



Introduction to CacheWorx

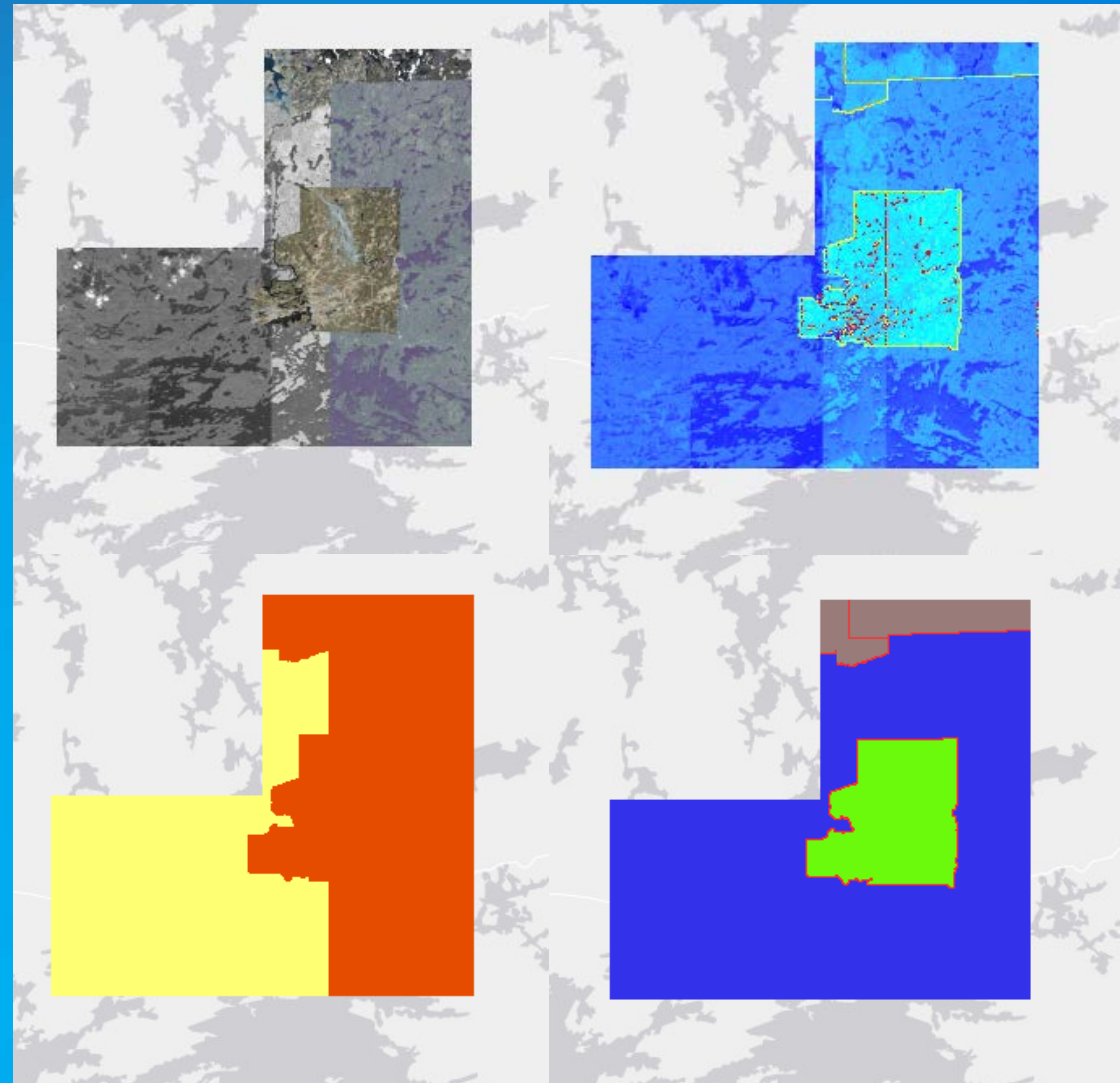
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What is CacheWorx?

