

Inventory & Monitoring Division

National Park Service



Standard Operating Procedure 3.11.1

Calculating Statistics for National Landscape Dynamics Metrics: Pattern Density

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Summary

Internal SOP for running summary statistics for Landscape Pattern Density Metrics for use in Landscape Dynamics.

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Overview

This internal SOP provides guidance on how to process summary statistics for Pattern Density. Outputs include summary tables in SQL Server that summarize area by category for defined landscape pattern density classes. Pattern Density statistics are available for cover types Forest, Grassland, Shrubland, and Wetland.

Python scripts are used to calculate these statistics for a suite of areas of analysis (AOA). AOAs for pattern density statistics include 30km buffers of Park boundaries and Custom AOAs, where pattern density data is available. Standardized file geodatabases are used as the sources of these AOA polygons (SOPs 2.11.6 and 2.11.8; Kineth and Nelson 2018c, a). Custom AOAs are not created by the IMD Central Office, they come from Park/Network/Cooperators and must follow guidelines and requirements set forth in Custom Areas of Analysis SOP (SOP 2.11.8; Kineth and Nelson 2018a).

Pattern density metrics calculated with this SOP include area per category (km²), and percent area per category for grouped density classes and ungrouped density classes for all geographical areas where data is available. Area and percent area per category are calculated at the AOA level, and output summary statistics are presented in a tabular format in a relational database.

It is assumed users of this SOP have prior knowledge of data paths, file locations, and repositories referenced in this SOP.

Requirements

- ArcGIS Pro, Spatial Analyst extension enabled
- Network connection to X:\ drive for access to data
- SSMS 2014 connection to StatsQA database, required permissions to write to StatsQA.
- UPDATED Landscape Dynamics AOA feature classes reflecting most recent LRD updates (SOP 2.11.6; Kineth and Nelson 2018c); any custom AOAs provided by Networks or other IMD Staff (SOP 2.11.8; Kineth and Nelson 2018a).

Pre-Processing

1. Create a scratch directory on a local drive.
2. Copy all necessary source data, AOAS, tables, etc., to the local scratch directory.
 - a. Source rasters for this process are located:
X:\ProjectData\LandscapeDynamics\Pattern\Products\Seamless;
 - b. Reclassification tables are located:
X:\ProjectData\LandscapeDynamics\SourceData\Reclassification_Lookups\Pattern_Reclassifications.gdb.

- c. AOAs are located:
X:\ProjectData\LandscapeDynamics\SourceData\Boundary

Note: If running statistics for new Pattern Density source data, Pattern Density Raster Processing must occur before statistics can be created – see Processing land cover source data to derive landscape dynamics metrics: Pattern (SOP 2.11.15; Nelson and Kinseth 2018).

Processing

Copy all data locally, and run all processing locally.

AOA Feature Class(es)

In most cases, summary statistics will be updated annually only for those AOAs that have changed from the previous year. This AOA change is detected either with 1) new and/or updated Custom AOAs submitted by a Network or Cooperator through the annual update process (SOP 2.11.8; Kinseth and Nelson 2018a), or 2) Land Resources Division (LRD) releases an updated version of a Landscape Dynamics park boundary (SOP 2.11.5; Kinseth and Nelson 2018b).

1. For running pattern density statistics for updated/changed AOAs, use the temporary feature class(es), by geographical extent, created during AOA processing:
 - a. For 30km, derived from LRD boundary release,
LandscapeDynamics_AOA.gdb\<*_temp> (SOP 2.11.6; Kinseth and Nelson 2018c)
 - b. For Custom, based on new or altered Custom AOAs submitted by Network/Year,
\Network_CustomAOAs\<Network>\<Year>\<*_temp> (SOP 2.11.8; Kinseth and Nelson 2018a).

NOTE: not all AOA types will have updated AOAs, and not all extents within each type will have updated AOAs.

2. If running pattern density statistics for all AOAs of a type, use a local copy of the respective AOAs geodatabase (same locations as noted above), full list of features.

