

Inventory & Monitoring Division

National Park Service



Standard Operating Procedure 3.11.12

Quality Assurance and Quality Control for Landscape Dynamics Metrics: Pattern Density

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Summary

This internal Landscape Dynamics SOP provides guidance on QA/QC process for area and percent area pattern density metric statistics.

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Overview

This SOP provides instruction on how to QA/QC pattern density, derived from the Pattern Density rasters created from the most recent Nation Land Cover Dataset (NLCD) released by Multi-Resolution Land Characteristics Consortium (MRLC) (SOP 2.11.15; Nelson and Kinseth 2018).

Statistics can represent various areas of analysis (AOA). At a minimum, AOAs for statistics include a 30km buffer of park boundaries (SOP 2.11.6; Kinseth and Nelson 2018c). Other AOAs can include custom AOAs submitted by Networks or Cooperators for analysis such as management areas or other ecological boundaries of interest to the Network (SOP 2.11.8; Kinseth and Nelson 2018b). Pattern Density statistics are limited to those AOAs that are within the extent of the source data (NLCD).

Statistics for Landscape Pattern Density include total AOA area in square kilometers (km²), total area of each pattern density class (in km²), and the percent total area of the pattern density class within the AOA (SOP 3.11.1; Kinseth and Nelson 2018a).

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

Requirements

- Knowledge and ability to use SSMS (SQL Server Management Studio)
- Read/write database security privileges for StatsQA and LD_Stage
- Run pattern density summary statistics (SOP 3.11.1; Kinseth and Nelson 2018a).

QA Processing & Procedures

Steps 1 to 3 can be accomplished by any IMD-GIS staff. Steps 4 to 6 can only be accomplished by select IMD-GIS staff with elevated permissions the database.

Before you start:

- Connect to SSMS and view the tables within the StatsQA database. There will be multiple pattern density statistics tables, by AOA type.
- Repeat steps 1, 2 for each pattern density table (DEN) present in StatsQA.

Naming convention for statistics tables:

NLCD<YYYYvYY><Cover Type>_<Geography>_<AOA>_<Type>_<Stat>

Where:

YYYYvYY = source data year

Cover Type = Forest, Grassland, Shrubland, Wetland

Geography = CONUS, or, <Network> or <other> if a Custom AOA

AOA = 30km, or defined type from Custom AOA feature class

Type = PFDEN (Forest), PSDEN (Shrubland), PGDEN (Grassland), PWDEN (Wetland)

Stat = "STATS", or "GROUPED_STATS"

Step 1: Quality Assurance

ALL TABLES

1. View table and look for any NULL fields in DATE_CALC. If there are any, stop. Statistics may have to be rerun. If there are no NULLs, continue with QA.
2. Check all AOAs are represented in the table. The number of rows should match the number of features from the input AOA feature class list (if there is a discrepancy, stop immediately):

```
SELECT Count(  
    [CLASSNAME])  
    , [AOA_NAME]  
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]  
group by [AOA_NAME]
```

3. Right click → Select Top 1000 rows → Delete "TOP 1000" from query
 - a. Sort by area; look for any ZERO or NEGATIVE values. If AREA_SQKM, or TAREA_SQKM, is ZERO, Count_ should also be ZERO:

```
order by AREA_SQKM, TAREA_SQKM, AOA_NAME, WINDOW_SIZE, CLASSNAME
```

***NOTE:** the final step of the statistics tool is to insert into the respective table a record for any missing AOAs, by covertype/window size. These inserted rows will have a 'Count_' = 0, CLASSNAME = 'Rare', (or for "_stats" table: BASE_CLASS = '>0 to <5'), and values of "0" in both [TAREA_SQKM], [AREA_SQKM]. These zero values are VALID and should not be counted as errors in QA checks. Check the AOA and source data in ArcMap if there's a question or concern about a particular AOA returning "0" as an area value.

