

# Inventory & Monitoring Division

National Park Service



## Standard Operating Procedure 2.11.4

### *NPS Unit Boundary Processing: Boundaries for Use for Analysis and Reporting by the Inventory & Monitoring Division*

Please cite this as:

Nelson, L. and M. Kineth. 2018. NPS unit boundary processing: Boundaries for use for analysis and reporting by the Inventory & Monitoring Division. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP-2.11.4. National Park Service, Fort Collins, Colorado.

### **Summary**

This SOP details the processing logic and steps to produce the `imd_unit_bounds` datasets for park unit boundaries used in I&M processing, updates to Landscape Dynamics features, and map services.

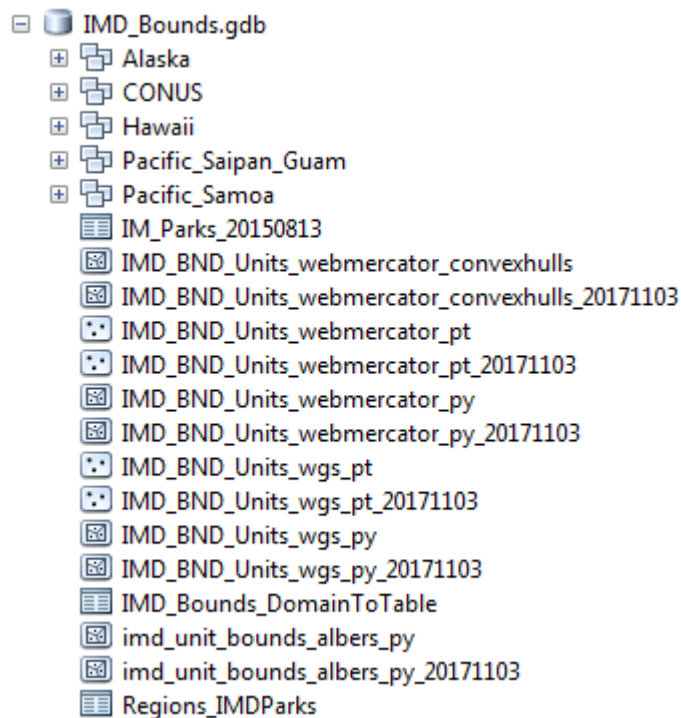
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## Overview

This SOP details the processing logic and steps to produce the imd\_unit\_bounds datasets for park unit boundaries used in I&M processing, updates to Landscape Dynamics features, and map services.

The datasets are managed in a file geodatabase (ArcGIS) on I&M Central Office shared drive. It is assumed users of this SOP have prior knowledge of data paths, file locations, and repositories referenced in this SOP.



The imd\_unit\_bounds datasets are updated when NPS Land Resources releases NPS Administrative Boundary updates (Appendix 1).

