



National Park Service  
U.S. Department of the Interior

Natural Resource Stewardship and Science

# NPS I&M Standard Operating Procedure: NPS Boundary-Derived Areas of Analysis for use with Landscape Dynamics

Version #1.5

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## Summary

Using park boundaries derived through NRSS Bounds Processing (adapted from Lands Division), Areas of Analysis are created for use with NPScene Landscape Dynamics. These park-based Areas of Analysis are standard across the entire NPS, and exist for all IMD Parks as Park AOAs, 3km AOAs, 30km AOAs, and HUC12 AOAs.

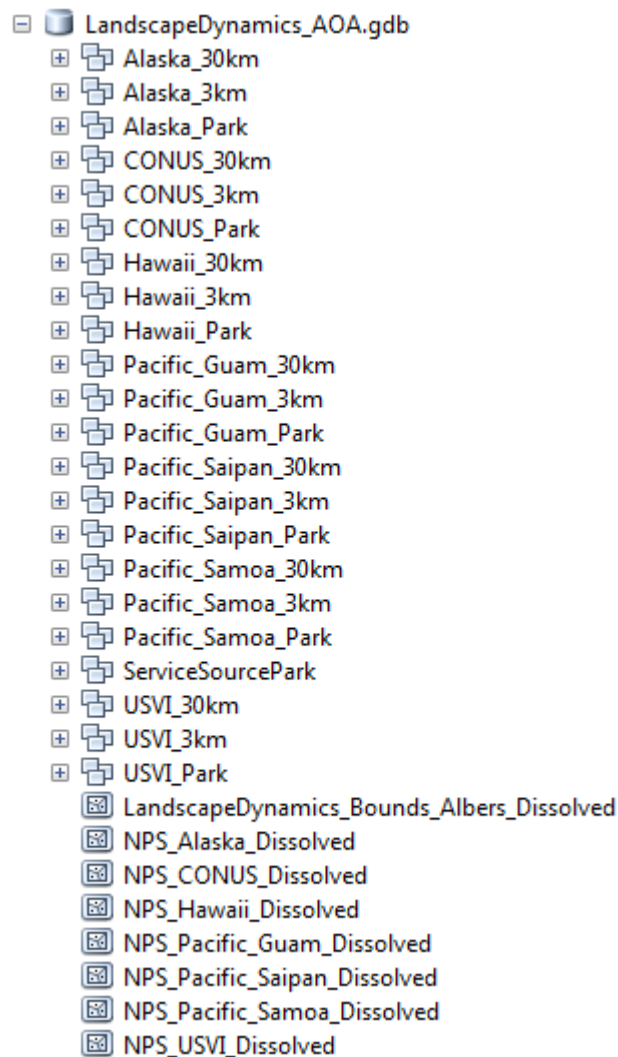
| Version History      |                  |                                                                                      |                  |        |                     |
|----------------------|------------------|--------------------------------------------------------------------------------------|------------------|--------|---------------------|
| Previous Version No. | Date of Revision | Changes                                                                              | Made by          | Reason | Updated Version No. |
| 1.0                  | 20151014         | Initial version                                                                      | Michelle Kinseth |        | 1.1                 |
| 1.1                  | 20151110         | Add clarification for running tool, creating map service                             | Michelle Kinseth |        | 1.2                 |
| 1.2                  | 20151120         | Output GDB reorganization, additional post-processing details added                  | Michelle Kinseth |        | 1.3                 |
| 1.3                  | 20160901         | Incorporated HUC12 AOA processing into SOP                                           | Michelle Kinseth |        | 1.4                 |
| 1.4                  | 20161007         | Transition to Landscape Dynamics from NPScene, removed HUC12 sections, see HUC12 SOP | Michelle Kinseth |        | 1.5                 |

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## Overview/Purpose

This internal Landscape Dynamics SOP documents how **areas of analysis (AOAs)** are derived from NPS park boundaries for use in Landscape Dynamics (LD) analyses. These standard, park-based AOAs are used in the LD Protocol: park AOAs, 3km AOAs, 30km, and HUC12 AOAs. The three and 30 kilometer AOA polygons are derived by buffering dissolved park polygons by three or thirty kilometers. This processing produces three AOAs for each Landscape Dynamics park. The HUC12 AOA polygons are derived from selecting HUC12 watersheds (source, WBD) that intersect a park AOA. An area attribute (AREA\_SQKM) is calculated for each AOA polygon. See Appendix 3 for details. A Python tool is used to create all AOAs as feature classes within feature datasets within standardized file geodatabases: LandscapeDynamics\_AOA.gdb, HUC12\_AOA.gdb:



These AOA file geodatabases can be downloaded from the Landscape Dynamics web site:  
[http://science.nature.nps.gov/im/monitor/npscape/methods\\_aoas.cfm](http://science.nature.nps.gov/im/monitor/npscape/methods_aoas.cfm)

*Note about Standard LD AOAs: Though these AOAs are derived from NPS Land Resources Division's Lands update, certain park AOA boundaries contained herein will differ from Lands based on local park/network staff knowledge. In these cases, the LD protocol defers to the local knowledge of park boundaries over the Lands version. As such, LD AOAs (specifically Park AOAs) are ONLY valid for use with IMD and the Landscape Dynamics Protocol (cite).*

In some cases, Parks and/or Networks might have areas of interest for analysis that fall outside the standard Landscape Dynamics AOAs (Park, 3km, 30km, HUC12). Park and Network staff are provided the opportunity to provide these custom areas to LD for inclusion. See SOP\_LD\_CustomAreasOfAnalysis\_Data.docx.

## Requirements

Users of this SOP are required to have:

- minimum installation of ArcGIS 10.2.2
- Mapped drive, and read/write permissions (*inp2300fcsisro1\IMD\_Data*)

- Database Connection with read permissions (Database Connections\NPScape\_Stats.NPScape\_Viewer.DBO\_INPNISCVDBNRST\_IMDGIS.sde\NPScape\_Stats.dbo.ParksNetworksRegions)
- Remote desktop permissions and access to ArcGIS Server to publish Map Services
- *Optional: IDE for Python (i.e. Pyscripter) with .pyt extension recognition – this is only necessary if editing the python toolbox; access limited to IMD Central Office GIS staff.*

## Pre-Processing Requirements

### Standard Landscape Dynamics Bounds Processing:

This tool requires the most recent version of

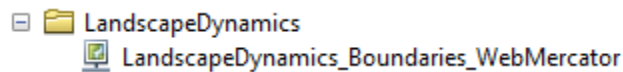
X:\ProjectData\Data\_Processing\Bounds\_Processing\Data\LandscapeDynamics\_Bounds.gdb\landscape\_dynamics\_bounds\_albers, which requires Landscape Dynamics Bounds Processing be completed first. See LandscapeDynamicsBounds\_Processing\_SOP.docx

***\*\*IF A NEW IMD PARK HAS BEEN ADDED TO A NON-CONUS GEOGRAPHY (and also to the IMD park list in SQL), THE AOA PROCESSING SCRIPT MUST BE EDITED TO INCLUDE THE NEW PARK IN THE APPROPRIATE LIST!! (see near line 210 in script)***

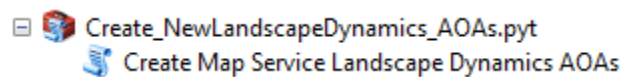
## AOA Processing – Landscape Dynamics AOAs Park, 3km, 30km

### Step 1: Run Tool

- To update standard Landscape Dynamics AOA feature datasets and feature classes (Park, 3km, 30km) using the most recent Landscape Dynamics Bounds features (derived from NPS boundary features through IMD Bounds Processing):
- **Before running the tool – STOP LandscapeDynamics Boundaries WebMercator map service**