4. Sum AREA_SQKM and compare to TAREA_SQKM by calculating the difference (DIFF). Check the results and make sure the difference (DIFF) is smaller than +/-0.0001:

```
SELECT SUM([AREA_SQKM]) AS SUM_AREA, TAREA_SQKM, AOA_NAME,  
    WINDOW_SIZE, (SUM([AREA_SQKM]) - TAREA_SQKM) DIFF  
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]  
group by AOA_NAME, TAREA_SQKM, WINDOW_SIZE  
order by DIFF desc, AOA_NAME, WINDOW_SIZE
```

5. Check the sum of all PCT_AREA by AOA. The values should be 100%. Acceptable range is 100 +/- 0.001.

Note: any AOAs absent a specific cover type will have a sum PCT_AREA of 0.0000. This is acceptable. If unsure if a sum of 0.000 is correct, visually check AOAs against source raster data to confirm cover type is absent.

```
SELECT SUM([PCT_AREA]) AS SUM_PCT, AOA_NAME, WINDOW_SIZE
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]
group by AOA_NAME, WINDOW_SIZE
order by SUM_PCT, WINDOW_SIZE, AOA_NAME
```

Step 2: Manage Data

Run the queries below, based on table type, to fill in any missing Pattern Density Classes, by AOA.

“STATS” TABLE ONLY

```
INSERT INTO [StatsQA].[dbo].[STATS TABLE HERE] ([VALUE], [COUNT_],
[CLASSNAME] ,
[BASE_CLASS], [WINDOW_SIZE], [AOA_NAME], [AOA_AREA_SQKM],
[TAREA_SQKM], [AREA_SQKM], [PCT_AREA], [CreateDate], [PARK_CODE],
[DATE_CALC],
[DATA_YEAR], [TOTAL_AOA_AREA_SQKM], [DATA_VERSION], [COVER_TYPE],
[AOA_DATE], [Code_Class_Area], [Code_PercentCover_Area])

SELECT DISTINCT X.[OUT_VAL], 0, X.[CLASSNAME], X.[BASE_CLASSNAME],
X.[WINDOW_SIZE], X.[AOA_NAME], X.[AOA_AREA_SQKM], 0, 0, 0, X.[CreateDate],
X.[PARK_CODE], X.[DATE_CALC], X.[DATA_YEAR], X.[TOTAL_AOA_AREA_SQKM],
X.[DATA_VERSION], X.[COVER_TYPE], X.[AOA_DATE], X.[Code_Class_Area],
X.[Code_PercentCover_Area]
FROM [LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay]
LEFT OUTER JOIN
(SELECT
[LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay].[OUT_VAL],
[LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay].[CLASSNAME],
[LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay].[BASE_CLASSNAME]
,
[StatsQA].[dbo].[STATS TABLE HERE].[WINDOW_SIZE],
[StatsQA].[dbo].[STATS TABLE HERE].[AOA_NAME],
[StatsQA].[dbo].[STATS TABLE HERE].[AOA_AREA_SQKM],
```

```

[StatsQA].[dbo].[STATS TABLE HERE].[TAREA_SQKM],
[StatsQA].[dbo].[STATS TABLE HERE].[CreateDate],
[StatsQA].[dbo].[STATS TABLE HERE].[PARK_CODE],
[StatsQA].[dbo].[STATS TABLE HERE].[DATE_CALC],
[StatsQA].[dbo].[STATS TABLE HERE].[DATA_YEAR],
[StatsQA].[dbo].[STATS TABLE HERE].[TOTAL_AOA_AREA_SQKM],
[StatsQA].[dbo].[STATS TABLE HERE].[DATA_VERSION],
[StatsQA].[dbo].[STATS TABLE HERE].[COVER_TYPE],
[StatsQA].[dbo].[STATS TABLE HERE].[AOA_DATE],
[StatsQA].[dbo].[STATS TABLE HERE].[Code_Class_Area],
[StatsQA].[dbo].[STATS TABLE HERE].[Code_PercentCover_Area]
FROM [LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay]
CROSS JOIN
[StatsQA].[dbo].[STATS TABLE HERE])
AS X ON X.[OUT_VAL]=
[LD_Stage].[dbo].[tlu_PatternDensity_Reclass_RasterDisplay].[OUT_VAL]
WHERE X.[OUT_VAL] NOT IN
(SELECT [StatsQA].[dbo].[STATS TABLE HERE].[VALUE]
FROM [StatsQA].[dbo].[STATS TABLE HERE]
WHERE [StatsQA].[dbo].[STATS TABLE HERE].[AOA_NAME] = X.[AOA_NAME] AND
[StatsQA].[dbo].[STATS TABLE HERE].[WINDOW_SIZE] = X.[WINDOW_SIZE]);