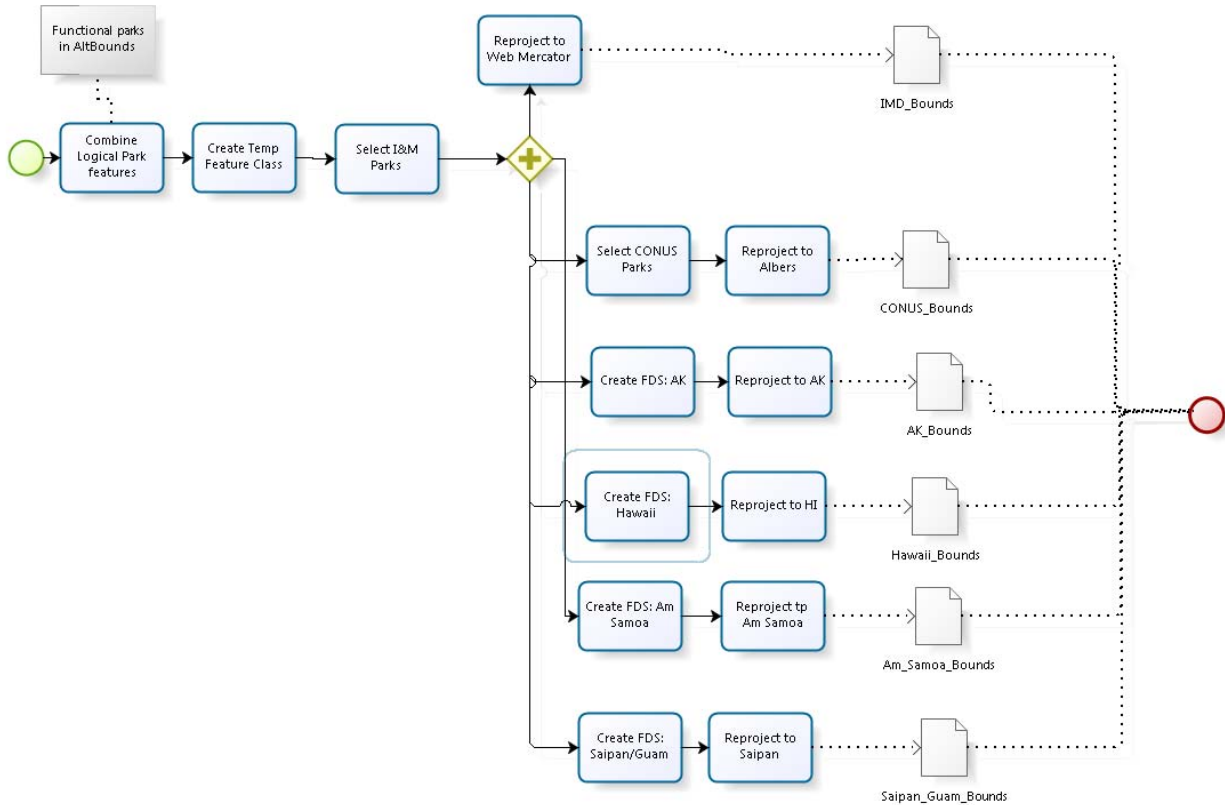


**Figure 1.** Processes completed using a Python toolbox, IMDBounds\_Processing.py

## Requirements

Users of this SOP are required to have:

- ArcGIS 10.2.2+
- Mapped drive to X:\ and read/write permissions to the drive
- Permissions to edit references in Data Store
- Admin/write permissions for ArcGIS Server, GDB\_NRSS, and SQL Server\LD\_Stage

Unit bounds feature class maintenance (SOP 2.11.3; Kinseth and Nelson 2018c) should be performed prior to running IMD Bounds processing.

## Processing & Procedures

Before running the tool: On the rare occurrence of a new NPS unit request for Landscape Dynamics statistics (inclusion, or exclusion), make sure the affected unit(s) are included in (or excluded from) the lookup table in LD\_Stage (config.IMDParks), and the list of 'AllUnits' in the Python script for

UpdateIMDBounds in IMDBounds\_Processing.pyt. If new NPS units are non-CONUS, make sure to add/remove them to the appropriate geographical array lists in the python script.

### Step 1: Create List of Changed IMD Bounds

1. Using the table created in Alternate Bounds Processing (SOP 2.11.2; Kinseth and Nelson 2018b), tbl\_IMDParksUpdated\_YYYYMMDD (in X:\ProjectData\Data\_Processing\Bounds\_Processing\Data\UnitBound\_Processing.gdb), create a list of park units that have been edited (by LRD) since the previous LRD release.

**NOTE:** Compare tbl\_IMDParksUpdated\_YYYYMMDD to the AlternateBounds feature class and EXCLUDE any park unit that exists in both tbl\_IMDParksUpdated\_YYYYMMDD and AlternateBounds (i.e., GLAC).