Cache content analysis toolset

- Content Assessment
 - Error Detection
 - Optimization Opportunities
 - Resource Allocation
-
- ArcMap Toolbox
 - Freeware: Apache 2.0 License
 - Download(s) from ArcGIS Online



Compact Cache 101

CacheWorx

- **Compact cache format stores multiple adjacent tiles in a single bundle**
 - 128x128 tiles per bundle, 2 files per bundle
 - Fast access, efficient storage utilization, easy to handle
- **Compact Cache V2**
 - Bundle format change, in ArcGIS 10.3
 - Reorganize bundle content
 - Combined index and data into a single file
 - Even faster access
- **When dealing with cache, each level has to be treated separately**

Types of problems CacheWorx helps solve

CacheWorx

- **Coverage:**
 - Are there Bundles/Tiles at a specific location?
- **Geolocation:**
 - Where does this file go?
- **Disk Usage:**
 - What areas take most storage space?
- **Quality Control:**
 - Is the cache readable?
 - Do tile features match expectations?

Five Tools

CacheWorx

- **Coverage Update, Coverage To Feature and Coverage Selection**
 - Coverage file holds bundle presence information
 - Inventory and visualize bundle extents
- **Bundle Size**
 - Generates rasters where each pixel value is equal to a bundle file size
- **Tile Synopsis**
 - Builds rasters where each value represents a tile characteristic:
 - Size, Average, Quality, Bands

