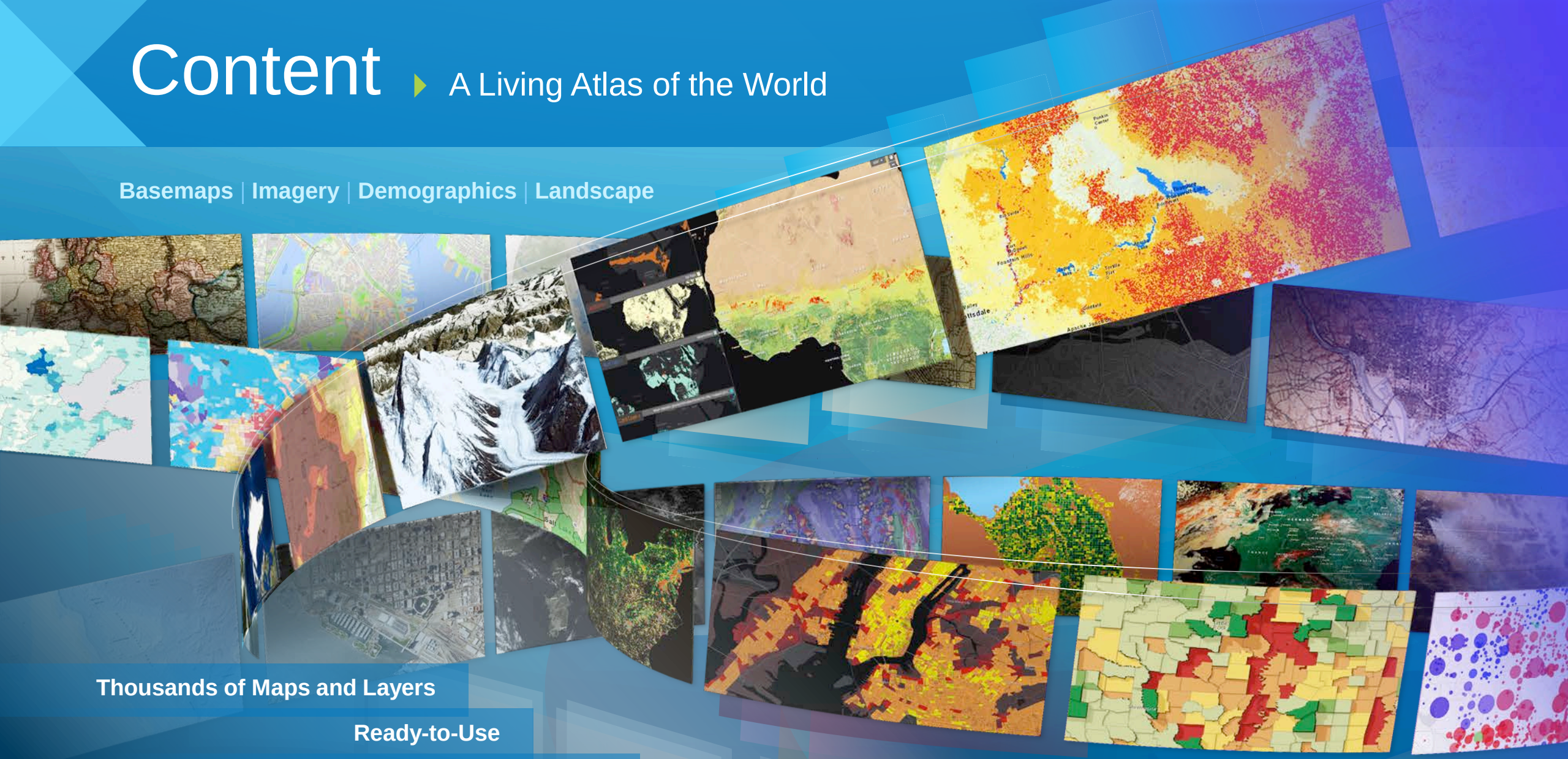
Using the National Water Model in ArcGIS

Daniel Siegel, Esri

Content ▸ A Living Atlas of the World

Basemaps | Imagery | Demographics | Landscape



Thousands of Maps and Layers

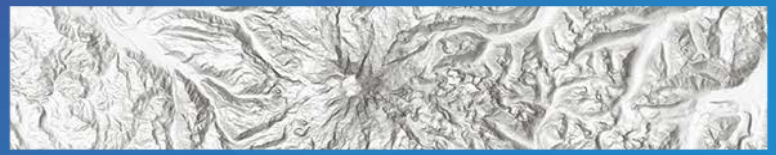
Ready-to-Use

Authoritative

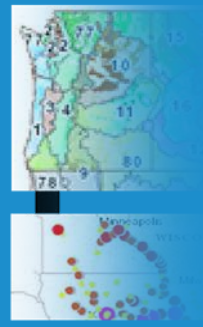
Millions of User Contributions . . .
. . . Billions of Views per Week