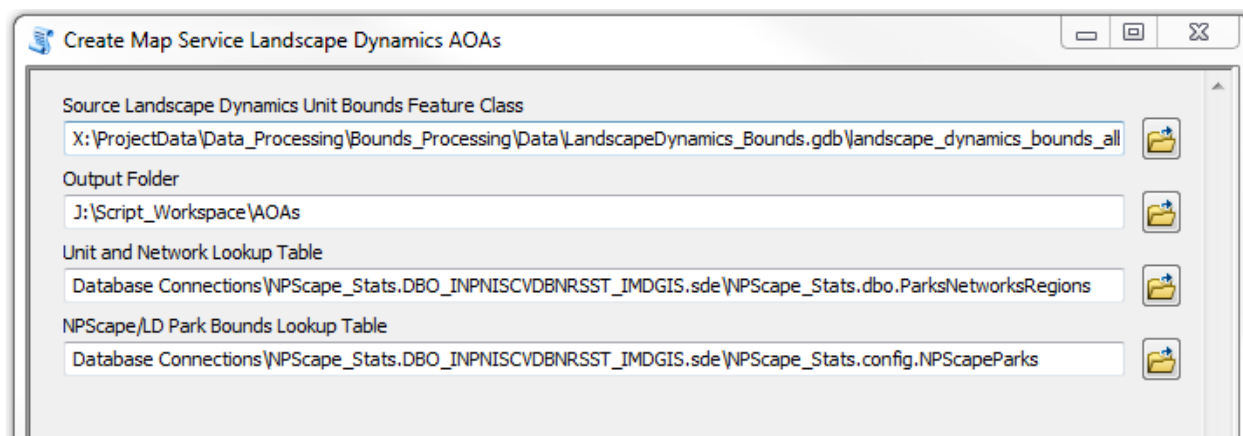


- Run the tool **Create Map Service Landscape Dynamics AOAs** (X:\ProjectData\Data\_Processing\Bounds\_Processing); the tool may take up to 2 hours to run.



**NOTE:** Make sure to run the tool locally. It will take 8+ hours if you attempt to create AOAs to a network drive.

- Select table/view “NPScape\_Stats.dbo.ParksNetworksRegions” from NPScape\_Viewer.Stats database (as noted in the figure below, see also Appendix 2).



#### General processing steps of the tool **Create Map Service Landscape Dynamics AOAs**:

Create AOA file geodatabase, create standard AOA feature datasets (Park, 3km, 30km), by geography, and with correct spatial reference (and transformation where applicable); dissolve source Landscape Dynamics boundary feature class on UNIT\_CODE; iterate through each dissolved park polygon, copying it to a new feature class in the relevant feature dataset, then buffering to 3 or 30km as appropriate; add AREA\_SQKM attribute and calculate the area in square kilometers; import metadata; merge individual AOA polygons into a merged AOA feature class; finally, create dissolved feature classes of 3km and 30km features. The tool also creates Web Mercator versions of Landscape Dynamics AOAs (Dissolved Park, 3km, 30km), and copies these web mercator feature classes to GDB\_NRSS.DBO.INPNISCVDBNRSST\_IMDGIS.sde for use as map services in web map applications.

Standard AOA attribute table details for each feature class <UNIT\_CODE>\_AOA\_<aoa type>, where <aoa type> = Park, 3km, 30km:

- UNIT\_CODE = the park Unit Code
- UnitName = the unit name
- NetworkCode = the Network Code home to the park
- NetworkName = the full name of the Network home to the park
- RegionName = the name of the Region home to the park
- DATE\_EDIT = date of last known edit of the park boundary
- Feature\_Source = author/creator of park boundary
- Source\_Metadata = link to data store (other) metadata for park boundary
- BUFF\_DIST (if applicable) = the buffered distance in meters (3000m or 30000m)
- AREA\_SQKM: total area of the AOA polygon in square kilometers
- PARK\_CODE: if the AOA is park-based, four-letter code for park
- AOA\_NAME (Map Service feature classes only) = <UNIT\_CODE>\_AOA\_<aoa type> where aoa type = Park, 3km, or 30km

### **Select/Changed AOAs**

When updating Landscape Dynamics statistics, only those AOAs that have changed will be recalculated (Park, 3km, 30km, HUC12). To determine the list of changed AOAs:

- **For Park (3km, 30km)**, run
- Using resulting table as guide, create Temp feature class in AOA geodatabase the includes these AOAs. When all related statistics have been updated for changed AOAs, delete Temp feature class: see all Landscape Dynamics stats SOPs.

### **Custom Network AOAs**

If new or updated Custom Network AOAs are submitted, add/swap them to the Custom AOA feature dataset (class?) used for the map service.

- CustomAOA\_ForServices.gdb

## Quality Control

Using ArcMap, the AREA\_SQKM values are spot-checked for a selected set of park-based AOAs. Using Field Calculator, the AOA area in square kilometers is calculated and checked against the AREA\_SQKM value in the AOA feature class.

Using ArcMap, visually check the merged AOA feature class with the source Landscape Dynamics Bounds polygons to check for spatial congruency. Check specific parks.

- Check for any known new or changed AOAs from last AOA update.
- Check Metadata on at least one feature class per feature dataset, edit as needed.
- From a random selection of feature classes, check that basic metadata is populated.
- Additionally, for individual feature classes as well as the combined feature class, check that all required attribute fields are present (Appendix xx), and that all fields are populated.

