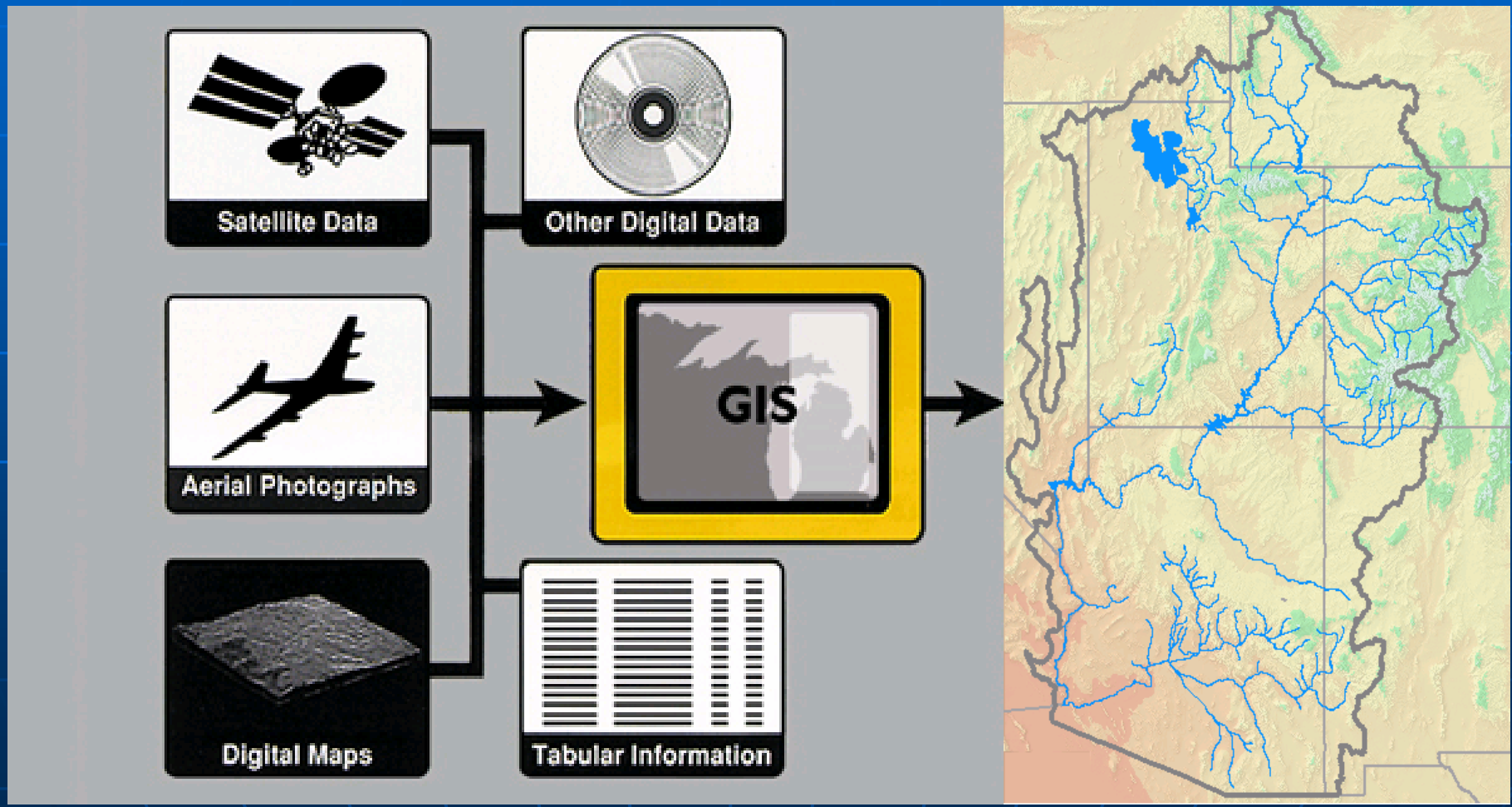
Primary CBRFC Tasks – Supported By GIS

Greg Smith
Colorado Basin River Forecast Center

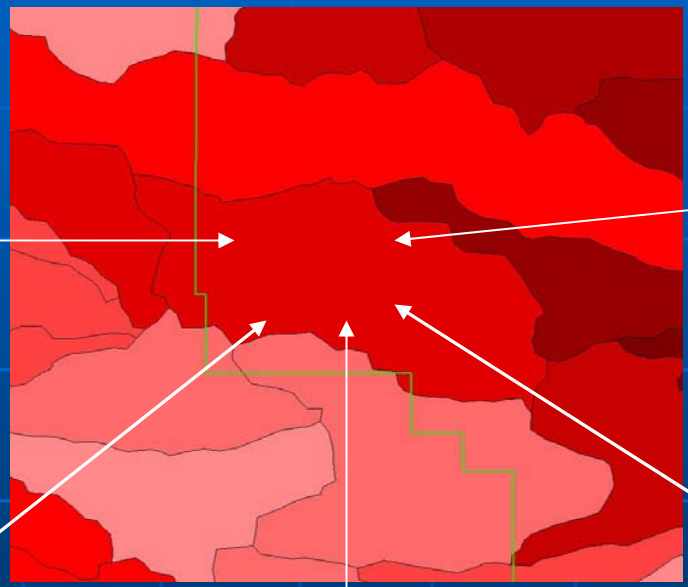


Support NWS Flash Flood Warning Program:

Development of Flash Flood Potential Index

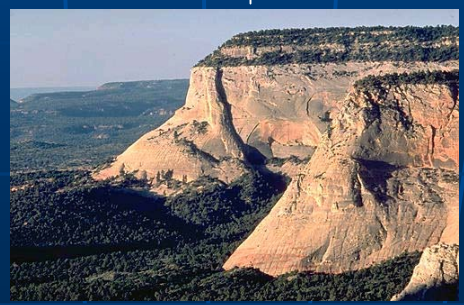
- National Application -

Soil type



Land Use

Fire activity

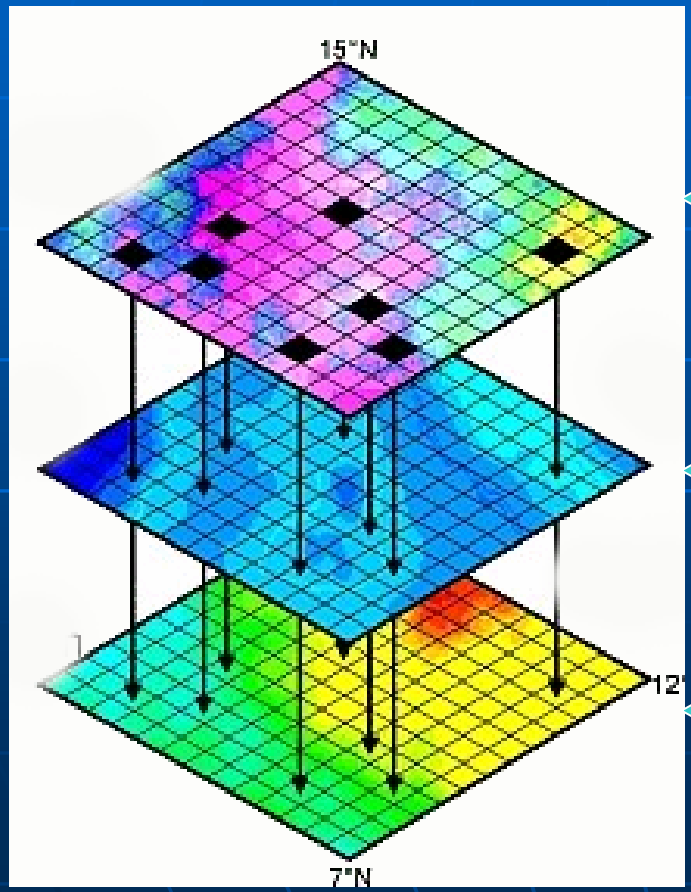


Slopes

Vegetation type /
Forest density

Support NWS Flash Flood Warning Program:

Development of Flash Flood Potential Index



Elevation/Slope

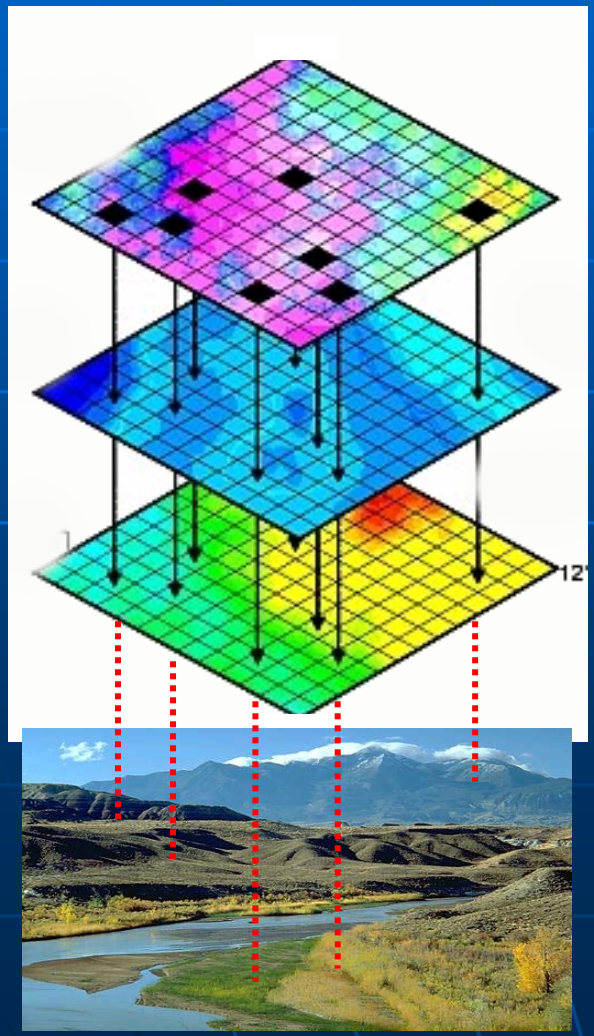
Forest Density

Soil Type

Support NWS Flash Flood Warning Program:

Development of Flash Flood Potential Index

GIS Functionality Requirements:

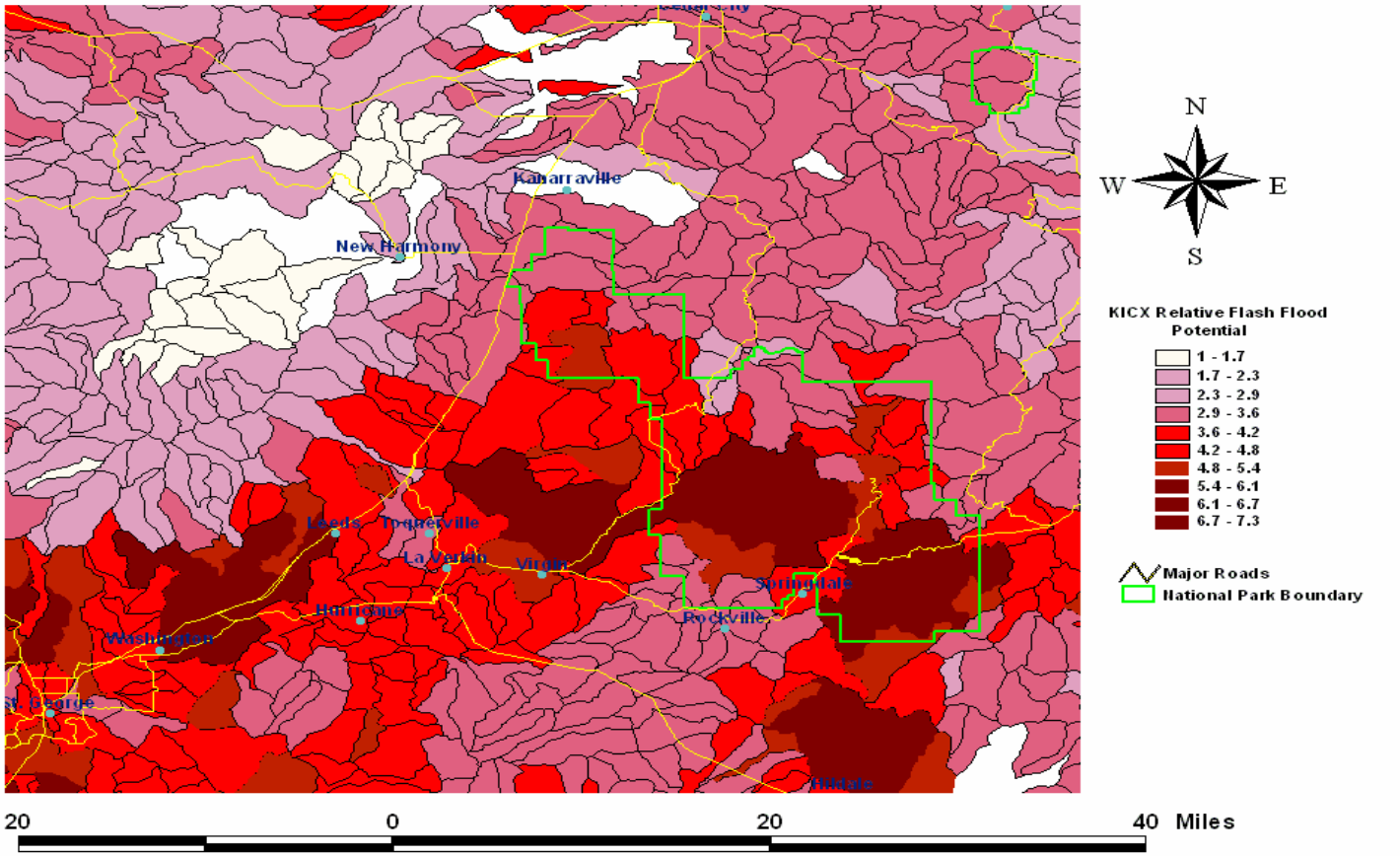


- Manipulate Raster/Gridded Data
  - Geo-Registering abilities
  - Re-Projecting data
    - **Map projection options => reduce distortions**
  - Re-Sample / Interpolate grids
    - **Various analysis techniques**
  - Reclassifying grid cells
  - Grid / Raster Algebra functions
    - **Including statistical operations**
  - Mapping / Visual options
    - **Various scales**
    - **Legend manipulation / editing functionality**

Support NWS Flash Flood Warning Program:

Development of Flash Flood Potential Index

GIS Functionality Requirements: ArcView / ArcGIS to handle output

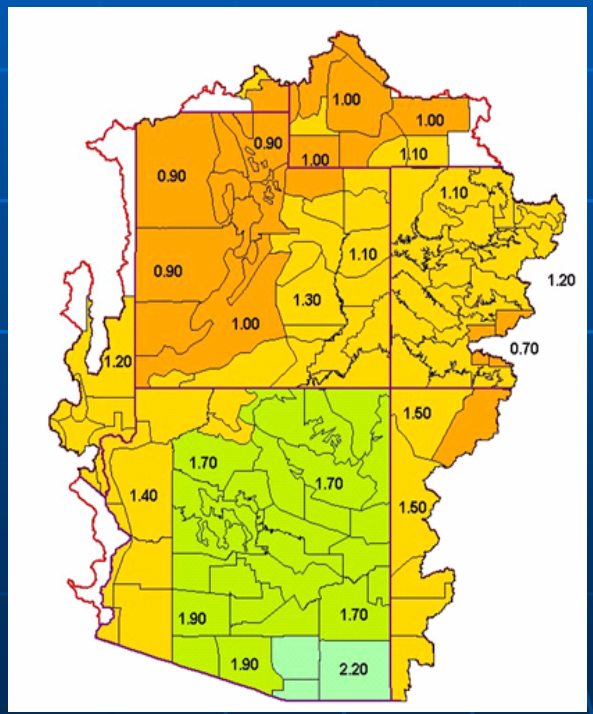


Support NWS Flash Flood Warning Program:

Issue Gridded Flash Flood Guidance

- Local Application – National Requirement -

Areal FFG



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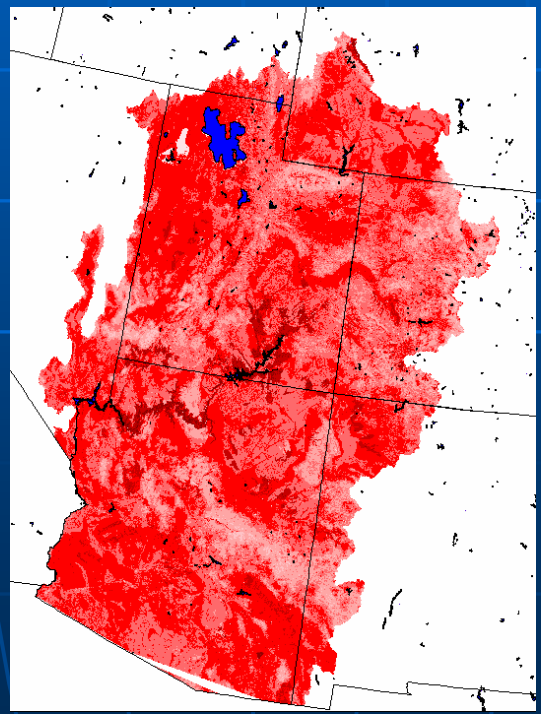
Gridded FFPI



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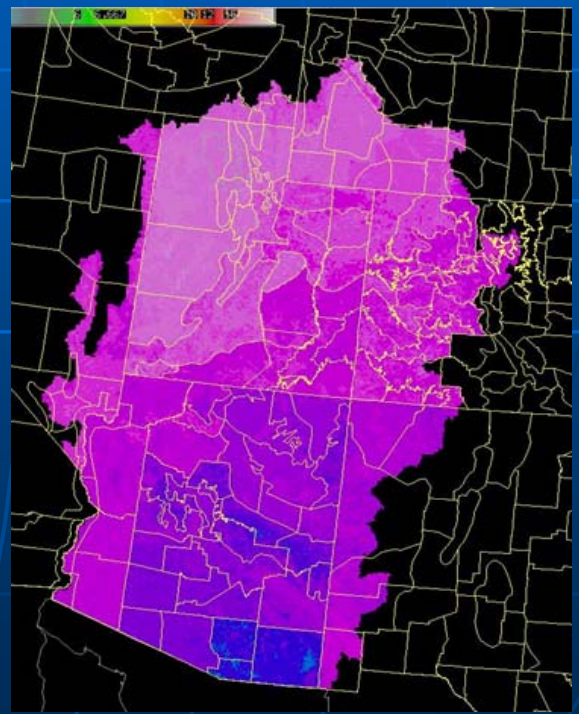
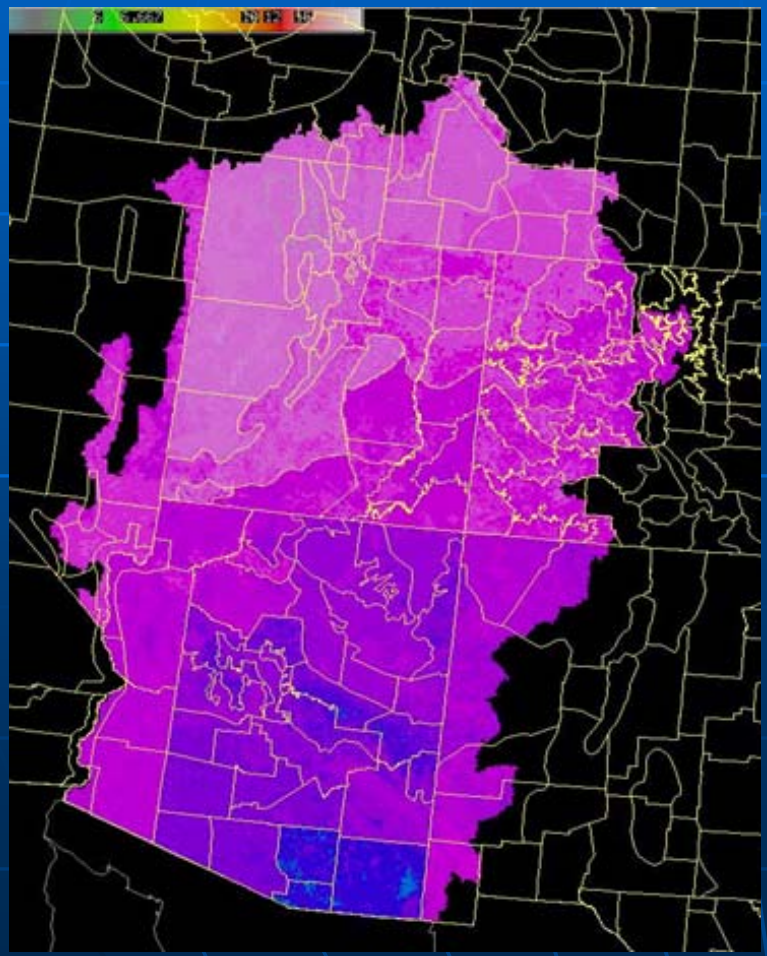
Gridded FFG



Support NWS Flash Flood Warning Program:

Issue Gridded Flash Flood Guidance

Gridded FFG



GIS Functionality Requirements:

Overlay Functions

Combine multiple dataset features in common geographic location

Conversion Tools

Various data formats / maintain spatial relationships

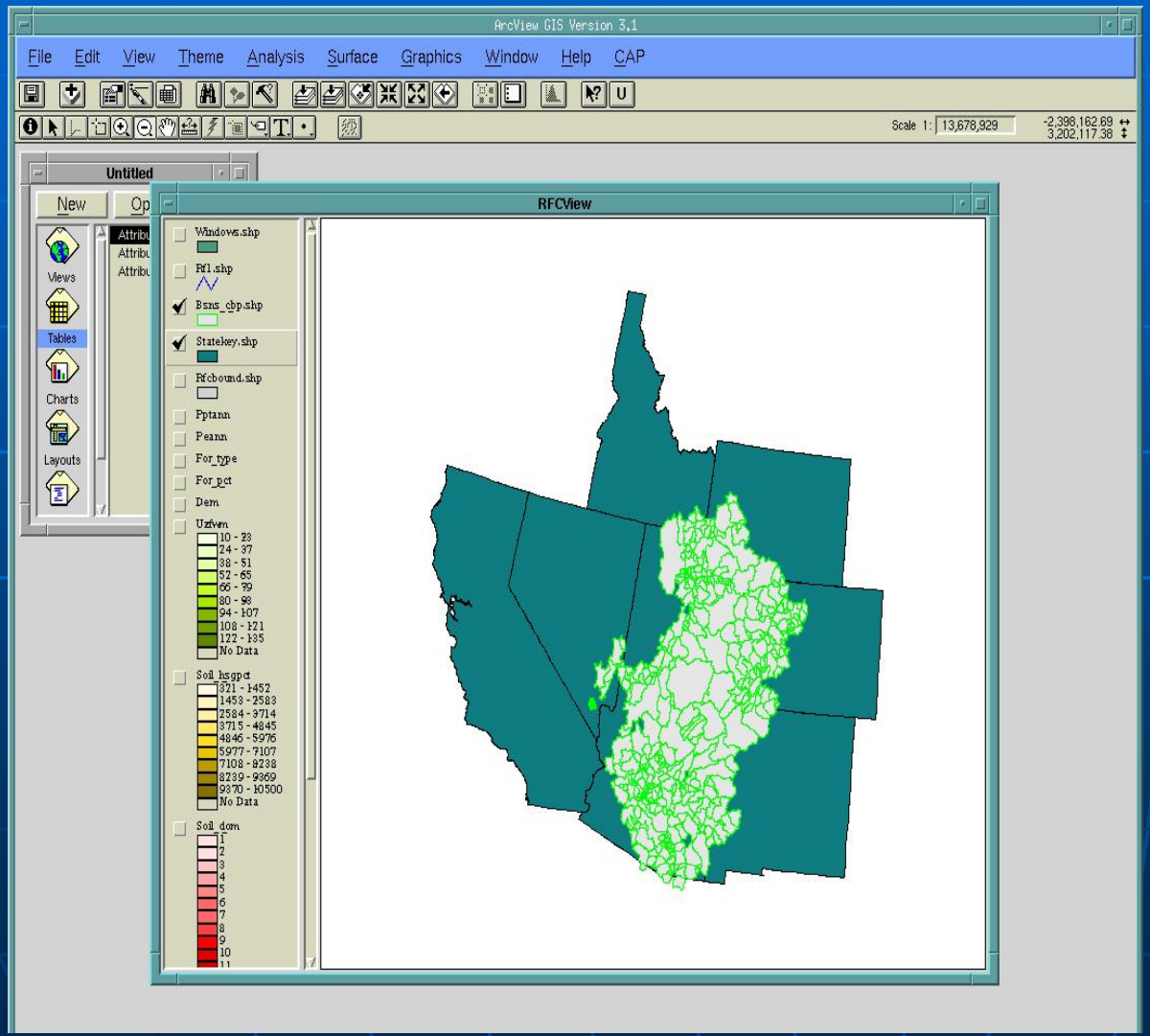
Geo-Processing Tools

Clip / Extract geographic regions

Support RFC Hydrologic Modeling Efforts:

Calibration Assistance Program

- National Application - => Requires GIS Application ArcView



CAP (GIS) Output:

Derive elevation profile

Sub-divide based on elevation

Derive precip characteristics

Determine by Basin / El. Zone:

- **Precipitation**
- **Evaporation**
- **Vegetation**
- **Soil based model parameters**

Support RFC Hydrologic Modeling Efforts:

Calibration Assistance Program

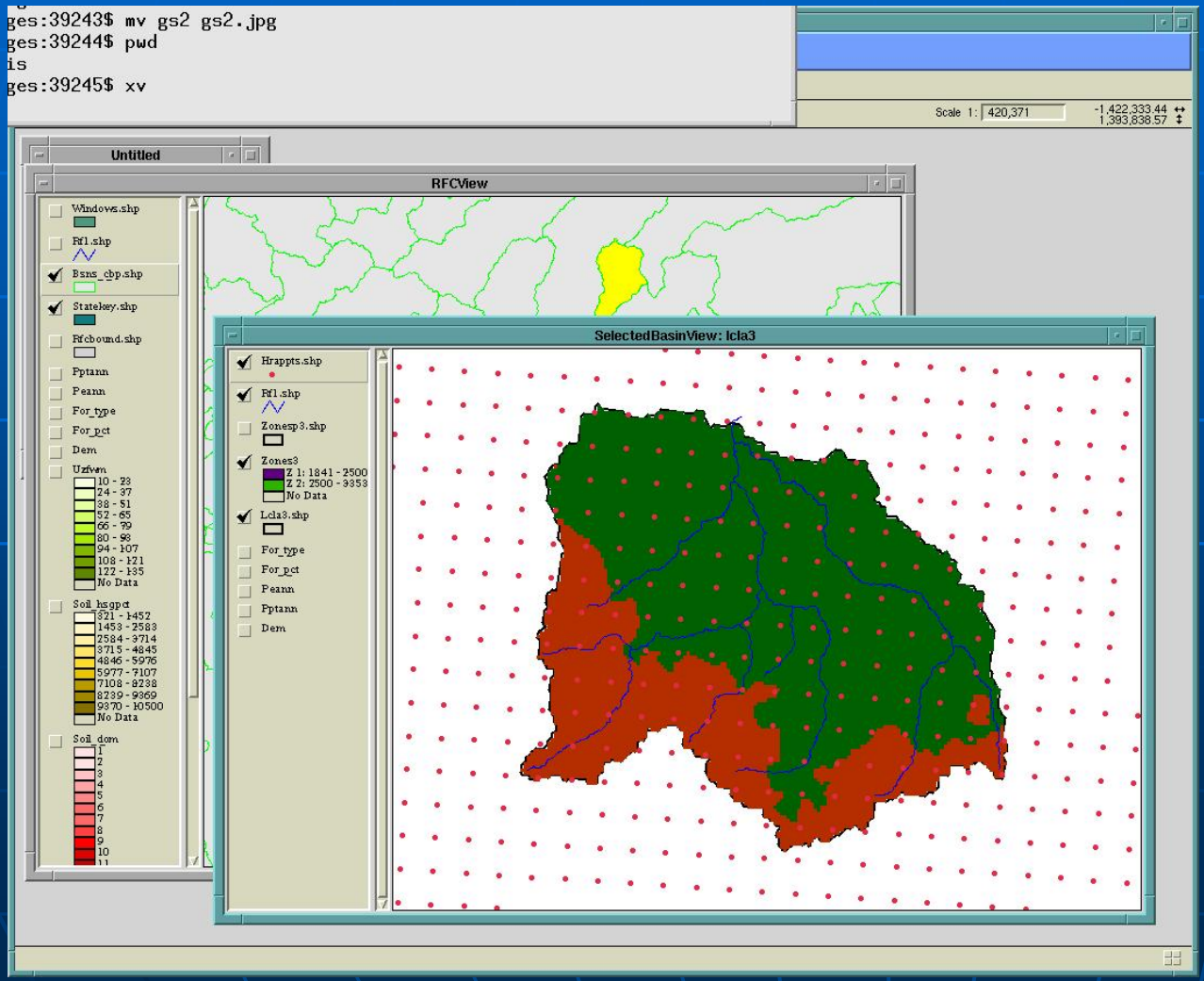
Data Inputs / Sources:

Data type	Source	Format	Spatial Information
Digital Elevation	USGS	Arc-Info Grid	[Geographic NAD83]
Rivers	EPA	PolyLine Shape	Geographic NAD83
Forest Density	EPA	Arc-Info Grid	Lambert Az. Eq. Area NAD27
Soils Data / STATSGO	USGS	Arc-Info Grid	Albers equal Area NAD27

GIS Functionality Requirement: Ingest data of various spatial formats, with various spatial definitions, from a variety of sources

Support RFC Hydrologic Modeling Efforts:

Calibration Assistance Program (MAPX)



GIS Issue:

MAPX pulls info directly from OFS files

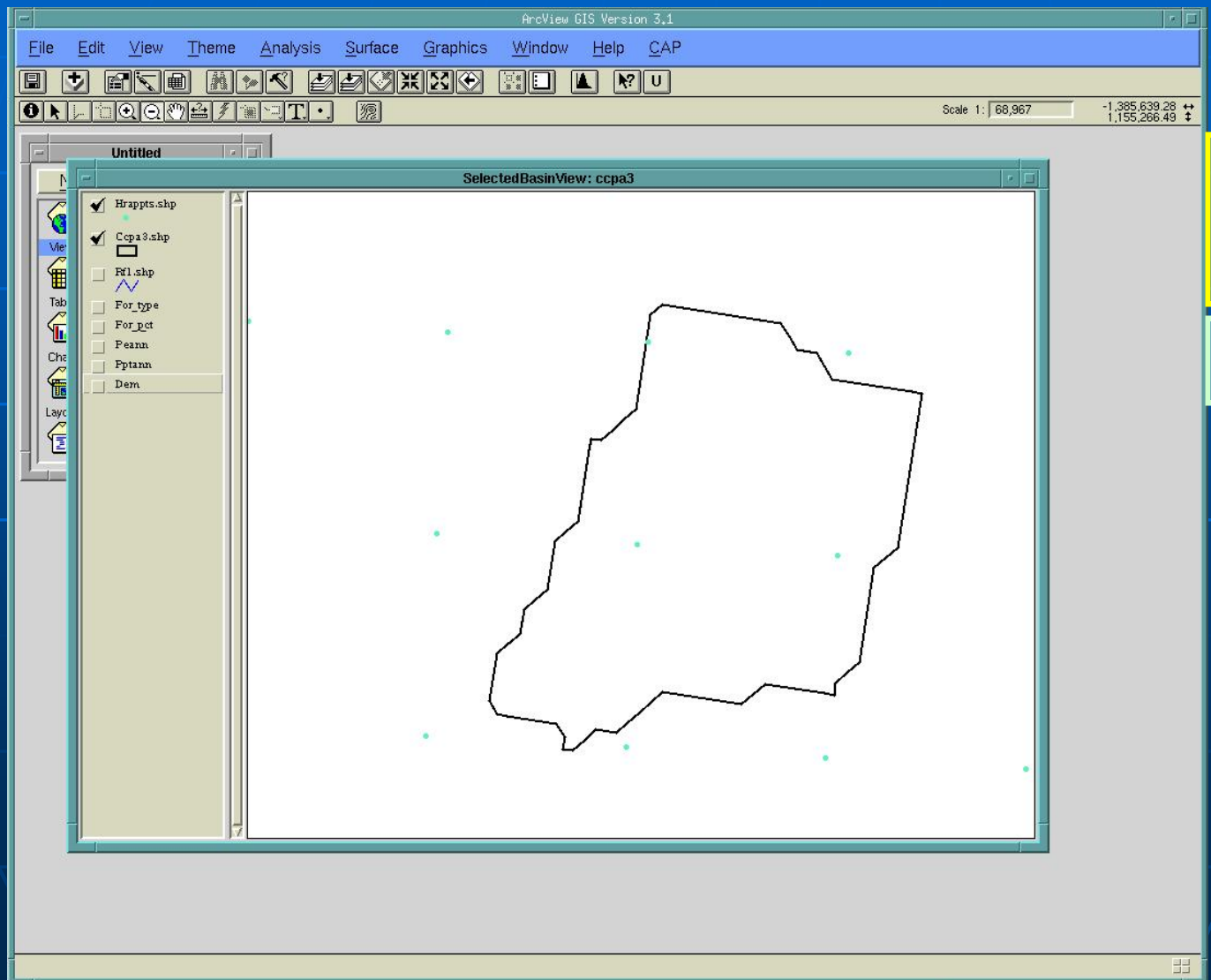
AV/CAP: Unix Platform

ArcGIS: Windows

GRASS?

Support RFC Hydrologic Modeling Efforts:

Calibration Assistance Program (MAPX)



GIS Issue:

~30M => 5 KM^2

~100M => 40 KM^2

~500M =>1000 KM^2

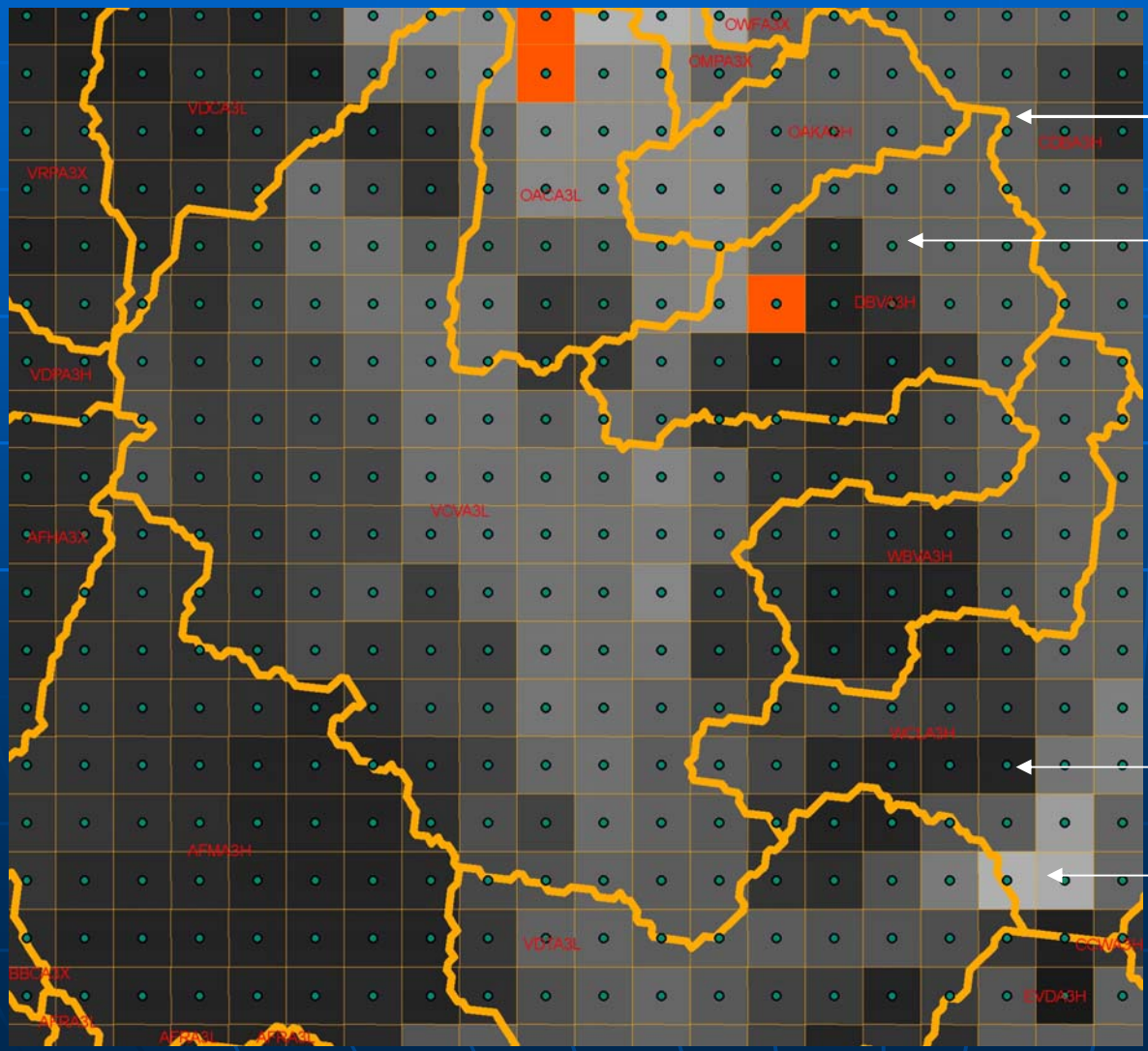
GIS Requirement:

Delineate basins (finer resolution)

Support RFC Hydrologic Modeling Efforts:

Distributed Model

- National Application -



Original Basin Boundary

Modeled on grid

Grids represents 1 of 11 soil parameters derived from gridded soil datasets

Greater surface runoff/response

Less surface runoff / response

Support RFC Hydrologic Modeling Efforts:

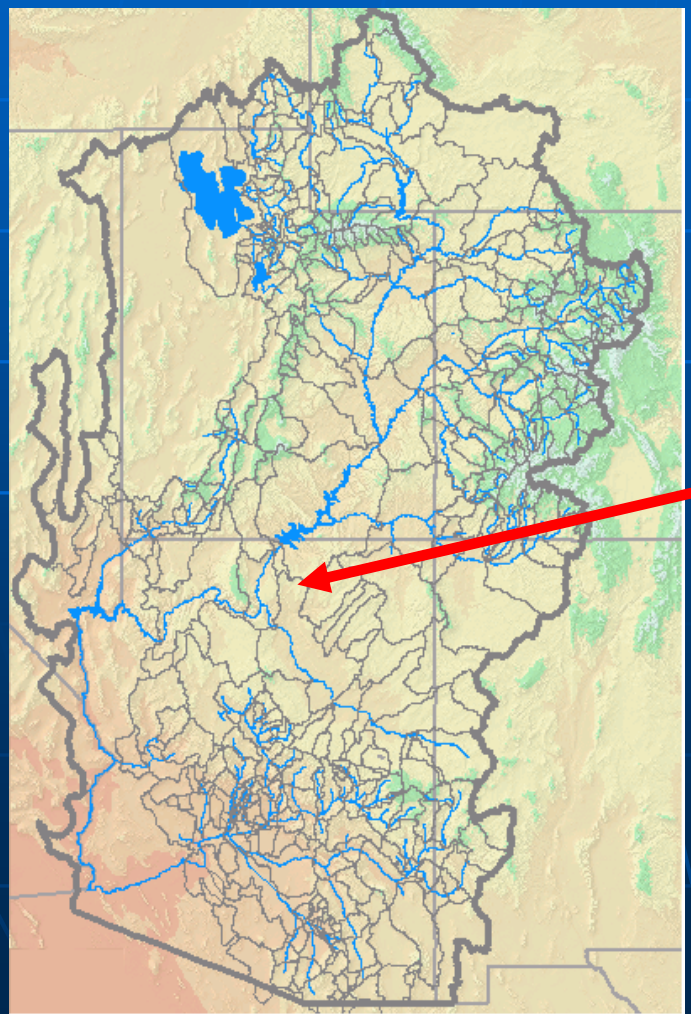
Support NWS Flash Flood Warning Program:

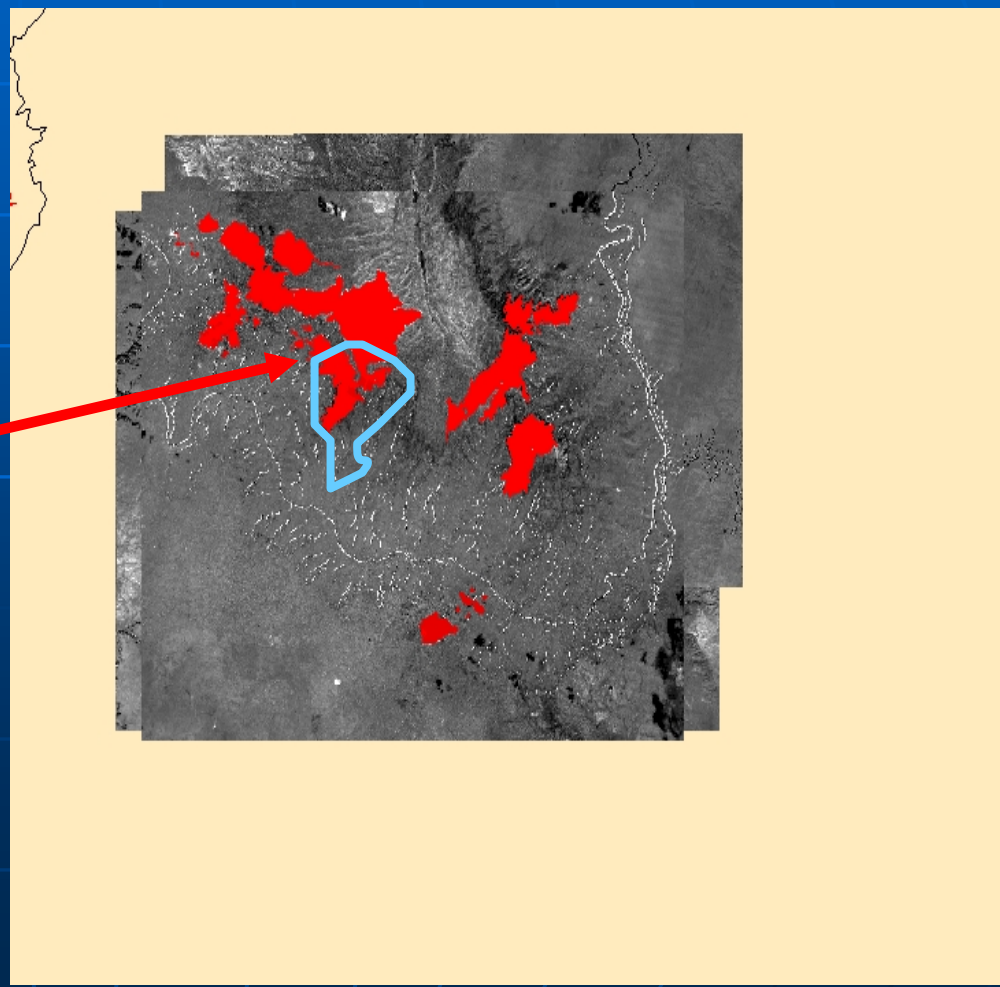
Accounting for Wildfires

- Local Applications -

Support RFC Hydrologic Modeling Efforts:

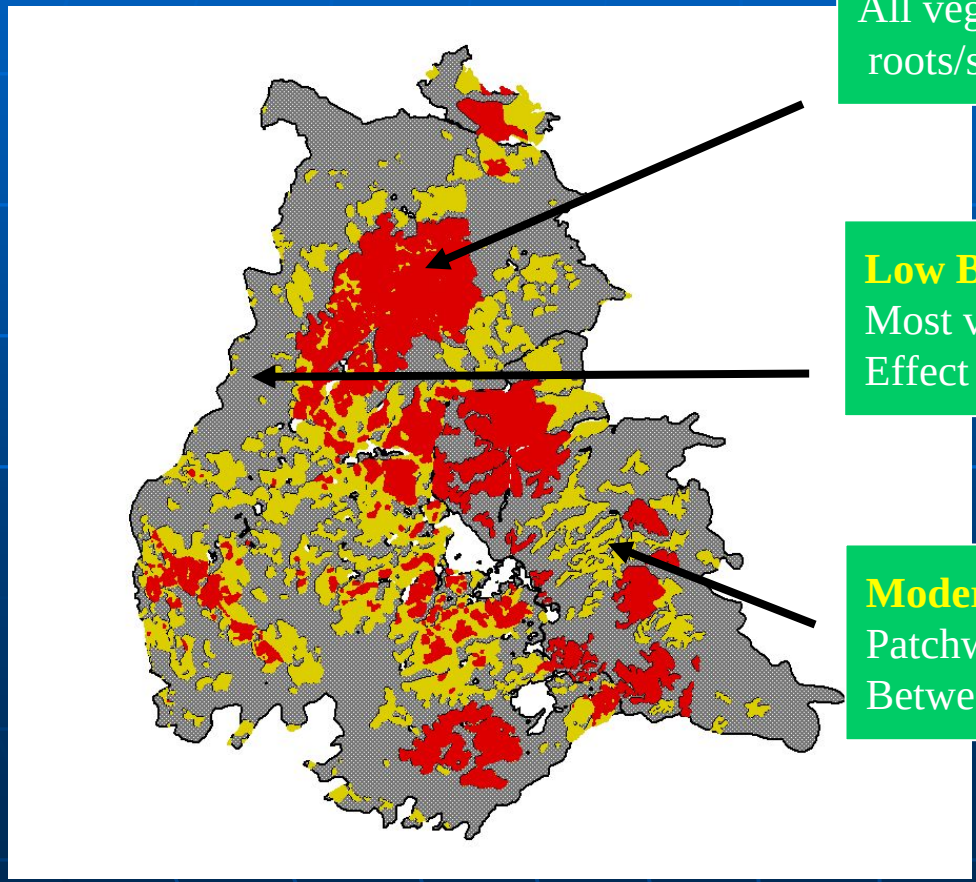
Accounting for Wildfires





Support NWS Flash Flood Warning Program:

Accounting for Wildfires



High Burn Severity:
All vegetation blackened, deep soil heating killing roots/seeds, “baking” of the soil surface.

Low Burn Severity:
Most vegetation untouched by fire. No significant Effect on soil properties or water repellency.

