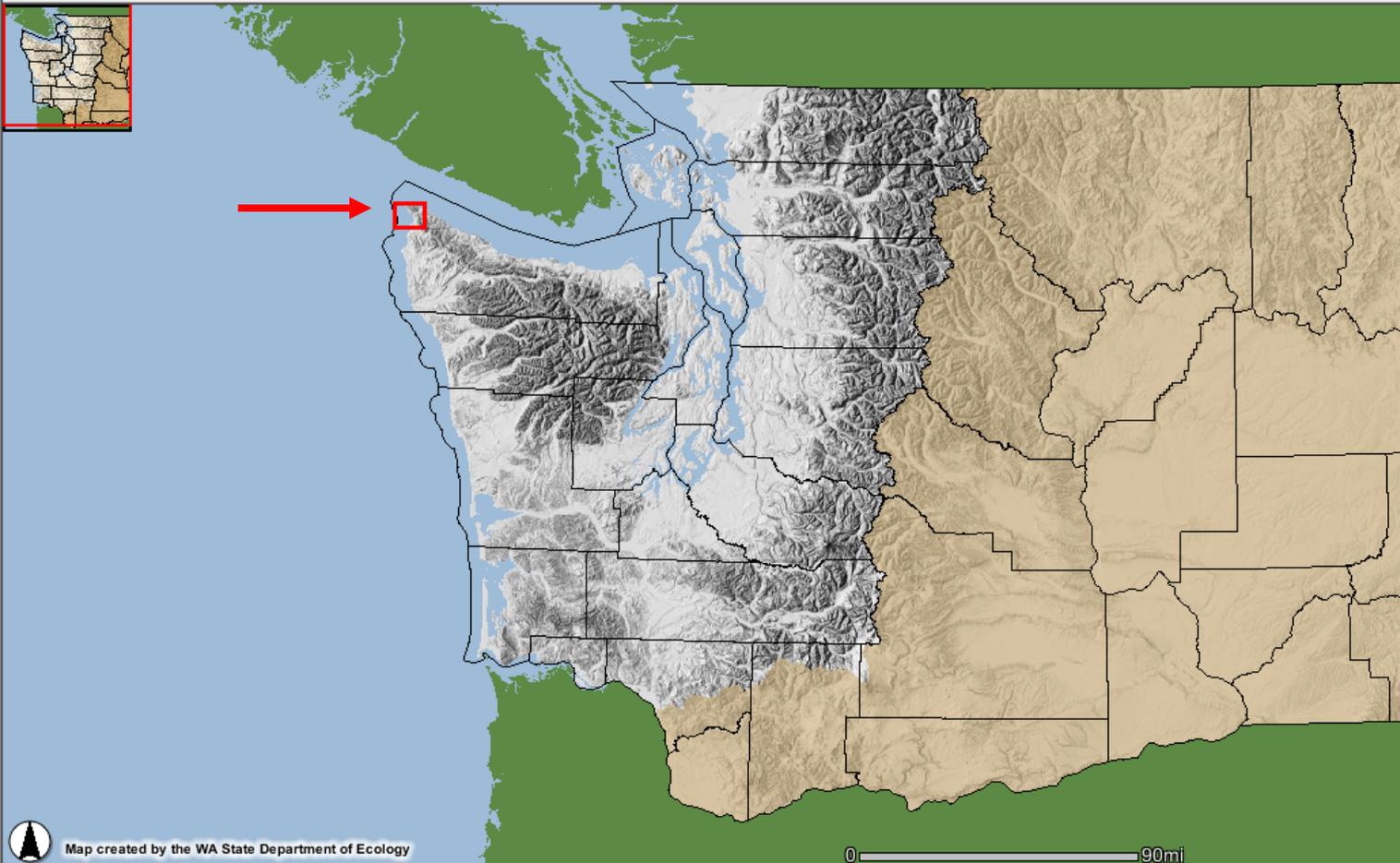
Special Features: Oblique Aerial Photos of Shoreline

- ▣ Downloadable
- ▣ High Resolution
- ▣ Available for Multiple Years
- ▣ Available for
 - all WA marine shorelines
 - some freshwater shorelines throughout WA



FULL STATE ZOOM IN ZOOM OUT PAN ZOOM TO ZOOM LAST VIEW PHOTO SELECT SELECT POLYGON BUFFER CLEAR SELECT LAND COVER MEASURE PRINT MAP

Refresh Map



- Data Layers
- Biological/Habitat Features
 - Physical Features
 - Regulated Features
 - Modifications
 - Jurisdictional Delineations
 - Transportation Features
 - Background Imagery
 - Satellite Imagery

- Help:
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2. Click on tools such as , , or  for further instructions and information in this window.