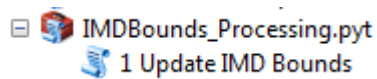
2. Check the DATE\_EDIT field in AlternateBounds and include on the list (if any) park unit feature that was updated/changed/added AFTER the previous IMDBounds process.

List format for use in Step 2 (the list of changed units): 'CODE','CODE','CODE'

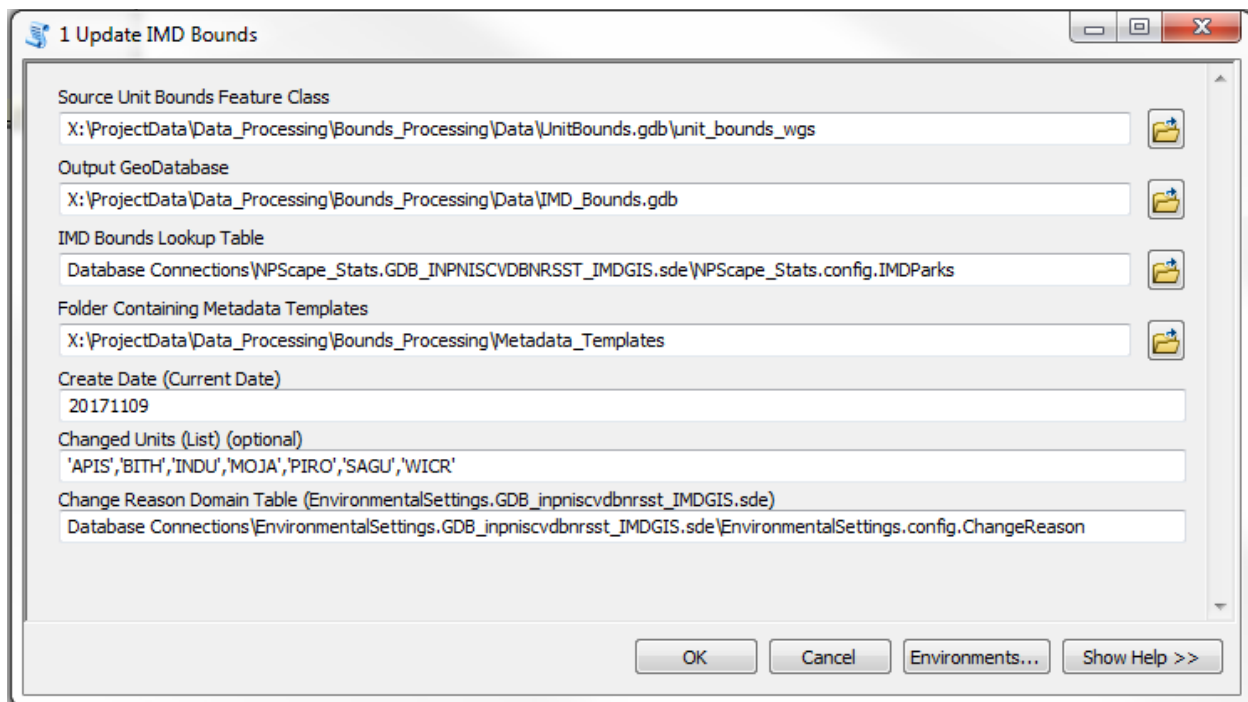
### Step 2: Run Update IMD Bounds tool

1. Run '1 Update IMD Bounds' tool to create imd\_unit\_bounds\_albers\_py, IMD\_BND\_Units\_webmercator\_py, IMD\_BND\_Units\_webmercator\_pt, IMD\_BND\_Units\_wgs\_py, and IMD\_BND\_Units\_wgs\_pt feature classes, and date-stamped feature classes of these datasets previously generated.

The tool is located in the IMDBounds\_Processing.pyt toolbox and may take approx. 10 minutes to run.



**Note:** Make sure fields 'Create Date' and 'Changed Units' are populated appropriately! There may or may not be any changed units associated with each quarterly boundary update.