ArcGIS includes a Living Atlas of the World

Maps and Layers from Esri and Thousands of Contributors



The Collection is growing and changing on a daily basis…



Transportation
Weather
Historical
Landscape
Habitats
Urban Systems
Basemaps
Elevation
Boundaries
Soils
Land Cover
Hazards
Oceans
Imagery
Hydro
Observations
Demographics

… with Curated Content on Many Topics

Content is Integral to the ArcGIS Platform

Open in ArcGIS Online

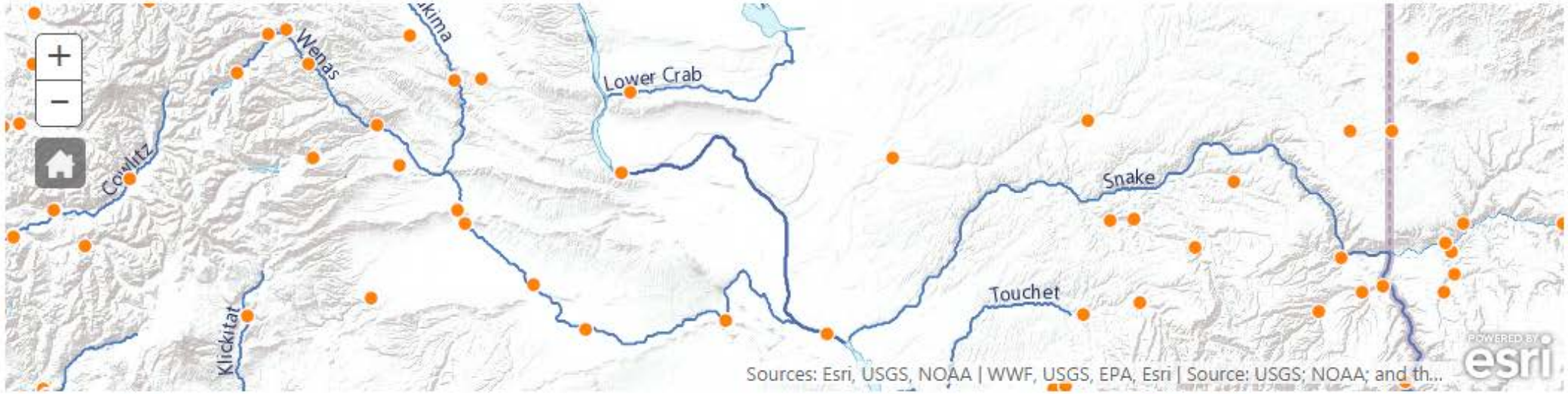
Live Stream Gauges

ACCEPTED AS-IS

Web Map - Sharing:public - Updated April 5, 2016

Source: Web Map

30688 views



Current Score

required score 80

87/100

SET STATUS

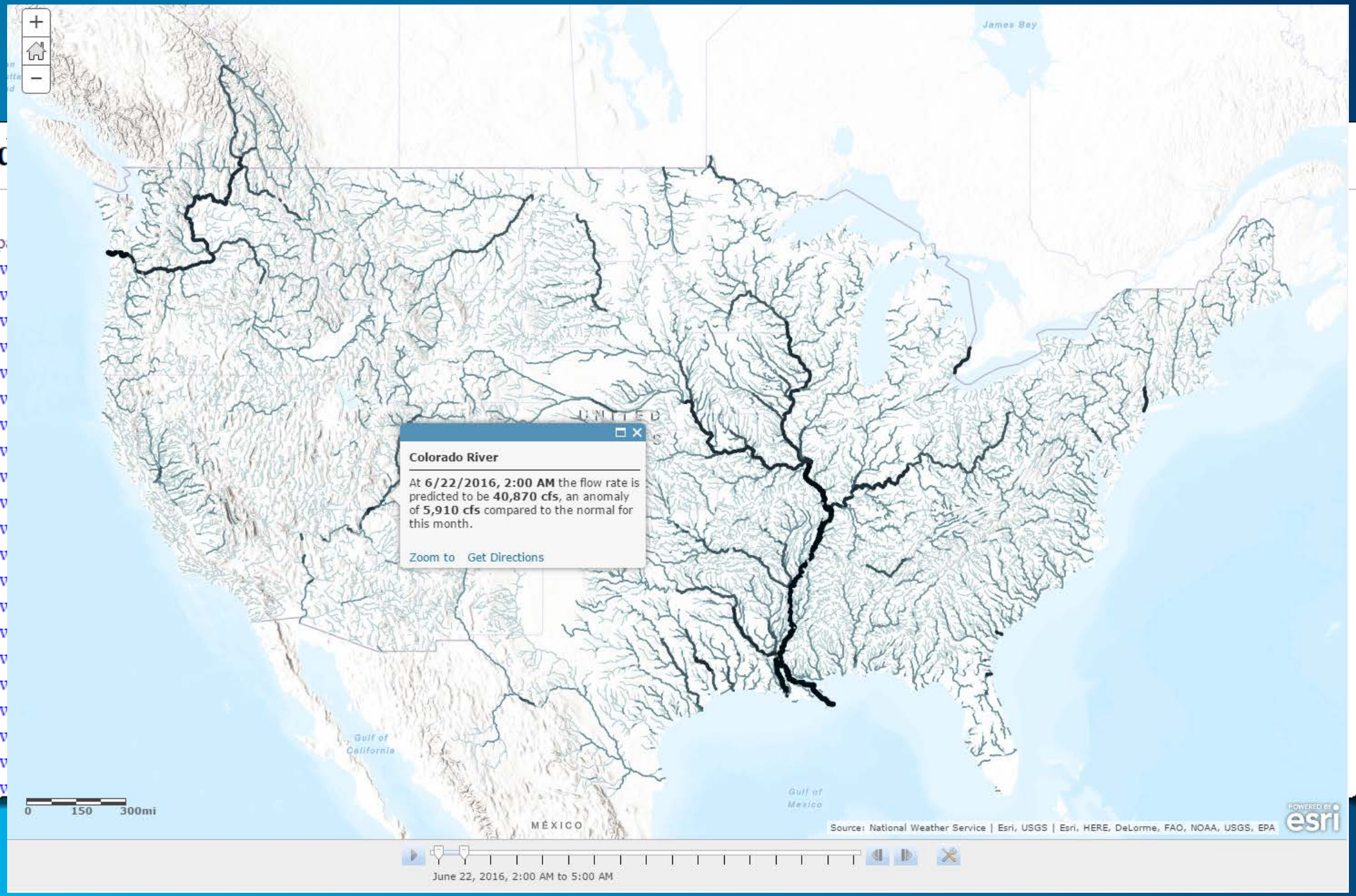
Review each of the five sections below to look for ways to improve this item's score.

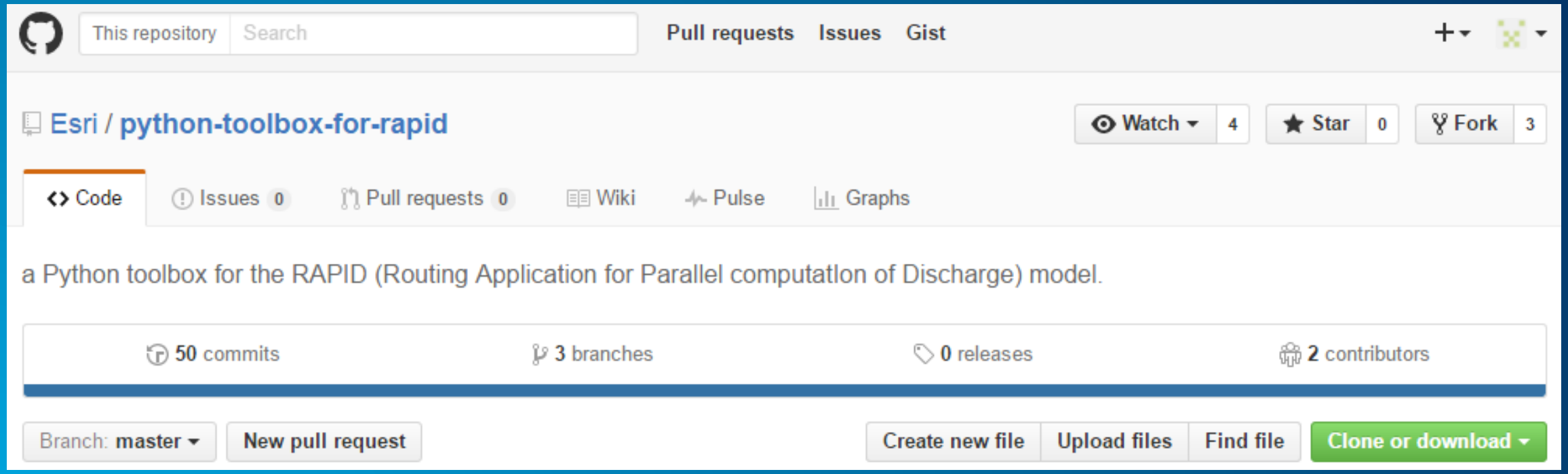
✔ DETAILS | ✔ USE/CREDITS | ✔ TAGS | SETTINGS | ✔ MY PROFILE

