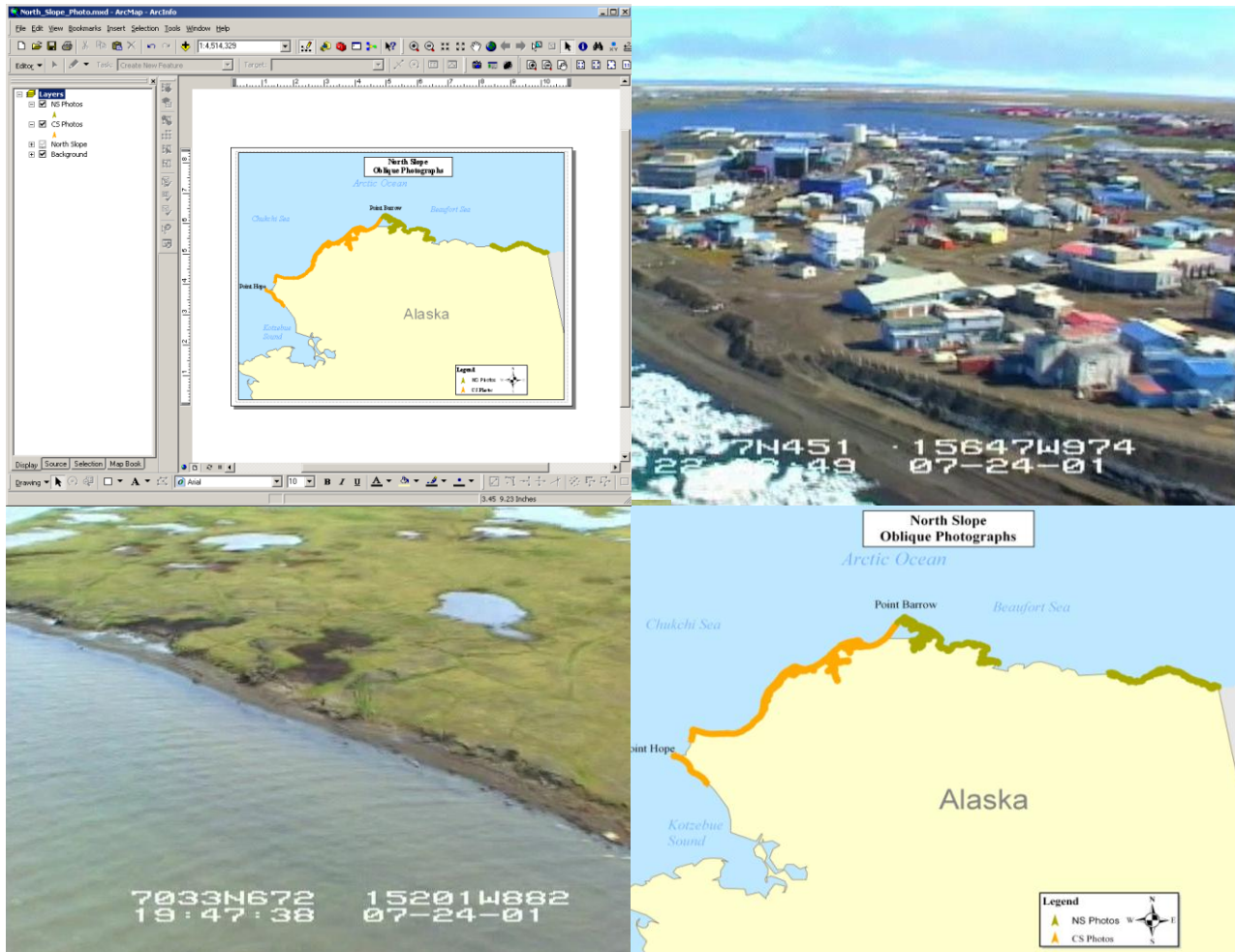


North Slope Oblique Photographs

North Slope, Alaska

North Slope Environmental Sensitivity Index (ESI) Project – Published June 2005



North Slope Oblique Photographs Users Guide

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Prepared for:

NOAA, Office of Response and Restoration (OR&R), Emergency Response Division (ERD)

Prepared by:

Jeffrey Dahlin

Mark White

Chris Locke

Research Planning, Inc.

Columbia, South Carolina 29202

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Oblique Photographs

North Slope, Alaska

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Introduction to ESI Maps:

In the event of an oil spill, responders must quickly decide which locations along the shoreline to protect. To do this effectively, they need to assess which areas would suffer the greatest consequences and focus their efforts on the more sensitive shoreline as well as the areas where sensitive biological and human-use resources are found. ESI maps are an invaluable tool in this decision making process.