2. In ArcMap, open the resulting feature classes and visually check select parks:  
 imd\_unit\_bounds\_albers\_py, IMD\_BND\_Units\_wgs\_py, and  
 IMD\_BND\_Units\_webmercator\_py.
  - a. Check the attribute table, looking for null values in the Feature\_Source and Full\_Name attributes.

***Note:** Logical parks (NPS units with park/monument and preserve components) are dissolved into single features by the Update IMD Bounds tool. See the list in Appendix 3 for details.*

### Step 3: Manually Edit IMD Bounds

1. Using the list created in step 1 as a check, sort the resulting feature class table(s) by **CreateDate** (descending). The parks with an updated **CreateDate** should match the parks from the list/table in Step 1.
2. In ArcMap, start an edit session and edit the **ChangeReason** (Appendix 5) for each park that was edited since the previous LRD release. Make sure the **CreateDate** reflects the current date for all park units with a **ChangeReason** edit – only parks with a current CreateDate should have a ChangeReason, and vice versa (Appendix 5).
3. Repeat these edits for ALL non-date-stamped feature classes (where applicable, up to 11 feature classes total) in IMD\_Bounds.gdb
4. When all table edits are complete, in ArcCatalog EXPORT the attribute tables for the following feature classes into EnvironmentalSettings (schema 'temp'):

- a. Feature class 'imd\_unit\_bounds\_albers\_py\_YYYYMMDD'

**NOTE:** After exporting 'imd\_unit\_bounds\_albers\_py\_YYYYMMDD', compare the table to the existing copy of 'imd\_unit\_bounds\_albers\_py' in EnvironmentalSettings. If they are NOT identical, STOP! If they are identical, proceed with exporting 'imd\_unit\_bounds\_albers\_py'.

- b. Feature class 'imd\_unit\_bounds\_albers\_py'

**NOTE:** This export will overwrite the existing table in EnvironmentalSettings.

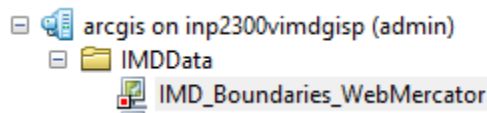
#### Step 4: Run IMD Bounds for Services tool

This tool will create the webmercator feature class for use in map services, as well as copy to SDE all webmercator and wgs IMD Bounds features.

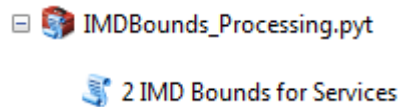
The IMD\_BND\_Units\_webmercator\_py, IMD\_BND\_Units\_webmercator\_pt, and IMD\_BND\_Units\_webmercator\_convexhulls feature classes are used to produce the IMD bounds map service on <http://irmaservices.nps.gov/arcgis/rest/services/IMDData>

IMD\_BND\_Units\_webmercator\_py and IMD\_BND\_Units\_webmercator\_convexhulls feature classes are updated with the running of this tool. Before proceeding, confirm any new/edited features are present in IMD\_BND\_Units\_webmercator\_py.

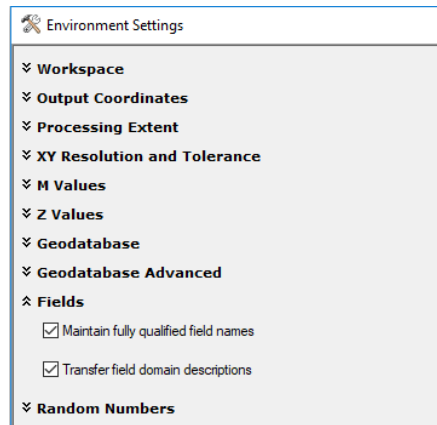
1. **\*\*Before running the tool**, connect to ArcGIS Server and stop the IMD\_Boundaries\_Webmercator service (Admin permissions required):