Coverage and Bundle Size Demo

CacheWorx

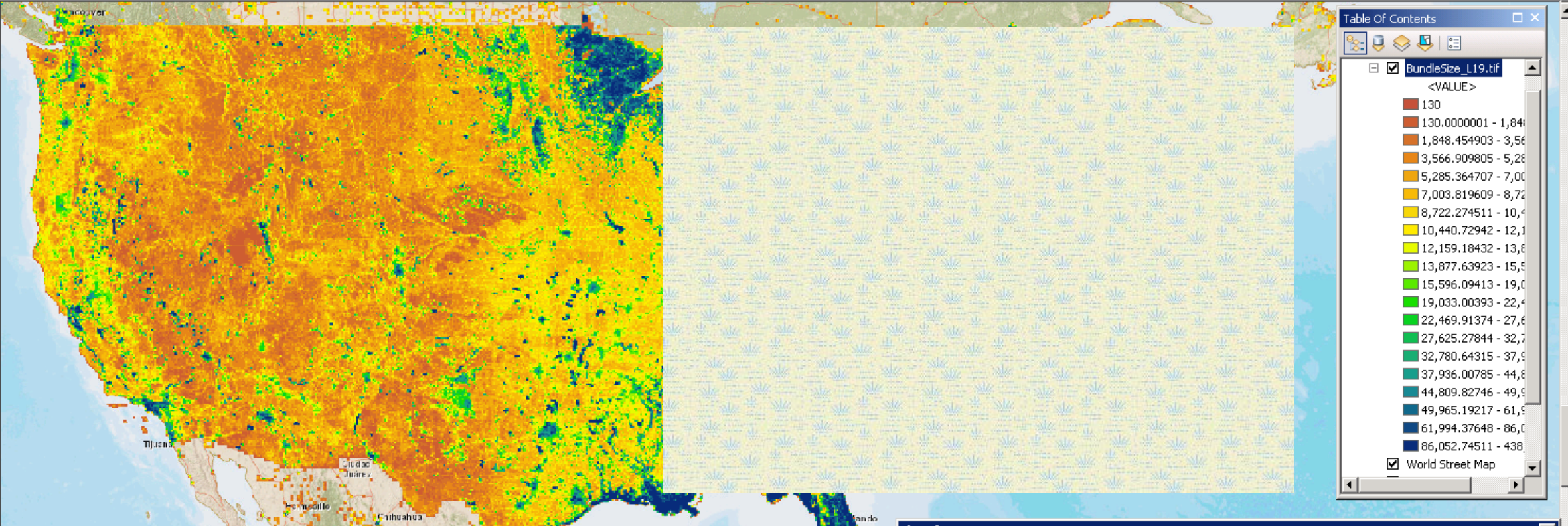


Table of Contents

BundleSize_L19.tif

<VALUE>

130
130.0000001 - 1,848.454903
1,848.454903 - 3,566.909804
3,566.909804 - 5,285.364706
5,285.364706 - 7,003.819608
7,003.819608 - 8,722.274511
8,722.274511 - 10,440.72941
10,440.72942 - 12,159.18432
12,159.18432 - 13,877.63923
13,877.63923 - 15,596.09413
15,596.09413 - 19,033.00393
19,033.00393 - 22,469.91374
22,469.91374 - 27,625.27844
27,625.27844 - 32,780.64315
32,780.64315 - 37,936.00785
37,936.00785 - 44,809.82746
44,809.82746 - 49,965.19217
49,965.19217 - 61,994.37647
61,994.37647 - 86,052.74511
86,052.74511 - 438,336

World Street Map

Layer Properties

General | Source | Key Metadata | Extent | Display | Symbology

Show:

- Unique Values
- Classified**
- Stretched
- Discrete Color

Draw raster grouping values into classes

Fields

Value: <VALUE> Normalization: <None>

Classification

Quantile Classes: 20 Classify...

Color Ramp

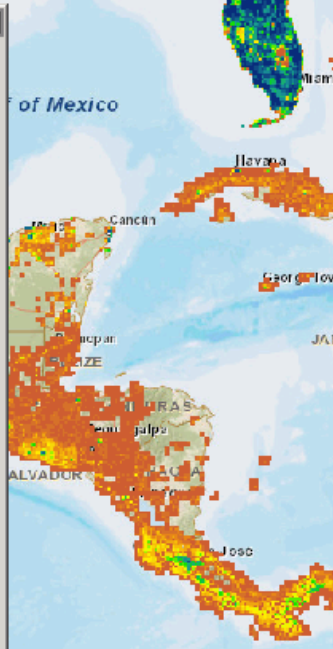
Symbol	Range	Label
130	130	130
130 - 1,848.454902	130.0000001 - 1,848.454902	
1,848.454902 - 3,566.909804	1,848.454903 - 3,566.909804	
3,566.909804 - 5,285.364706	3,566.909805 - 5,285.364706	
5,285.364706 - 7,003.819608	5,285.364707 - 7,003.819608	
7,003.819608 - 8,722.274511	7,003.819609 - 8,722.274511	
8,722.274511 - 10,440.72941	8,722.274511 - 10,440.72941	

Show class breaks using cell values

Use hillshade effect

Display NoData as

Z: 1



Classification

Classification Method: Quantile

Classes: 20

Data Exclusion

Exclusion ... Sampling ...

Columns: 100

Show Std. Dev. Show Mean

Classification Statistics

Count: 339512

Minimum: 130

Maximum: 438,336

Sum: 3,731,610,836

Mean: 10,991.10145

Standard Deviation: 18,433.16068

Break Values %

3.165982081	%
3.55802264	
4.342103756	
5.126184873	
6.302306548	
7.478428223	
8.654549899	
10.22271213	
11.39883381	
14.14311772	
19.63168553	
100	

Bundle Size

CacheWorx

- Values are equal to bundle size in KB
- Very fast
- Zero means No Bundle
- File names:

BundleSize_LXX.tif

Coverage Tools

CacheWorx

- **Coverage Update**
 - Inventories existing bundles
 - Run every time something changes
 - Controls what bundles are seen by the rest of CacheWorx
- **Coverage To Feature**
 - Each bundle in the coverage file generates a feature
 - Draw – controls if the output feature class is loaded in current map
 - Output saved in a geodatabase
- **Coverage Selection**
 - Internal use, selects bundles from a coverage based on area of interest

Tile Synopsis

CacheWorx

- Analysis at the tile level
 - Minimum unit is still a bundle
- Single tool, four different modes
 - Size - Average - Quality - Bands**
- May use an area of interest
 - If a bundle intersects the AOI, the whole bundle is done
 - Buffering is in tiles, works across levels
- Output and execution time can be large
 - **Size** is fast and limited by IOPS, the others are mostly IO bandwidth limited
 - **Average** uses all available CPUs
 - Output can be split in chunks