WASHINGTON STATE Department of Ecology
Coastal Atlas 

Map navigation tools: FULL STATE, ZOOM IN, ZOOM OUT, PAN, ZOOM TO, ZOOM LAST, **VIEW PHOTO** (circled in red), SELECT, SELECT POLYGON, BUFFER, CLEAR SELECT, LAND COVER, MEASURE, PRINT MAP



Refresh Map

Data Layers

- Biological/Habitat Features
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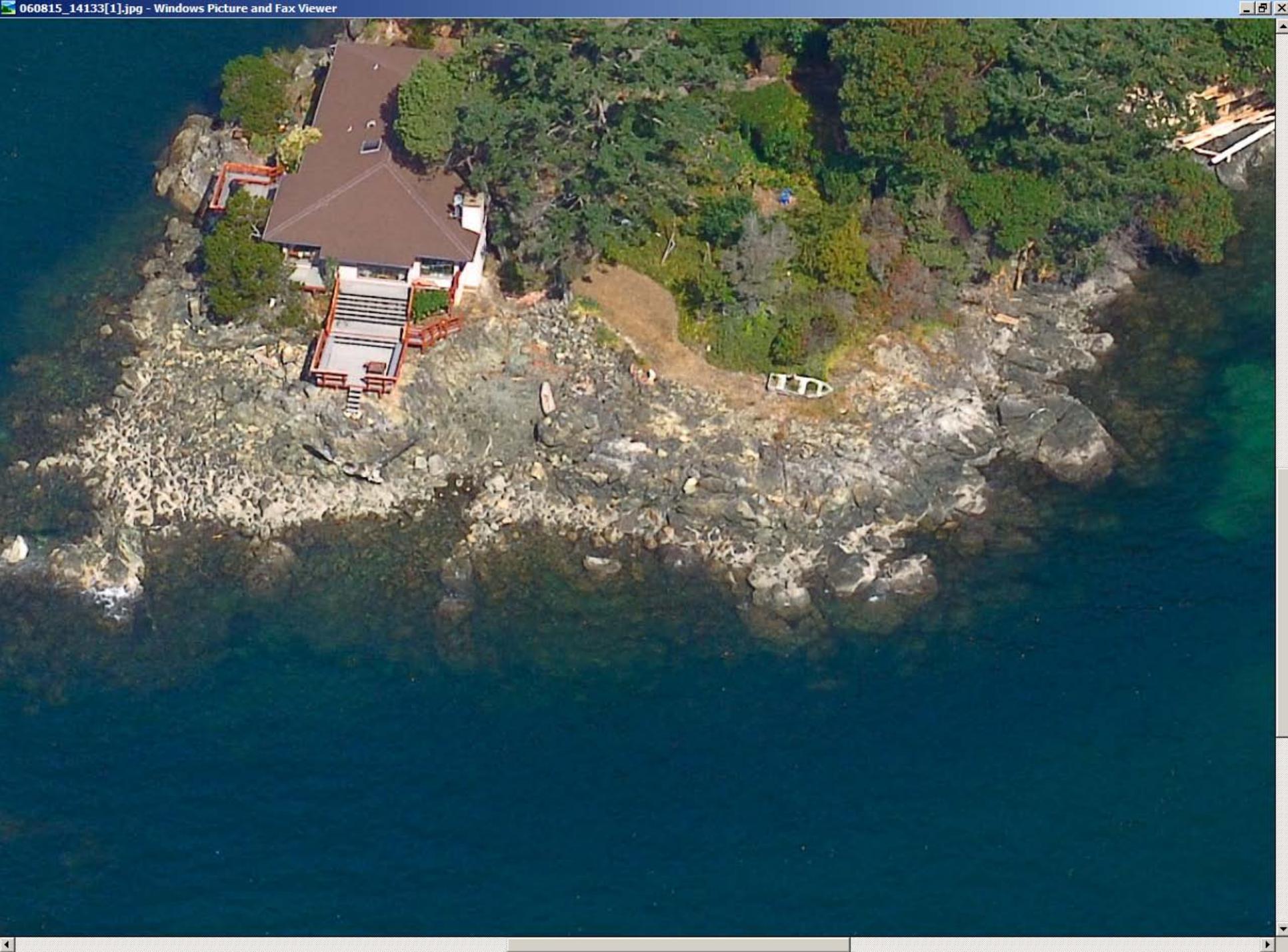
View Shoreline Photos

Choose a time period for which you would like to view photos below, then click on a point to view the oblique 1970's, 1990's or 2000's photos or within a grid cell for the vertical 1940's photos.