```

1. All absent pattern density classes should have been inserted. Check the count again:

```

SELECT Count(
    [WINDOW_SIZE])
    , [AOA_NAME], [WINDOW_SIZE]
FROM [StatsQA].[dbo].[STATS TABLE HERE]
group by [AOA_NAME], [WINDOW_SIZE]
order by AOA_NAME, WINDOW_SIZE

```

- a. All rows should have the same count, 21/row

- b. The number of rows should match the number of AOAs in the input feature class as above (Step 1.2)
2. Right click on table → Design. Edit field “Count_” to “Count” and save.
3. Populate fields ‘Code_Class_Area’ and ‘Code_Percent_Area’:
 - a. In SSMS, open PDEN_<CoverType>_CodeJoins.sql; all .sql scripts can be found in the repository.
 - b. Edit the .sql script as needed.

sql Code Example:

```
Update a set a.[Code_Class_Area] = b.Code
from [LD_Stage].[config].[LandscapeDynamicsMetrics] as b
FULL OUTER JOIN [StatsQA].[dbo].[nlcd2001v11_Forest_pden_stats_30km] as a
on a.CLASSNAME = b.Classname and a.Window_Size = b.Size
where b.Description like 'PDEN%' and ParameterType = 'Class Area';
```

```
Update a set a.[Code_PercentCover_Area] = b.Code
from [LD_Stage].[config].[LandscapeDynamicsMetrics] as b
INNER JOIN [StatsQA].[dbo].[nlcd2001v11_Forest_pden_stats_30km] as a
on a.CLASSNAME = b.Classname and a.Window_Size = b.Size
where b.Description like 'PDEN%' and b.ParameterType = 'Percent Area';
```

“GROUPED_STATS” TABLE ONLY

```
INSERT INTO [StatsQA].[dbo].[STATS TABLE NAME GOES HERE] ([VALUE],
[COUNT_], [CLASSNAME] , [WINDOW_SIZE], [AOA_NAME], [AOA_AREA_SQKM] ,
[TAREA_SQKM] , [AREA_SQKM] , [PCT_AREA], [CreateDate], [PARK_CODE],
[DATE_CALC], [DATA_YEAR], [TOTAL_AOA_AREA_SQKM], [DATA_VERSION],
[COVER_TYPE], [AOA_DATE], [Code_Class_Area], [Code_PercentCover_Area] )
SELECT DISTINCT X.[OUT_VAL], 0, X.[CLASSNAME], X.[WINDOW_SIZE],
X.[AOA_NAME], X.[AOA_AREA_SQKM], 0, 0, 0, X.[CreateDate], X.[PARK_CODE],
X.[DATE_CALC], X.[DATA_YEAR], X.[TOTAL_AOA_AREA_SQKM], X.[DATA_VERSION],
X.[COVER_TYPE], X.[AOA_DATE], X.[Code_Class_Area],
X.[Code_PercentCover_Area]
FROM [LD_Stage].[dbo].[tlu_PatternDensityGrouped_Reclass]
LEFT OUTER JOIN
(SELECT
[LD_Stage].[dbo].[tlu_PatternDensityGrouped_Reclass].[OUT_VAL],
[LD_Stage].[dbo].[tlu_PatternDensityGrouped_Reclass].[CLASSNAME],
```

```

[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[WINDOW_SIZE],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[AOA_NAME],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[AOA_AREA_SQKM],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[TAREA_SQKM],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[CreateDate],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[PARK_CODE],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[DATE_CALC],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[DATA_YEAR],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[TOTAL_AOA_AREA_SQKM],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[DATA_VERSION],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[COVER_TYPE],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[AOA_DATE],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[Code_Class_Area],
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[Code_PercentCover_Area]
FROM [LD_Stage].[dbo].[tlu_PatternDensityGrouped_Reclass]
CROSS JOIN
[StatsQA].[dbo].[STATS TABLE NAME GOES HERE])
AS X ON X.[OUT_VAL]=
[LD_Stage].[dbo].[tlu_PatternDensityGrouped_Reclass].[OUT_VAL]
WHERE X.[OUT_VAL] NOT IN
(SELECT [StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[VALUE]
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]
WHERE [StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[AOA_NAME] =
X.[AOA_NAME] AND [StatsQA].[dbo].[STATS TABLE NAME GOES HERE].[WINDOW_SIZE]
= X.[WINDOW_SIZE]);