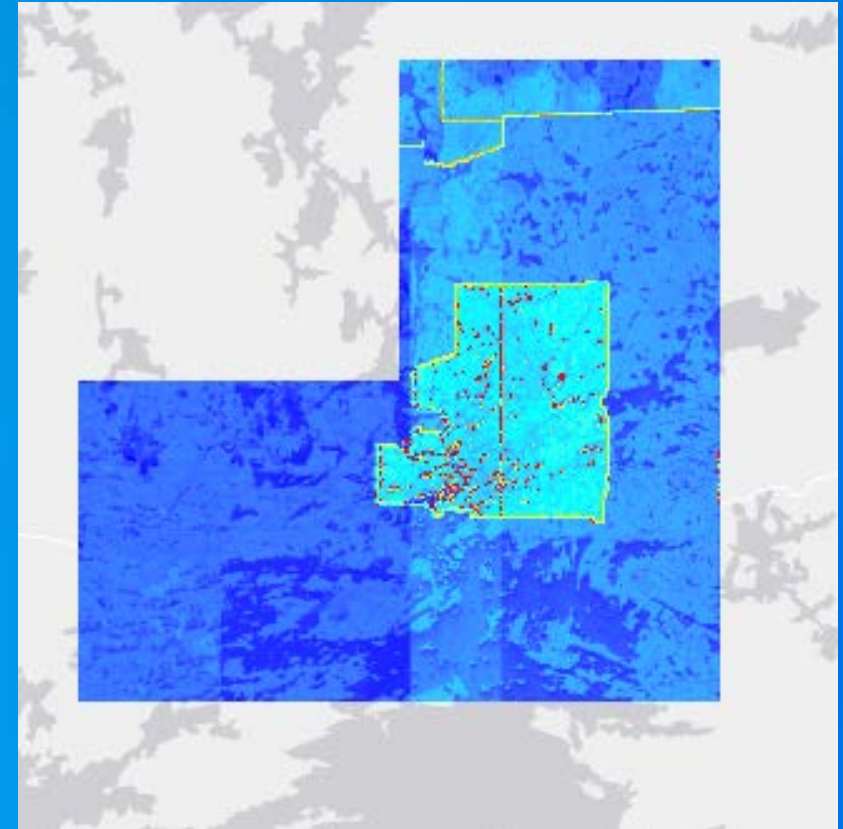
Tile Synopsis Demo

CacheWorx

Tile Size

CacheWorx

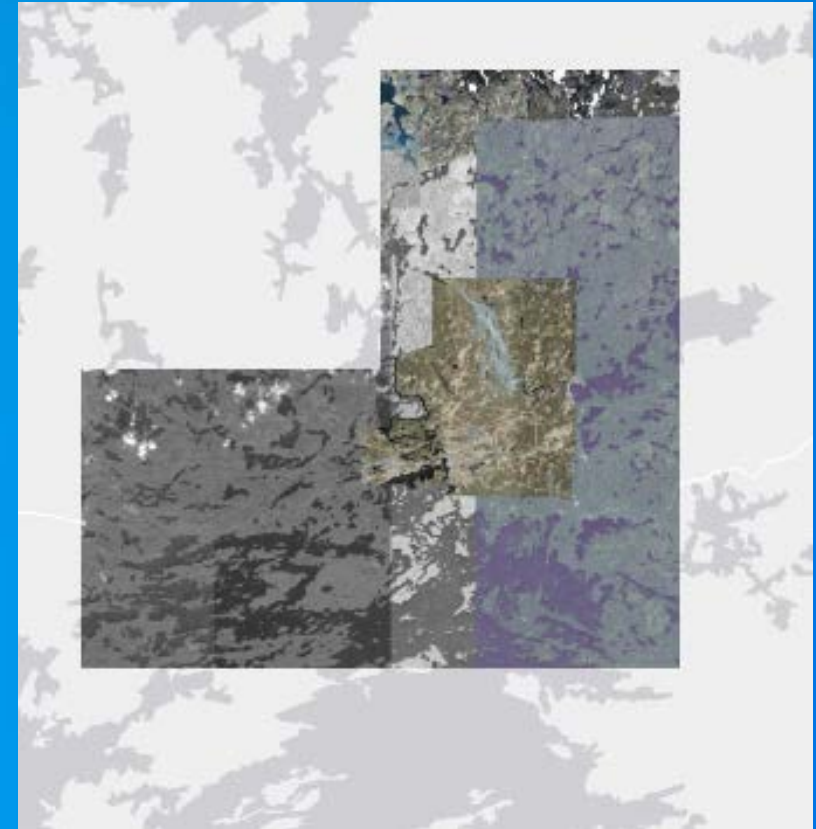
- Pixel value is tile size
- Fast, only reads the index
- Position and values can be inaccurate
 - Accurate for V2 bundles
 - Accurate for full, unmodified bundles
- Zero usually means No Tile
- Negative values flag incorrect content
- File names:
Size_LXX.tif