Run Summary Statistics Tool

1. Run the **Pattern Density** tool (Figure 1):
 - a. General processing steps of the tool:
 - i. Clip source raster to the area of analysis; reclassify clipped raster using the respective reclassification table; add and populate CLASSNAME attribute in reclassified output raster; calculate using pixel count math the summary statistics for the reclassified raster with AOA_FEATURE_SQKM, TAREA_SQKM, PCT_AREA, and AOA_NAME fields in the output table.

2. Run statistics for the following AOAs, for all cover types, where pattern data is available.
 - a. 30km, Custom AOAs

The image shows a software window titled "Pattern Density". It contains a list of parameters for a spatial analysis tool. Each parameter is preceded by a green diamond icon. The parameters are: "Pattern Density Raster Source Folder", "Pattern Year", "Pattern Density Source (NLCD)", "Target Type (Forest, Grassland, Shrubland, Wetland)", "Pattern Indicator Raster (optional)", "Reclassification Table", "Grouped Reclassification Table", "Source AOA Feature Dataset", "Feature Class", "AOA Suffix", "Output Folder", "StatsQA Database Connection (optional)", "Select Window Size(s) (optional)", and "Full AOA List (Feature Class)". Each parameter has a corresponding text input field. To the right of each input field is a small folder icon with a blue plus sign, indicating a browse button. At the bottom of the window are four buttons: "OK", "Cancel", "Environments...", and "Show Help >>".

Parameter	Input Field	Browse Button
Pattern Density Raster Source Folder		Yes
Pattern Year		No
Pattern Density Source (NLCD)		No
Target Type (Forest, Grassland, Shrubland, Wetland)		No
Pattern Indicator Raster (optional)		No
Reclassification Table		Yes
Grouped Reclassification Table		Yes
Source AOA Feature Dataset		Yes
Feature Class		Yes
AOA Suffix		No
Output Folder		Yes
StatsQA Database Connection (optional)		Yes
Select Window Size(s) (optional)		No
Full AOA List (Feature Class)		Yes

Figure 1. Parameter entry gui for the Pattern Density Tool (Table 1). Depending on the number of AOAs, the script may take several hours or days to run. See Appendix 4 for handling errors.

Table 1: Options to use for parameters in the Pattern Density Tool.

Parameter	Notes
Pattern Density Raster Source Folder	Folder that contains the rasters for the cover type and source year of interest
Pattern Year	YYYYvYY (NLCD)
Pattern Density Source	NLCD
Target Type (Forest, Grassland, Shrubland, Wetland)	One of four cover type options
Pattern Indicator Raster (optional)	Indicator raster for cover type and source year of interest
Reclassification Table	PatternDensity_Reclass_RasterDisplay
Grouped Reclassification Table	PatternDensityGrouped_Reclass
Source AOA Feature Dataset	The feature dataset that contains the unique AOA feature classes.
Feature Class	The combined feature class list within the Source AOA Feature Dataset. Includes all the AOA feature classes to be included in the statistics calculations.
AOA Suffix	The identifier for the AOA type (i.e. 30km)
Output Folder	The local Scratch folder
Stats QA Database Connection	An optional parameter, can be left blank if summary statistics should not be copied to the database for QA.
Select Window Size(s) (optional)	Window sizes should be listed, comma-separated. This parameter should only be used if a subset of window sizes are needed/desired.
Full AOA List (Feature Class)	The complete, combined feature class list within the Source AOA Feature Dataset. Includes all the AOA feature classes to be included in the statistics calculations. May be the same feature class as parameter "Feature Class"

Summary statistics table details

The **Pattern Density** tool will iterate through all AOAs in the input feature class and produce statistics in two tables within a file geodatabase (Table 2, Table 3); if desired, output statistics tables are then copied to SQL Server (StatsQA) for the QAQC process (SOP 3.11.12; Kinseth and Nelson 2018d).