```

1. All absent pattern density classes should have been inserted. Check the count again:

```

SELECT Count(
    [WINDOW_SIZE]) WS
, [AOA_NAME], [WINDOW_SIZE]

```

```
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]
```

```
group by [AOA_NAME], [WINDOW_SIZE]
```

```
order by [WS] desc, [AOA_NAME], [WINDOW_SIZE]
```

- a. Each AOA/window size combo should have a Count of 6
 - b. The number of rows should match number of AOAs in the input feature class as above (Step 1.2).
2. Right click on table → Design. Edit field “Count_” to “Count” and save.
3. Populate fields ‘Code_Class_Area’ and ‘Code_Percent_Area’.
 - a. Open PDEN_<CoverType>_CodeJoins.sql; all .sql scripts can be found in the repository.
 - b. Edit the ‘grouped_stats’ table names as needed.

sql Code Example:

```
Update a set a.[Code_Class_Area] = b.Code
from [LD_Stage].[config].[LandscapeDynamicsMetrics] as b
FULL OUTER JOIN [StatsQA].[dbo].[nlcd2001v11_Forest_pden_grouped_stats_30km]
as a
on a.CLASSNAME = b.Classname and a.Window_Size = b.Size
where b.Description like 'PDEN%' and ParameterType = 'Class Area';
```

```
Update a set a.[Code_PercentCover_Area] = b.Code
from [LD_Stage].[config].[LandscapeDynamicsMetrics] as b
INNER JOIN [StatsQA].[dbo].[nlcd2001v11_Forest_pden_grouped_stats_30km] as a
on a.CLASSNAME = b.Classname and a.Window_Size = b.Size
where b.Description like 'PDEN%' and b.ParameterType = 'Percent Area';
```

Step 3: Combine Statistics

Where applicable, combine data with matching source/year/metric/AOA to create one table of pattern density statistics.

Go to Step 4 if there are no tables to combine.

“STATS” TABLE ONLY

1. Create a new “stats” table for combined pattern density (by cover type, year, AOA). Add the following to the select statement, on the line above ‘From’:

```
INTO [StatsQA].[dbo].[NEW TABLE HERE]
```

Naming convention for **new** tables should match table names in LD_Stage, for the same metric (if any):

Example New Table = [StatsQA].[dbo].[nlcd2011v11_Forest_pden_stats_Custom]

2. Refresh StatsQA and look for the new table.
3. Insert additional tables as needed:

```
INSERT INTO [StatsQA].[dbo].[NEW TABLE HERE]
    ([VALUE]
    , [COUNT]
    , [BASE_CLASS]
    , [CLASSNAME]
    , etc. with remaining fields)

SELECT [VALUE]
    , [COUNT]
    , [BASE_CLASS]
    , [CLASSNAME]
    , etc. with remaining fields

FROM [StatsQA].[dbo].[ADDITIONAL SOURCE TABLE(S)]
```

4. When done, check combined table:

```
SELECT Count(
    [CLASSNAME])
    , [AOA_NAME]
    , [WINDOW_SIZE]

FROM [StatsQA].[dbo].[STATS TABLE NAME HERE]

group by [AOA_NAME], [WINDOW_SIZE]

order by [AOA_NAME]
```

Each AOA/window size should have **21** CLASSNAME Count, and the number of rows should equal the total of all AOAs from the individual tables that were merged.

```
SELECT Count(
    [WINDOW_SIZE])
    , [AOA_NAME]

FROM [StatsQA].[dbo].[STATS TABLE NAME HERE]

group by [AOA_NAME]
```

Each AOA should have **126** CLASSNAME Count, the number of rows should equal the total of all AOAs from the individual tables that were merged.

- a. If merged tables have the proper count (as noted above), delete individual tables leaving only the combined/new tables in the database.