ESI maps are comprised of three general types of information:

1. Shoreline Classification—ranked according to a scale relating to sensitivity, natural persistence of oil, and ease of cleanup.
2. Biological Resources—including oil-sensitive animals and rare plants; and habitats, which are used by oil-sensitive species or are themselves sensitive to oil spills, such as submersed aquatic vegetation and coral reefs.
3. Human-Use Resources—specific areas that have added sensitivity and value because of their use, such as beaches, parks and marine sanctuaries, water intakes, and archaeological sites.

The ESI shoreline is classified/ranked on a scale from 1 to 10 (Figure 1) based on sensitivity to oiling by:

- Relative exposure to wave and tidal energy
- Biological productivity and sensitivity
- Substrate type (grain size, mobility, penetration, and trafficability)
- Shoreline slope
- Ease of cleanup
- Ease of restoration

As part of the shoreline classification process and to assist the geologist with the classification, the shoreline was videotaped during low altitude overflights of the project area within 2-3 hours of low tide. This DVD contains the oblique photographs and acquisition flightlines for the North Slope Environmental Sensitivity Index (ESI) published in June 2005.

For more information about ESI mapping visit NOAA's Ocean Service, Office of Response and Restoration at <http://response.restoration.noaa.gov/esi> .

ESI SHORELINE CLASSIFICATION		02 March 2009		
ESI NO.	ESTUARINE	LACUSTRINE	RIVERINE	
	1A Exposed rocky shores	Exposed rocky shores	Exposed rocky banks	
	1B Exposed, solid man-made structures	Exposed, solid man-made structures	Exposed, solid man-made structures	
	2A Exposed wave-cut platforms in bedrock, or mud	Shelving bedrock shores	Rocky shoals; bedrock ledges	
	2B Exposed scarps and steep slopes in mud			
	3A Fine- to medium-grained sand beaches			
	3B Scarps and steep slopes in sand	Eroding scarps in unconsolidated sediments	Exposed, eroding banks in unconsolidated sediments	
	3C Tundra cliffs			
	4 Coarse-grained sand beaches	Sand beaches	Sandy bars & gently sloping banks	
	5 Mixed sand and gravel beaches	Mixed sand and gravel beaches	Mixed sand and gravel bars and gently sloping banks	
	6A Gravel beaches	Gravel beaches	Gravel bars and gently sloping banks	
	6A Gravel beaches (granules & pebbles) - (SEAK only)			
	6D Boulder rubble			
	6B Riprap	Riprap	Riprap	
	6B Gravel beaches (cobbles & boulders) - (SEAK only)			
	6C Riprap (SEAK only)			
	7 Exposed tidal flats	Exposed tidal flats	Exposed sand flats	
	8A Sheltered rocky shores (impermeable - SEAK only) and sheltered scarps in bedrock, mud, or clay	Sheltered scarps in bedrock, mud, or clay	Sheltered scarps in bedrock, mud, or clay	
	8B Sheltered, solid man-made structures	Sheltered, solid man-made structures	Sheltered, solid man-made structures	
	8B Sheltered rocky shores (permeable) - (SEAK only)			
	8C Sheltered riprap	Sheltered riprap	Sheltered riprap	
	8D Sheltered rocky rubble shores			
	8E Peat shorelines			
	8F		Vegetated, steeply-sloping bluffs	
	9A Sheltered tidal flats	Sheltered sand/mud flats	Sheltered sand/mud flats	
	9B Vegetated low banks	Sheltered, vegetated low banks	Vegetated low banks	
	9C Hypersaline tidal flats			
	10A Salt- and brackish-water marshes			
	10B Freshwater marshes	Freshwater marshes	Freshwater marshes	
	10C Swamps	Swamps	Swamps	
	10D Scrub-shrub wetlands	Scrub-shrub wetlands	Scrub-shrub wetlands	
	10D Mangroves			
	10E Inundated low-lying tundra			

Figure 1. ESI shoreline classification system. Higher values represent more sensitive shorelines.

North Slope Photo DVD:

The North Slope DVD contains frame grabs (obliques) from the overflight videos and acquisition flightlines for the North Slope Environmental Sensitivity Index (ESI) published in June 2005. The obliques are organized on the DVD by flightline and date. Video acquisition dates are July 24th to July 26th 2001 and July 28th and July 29th 2001.