Vintage: **Shoreline Photos 2006-07** (selected)
Shoreline Photos 2000-02
Shoreline Photos 1992-97
Shoreline Photos 1976-77

Hide Photo Layer







Oblique Aerial Photos of Shoreline

- ▣ Downloadable
- ▣ High Resolution
- ▣ Available for Multiple Years
- ▣ Available for
 - all WA marine shorelines
 - some freshwater shorelines throughout WA





Photo Reference: PIE0677_063

Date: on photo

Area: Ruston ASARCO Plant

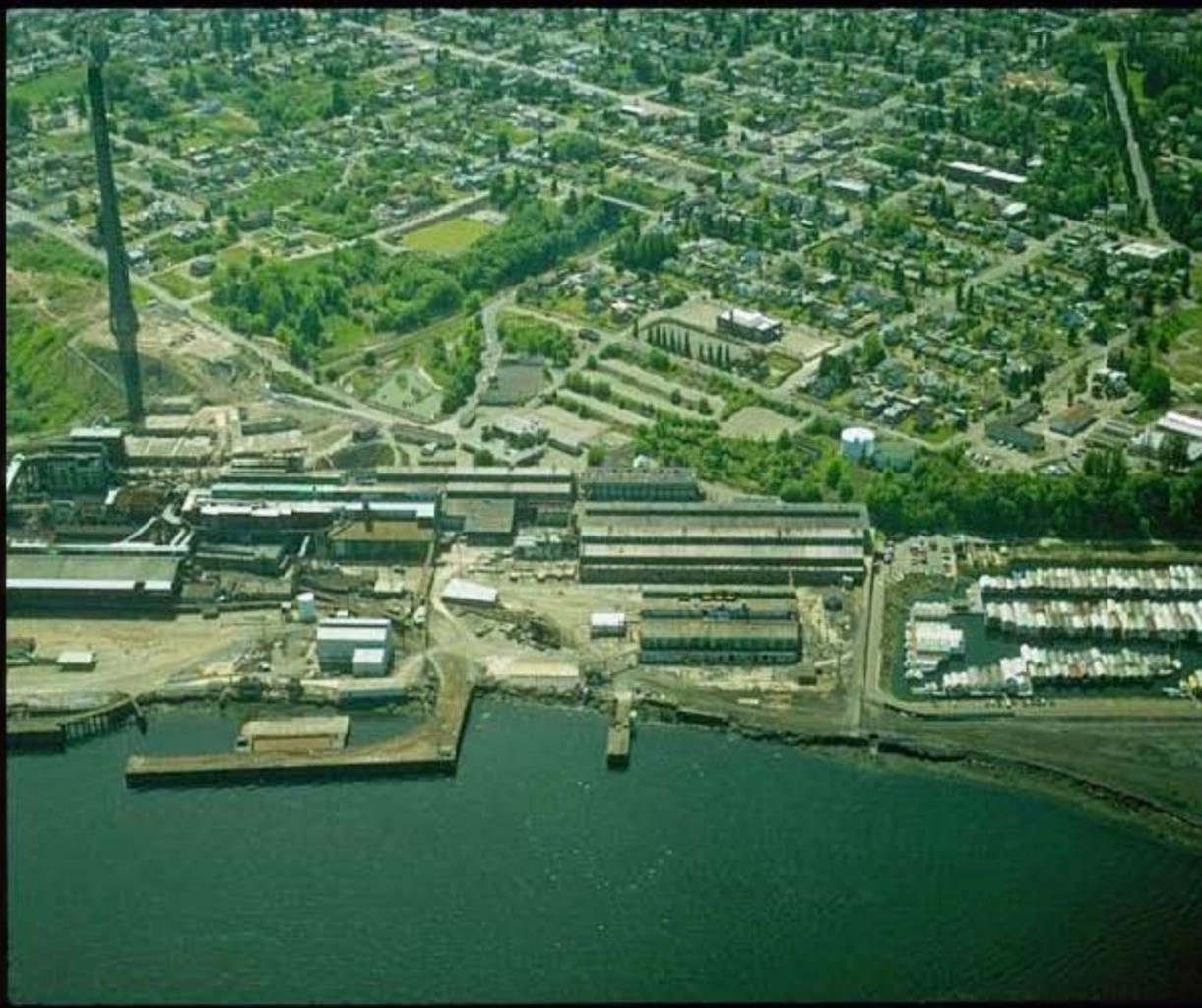
Download links for this photo:

[Low Resolution \(700 x 702 pixels, 618Kb\)](#)

[High Resolution \(2092 x 2118 pixels, 1131Kb\)](#)