2. Run '2 IMD Bounds for Services' tool; may take up to 20 minutes to complete.

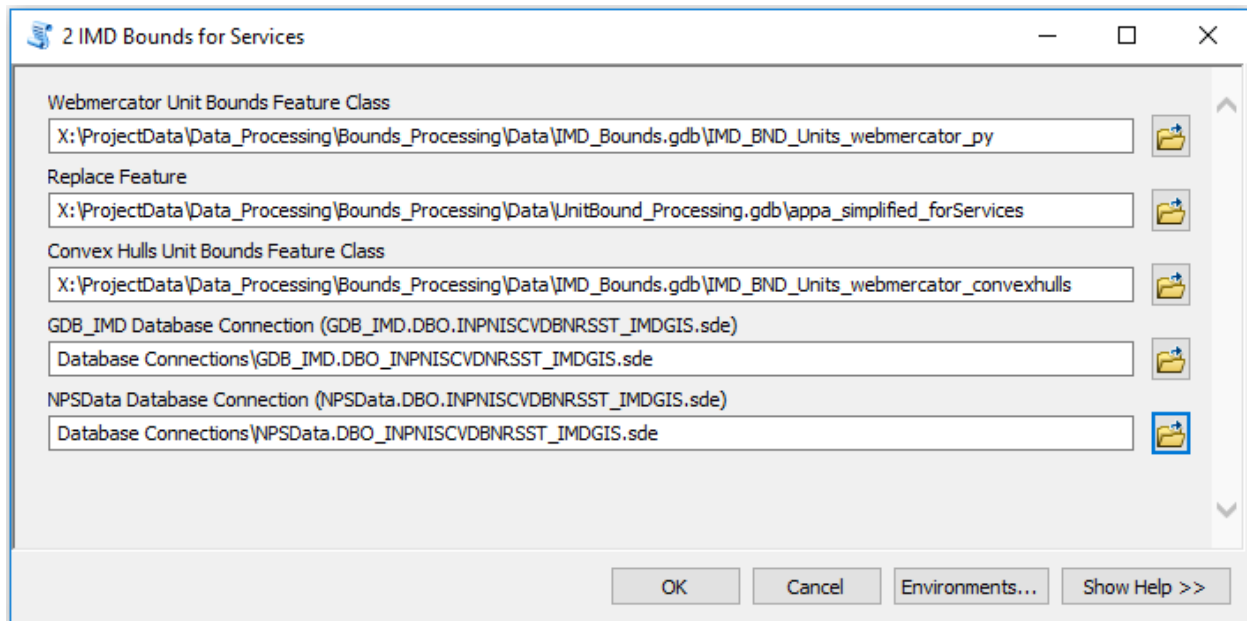


**In Environment Settings → Fields: turn on “Transfer field domain descriptions”**



This tool will create a temporary copy of the webmercator unit bounds feature class (polygon), delete the existing APPA row before loading a generalized APPA version located in X:\ProjectData\Data\_Processing\Bounds\_Processing\Data\UnitBound\_Processing.gdb. Repair Geometry is run on the temporary feature class and the final output is copied to SDE (GDB\_NRSS) along with updated IMD\_BND\_Units\_webmercator\_convexhulls, IMD\_BND\_Units\_webmercator\_pt, IMD\_BND\_Units\_wgs\_py, and IMD\_BND\_Units\_wgs\_pt feature classes. The temporary webmercator feature class with the generalized APPA boundary is then deleted from the Scratch space. The only version that exists is in the SDE.

**Note:** Only the “\_webmercator\_py” feature class includes the generalized APPA boundary. The webmercator\_convexhulls feature class is also copied to SDE (NPSData).



3. See Appendix 1 if there are problems or issues with copying features to SDE.

# Dissemination

## Step 1: Publish Updated IMD Bounds Map Service

1. Open IMD\_Boundaries\_WebMercator.mxd from  
X:\ProjectData\Data\_Processing\Bounds\_Processing\MapServices
2. Update Map Doc Properties, Data Frame Properties, and Data Layer Properties to reflect the new date of boundary updates. Save the map doc.