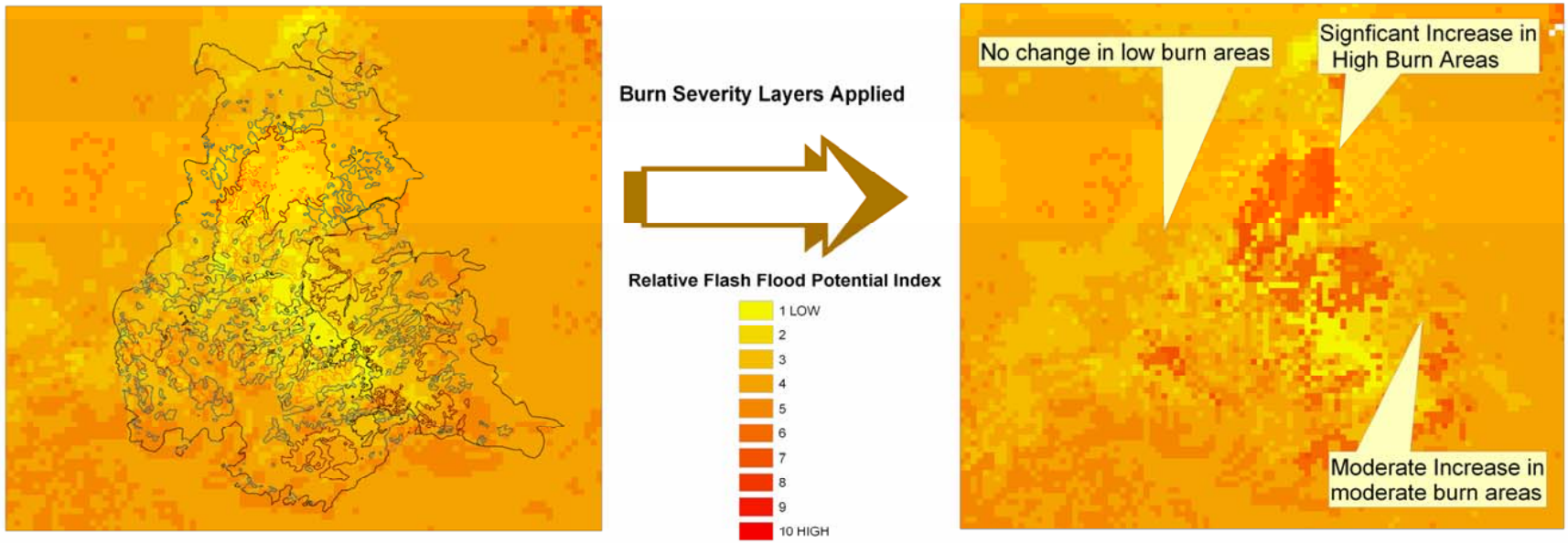
Moderate Burn Severity:
Patchwork of green and burnt areas. Intermediate Between “high” and “low” severity levels.

Support NWS Flash Flood Warning Program:

Accounting for Wildfires

Affect of Fire on Hydrologic Response and Gridded Relative Flash Flood Potential

* Preliminary Results *



Prepared by: Greg Smith - Colorado Basin River Forecast Center - NWS/NOAA

Support NWS Flash Flood Warning Program:

Accounting for Wildfires

GIS Functionality Requirements:

Geoprocessing

Geographic query

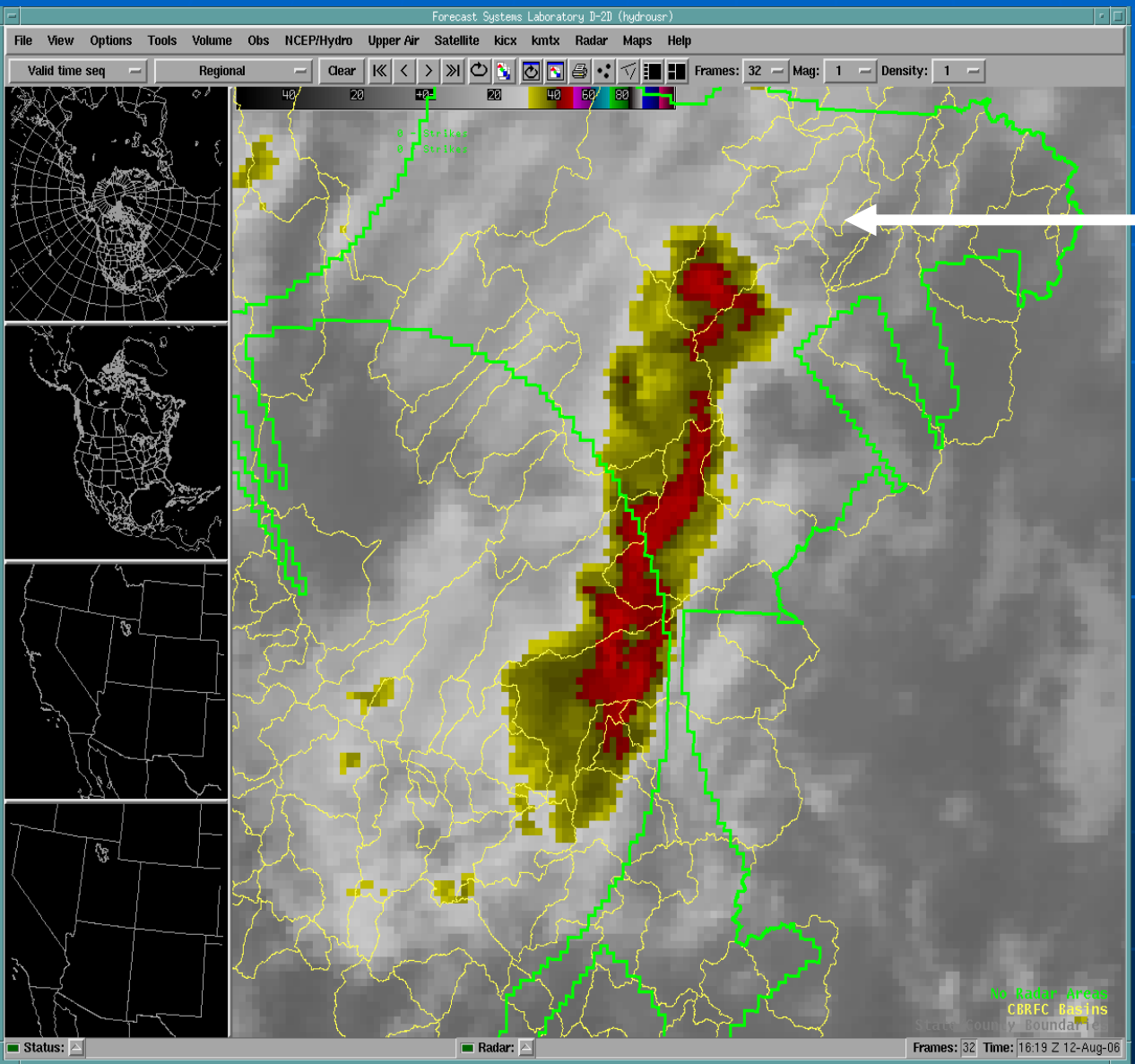
Statistical Information

Scripting Ability

Repeat process

Support CBRFC Daily Operations:

D2D Map Backgrounds



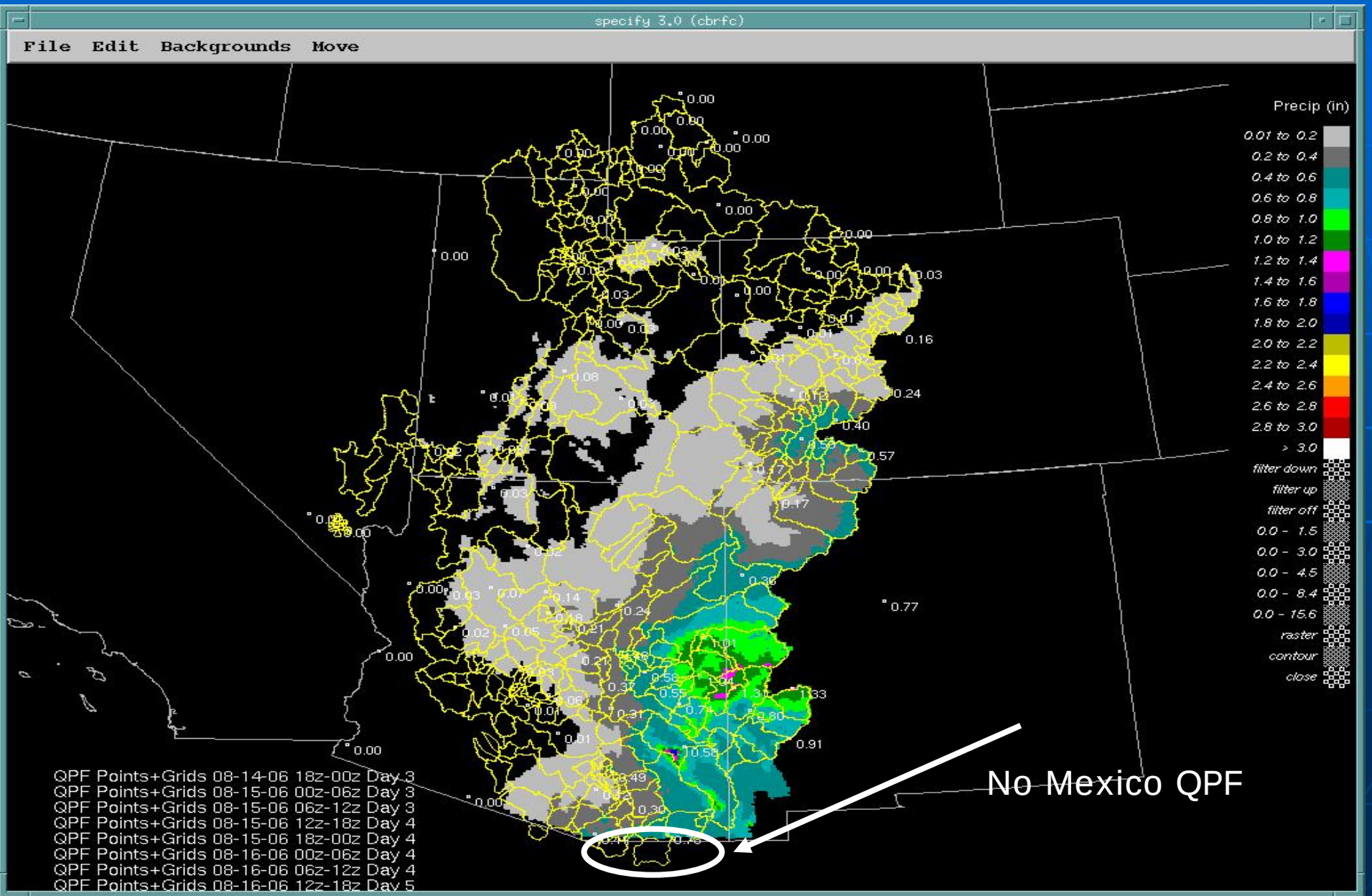
No radar coverage over these modeled basins