Next ▲ Image



Next ▼ Image

Photo Reference: PIE0102

Date: 5/16/1992

Area: Asarco Smelter

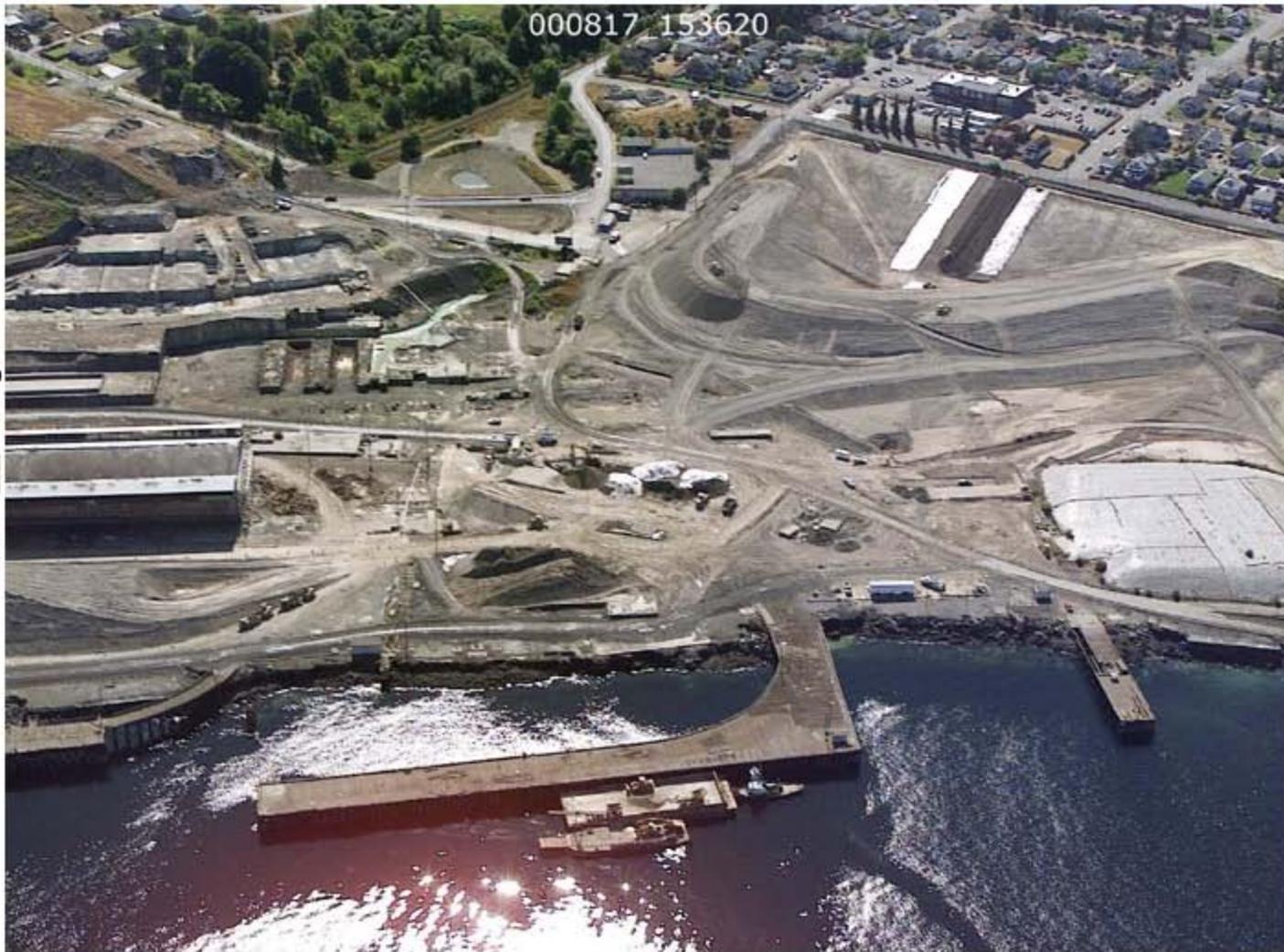
Download links for this photo:

[Low Resolution \(768 x 512 pixels, 92Kb\)](#)

*** High resolution image not available ***



000817_153620



Next  Image

Next  Image

Photo Reference: 000817_153620

Date: 8/17/2000

Download links for this photo:

[Low Resolution \(700 x 524 pixels, 185Kb\)](#)

[High Resolution \(2008 x 1504 pixels, 718Kb\)](#)



7/27/2006 1:40 PM



Next ▲ Image

Next ▼ Image

Photo Reference: 060727_10050

Date: 7/27/2006

Download links for this photo:

Future Development

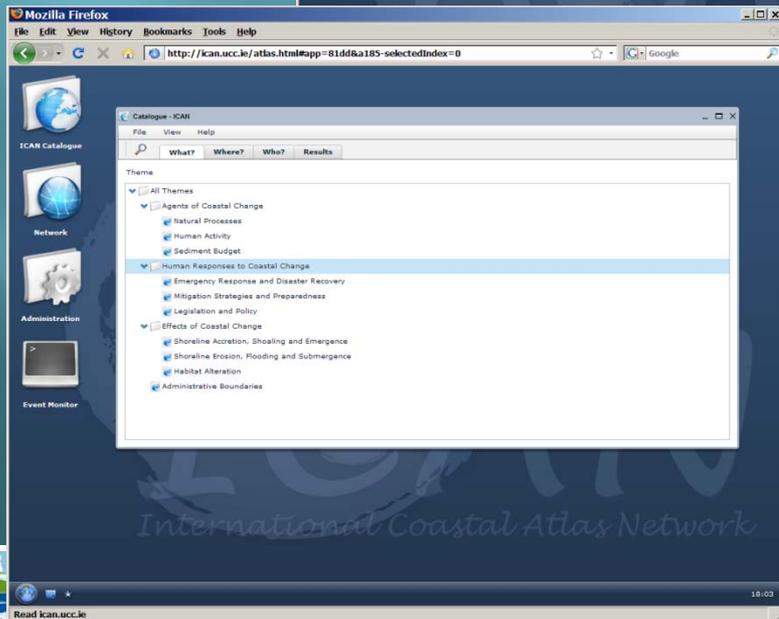
- ▣ Will add information on public access to Washington marine shorelines.
- ▣ Working cooperatively with other state agencies
- ▣ Increasing communication with Oregon, BC, Alaska and California Coastal Atlases:
 - West Coast Coastal Atlas Workshop
- ▣ Increasing interoperability w/other atlases through the International Coastal Atlas Network (ICAN)