Table 2. Summary statistics table details; P<f, g, s, w>den_<WindowSize>_stats
(merged table: NLCD_<TargetType>_p<f, g, s, w>_YYYYvYY_stats)

Field	Definition
VALUE	Identifier of CLASSNAME
COUNT	Number of cells in respective pattern density class
CLASSNAME	Descriptive name of pattern density class
BASE_CLASS	Percent density range of CLASSNAME
AOA_NAME	The AOA name specified in the script input
WINDOW_SIZE	Size, in pixels, of moving window used to create the input raster (NLCD windows: 7, 13, 27, 81, 243, 729)
AOA_AREA_SQKM	Area of respective AOA polygon feature, in square kilometers, taken from vector source
TAREA_SQKM	Total area of respective AOA, in square kilometers, calculated from raster cells: $TAREA_SQKM = (SUM(COUNT) * cell\ size^2) / 1,000,000$
AREA_SQKM	Total area, in square kilometers, of each morphology class, calculated from raster cells $AREA_SQKM = (COUNT * cell\ size^2) / 1,000,000$
PCT_AREA	Percent area of respective morphology class, within respective AOA $PCT_AREA = (AREA_SQKM / TAREA_SQKM) * 100$
DATE_CALC	Date the statistics were calculated, YYYYMMDD format
PARK_CODE	If applicable, four-letter park code
DATA_YEAR	Year the source data represents
DATA_VERSION	Source and year
TOTAL_AOA_AREA_SQKM	Area calculated, in script, from the feature class in use
AOA_DATE	Date AOA was created in GIS; from AOA source feature class
COVER_TYPE	Source data cover type.
CreateDate	Date the statistics were calculated for the respective AOA
Code_Class_Area	Code indicating statistics values are related to pattern density classes, by window size; values are added to table in QAQC. (Appendix 3)
Code_Percent_Area	Code indicating statistics values are related to pattern density percent class, by window size; values are added to table in QAQC. (Appendix 3)

Table 3. Summary statistics table details, grouped statistics.

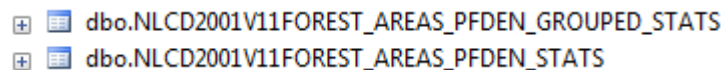
P<f, g, s, w>den_<WindowSize>_grouped_stats

(merged table: NLCD_<TargetType>_p<f, g, s, w>_YYYYvYY_grouped_stats)

Field	Definition
VALUE	Identifier of CLASSNAME
COUNT	Number of cells in respective pattern density class
CLASSNAME	Descriptive name of pattern density class
AOA_NAME	The AOA name specified in the script input
WINDOW_SIZE	Size, in pixels, of moving window used to create the input raster (NLCD windows: 7, 13, 27, 81, 243, 729)
AOA_AREA_SQKM	Area of respective AOA polygon feature, in square kilometers, taken from vector source
TAREA_SQKM	Total area of respective AOA, in square kilometers, calculated from raster cells: $TAREA_SQKM = (SUM(COUNT) * cell\ size^2) / 1,000,000$
AREA_SQKM	Total area, in square kilometers, of each morphology class, calculated from raster cells $AREA_SQKM = (COUNT * cell\ size^2) / 1,000,000$
PCT_AREA	Percent area of respective morphology class, within respective AOA $PCT_AREA = (AREA_SQKM / TAREA_SQKM) * 100$
DATE_CALC	Date the statistics were calculated, YYYYMMDD format
PARK_CODE	If applicable, four-letter park code
DATA_YEAR	Year the source data represents
DATA_VERSION	Source and year
TOTAL_AOA_AREA_SQKM	Area calculated, in script, from the feature class (AOA) in use
AOA_DATE	Date AOA was created in GIS; from AOA source feature class
COVER_TYPE	Source data cover type.
CreateDate	Date the statistics were calculated for the respective AOA ted.
Code_Class_Area	Code indicating statistics values are related to pattern density grouped classes, by window size; values are added to table in QAQC. (Appendix 3)
Code_Percent_Area	Code indicating statistics values are related to pattern density grouped percent class, by window size; values are added to table in QAQC. (Appendix 3)