Tile Average

CacheWorx

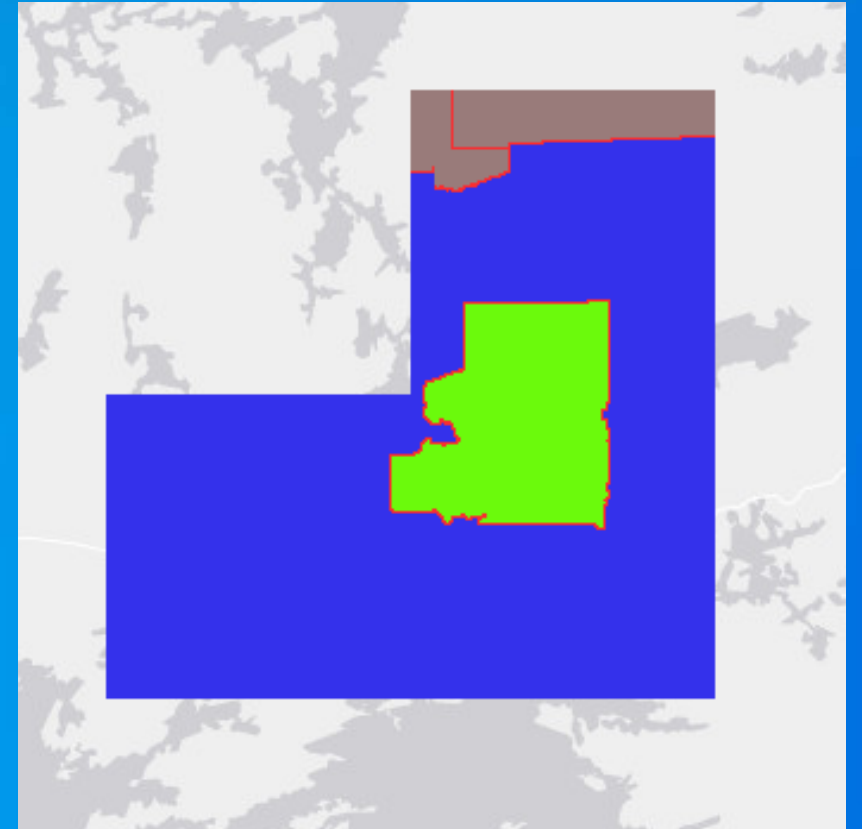
- Pixel is tile average, per band
 - Verifies that tiles are readable
- Output is always RGBA
- Slow, read and checks everything
 - JPEG avoids full decompression, much faster
 - Uses all cores
- Zero Alpha means no data
 - Except for fully transparent PNG
- Purple flags corrupt values (255;0;255;255)
- File names:
Average_LXX.tif



