

NASA RECOVER 2.0 POST-WILDFIRE DECISION SUPPORT SYSTEM PROTOCOL FOR THE PRELIMINARY FIRE SEVERITY IMAGE SERVICE

The **Preliminary Fire Severity Image Service** represents one layer available to RECOVER's users in the RECOVER_Tracker web map and Dashboard. These data represent preliminary (i.e., not yet field validated by BAER or ES&R teams) fire severity calculations derived from a differenced normalized burn ratio (dNBR) raster image produced by the USDA Forest Service Monitoring Trends in Burn Severity (MTBS) program.

A dNBR is a simple band ratio very similar to the Normalized Difference Vegetation Index (NDVI). It is computed by first creating pre-fire and post-fire normalized burn ratio images:

$$\text{NBR} = (\text{NIR}-\text{SWIR})/(\text{NIR}+\text{SWIR})$$

$$\text{e.g., Landsat 8: NBR} = (\text{B5}-\text{B7})/(\text{B5}+\text{B7})$$

Next, dNBR is calculated as $\text{dNBR} = \text{Pre-fire_NBR} - \text{Post-fire_NBR}$

dNBR data is produced by MTBS. To maintain the Preliminary Fire Severity Image Service, you will need to monitor data availability at <https://burnseverity.cr.usgs.gov/baer/baer-imagery-support-data-download>

To determine if new data exists, you will need to compare the available data on MTBS with current data already added to the dNBR image service. To do this:

1. Open the MTBS burn severity website
2. Open ArcGIS Pro
3. Add the Preliminary_FireSeveritydNBR image service to a map (NOTE: A layer file link to this image service is available for download here: https://giscenter.isu.edu/research/Techpg/nasa_RECOVER2/zip/dNBR_PreliminaryFireSeverity.zip).
4. Open the image service's attribute table
5. Compare fire NAME records with data available on the MTBS site (Fire ID).

All new preliminary data needs to be downloaded to a local computer. The data will download as a ZIP file (e.g., .\Downloads\oak_az3180711070920230616_20230701_preliminary.zip). This protocol will explain the step-by-step process needed to update and maintain the Preliminary Fire Severity Image Service.

1. Extract each dNBR zip file acquired from the MTBS.
2. Move the extracted folder to the Rasters folder within the dNBR_PreliminaryFireSeverity project folder (NOTE: a copy of this project can be downloaded from https://giscenter.isu.edu/research/Techpg/nasa_RECOVER2/ZIP/dNBR_PreliminaryFireSeverity.zip).

The new dNBR data folder will become a sub-folder within the Rasters folder.

3. Launch the dNBR_PreliminaryFireSeverity ArcGIS Pro project file (.aprx)
4. From ArcGIS Pro:
 - a. Examine the new fire severity data
 - b. Delete all files save for the *_dnbr.tif file

- c. Use ArcGIS Pro to rename each TIF layer to include the name of the fire or a part of the name of the fire as a *prefix* to the current raster file name.
- d. When all new data have been verified as readable and correctly projected, continue with building a new mosaic dataset for these data.

BUILD A MOSAIC DATASET

5. From the ArcGIS Pro Catalog pane, right-click the `dNBR_PreliminaryFireSeverity.gdb` geodatabase.
 - a. Choose NEW---MOSAIC DATASET.
 - b. From the Geoprocessing pane that opens, give the Mosaic Dataset a name following this convention `dNBR_Prelim_YYYYMMDD` (e.g., `dNBR_Prelim_20230814`).
 - c. Change the Coordinate System (Spatial Reference System) to the NASA RECOVER standard, Albers Equal Area USGS version WKID: 102039.
 - d. No other changes or setting are required.
 - e. Click Run.
6. Once the tool completes (about 1 minute), return to the Catalog pane.
7. Locate and right-click the new Mosaic Dataset you just created.
 - a. Choose Add Rasters
 - b. From the Add Rasters geoprocessing pane change the Input Data to Folder.
 - c. Click the Browse button below the Input Data text box.
 - d. Navigate to and select the Rasters folder.
 - e. Expand the Advanced Input Data Options section.
 - f. Make sure the Include Sub Folders box is checked.
 - g. Next, expand the Raster Processing section.
 - h. Place checks in both the Calculate Statistics and Build Raster Pyramids boxes.
 - i. Last, expand the Mosaic Post-processing section.
 - j. Place checks in all boxes (Build Thumbnails, Update Cell Size Ranges, Update Boundary, Update Overviews, and Estimate Mosaic Dataset Statistics)

NOTE: when turning on (checking) Update Overviews the list of options will automatically collapse showing only three options. This is because updating overviews necessitates updating cell size ranges and boundary data.

- k. Click Run.
8. Once this process completes, explore the new data added to the Contents pane. Ensure it is drawing correctly. If so, continue to the next step. If there are problems see Keith.

SHARE THE IMAGE SERVICE

9. Before proceeding, make sure you are signed into the `giscenter.rdc.isu.edu` portal.
10. Return to the Catalog pane.
11. Right-click the completed mosaic dataset and choose OPTIMIZE---ANALYZE MOSAIC DATASET.
 - a. From the Geoprocessing pane that opens, click Analyze.
 - b. You may see a warning regarding raster statistics and radiometric range. This can be ignored.
 - c. If there are any errors, see Keith.

12. Return to the Catalog pane once again.
13. Right-click the completed mosaic dataset and choose Overwrite Web Layer
 - a. Navigate to and choose the Preliminary Fire Severity dNBR imagery layer (located in the RECOVER folder of this Portal).
 - b. The Overwrite Web Layer geoprocessing tool will open and populate much of the data needed.
 - c. Click Analyze
 - d. You will likely see a warning about the maximum number of rasters (24062). We can fix this easily. Here's how:
 - i. From the Geoprocessing pane, open the Set Mosaic Dataset Properties tool.
 - ii. Set the Mosaic Dataset to your current mosaic dataset (e.g., dNBR_Prelim_20230814).
 - iii. Expand the Mosaic Properties section.
 - iv. Change the Max Number Per Mosaic from 20 (default) to 48.
 - v. Click Run.
 - e. Return to the Overwrite Web Layer tool.
 - f. Click Analyze once again.
14. As long as no warnings or errors were found, click the Publish button.
15. Once the image service has been published successfully, check this web service in the RECOVER platform to ensure it is functioning correctly. If not, see Keith to fix any problems.

END