The oblique photos were extracted from the videos at one second intervals, while GPS point locations for the flightline data were acquired at 2 seconds intervals. As a result, every other photo corresponds to the location of a point along the flightline, with intermediate photos being positioned somewhere between the two visible hyperlinks. When a hyperlink along the flightline is selected, the photo corresponding to that point opens in the users default image viewer. When browsing forward or backwards through the photos in the viewer, the images adjacent to the selected point become visible. By capturing the stills, oblique photographs, at one second intervals, a continuous set of overlapping oblique photographs exist for the shoreline that was flown.

The DVD is organized to allow viewing directly from the disk. However, if a user prefers, all the photographs can be save to, and accessed from, their hard drive. Additional information as well as the required directory structure for this option is provided below in the Viewing Options section of this document.

Metadata Information:

Detailed information about the ESI shoreline classification process and the oblique photograph acquisition can be found in the metadata documents included on the DVD; see *Process_Step* under the *Data_Quality_Information* section of the ESI, CS_Photo, and NS_Photo metadata documents.


By May 2010, the North Slope photographs will be posted on the NOAA/NOS/ORR website along with KML and KMZ files for use in Google Earth. For information go to <http://response.restoration.noaa.gov/> and search on North Slope Photography. In the interim, the data may be accessed in Google Earth from the Research Planning website at <http://esionline.researchplanning.com> . PDF versions of the ESI maps, ESI GIS data, and ESI metadata can also be downloaded from the NOS Data Explorer site at <http://nosdataexplorer.noaa.gov/nosdataexplorer/> .

Viewing Options:

The North Slope photo DVD contains an ArcMap document (.mxd file) with every other oblique photograph hyperlinked to a spatially referenced flightline (see description under the North Slope Photo DVD section). As mentioned, there are 2 options for viewing these photos. The first is to access them directly from the DVD. The second is to load the photos and the ArcMap document onto your hard drive. The 57,646 oblique photographs, along with the ArcMap document, base layer shapefiles, metadata, and Users Guide will require approximately 3.5 GB of disk space.

Viewing photos directly from the DVD:

The DVD has an ArcMap .mxd file for use with the photos. Users can double click North_Slope_Photo.mxd to open the document. Once opened, the georeferenced flightlines are displayed as colored, directional arrowheads (see figure top right). The arrowheads show the general direction of the camera based on the heading of the aircraft. Select the

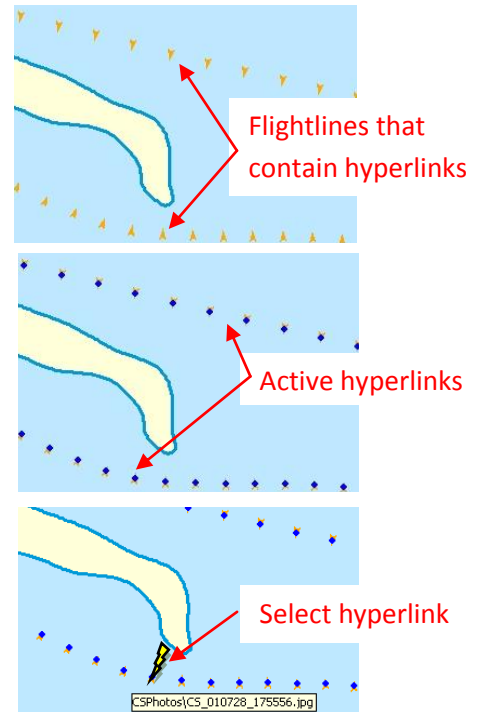
hyperlink tool  from the ArcMap toolbar. With this tool selected, the overflight locations with embedded hyperlinks will become active. Active hyperlinks display as blue dots on top of the directional arrowheads (see figure center right).

Select an active hyperlink to view the corresponding photo which will open in your default JPEG image viewer (see figure bottom right). After the image is open, you will be able to navigate to the adjacent photographs.

Viewing photos from your hard drive:

Ensure that you have at least 3.5 GB of disc space available. Copy the contents of the DVD onto your computer, replicating the directory structure that appears in Figure 2. The ArcMap document uses relative paths, so adhering to this structure is essential.

Once these data are loaded, you can view the photographs using the same process described above.