**Note:** Data in MXD/Map Service must match the user data source listed in Data Store for the registered database; for instance, GDB\_NRSS is registered (in Server Manager → Data Store) under the username SDE\_Data\_Viewer, so any data used in a map service from that database must come from the SDE\_Data\_Viewer database connection in order for the data to NOT be copied to the server. We do NOT want data copied to the Server.

3. Delete the stopped service.
4. Publish updated IMD\_Boundaries\_WebMercator service to IMDData folder
  - a. File → Share As → Service → Publish a service
    - i. Connection: arcgis on inp2300vimdgisp (admin)
    - ii. Service name: inherit from MXD
    - iii. Publish service to folder → Use existing folder: IMDData
  - b. In Service Editor → Parameters → Output Directory change Directory to “proxy output”
  - c. Capabilities → turn on Feature Access
    - i. Feature Access → Query, Extract
  - d. Analyze → Publish

## Step 2: Export Metadata and Post to Data Store

Use Internet Explorer to upload to Data Store.

1. If relevant, update the table in Appendix 3 for any additional/different features added or replaced.
2. Export the metadata to a stand-alone ISO XML files for imd\_unit\_bounds\_albers\_py:
  - a. Use Translator: C:\Program Files  
(x86)\ArcGIS\Desktop10.6\Metadata\Translator\ARCGIS2FGDC.xml

- b. Output:  
X:\ProjectData\Data\_Processing\Bounds\_Processing\Data\imd\_unit\_bounds\_albers\_  
py\_ArcGIS2FGDC.xml
- 3. Go to the existing data store record,  
<https://irma.nps.gov/DataStore/Reference/Profile/2235594?lnv=true>:
  - a. **Actions → Edit.**
  - b. From **Version History** tab, click **Add**
    - i. click “Yes”
    - ii. “Clone this Reference to Create a New Version”
    - iii. Add **\*Notes** to identify the update as from a new release of nps\_boundary from LRD
  - c. Update Date of Issue/Publication to the DATE OF RELEASE of the nps\_boundary shapefile from LRD.
  - d. Make sure **Permissions** are marked “Public” for all access.
  - e. Under Files and Links, upload
    - i. .zip of IMD\_Bounds.gdb
    - ii. SOP pdf
    - iii. Companion metadata xml file
    - iv. .zip of IMDBounds\_Processing.pyt
  - f. **Activate** the reference when all files and links have been uploaded.

### Step 3: Update Repo

If any changes to the Python toolbox script were made – make sure to update the repo.

- 1. Refresh (Pull) local Repo directory containing the existing toolbox.
  - a. Copy edited/working copy of toolbox to local repo directory and Push all the changes back to the repo.
    - i. Right click on repo folder → Git GUI Here → “Stage Changed”
    - ii. Enter a meaningful Commit Message → “Commit” → “Push”
    - iii. Confirm any updates posted

#### **Step 4: Update Landscape Dynamics Bounds**

**Annually only:** In conjunction with LRD's third quarter release of an updated nps\_boundary shapefile (approximately Sept 30, annually), run Update Landscape Dynamics Bounds as described in the Landscape Dynamics Boundary Processing SOP (2.11.5; Kinseth and Nelson 2018a).

## Literature Cited

- Kineth, M. and L. Nelson. 2018a. NPS unit boundary processing: Boundaries for use for analysis and reporting as a part of the IMD Environmental Settings Protocol. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—2.11.5. National Park Service, Fort Collins, Colorado.
- Kineth, M. and L. Nelson. 2018b. NPS unit boundary processing: Park operational administrative boundaries. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—2.11.2. National Park Service, Fort Collins, Colorado.
- Kineth, M. and L. Nelson. 2018c. NPS unit boundary processing: Reconciliation of official Lands Division and park operational administrative boundaries. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—2.11.3. National Park Service, Fort Collins, Colorado.