9/9

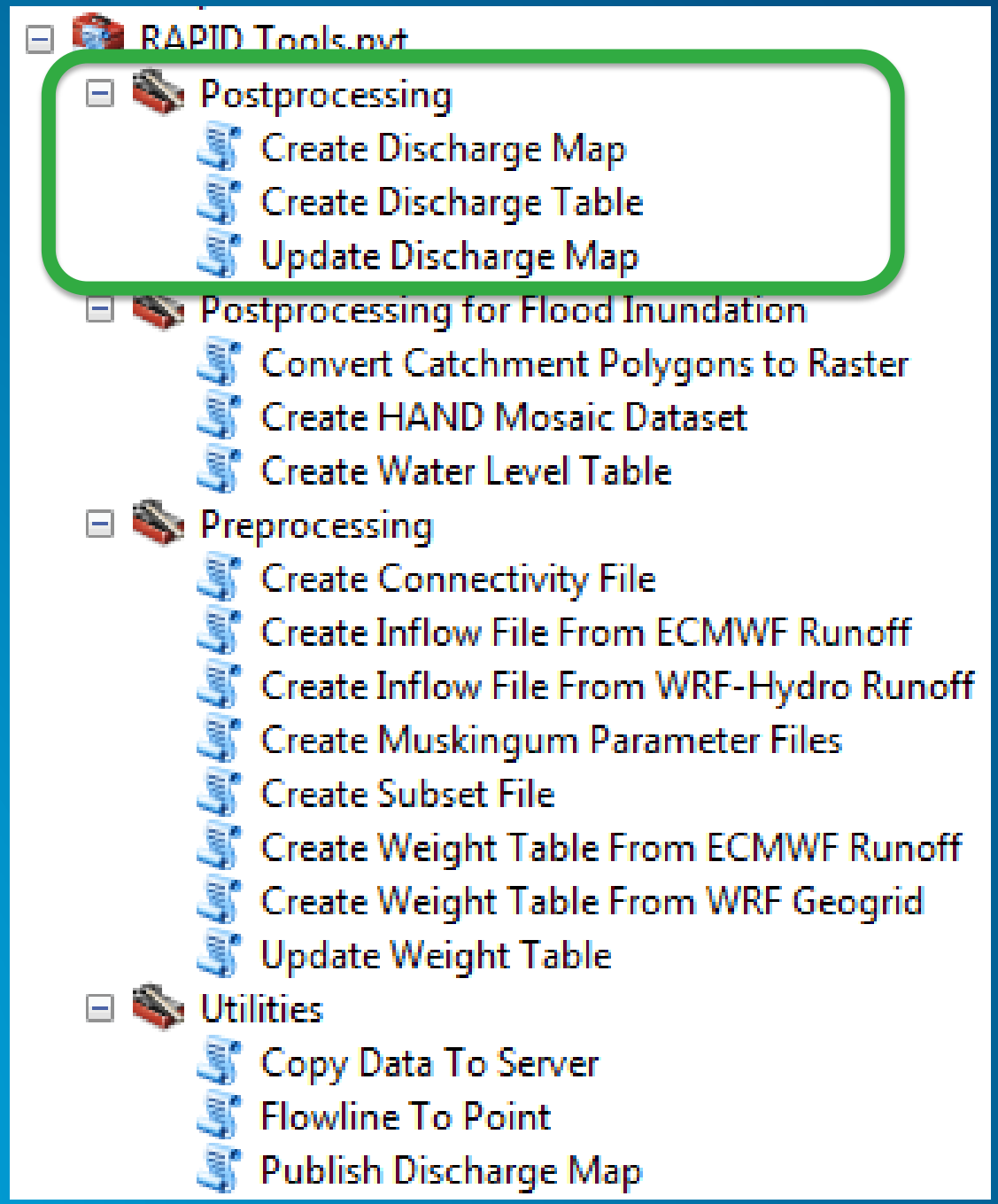
Thumbnails

EDIT


Colorado River
At 6/22/2016, 2:00 AM the flow rate is predicted to be 40,870 cfs, an anomaly of 5,910 cfs compared to the normal for this month.
Zoom to
Get Directions
James Bay
Gulf of California
Gulf of Mexico
MÉXICO
0
150
300mi
June 22, 2016, 2:00 AM to 5:00 AM
Source: National Weather Service | Esri, USGS | Esri, HERE, DeLorme, FAO, NOAA, USGS, EPA
esri



https://github.com/Esri/python-toolbox-for-rapid


RAPID Tools.pyt
Postprocessing
Create Discharge Map
Create Discharge Table
Update Discharge Map
Postprocessing for Flood Inundation
Convert Catchment Polygons to Raster
Create HAND Mosaic Dataset
Create Water Level Table
Preprocessing
Create Connectivity File
Create Inflow File From ECMWF Runoff
Create Inflow File From WRF-Hydro Runoff
Create Muskingum Parameter Files
Create Subset File
Create Weight Table From ECMWF Runoff
Create Weight Table From WRF Geogrid
Update Weight Table
Utilities
Copy Data To Server
Flowline To Point
Publish Discharge Map