ICAN Atlas Mediator Prototype: Aims



- Develop an internationally-enabled Coastal Web Atlas (CWA) ontology
 - users will be able to conduct sophisticated and meaningful queries across a range of atlases
- a proof-of-concept exercise
 - a single test case: coastal erosion
- make connections within regional partnerships
 - build and strengthen atlas networks



Search All Atlases:
"Global Ontology"



ICAN Catalogue



Network



Administration



Event Monitor

Catalogue - ICAN

File View Help

What? Where? Who? Results

Theme

- All Themes
 - Agents of Coastal Change
 - Natural Processes
 - Human Activity
 - Sediment Budget
 - Human Responses to Coastal Change
 - Emergency Response and Disaster Recovery
 - Mitigation Strategies and Preparedness
 - Legislation and Policy
 - Effects of Coastal Change
 - Shoreline Accretion, Shoaling and Emergence
 - Shoreline Erosion, Flooding and Submergence
 - Habitat Alteration
 - Administrative Boundaries

International Coastal Atlas Network

Search by Area



ICAN Catalogue



Network



Administration



Event Monitor

Catalogue - ICAN

File View Help

What? **Where?** Who? Results

Blue Marble

International Coastal Atlas Network

Search by Atlases



ICAN Catalogue



Network



Administration



Event Monitor

Catalogue - ICAN

File View Help

What? Where? Who? Results

Select Nodes

<input checked="" type="checkbox"/> MIDA	<input checked="" type="checkbox"/> OCA	<input checked="" type="checkbox"/> MarBound	<input checked="" type="checkbox"/> China

International Coastal Atlas Network

Search Results

Atlas	Title	Abstract	Keywords
	Mosaic of Landsat Satellite Images	Multispectral Images acquired by the Landsat satellite for the updating of the European Land Cover database (CORINE Land Cover). These images can be used as an information source for geology, hydrology, coastal resources, environmental monitoring, land use and mapping, etc.	<i>LANDSAT, Ireland</i>
	Coastal Defence Works	This dataset has been created by the EuroSION project at a scale 1:100,000 and in vector format for the European coast. The dataset shows morpho-sedimentological patterns, geological patterns, erosion trends and the existence of coastal defence works along the Irish coast.	<i>CoastalDefenceStructures, Ireland</i>
	Shore Protective Structure Eligibility for Oceanfront Parcels in Curry County, DLCD, 2007	This dataset is a mapped inventory of ocean front tax lots and the status of their eligibility for shoreline protective structure (SPS) permits. Under Statewide Planning Goal 18, Implementation Requirement #5, SPS may be permitted only where development existed on January 1, 1977. Development is defined as houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through construction of streets and provision of utilities to the lot. Status determinations delineated in the shapefile include: 1. Developed (therefore eligible for SPS permit under Goal 18); 2. Not developed (therefore not eligible for SPS permit); 3. Undetermined (where more information was needed to make a determination); and 4. Eligible under a prior Goal 18 exception. A fifth category, -omitted from analysis- was used for oceanfront lots not subject to Goal 18 (rocky headlands), tax lots completely on the intertidal beach areas, or upland tax lots that were not oceanfront but were still included in the shapefile. Tax lots located entirely on the beach or intertidal area were not included in this database. However, those tax lots that contained both beach and upland area were included, even if the upland property was very small.	<i>Shore Protective Structure, ShoreProtectiveStructures, Erosion, Goal18, Shore Protection...</i>
	Shore Protective Structure Eligibility for Oceanfront Parcels in Lincoln County, DLCD, 2005	This dataset is a mapped inventory of ocean front tax lots and the status of their eligibility for shoreline protective structure (SPS) permits. Under Statewide Planning Goal 18, Implementation Requirement #5, SPS may be permitted only where development existed on January 1, 1977. Development is defined as houses, commercial and industrial buildings, and vacant subdivision lots which are physically improved through construction of streets and provision of utilities to the lot. Status determinations delineated in the shapefile include: 1. Developed (therefore eligible for SPS permit under Goal 18); 2. Not developed (therefore not eligible for SPS permit); 3. Undetermined (where more information was needed to make a determination); and 4. Eligible under a prior Goal 18 exception. A fifth category, "omitted from analysis" was used for oceanfront lots not subject to Goal 18 (rocky headlands), tax lots completely on the intertidal beach areas, or upland tax lots that were not oceanfront but were still included in the shapefile. Tax lots located entirely on the beach or intertidal area were not included in this database. However, those tax lots that contained both beach and upland area were included, even if the upland property was very small	<i>Coastal Erosion, Erosion, Goal18, Shoreline Hardening, Coastal Hazards...</i>
	Oregon Statutory Vegetation Line (ORS 390.77)	This shapefile represents the line of the statutory vegetation line based on ORS 390.77. This is a jurisdictional line that determines the regulatory authority of Oregon State Parks and Recreation to regulate development on the beach.	<i>statutory vegetation line, Erosion, PublicTrustResources, ocean shore, Goal18...</i>