## Post-Processing

- After QA/QC, manually COPY LandscapeDynamics\_AOA.gdb from local drive to X:\ProjectData\NPSCAPE\DATA\SourceData\USData\Boundary AND X:\ProjectData\Data\_Processing\Bounds\_Processing\Data
  - In Bounds\_Processing\Data:
    - Manually date stamp previous version LandscapeDynamics\_AOA.gdb, and delete any older date stamped versions.
  - In USData\Boundary:
    - Delete current LandscapeDynamics\_AOA.gdb and copy the new one into this location
- Upload new AOAs (and SOP) to Data Store:
  - Parks: <https://irma.nps.gov/App/Reference/Profile/2225024>
  - Zip new AOAs gdb, upload as holding, also reupload SOP
  - Check website after new reference created, make sure AOAs link points to the correct version of the AOAs  
([http://science.nature.nps.gov/im/monitor/npscape/methods\\_aoas.cfm](http://science.nature.nps.gov/im/monitor/npscape/methods_aoas.cfm))
- Rerun Landscape Dynamics Stats for new/updated/altered AOA boundaries. See LD Stats SOPs for each Landscape Dynamics Metric.

## AOA Map Services – Creation and Publication

During processing, AOA dissolved features (Park, 3km, 30km, HUC12) are copied to SDE for use in a map service (GDB\_NRSS.DBO.INPNISCVDBNRSST\_IMDGIS.sde); accessed in service mxds from (GDB\_NRSS.SDE\_Data\_Viewer.DBO.INPNISCVDBNRSST\_IMDGIS.sde)

 GDB\_NRSS.DBO.LandscapeDynamics\_30km\_webmercator  
 GDB\_NRSS.DBO.LandscapeDynamics\_3km\_webmercator  
 GDB\_NRSS.DBO.LandscapeDynamics\_HUC12\_webmercator  
 GDB\_NRSS.DBO.LandscapeDynamics\_Park\_webmercator

- From ArcGIS Server connection:
  - Delete LandscapeDynamicsAOA map services from the LandscapeDynamics folder
  - Open:
    - X:\ProjectData\Data\_Processing\Bounds\_Processing\MapServices\LandscapeDynamics\_Boundaries.mxd (Albers prj)
    - X:\ProjectData\Data\_Processing\Bounds\_Processing\MapServices\LandscapeDynamics\_Boundaries\_WebMercator.mxd (webmercator prj)
  - For both - confirm any new/changed AOAs are reflected
    - Edit Data Frame Properties (Description, add new date)
    - Edit Data Layer Properties (Description, add new date)

- Edit Map Doc Properties (Description, add new date)
- Publish service(s)
  - In Service Editor → Parameters → Output Directory change Directory to “proxy output”
  - Turn on Feature Access and make sure only Query and Extract are allowed
- Log in to ArcGIS Online and make sure Landscape Dynamics Map Viewer is working and AOAs are showing in the app.
  - See SOP\_How\_To\_Update\_LandscapeDynamics\_Viewer.doc

## **Literature Cited**

Nelson, Lisa and Michelle Kineth. 2015. NPS I&M Standard Operating Procedure: Inventory and Monitoring Boundary Processing. NPS/NRSS/IMD/SOP-1.0.

## Appendices

### Appendix 1: Known issues

#### Data currency

NPS boundary data (Park, 3km buffer, 30km buffer) are continually updated by the NPS Land Resources Division (Lands). The current LD NPS boundary-derived AOAs are based on the NPS Current Administrative Boundary dataset generated by Lands. All LD AOAs (custom and standard) are updated **ANNUALLY**. Any LANDS corrections/updates/etc. that occur after will not be reflected until next update, if they are relevant to the Landscape Dynamics project.

NPS-related HUC12 data are a subset of data from <http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/WBD/>. These AOAs will only be updated annually through the process described herein.

#### Source Data Quality

Landscape Dynamics AOAs are not an official source for park boundaries. They are only applicable to the Landscape Dynamics project and the processing of Landscape Dynamics within the various I&M Networks.

The NPS Land Resources Division notes which NPS boundary polygons are Legacy (i.e., not updated) by populating the GIS\_NOTES and CREATED\_BY attribute in the Current Administrative Boundaries shapefile. If an AOA was created from a custom park boundary, that information will also be present in the attribute table, along with the source for the spatial data.

### Appendix 2: Landscape Dynamics/NPScape Standard Areas of Analysis

The standard AOAs exist for most NPS Inventory and Monitoring Program parks. This defined subset is listed in a landscape dynamics data service. Refer to it for more details:

<http://irmadevservices.nps.gov/NPScapeStatistics/odata/ParksNetworksRegions>