Create Discharge Map

Create Flat Table from NetCDFs

Index of /pub/data/nccf/com/nwm/para/nwm.20160622/fe_n

Name	Size	Date Modified
[parent directory]		
nwm.t06z.fe_medium_range.f001.conus.nc.gz	353 MB	6/22/16, 10:51:00 AM
nwm.t06z.fe_medium_range.f002.conus.nc.gz	353 MB	6/22/16, 10:53:00 AM
nwm.t06z.fe_medium_range.f003.conus.nc.gz	354 MB	6/22/16, 10:52:00 AM
nwm.t06z.fe_medium_range.f004.conus.nc.gz	357 MB	6/22/16, 10:54:00 AM
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nwm.t06z.fe_medium_range.f007.conus.nc.gz	399 MB	6/22/16, 10:52:00 AM
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nwm.t06z.fe_medium_range.f010.conus.nc.gz	414 MB	6/22/16, 10:54:00 AM
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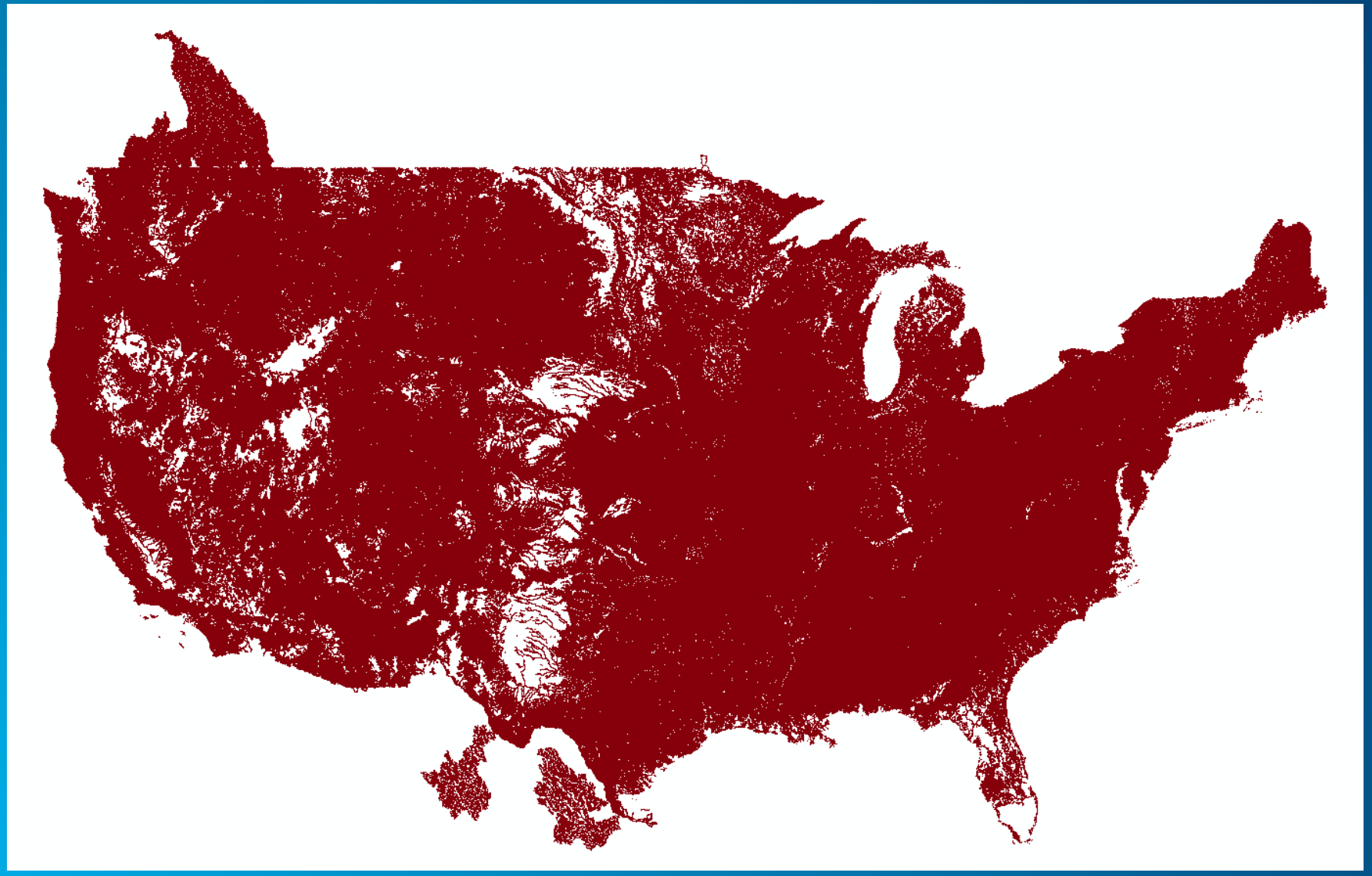
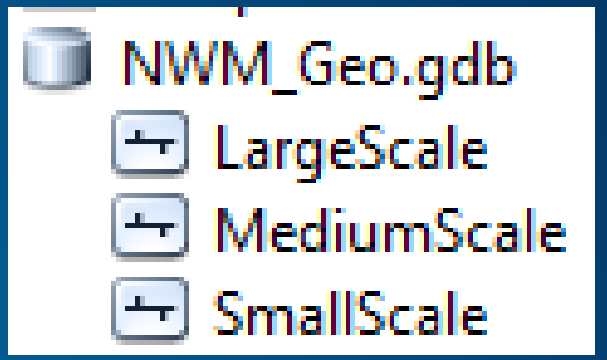
nwm.t06z.fe_medium_range.f018.conus.nc.gz	418 MB	6/22/16, 10:54:00 AM
nwm.t06z.fe_medium_range.f019.conus.nc.gz	397 MB	6/22/16, 10:53:00 AM
nwm.t06z.fe_medium_range.f020.conus.nc.gz	393 MB	6/22/16, 10:52:00 AM
nwm.t06z.fe_medium_range.f021.conus.nc.gz	391 MB	6/22/16, 10:53:00 AM