24 Elements

Search by Atlas: Uses "Local Ontology"



ICAN Catalogue



Network



Administration



Event Monitor

ICAN - Network

File View Help

MIDA OCA MarBound China

Catalogue - OCA

File View Help

What? Where? Results

Theme

- ▼ All Themes
 - ▶ Biological
 - ▼ Human
 - ▶ Safety
 - ▶ Economy
 - ▶ Boundaries
 - ▶ Management
 - ▶ Infrastructure
 - ▶ Society
 - ▼ Physical
 - ▼ Geophysical
 - ▶ ShorelineGeomorphology
 - ▶ GeologicFault
 - ▶ EarthSurfaceGeology
 - ▶ Soil
 - ▶ OceanFloorGeology
 - ▶ Elevation

Currently 3 atlases connected

- More atlases added in next 6 mos (WCA, Wisconsin, Africa, Caribbean, Andalusia,...?)

Further expansion as funding allows

- Scope and number

Using Standards

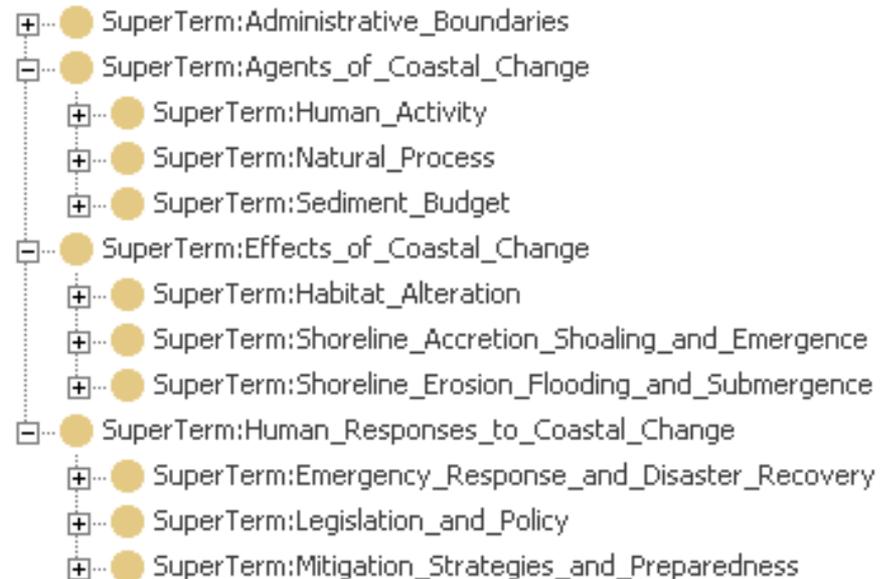
- ▣ OGC services
 - CSW, WMS, WFS, WCS
- ▣ Controlled Vocabularies/
Ontologies connect
metadata for searching
 - Ontology: A Knowledge Organisation System (KOS)
 - Define concepts (categories and subjects: ex: borders and coastline)
 - Define relationships between those concepts
 - Local Ontologies connect to Global Ontology
- ▣ Atlases have autonomy
 - Hold and distribute own data
 - **Harmonization and Mediation**

Mapping Example:

ICAN:Coastline

is similar to

WCA:Shoreline



Connecting the WCA to the ICAN Atlas Mediator Prototype

1. Pick OGC compliant software (CSW, WMS, WFS)
 - Install and set up as CSW
2. Develop Coastal Erosion Controlled Vocabulary
3. Map Local Ontology
 - Map how terms relate to each other
 - Get input from coastal hazards expert
4. Coordinate with ICAN Ontology master
 - Submit WCA ontology
 - He maps WCA ontology to super ontology
 - Adds WCA as a node in the Atlas Mediator Prototype
5. Test that ICAN atlas harvesting tool can search WCA CSW
 - Refine as needed
 - May occasionally be tweaks to ontology