# Appendix 1: Data Availability & Known issues

## Data availability

Updating IMD Bounds relies on updates from Land Resources Division. Availability and frequency of new IMD Bounds is dependent upon the frequency of updates from LRD, currently releasing updates on a quarterly schedule; March 31, June 30, Sept 30, and Dec 31.

## Additional issues

NCRN parks:

- Not all IMD Parks for NCRN are also Landscape Dynamics parks.
- ANAC and BAWA are part of NACE
- Not all NCRN parks are in Alternate Bounds

## SFAN parks:

- Not all IMD Parks for SFAN are also Landscape Dynamics parks.
- PRSF is part of GOGA and was removed from IMD Parks.

For more, see:

[https://docs.google.com/spreadsheets/d/1vnngFnNBrYMIH1rvi64H8Q12ZSt5S\\_A-pjQH1rnEWhc/edit#gid=0](https://docs.google.com/spreadsheets/d/1vnngFnNBrYMIH1rvi64H8Q12ZSt5S_A-pjQH1rnEWhc/edit#gid=0)

AND

<https://docs.google.com/document/d/1A7AekiqhAtTEeP8wF0XEkAzWi8n1fl1Frwe7NyFHiE/edit>

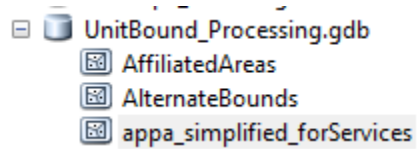
## SDE Issues

If there are problems with copying/renaming webmercator\_pt or webmercator\_py features, see:

X:\ProjectData\LandscapeDynamics\Processing\Tools\FixCorrupted\_SDE\_Tables.sql

## Appendix 2: Simplified feature for APPA

The default polygon for Appalachian Trail is a complex feature. The simplified polygon, *appa\_simplified\_forServices*, is a de-densified version of the APPA boundary (2.11.2; Nelson, L. and M. Kinseth 2018a). This feature is swapped into the *IMD\_BND\_Units\_webmercator\_py* feature class prior to map service creation and/or updating. This feature class is the only one with the simplified APPA boundary inserted.



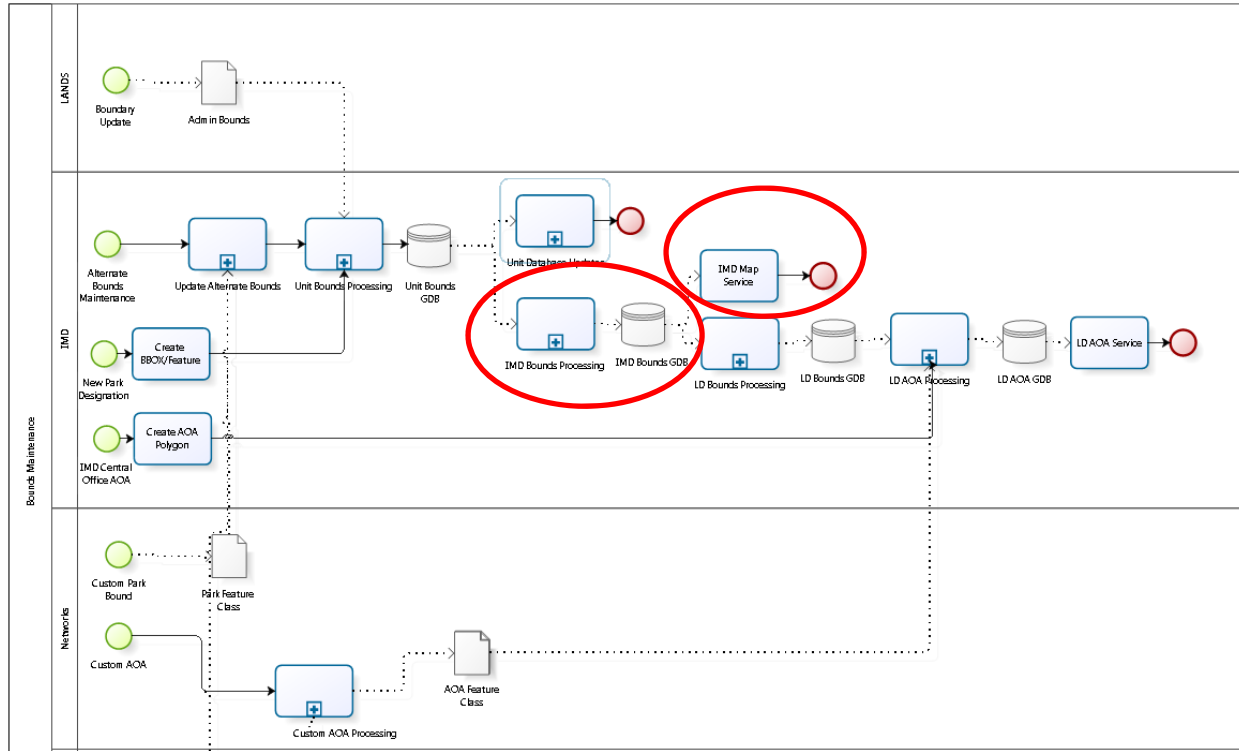
## Appendix 3: Dissolve of logical parks