comid	flowrate
88518	0.458
88402	7.059
90354	0.028
90352	0.097
90356	0.146
89088	2.847
89092	2.374
90362	0.166
90378	0.031
90370	0.034
90374	0.11
90372	0.117
90358	0.003
90384	0.129
90382	0.054
90392	0.023
88778	2.82
90366	0.03
90364	0.01
89120	3.064
88544	89.881
88548	15.867
88890	1.769

Join to NHDPlusV2.1



Steps to Create Discharge Map



- Simplify NHD lines for small and medium scales
- Dissolve MediumScale and SmallScale features by flow class
- Filter by stream order to create 5 layers, apply cartography

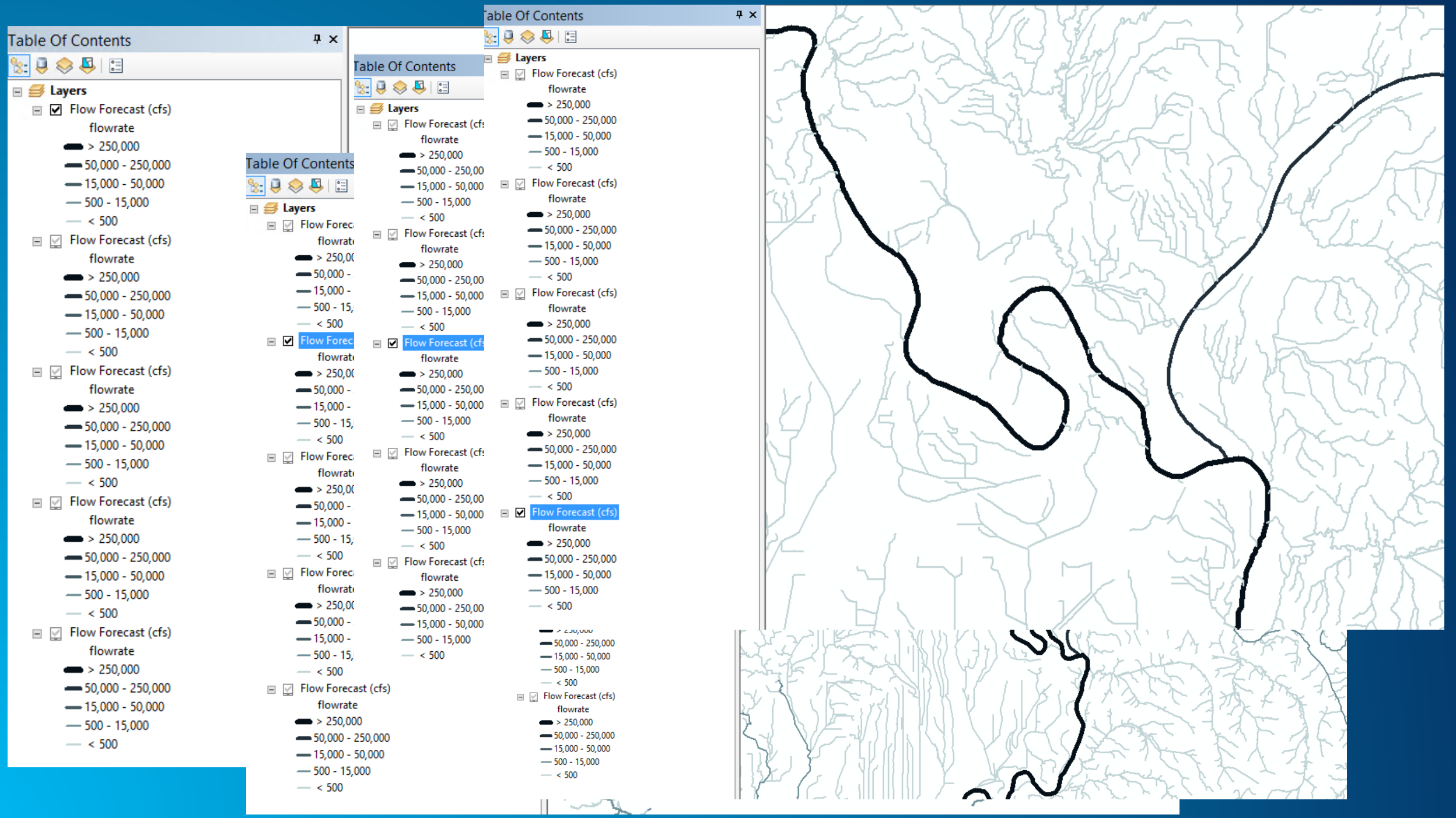


Table Of Contents
Layers