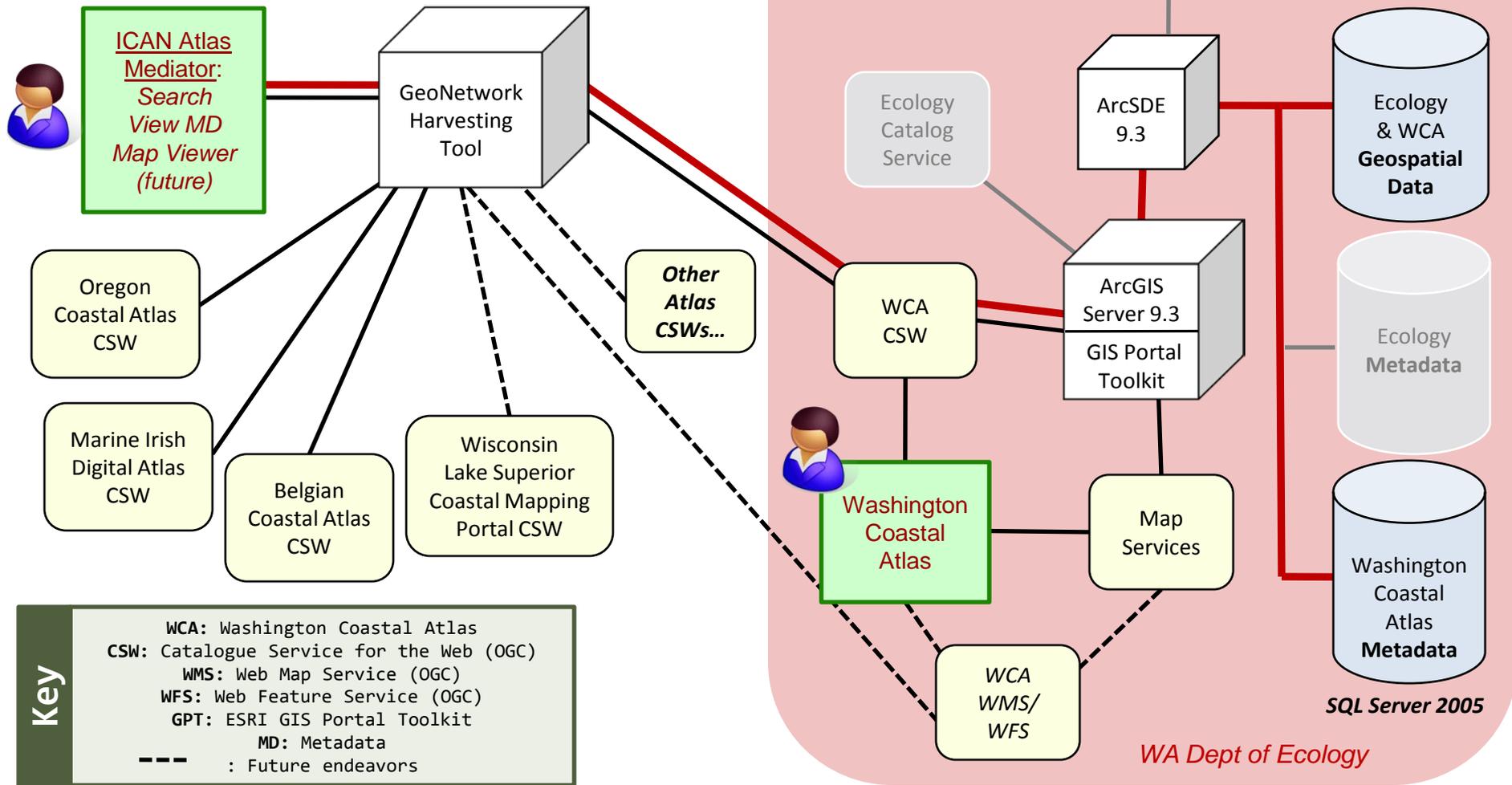
Outcome: WCA Metadata will be searchable as current connected atlases are.