Post-Processing

1. After the tool has run successfully for all AOAs and cover types of interest, confirm all the summary statistics output table(s) are copied to SQL Server (if desired). Check for tables in StatsQA database in SQL Server (Figure 2):



dbo.NLCD2001V11FOREST_AREAS_PFDEN_GROUPED_STATS
dbo.NLCD2001V11FOREST_AREAS_PFDEN_STATS

Figure 2. Example of tables in the StatsQA Database.

2. Move the output geodatabase (Figure 3) from the local folder to
X:\ProjectData\LandscapeDynamics\Pattern\Products\Statistics\YYYY



Figure 3. Example (partial) output geodatabase (GDB)

3. Move to Pattern Density QAQC (SOP 3.11.12; Kinseth and Nelson 2018d).

Literature Cited

- Environmental Systems Research Institute (ESRI). 2017. How To: Redirect where ArcInfo Workstation and/or ArcGIS writes temporary or scratch files during processing website. <http://support.esri.com/en/technical-article/000001418> (accessed 12/19/2017).
- Kinseth, M. and L. Nelson. 2018a. Creating custom areas of analysis for use as a part of the IMD Environmental Settings Protocol. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—2.11.8. National Park Service, Fort Collins, Colorado.
- Kinseth, M. and L. Nelson. 2018b. 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.
- Kinseth, M. and L. Nelson. 2018c. NPS unit boundary processing: Boundary-derived areas of analysis for use as a Part of the IMD Environmental Settings Protocol Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—2.11.6. National Park Service, Fort Collins, Colorado.
- Kinseth, M. and L. Nelson. 2018d. Quality assurance and quality control for landscape dynamics metrics: Pattern density. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—3.11.12. National Park Service, Fort Collins, Colorado.
- Nelson, L. and M. Kinseth. 2018. Processing land cover source data to derive landscape dynamics metrics: Pattern. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—2.11.15. National Park Service, Fort Collins, Colorado.

Appendix 1: Data Availability and Known Issues

Data availability

Pattern Density source rasters are derived from available NLCD data (multiple years). NLCD data is updated approximately every five years.

Issues

Pattern Density summary statistics are available for select cover types only; Grassland, Forest, Shrubland, and Wetland (SOP 2.11.15; Nelson and Kinseth 2018), and only where data is available.

Spatial Reference

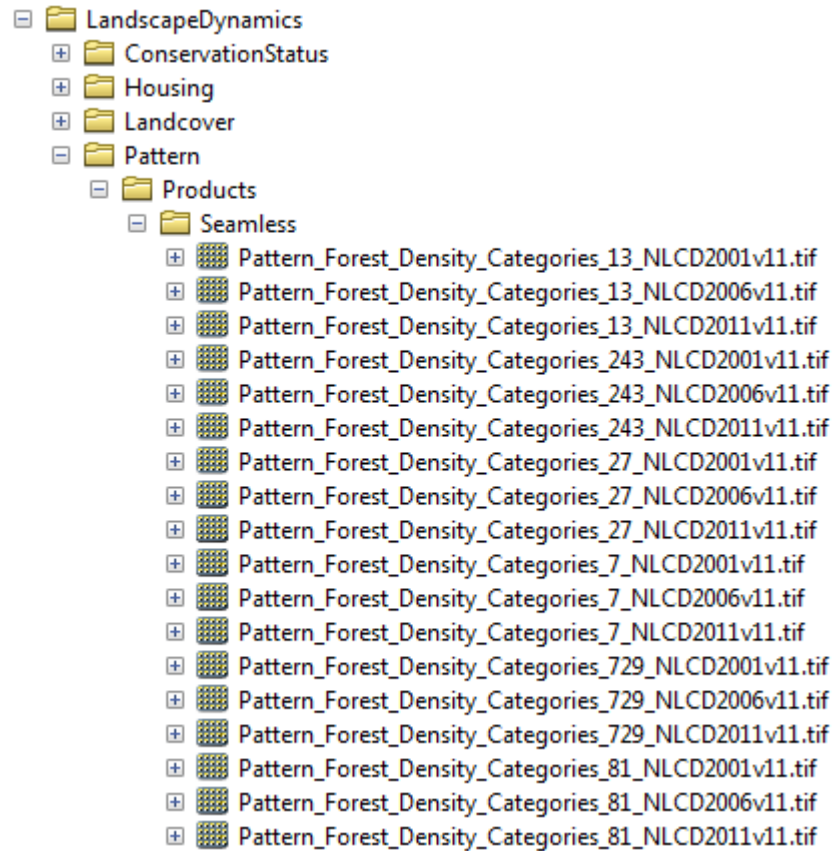
Data for the varying geographies should be in the spatial reference noted (Table 4).