“GROUPED_STATS” TABLE ONLY

1. Create a new “grouped_stats” table (by cover type, year, AOA). Add the following to the select statement, on line above ‘From’:

```
INTO [StatsQA].[dbo].[NEW TABLE HERE]
```

Naming convention for **new** tables should match table names in LD_Stage, for the same metric (if any):

Example New Table = [StatsQA].[dbo].[nLcd2011v11_Forest_pden_grouped_stats_Custom]

2. Refresh StatsQA and look for the new table.
3. Insert additional tables as needed:

```
INSERT INTO [StatsQA].[dbo].[NEW TABLE HERE]
```

```
([Value]  
, [Count]  
, [CLASSNAME]  
, etc. for remaining fields)
```

```
SELECT [Value]  
, [Count]  
, [CLASSNAME]  
, etc. for remaining fields
```

```
FROM [StatsQA].[dbo].[ADDITIONAL SOURCE TABLE(S)]
```

4. When done, check counts on new table:

```
SELECT Count(  
    [CLASSNAME]  
, [AOA_NAME]  
, [WINDOW_SIZE]  
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]
```

```
group by [AOA_NAME], [WINDOW_SIZE]

order by [AOA_NAME]
```

Each AOA/window size should have **6** CLASSNAME Count, the number of rows should equal the total of all AOAs from the individual tables that were merged.

```
SELECT Count(

    [WINDOW_SIZE] )

    , [AOA_NAME]

FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]

group by [AOA_NAME]
```

Each AOA should have **36** CLASSNAME Count, the number of rows should equal the total of all AOAs from the individual tables that were merged.

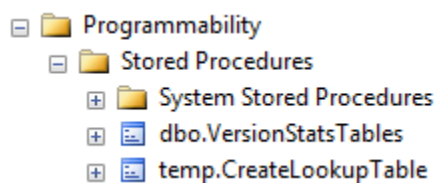
- a. If combined tables have the proper count (as noted above), delete individual tables leaving only the combined/new tables in the database.

Step 4: Replace Statistics Data – All AOAs

Skip to Step 5 if updating/adding a partial list of AOA statistics

Move the final tables from StatsQA to the LD_Stage database when all QA checks are done and all data values are as they should be (requires elevated privileges). If adding new YYYY data/statistics, go to #2.

1. Version previous density tables (if applicable):
 - a. In LD_Stage expand Programmability → Stored Procedures:



- b. Right click on dbo.VersionStatsTables → “Script Stored Procedure As” → EXECUTE TO → New Query Window.
 - c. Replace @fromTable with the name of the table to be versioned, in single quotes (example below in red):

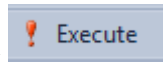
```

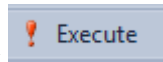
DECLARE @RC int
DECLARE @fromTable varchar(60)

-- TODO: Set parameter values here.

EXECUTE @RC = [dbo].[VersionStatsTables]
    'nlcd2011_Forest_pden_grouped_stats_30km'
GO

```



d. Click  to date-stamp existing table

e. Refresh to see table with date stamp appended:

  **dbo.nlcd2011_Forest_pden_grouped_stats_30km_2016-02-17**

2. Copy each new statistics table into LD_Stage, repeat for all new tables (“grouped_stats”, “stats”).

```

SELECT [OBJECTID]
    , CONVERT(int, [Count]) Count
    , [[ [. . . make sure all fields are listed]]]
INTO [LD_Stage].[dbo].[NEW STATS TABLE NAME GOES HERE]
FROM [StatsQA].[dbo].[STATS TABLE NAME GOES HERE]

```

Name new LD_Stage tables as follows (where applicable):

**[SourceYYYY_TargetType_pden_grouped_stats_AOA] →
[nlcd2011v11_Forest_pden_grouped_stats_30km]**

Or

**[SourceYYYY_TargetType_pden_stats_AOA] →
[nlcd2011v11_Forest_pden_stats_30km]**

(see existing tables in LD_Stage for additional examples)

- a. REFRESH LD_Stage and look for the table. It should be adjacent to the date-stamped table (if any).
3. In LD_Stage, change schema of date-stamped table(s) from dbo to zArchive:

```
ALTER SCHEMA zArchive TRANSFER dbo.[DATE STAMP TABLE NAME HERE] ;
```

- a. Refresh LD_Stage and check all date-stamp tables are moved from dbo to zArchive.