Flow Forecast (cfs)
flowrate
> 250,000
50,000 - 250,000
15,000 - 50,000
500 - 15,000
< 500

Web Map Demo

Update Discharge Map

Time Trials

Operation	Time (seconds)
Load NetCDF file into NumPy Array	3
Calculate Flow Class and Anomaly	15
Join to Small Scale Geometries and Dissolve	18
Join to Medium Scale Geometries and Dissolve	67
Load Array Into SQL, Join to Large Scale Geometries	57
Total	**160**

Time Trials

	One Worker	Multi-`threaded (4 Workers)
Medium Term (80 Files)	213 min	80 min
Short Term (18 Files)	48 min	18 min

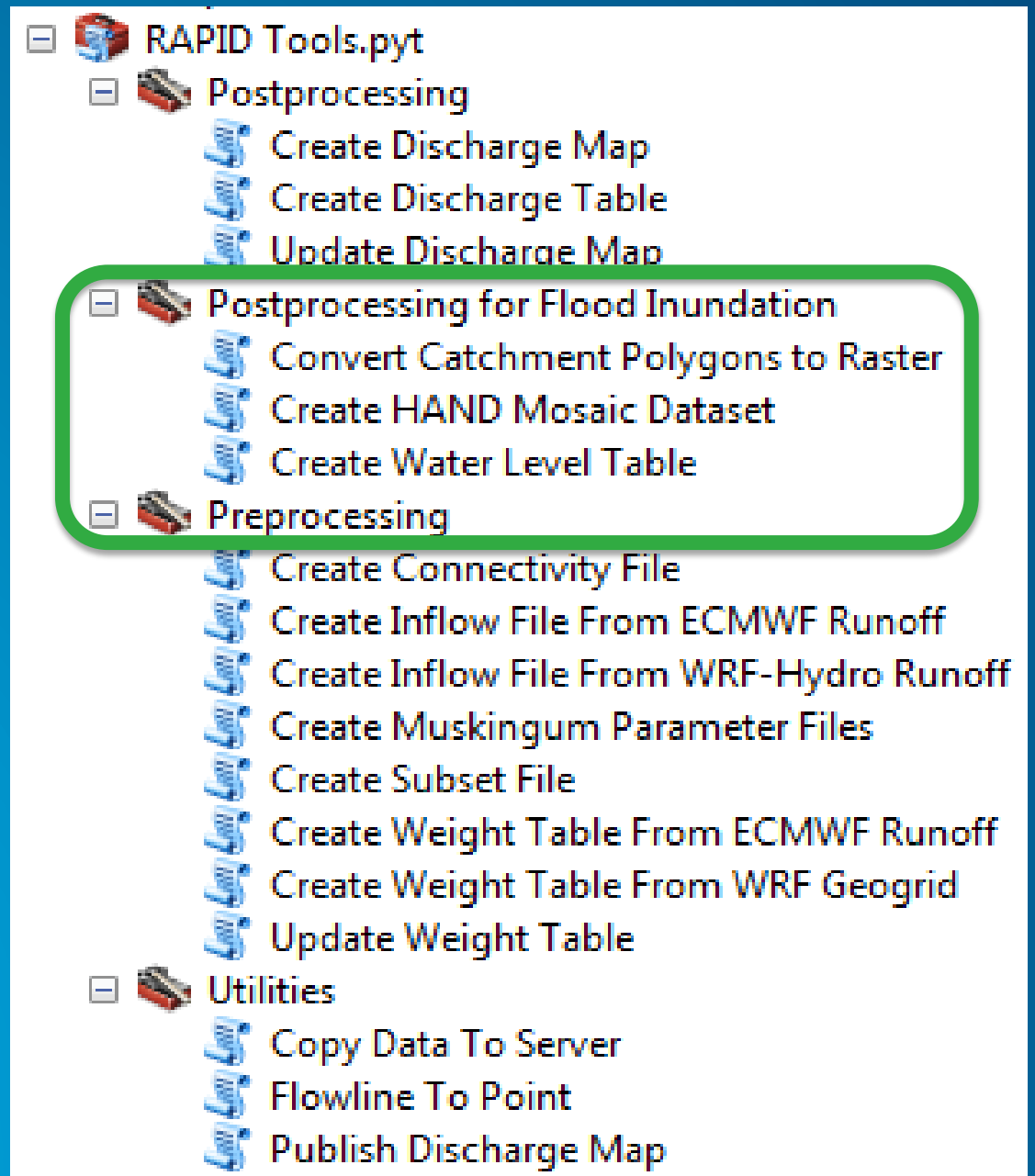
Not bad, and that’s using AWS!