Table 4. Standard spatial references by processing extent

Processing Extent	Spatial Reference Name (datum)	Well-known ID (WKID)
North America (US, Canada, Mexico)	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
CONUS	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Puerto Rico and USVI	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Alaska	Alaska Albers Equal Area Conic (NAD83)	WKID: 3338
Hawaii	UTM Zone 5N (NAD83)	WKID: 26905
American Samoa	NAD_1983_HARN_UTM_Zone_2S (NAD83 HARN)	WKID: 2195
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983 + NAD_1983_HARN_To_WGS_1984_2	
Guam	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	
CN Mariana Islands	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	

Appendix 2: Source Data

(X:\ProjectData\LandscapeDynamics\Pattern\Products\Seamless), each available land cover type, by year, has multiple associated rasters for use in running statistics (partial list shown):



Appendix 3: Pattern Density Metric Codes

Code, metric and definition crosswalk table for Pattern Density.

Classname		Code, Area of Class (by Window Size)					
Grouped	Value	Window Size 7	Window Size 13	Window Size 27	Window Size 81	Window Size 243	Window Size 729
Rare	2	PDEN_G1-1	PDEN_G2-1	PDEN_G3-1	PDEN_G4-1	PDEN_G5-1	PDEN_G6-1
Patchy	3	PDEN_G1-2	PDEN_G2-2	PDEN_G3-2	PDEN_G4-2	PDEN_G5-2	PDEN_G6-2
Transitional	4	PDEN_G1-3	PDEN_G2-3	PDEN_G3-3	PDEN_G4-3	PDEN_G5-3	PDEN_G6-3
Dominant	5	PDEN_G1-4	PDEN_G2-4	PDEN_G3-4	PDEN_G4-4	PDEN_G5-4	PDEN_G6-4
Interior	6	PDEN_G1-5	PDEN_G2-5	PDEN_G3-5	PDEN_G4-5	PDEN_G5-5	PDEN_G6-5
Intact	7	PDEN_G1-6	PDEN_G2-6	PDEN_G3-6	PDEN_G4-6	PDEN_G5-6	PDEN_G6-6
Classname		Code, Percent Area of Class (by Window Size)					
Grouped	Value	Window Size 7	Window Size 13	Window Size 27	Window Size 81	Window Size 243	Window Size 729
Rare	2	PDEN_G7-1	PDEN_G8-1	PDEN_G9-1	PDEN_G10-1	PDEN_G11-1	PDEN_G12-1
Patchy	3	PDEN_G7-2	PDEN_G8-2	PDEN_G9-2	PDEN_G10-2	PDEN_G11-2	PDEN_G12-2
Transitional	4	PDEN_G7-3	PDEN_G8-3	PDEN_G9-3	PDEN_G10-3	PDEN_G11-3	PDEN_G12-3
Dominant	5	PDEN_G7-4	PDEN_G8-4	PDEN_G9-4	PDEN_G10-4	PDEN_G11-4	PDEN_G12-4
Interior	6	PDEN_G7-5	PDEN_G8-5	PDEN_G9-5	PDEN_G10-5	PDEN_G11-5	PDEN_G12-5