Name	Size	Type	Date Modified
CSLayer		File Folder	3/26/2010 5:54 PM
CSPHOTOS		File Folder	3/29/2010 6:04 PM
Metadata		File Folder	3/29/2010 6:13 PM
NSLayer		File Folder	3/26/2010 5:55 PM
NSPHOTOS		File Folder	3/29/2010 6:04 PM
North Slope ESI 2005.kmz		File	3/9/2010 3:03 PM
North_Slope_Photo.mxd		File	3/9/2010 6:16 PM
UserGuide.pdf		File	3/29/2010 6:34 PM

Do not delete files in Layer directory

Do not move oblique photographs out of or between directories. Doing so will corrupt the hyperlinks in the ArcMap document.

Figure 2. Directory file structure for data copied to the hard drive. Approximately 3.5 GB of disk storage is required.

DVD Descriptions:

North Slope Oblique Photographs DVD:

DVD contains the following files:

- **North_Slope_Photo.mxd** – This is the ArcMap document used to view the oblique photographs.
- **NSLayer** – This folder contains the ESI line, Hydro, and Index shapefiles. These are the shoreline related GIS data layers that are part of the final ESI data product. The ESI line layer was derived largely from the oblique photos seen here. Also included is the NS_Photos shapefile which is the flightline data for the Beaufort Sea and the Land and Ocean background shapefiles from ESRI data.
- **CSLayer** – This folder contains CS_Photos shapefile which is the flightline data for the Chukchi Sea from Point Hope, AK to Barrow, AK.
- **CS_Photos** – This folder contains the oblique photographs from the Chukchi Sea area.
- **NS_Photos** – This folder contains the oblique photographs from the Beaufort Sea area.
- **Metadata** – The metadata documents in HTML and XML formats for the North Slope ESI, Hydro, Index, and flightline data layers. Included is the North Slope ESI metadata document in PDF format (NSmdata.pdf).
- **North Slope ESI 2005.kmz** – This is the Google Earth document used to view the oblique photographs online in Google Earth.
- **UserGuide.pdf** - A pdf version of this Users Guide.

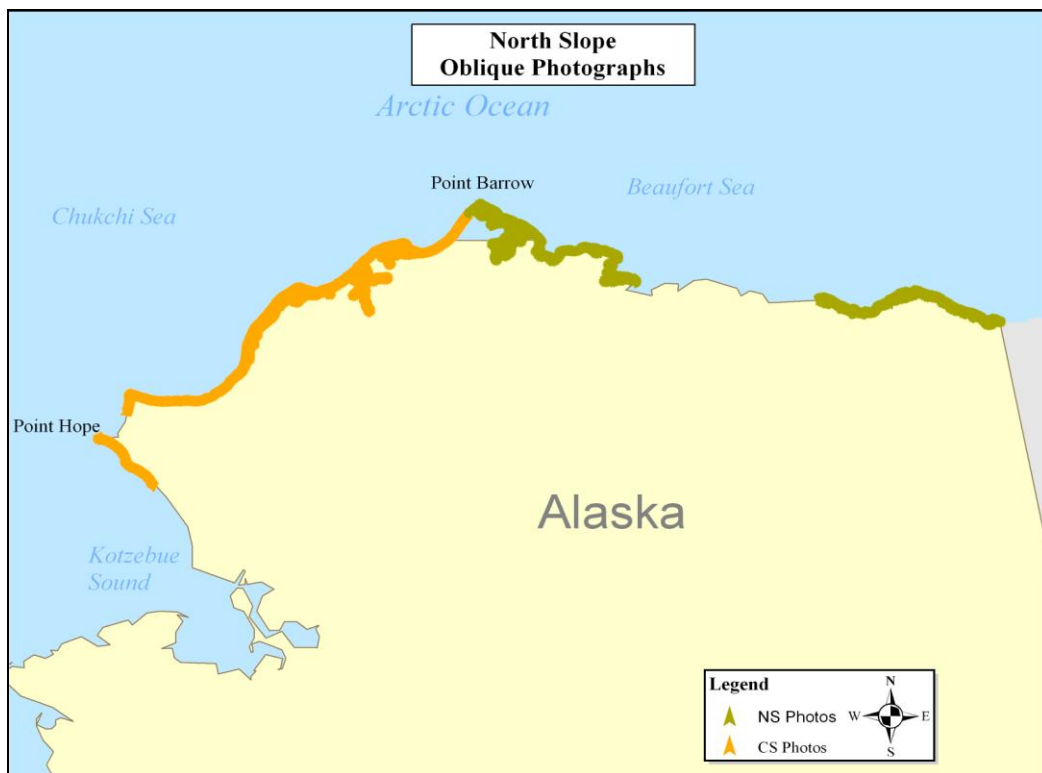


Figure 3. The DVD contains the oblique photographs for the shoreline represented by the green and orange colored arrows.