ESRI GIS Portal Toolkit

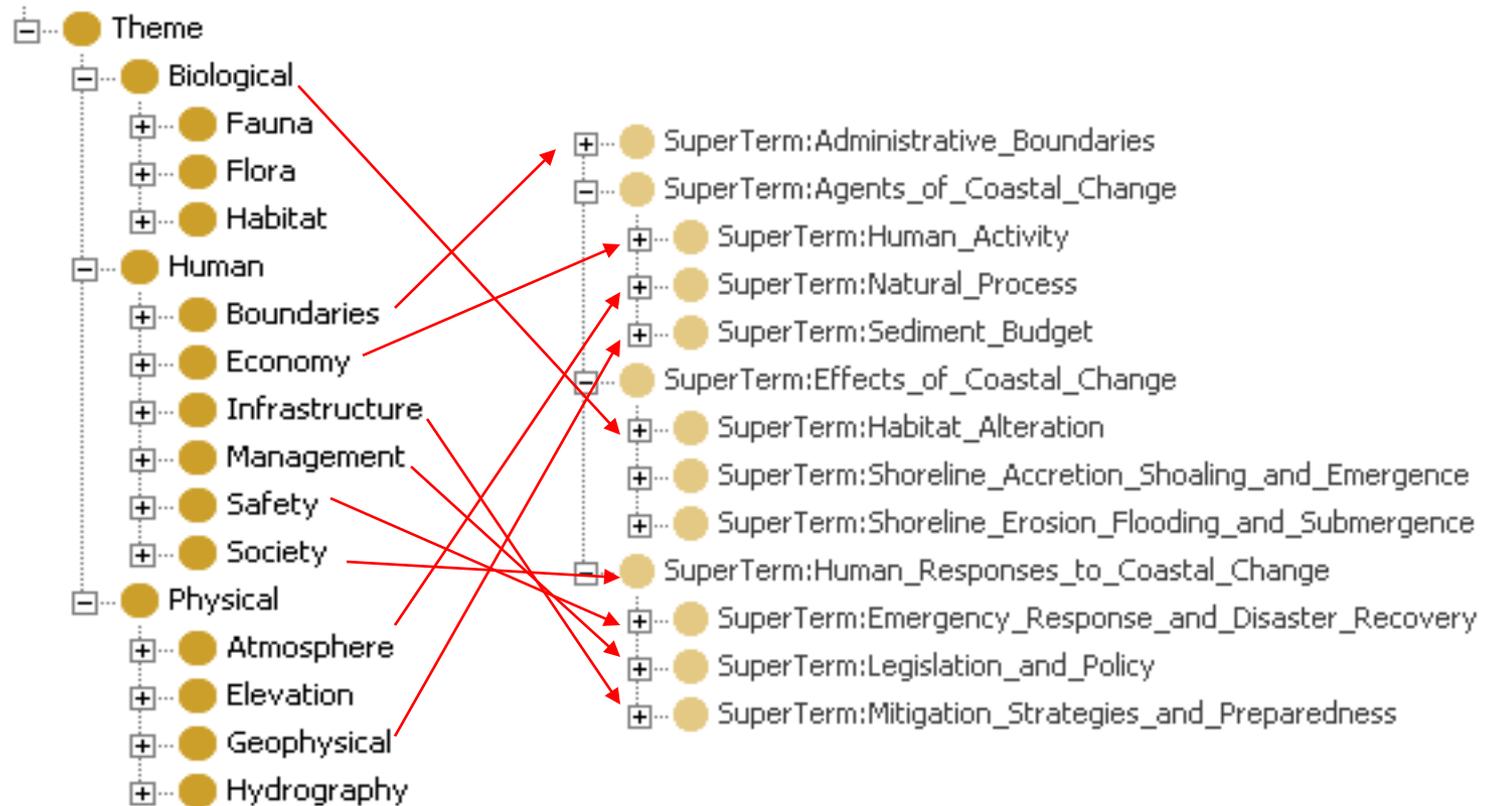
- ▣ Chosen to fit our Enterprise system
- ▣ ArcGIS Server Extension
 - Catalog and Search resources
 - Build portals, SDIs, Metadata catalogs
 - Ex: Geospatial One-Stop, NOAA Large Marine Ecosystems
- ▣ OGC Compliant
 - Catalog Service for the Web (CSW):
 - ▣ Requires editing a line in web.config
- ▣ Installation issues:
 - Unsure if it supports SQL 2008
 - Access to CSW through Firewall
 - No filters for providing limited access to target user groups
 - ▣ Must install multiple GPT instances

Architecture of The Washington Coastal Atlas:

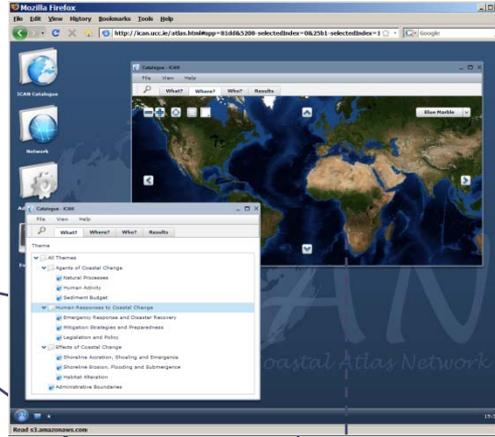
Connecting with the ICAN Atlas Mediator



Controlled Vocabulary & Mapping Ontologies



When WCA and others are Added...



ICAN Ontology

Mappings

MIDA Ontology

OCA Ontology

WCA Ontology

CSW WMS WFS

MIDA

CSW WMS WFS

Oregon Coastal Atlas

CSW WMS WFS

Washington Coastal Atlas

Conclusions

- ▣ Coastal Atlases provide an array of geographically based information which can inform coastal scientific, policy and planning work.
- ▣ Sharing data across borders can:
 - Improve ecosystem management
 - Help communicate priorities and needs
 - Make cross-border management of natural resources easier and likely more effective
 - Enhance communication among scientists regarding existing conditions
- ▣ It is feasible to implement collaborative tools to improve access to coastal data
 - Dedication, support and openness to sharing

Links

- ▣ Washington Coastal Atlas:

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

- ▣ International Coastal Atlas Network

Technical Group:

http://ican.science.oregonstate.edu/ican_tech

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Liz O'Dea

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