Intact	7	PDEN_G7-6	PDEN_G8-6	PDEN_G9-6	PDEN_G10-6	PDEN_G11-6	PDEN_G12-6
Classname		Code, Area of Class (by Window Size)					
Density	Value	Window Size 7	Window Size 13	Window Size 27	Window Size 81	Window Size 243	Window Size 729
>0 to <5	2	PDEN1-1	PDEN2-1	PDEN3-1	PDEN4-1	PDEN5-1	PDEN6-1
5 to <10	3	PDEN1-2	PDEN2-2	PDEN3-2	PDEN4-2	PDEN5-2	PDEN6-2
10 to <15	4	PDEN1-3	PDEN2-3	PDEN3-3	PDEN4-3	PDEN5-3	PDEN6-3
15 to <20	5	PDEN1-4	PDEN2-4	PDEN3-4	PDEN4-4	PDEN5-4	PDEN6-4
20 to <25	6	PDEN1-5	PDEN2-5	PDEN3-5	PDEN4-5	PDEN5-5	PDEN6-5
25 to <30	7	PDEN1-6	PDEN2-6	PDEN3-6	PDEN4-6	PDEN5-6	PDEN6-6
30 to <35	8	PDEN1-7	PDEN2-7	PDEN3-7	PDEN4-7	PDEN5-7	PDEN6-7
35 to <40	9	PDEN1-8	PDEN2-8	PDEN3-8	PDEN4-8	PDEN5-8	PDEN6-8
40 to <45	10	PDEN1-9	PDEN2-9	PDEN3-9	PDEN4-9	PDEN5-9	PDEN6-9
45 to <50	11	PDEN1-10	PDEN2-10	PDEN3-10	PDEN4-10	PDEN5-10	PDEN6-10
50 to <55	12	PDEN1-11	PDEN2-11	PDEN3-11	PDEN4-11	PDEN5-11	PDEN6-11
55 to <60	13	PDEN1-12	PDEN2-12	PDEN3-12	PDEN4-12	PDEN5-12	PDEN6-12
60 to <65	14	PDEN1-13	PDEN2-13	PDEN3-13	PDEN4-13	PDEN5-13	PDEN6-13
65 to <70	15	PDEN1-14	PDEN2-14	PDEN3-14	PDEN4-14	PDEN5-14	PDEN6-14
70 to <75	16	PDEN1-15	PDEN2-15	PDEN3-15	PDEN4-15	PDEN5-15	PDEN6-15
75 to <80	17	PDEN1-16	PDEN2-16	PDEN3-16	PDEN4-16	PDEN5-16	PDEN6-16
80 to <85	18	PDEN1-17	PDEN2-17	PDEN3-17	PDEN4-17	PDEN5-17	PDEN6-17
85 to <90	19	PDEN1-18	PDEN2-18	PDEN3-18	PDEN4-18	PDEN5-18	PDEN6-18
90 to <95	20	PDEN1-19	PDEN2-19	PDEN3-19	PDEN4-19	PDEN5-19	PDEN6-19
95 to <100	21	PDEN1-20	PDEN2-20	PDEN3-20	PDEN4-20	PDEN5-20	PDEN6-20
100	22	PDEN1-21	PDEN2-21	PDEN3-21	PDEN4-21	PDEN5-21	PDEN6-21
Classname		Code, Percent Area of Class (by Window Size)					
Density	Value	Window Size 7	Window Size 13	Window Size 27	Window Size 81	Window Size 243	Window Size 729
>0 to <5	2	PDEN7-1	PDEN8-1	PDEN9-1	PDEN10-1	PDEN11-1	PDEN12-1
5 to <10	3	PDEN7-2	PDEN8-2	PDEN9-2	PDEN10-2	PDEN11-2	PDEN12-2
10 to <15	4	PDEN7-3	PDEN8-3	PDEN9-3	PDEN10-3	PDEN11-3	PDEN12-3
15 to <20	5	PDEN7-4	PDEN8-4	PDEN9-4	PDEN10-4	PDEN11-4	PDEN12-4
20 to <25	6	PDEN7-5	PDEN8-5	PDEN9-5	PDEN10-5	PDEN11-5	PDEN12-5
25 to <30	7	PDEN7-6	PDEN8-6	PDEN9-6	PDEN10-6	PDEN11-6	PDEN12-6