**Table 1.** Logical park units for which the NPS unit polygons are dissolved.

| Unit Code | Park Name                                          |
|-----------|----------------------------------------------------|
| ANIA      | Aniakchak National Monument and Preserve           |
| DENA      | Denali National Park and Preserve                  |
| CRMO      | Craters of the Moon National Monument and Preserve |
| GAAR      | Gates of the Arctic National Park and Preserve     |
| GLBA      | Glacier Bay National Park and Preserve             |
| GRSA      | Great Sand Dunes National Park and Preserve        |
| KATM      | Katmai National Park and Preserve                  |
| LACL      | Lake Clark National Park and Preserve              |
| WRST      | Wrangell-St. Elias National Park and Preserve      |

## Appendix 4: Boundary Maintenance Process Summary

Unit boundary processing is a component of the overall boundary maintenance conducted by the IMD central office.



## Appendix 5: Change Tracking of IMD Bounds

Beginning in November 2017 (with the September 30 2017 LRD Release of nps\_boundary.shp), fields CreateDate and ChangeReason are included in IMD boundary products. These fields indicate if a particular park unit has changed from the previous release of LRD boundaries, when that change occurred, and the reason for the change.

CreateDate means the date the boundary was created. This date will change when a respective boundary has been altered from the previous iteration of the boundary. The ChangeReason associated with any park unit change must be qualified as per codes provided in Table 2.

**Table 2.** Change Reason Domain Table (Environmental Settings DB)

| Code | Label                  | Summary                                                                         |
|------|------------------------|---------------------------------------------------------------------------------|
| A    | New unit               | New park unit                                                                   |
| B    | Spatial change (Lands) | From LRD – update/correction to a park unit spatial data                        |
| C    | Requested              | Park/Network/other requested change for their use                               |
| D    | Exclusion              | Excluding part of a unit; i.e. Admin parcel                                     |
| E    | Datum-driven           | Placeholder for future changes to how datums are used                           |
| F    | Station add            | New monitoring station (hydro, climate ONLY)                                    |
| G    | Station delete         | Removal of monitoring station (hydro, climate ONLY)                             |
| H    | Logic Change           | Methods for deriving Bounds/AOAs change                                         |
| I    | Source release         | New version of data, supersedes all previous releases                           |
| J    | Source correction      | A release correcting an error in the current version                            |
| K    | Source update          | A change in dynamically edited data (updated continually); no released versions |
| L    | None                   | No change in AOA                                                                |
| M    | Source name change     | Source changed identifying name/code of unit/AOA                                |