

SOP #1: Spatial Data Management

Version 2 (January 2022)

Revision History Log

Version No.	Revision Date	Author	Changes Made	Reason for Change
2	Jan 2022	David Swanson	Added guidelines for including new types of shoreline features. Updated references to locations of data. Deleted unneeded narrative material	New data elements were added to the protocol by Farquharson and Swanson. Filenames and folder structures have been defined more specifically than in the original protocol.

1. Overview

This SOP provides guidelines for data related to analysis of coastal change in the ARCN parks. Spatial data include imagery, digital shorelines, and DSAS baselines and transects. During analysis these data are stored on the local NPS network server, and after analysis is completed they are uploaded to the NPS Alaska Region GIS permanent data set for distribution within NPS and to the NPS IRMA data store for public distribution.

1. ARCN Coastal Datasets

Data from earlier monitoring of coastal change for ARCN are combined with new data to assemble a time series. Existing data include:

1.1. High-resolution orthorectified imagery for the 1950's, 1980's, 2003, and 2013-14 at 1-m or better resolution covering the BELA and CAKR shorelines and surrounding areas. These are available as a part of the NPS Alaska Region GIS data set, available via NPS internal data servers and described at the following NPS internal website:

<http://inpakroms03web/rgr/akgis/index.cfm?action=dsp&topic=data&item=data>. For NPS users, the data are most easily located using the NPS "Theme Manager" application (see <http://inpakroms03web/rgr/akgis/index.cfm?action=dsp&topic=helpdesk&item=scripts>), under "BELA Themes" or "CAKR Themes". See "Basemap/Aerial Photography" for the 1950's, 1980's, and 2003 images. Satellite imagery is stored on the local ARCN network drive under "O:\Monitoring\Imagery\Coastal".

1.2. Digital shorelines for each of the time periods of imagery. Copies are archived for public distribution in the NPS IRMA Data Store as a part of the ARCN Coastal Erosion Vital Sign project at <https://irma.nps.gov/DataStore/Reference/Profile/2210650>. For Alaska NPS users they are also available on the GIS server and located using Theme Manager under "BELA Themes" or "CAKR Themes", "Land/Water". Working copies are also available on the local network in O:\Monitoring\Vital Signs\Coastal Erosion\Data\.

1.3. GIS features used by the USGS Digital Shoreline Analysis System (DSAS, an extension to ArcGIS; Himmelstoss 2018). These include baselines and transects used to quantify shoreline change. Found in the same IRMA and GIS server locations as the shorelines described above.

File and Folder Management

Vector (line) GIS data

Vector data are stored as ArcGIS file geodatabases (mdb format) compatible with DSAS. There is one geodatabase for each NPS unit (DSAS_BELA.mdb and DSAS_CAKR.mdb), each containing all sampling dates. Working copies of the geodatabases are stored on the internal ARCN "O:" drive (\\inpyugamsstor00\Primary Datapool\I&M\ARC�) under O:\Monitoring\Vital Signs\Coastal Erosion\Data. Each re-analysis is placed under a folder labeled with the year, e.g. "2019", with subfolders under the park units BELA and CAKR. For a new sampling episode, create a new folder named by the year with BELA and CAKR subfolders, copy the most recent previous version of the geodatabases, and add all new data to them as a cumulative record. Folders from previous sampling episodes are retained as an archival record.

Raster (image) data

Image files from the 2003 and earlier are stored on the NPS AK Region GIS permanent data set. Image files from 2013-14 are stored on the NPS ARCN network drive under "O:\Monitoring\Imagery\Coastal". The current folder structure there is "BELA_ortho_2014" and "BELA_pansharpened_2014" (analogous for CAKR). The "ortho" folders contain orthorectified images, both multispectral and the higher-resolution panchromatic images. The "pansharpened" folders contain pansharpened images made from fusion of the orthorectified images, and an ArcGIS mosaic geodatabase for easy viewing of the images. Future images may be stored on the O: drive in similar fashion.

File Naming Conventions

All vector (line) data are currently stored in geodatabases suitable for DSAS analysis, and exported in shapefile format for easy sharing and archiving. Shapefiles and DSAS geodatabase feature classes all begin with the lowercase NPS park abbreviations "bela" and "cacr", symbolized below as "xxxx". The DSAS databases are named "DSAS_BELA.mdb" and "DSAS_CAKR.mdb".

DSAS baseline and transects

The DSAS baseline features are named xxxx_baseline_inner and xxxx_baseline_outer, referring to the inner (lagoon) and outer (open ocean) shorelines, respectively. DSAS Transect shapefiles are likewise named xxxx_trans_inner_v5 and xxxx_transect_outer_v5. Shapefile exports of these layers have the various shapefile file extensions but are otherwise the same.

Shoreline position files

These files are named by merging the park code (bela, cacr), type of shoreline (el – erosion line, vl – vegetation line, wl – water line), and the sampling episode (1 – c. 1950 images, 2 – c. 1980 images, 3 – 2003 images, 4 – c. 2014 images, and so on in the future). For example the feature "cacr_wl_1" is the Cape Krusenstern NM waterline from sampling episode 1. Note that for DSAS analysis we need to place two or more years of shorelines into one feature class, which we do by merging the years in

GIS. And naming them after the episodes involved, e.g. “cakr_wl_12”. These merged files are duplicates of the single-year layers and are not retained after analysis.

DSAS statistics files

DSAS statistics are append as columns to the transect files that were used to obtain them. The naming convention is based on the merged shoreline features, with “rate” appended, for example “cakr_wl_12_rates” for statistics pertaining to CAKR waterline changes between episodes 1 and 2.

Data Distribution

After digitization and DSAS analysis for a new sampling episode are complete, new versions of the DSAS geodatabases for BELA and CKR and shapefile exports should be uploaded to the NPS IRMA Data Store in a new reference linked to the Coastal Erosion vital sign project at <https://irma.nps.gov/DataStore/Reference/Profile/2210650>. ..

The imagery used to create the new shoreline GIS files may be sent to the AK Region GIS team for addition to the permanent data set, or stored locally in under "O:\Monitoring\Imagery\Coastal", depending on space limitations and expected user needs.

References

Himmelstoss, E. A., R. E. Henderson, M. G. Kratzmann, and A. S. Farris. 2018. “Digital Shoreline Analysis System (DSAS) Version 5.0 User Guide.” Open-File Report 2018–1179. Woods Hole, MA: U.S. Geological Survey. <https://doi.org/10.3133/ofr20181179>.