30 to <35	8	PDEN7-7	PDEN8-7	PDEN9-7	PDEN10-7	PDEN11-7	PDEN12-7
35 to <40	9	PDEN7-8	PDEN8-8	PDEN9-8	PDEN10-8	PDEN11-8	PDEN12-8
40 to <45	10	PDEN7-9	PDEN8-9	PDEN9-9	PDEN10-9	PDEN11-9	PDEN12-9
45 to <50	11	PDEN7-10	PDEN8-10	PDEN9-10	PDEN10-10	PDEN11-10	PDEN12-10
50 to <55	12	PDEN7-11	PDEN8-11	PDEN9-11	PDEN10-11	PDEN11-11	PDEN12-11
55 to <60	13	PDEN7-12	PDEN8-12	PDEN9-12	PDEN10-12	PDEN11-12	PDEN12-12
60 to <65	14	PDEN7-13	PDEN8-13	PDEN9-13	PDEN10-13	PDEN11-13	PDEN12-13
65 to <70	15	PDEN7-14	PDEN8-14	PDEN9-14	PDEN10-14	PDEN11-14	PDEN12-14
70 to <75	16	PDEN7-15	PDEN8-15	PDEN9-15	PDEN10-15	PDEN11-15	PDEN12-15
75 to <80	17	PDEN7-16	PDEN8-16	PDEN9-16	PDEN10-16	PDEN11-16	PDEN12-16
80 to <85	18	PDEN7-17	PDEN8-17	PDEN9-17	PDEN10-17	PDEN11-17	PDEN12-17
85 to <90	19	PDEN7-18	PDEN8-18	PDEN9-18	PDEN10-18	PDEN11-18	PDEN12-18
90 to <95	20	PDEN7-19	PDEN8-19	PDEN9-19	PDEN10-19	PDEN11-19	PDEN12-19
95 to <100	21	PDEN7-20	PDEN8-20	PDEN9-20	PDEN10-20	PDEN11-20	PDEN12-20
100	22	PDEN7-21	PDEN8-21	PDEN9-21	PDEN10-21	PDEN11-21	PDEN12-21

Appendix 4: Error Handling

In some cases, **Pattern Density** may fail before completion of summary statistics for all AOAs of interest. Some raster data can max out the available memory in ArcGIS and cause the program to crash mid-run. Sometimes there is a forced reboot of the computer which will disrupt the statistics processing.

Memory Error

If the error appears to be due to memory issues within ArcGIS or the local computer see ESRI (2017) to set the temp directory to a location with more space available. This may not completely resolve the memory issue, but it can help:

1. Use the following procedure to set an ARCTMPDIR system environment variable:
 - a. Navigate to Start > Control Panel > System and Security > System
 - b. Select Advanced system settings, and click the Environment Variables button.
 - c. Under System variables, click the New button and enter the following:
variable name: ARCTMPDIR
variable value: C:\temp (Replace c:\temp in the above with a disk location appropriate for the current user. The current user must have full read/write access to this location.)
 - d. Click OK on the New System Variable dialog box and click OK on the System Properties dialog box.
 - e. Restart ArcInfo or ArcGIS Desktop for this change to take effect.

Forced Reboot Error

If the script is interrupted for reasons other than memory, such as a computer reboot, resume the tool making sure the final parameter (Complete AOA Feature Class) is populated. This will allow the script to bypass AOAs already calculated in the partial statistics output table, and finish processing for missing AOAs only.