Tables, example, zArchive:

  zArchive.nlcd2011_Grassland_pden_stats_30km_2016-03-02
  zArchive.nlcd2011_Grassland_pden_stats_30km_2016-07-28

4. Delete the moved tables from StatsQA.

5. Go to Step 6 – Manage Data Views

Step 5: Replace Statistics Data – Select AOAs

Move stats table of interest from LD_Stage to StatsQA and replace data for AOAs that have been updated, or add data for new AOAs to the table.

1. To append updated statistics or add new AOA statistics to existing statistics tables:

- a. COPY the table to be updated FROM LD_Stage TO StatsQA.

Right click LD_Stage table → Script Table As → Select To → New Query Window

```
INTO [StatsQA].[dbo].[STATS TABLE NAME_copy]
```

```
FROM [LD_Stage].[dbo].[STATS TABLE NAME]
```

- b. Get an initial count of AOAs:

```
SELECT Count(  
    [CLASSNAME])  
    , [AOA_NAME]  
  
FROM [StatsQA].[dbo].[STATS TABLE NAME_copy]  
  
group by [AOA_NAME]
```

2. Delete from the “_copy” table all AOAs/rows to be replaced

- a. Right click → Edit Top 200 Rows → click white sql button and edit query as needed

- i. Select and delete all AOAs/rows that are updated.

Edits are immediate and cannot be undone – make sure you are editing the appropriate table.

- b. Or, edit sql statement as needed. Run.

```
DELETE FROM [StatsQA].[dbo].[STATS TABLE NAME_copy]
```

```
where AOA_NAME like 'APIS%'
```

```
OR AOA_NAME like 'AZRU%'
```

```
OR AOA_NAME like 'BIBE%'
```

```

OR AOA_NAME like 'BITH%'
OR AOA_NAME like 'BLCA%'
OR AOA_NAME like 'CARL%'
,...add/edit as needed

```

- i. Deleted rows cannot be undone. Make sure to delete from the appropriate table.

3. Query for new count on edited table:

```

SELECT Count(
    [CLASSNAME])
    , [AOA_NAME]
FROM [StatsQA].[dbo].[STATS TABLE NAME_copy]
group by [AOA_NAME]

```

4. Insert new/updated statistics from the newly created base table into the ‘_copy’ of the table (make sure to match fields based on table being updated; exclude field ‘OBJECTID’):

```

INSERT INTO [StatsQA].[dbo].[STATS TABLE NAME_copy]
([FIELD LIST HERE])

SELECT
    FIELD LIST HERE
FROM [StatsQA].[dbo].[NEW BASE TABLE HERE]

```

5. Check Count. The number of rows should have increased by the number of AOAs added in the previous step and should now reflect required total for AOA type.

```

SELECT Count(
    [CLASSNAME])
    , [AOA_NAME]
FROM [StatsQA].[dbo].[STATS TABLE NAME_copy]
group by [AOA_NAME]

```

6. Visually check table for the updates,
 - a. Right click → “Select Top 1000 rows”
 - i. Order by AOA_Name
 - ii. Order by OBJECTID

iii. Other queries

7. **Go to STEP 4 – Replace Statistics Data – All AOAs** and follow steps to replace/update tables in LD_Stage

Step 6: Manage Data Views

If required, go to Inventory and monitoring database documentation: Environmental Setting Protocol SOP (SOP 7.1.1; Kinseth et al. 2018) and check the Landscape Dynamics portion.

Literature Cited

- Kineth, M. and L. Nelson. 2018a. Calculating statistics for national landscape dynamics metrics: Pattern density. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—3.11.1. National Park Service, Fort Collins, Colorado.
- Kineth, M. and L. Nelson. 2018b. 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.
- Kineth, 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.
- Kineth, M., L. Nelson, and S. Schupbach. 2018. Inventory and monitoring database documentation: Environmental Setting Protocol. Inventory & Monitoring Division Standard Operating Procedure NPS/NRSS/IMD/SOP—7.1.1. National Park Service, Fort Collins, Colorado.
- Nelson, L. and M. Kineth. 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 data is dependent on available NLCD data, and is only available for those AOAs within the extent of source NLCD. Not all geographies/AOAs will have data available to calculate Pattern Density summary statistics.

Data Issues

PARK_CODE is valid for AOAs derived specifically from individual parks. Some Custom AOAs are not park-based and therefore will not have a PARK_CODE value.