Next Steps

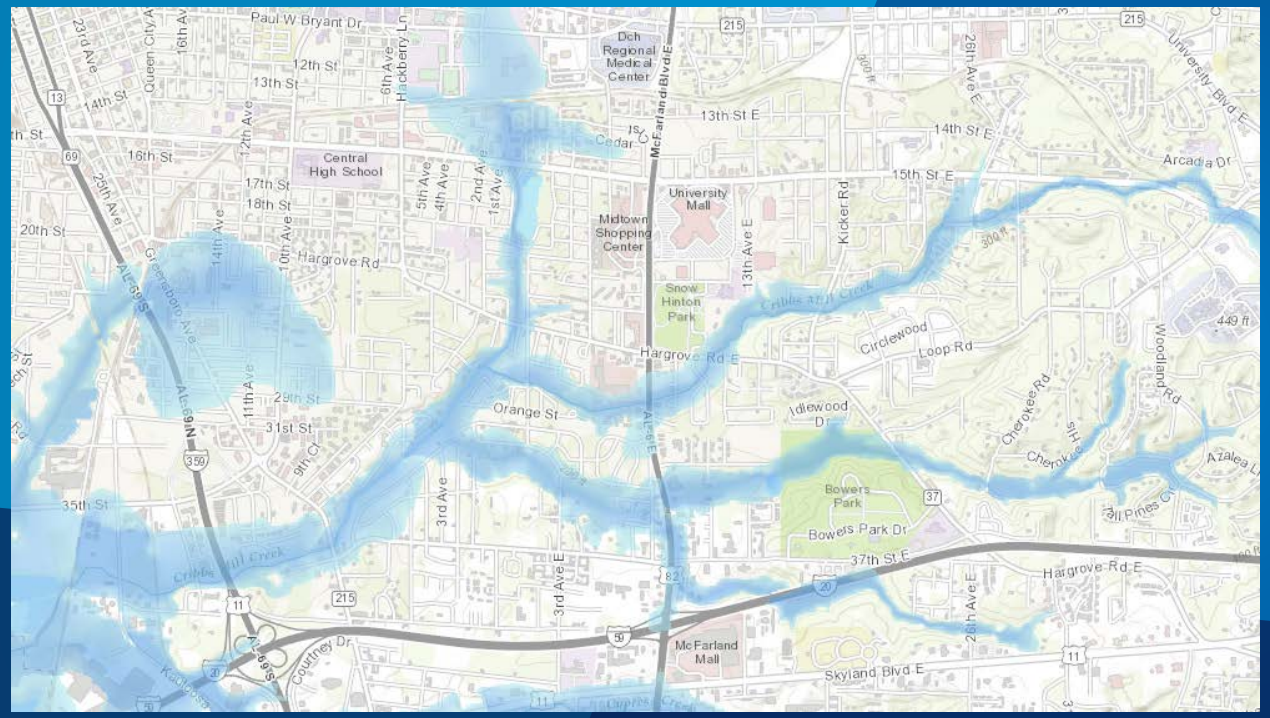
- Long-term forecast
- More attributes for cartography
- Application with notifications and graphing widget

Create Innudation Map

Once you have a rating curve for each reach, the rest is GIS



Demo



Inundation Map