Tile Quality

CacheWorx

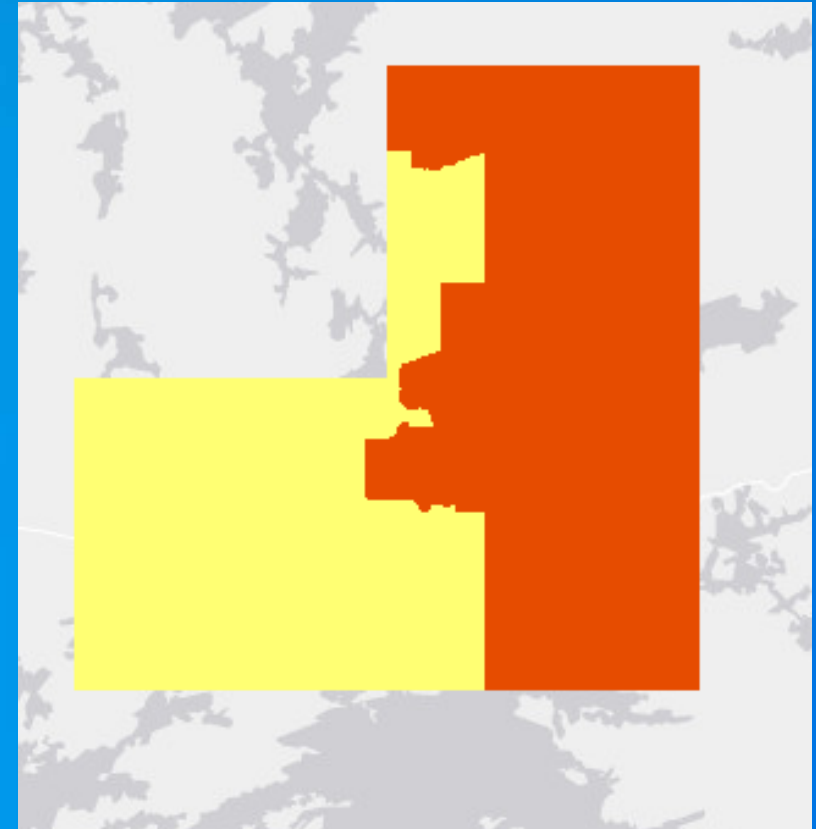
- Pixel value equal to:
 - JPEG: Q setting
 - PNG8: Number of colors used
 - PNG24/32, grayscale PNG: Not valid
- Slow, does read the data
- Zero means No Tile or not valid
- File names:
Quality_LXX.tif



Tile Bands

CacheWorx

- **Pixel value is number of channels:**
 - 1 – Grayscale JPEG/PNG or Palette PNG
 - 2 – Gray + Alpha PNG; Not generated by ArcGIS
 - 3 – RGB
 - 4 – RGBA
 - 128 – Format Error for JPEG
- **Slow, reads all data**
- **Zero means No Tile! Acurately!**
- **File names:**
Bands_LXX.tif



Tile Synopsis: Summary

CacheWorx

- **Each mode has a role:**
 - **Size mode is the fastest, has lots of useful information, may be misleading for non-V2 bundles**
 - **Average mode reads and decompresses every tile, flags errors, most complete check. Needs lots of CPUs for PNG. Valid PNGs may be fully transparent**
 - **Quality mode shows the standard JPEG quality or the number of colors used in a PNG8 tile. Does not work for PNG24/32**
 - **Bands mode works for both PNG and JPEG, appositionally accurate. Flags corrupt JPEG**
- **Output files are TIF files with fixed names, stored in an output folder**
 - **Allows all levels and multiple modes to be run in one execution**
 - **Have to be explicitly loaded**
- **Use area of interest to restrict what bundles it runs on**
 - **Pad is a buffer in tile units, can be positive or negative**
- **Chunk size is in bundles, used to limit the size of the output files**

Info:

CacheWorx

- **CacheWorx V2**
 - Compact Cache V2 support
 - LERC (elevation, no average)
 - 10.3 toolbox
 - Bug fixes, speed and stability improvements
- **CacheWorx**
 - Previous Version, 10.2 toolbox, 32 bit
- **CacheID**
 - Similar to Coverage to Feature, rich set of attributes, Python only
- **On ArcGIS Online**
 - Search for CacheWorx in Tools, show ArcGIS Desktop content
 - Search Google for “Esri CacheWorx”

Thank You!

Questions?