GIS Functionality:
Preparation of map backgrounds

Re-projecting
Buffering
Dynamic (frequent edit)
Non-NWS Source (format)

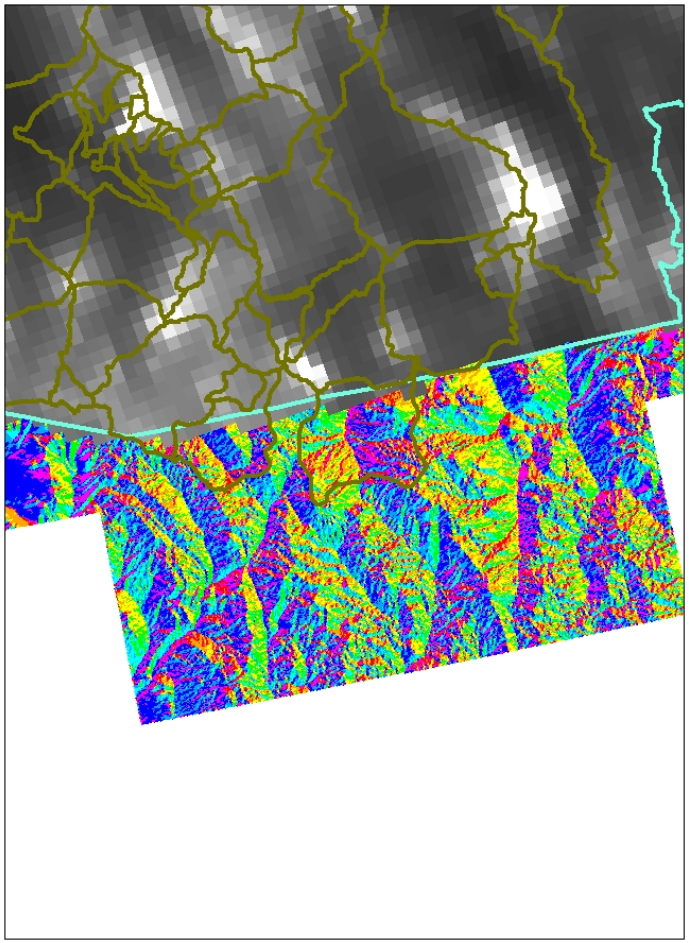
Support CBRFC Daily Operations:

Expand QPF Ability



Support CBRFC Daily Operations:

Expand QPF Ability



Utilizing Elevation Data

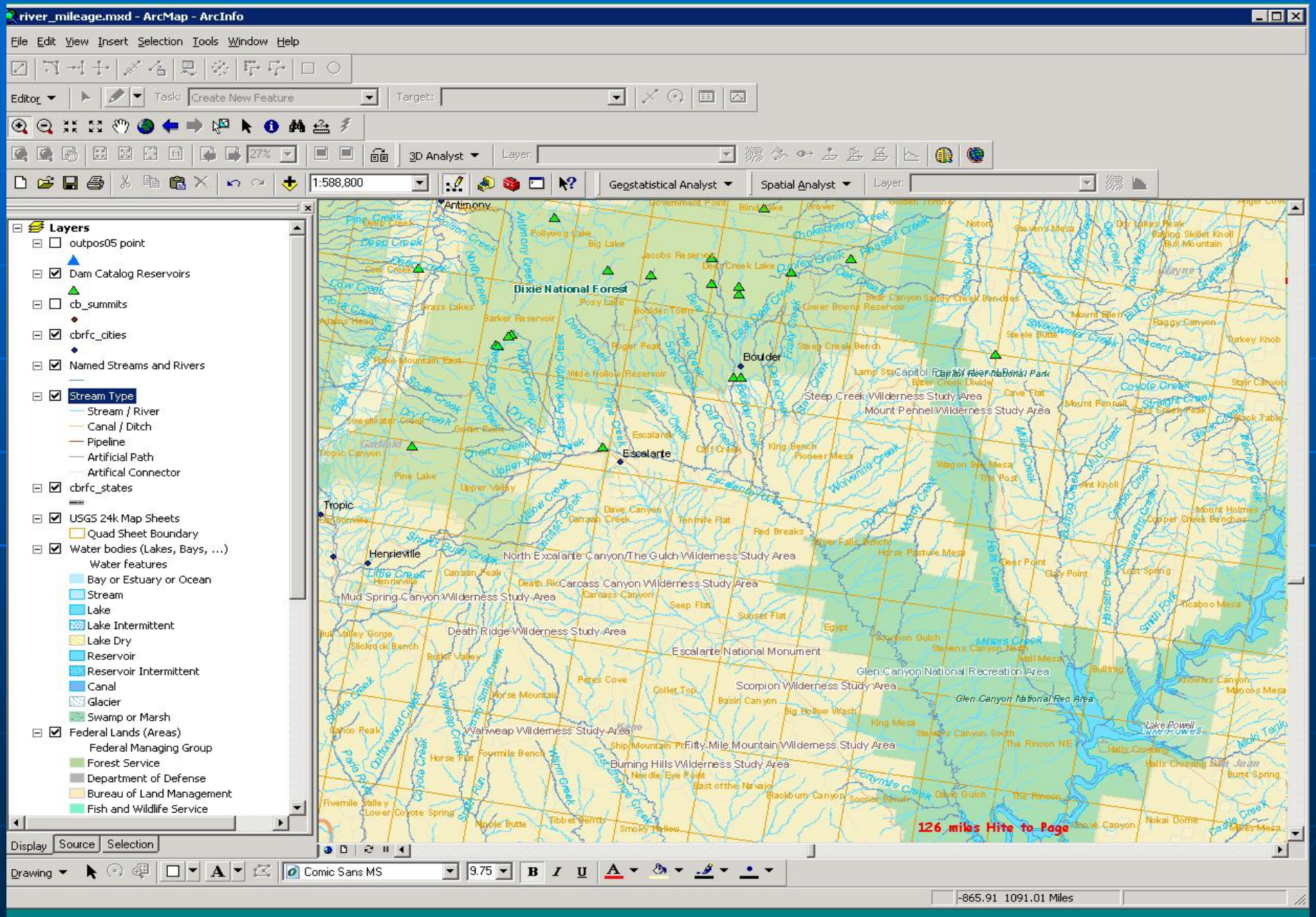
&

Aspect Information

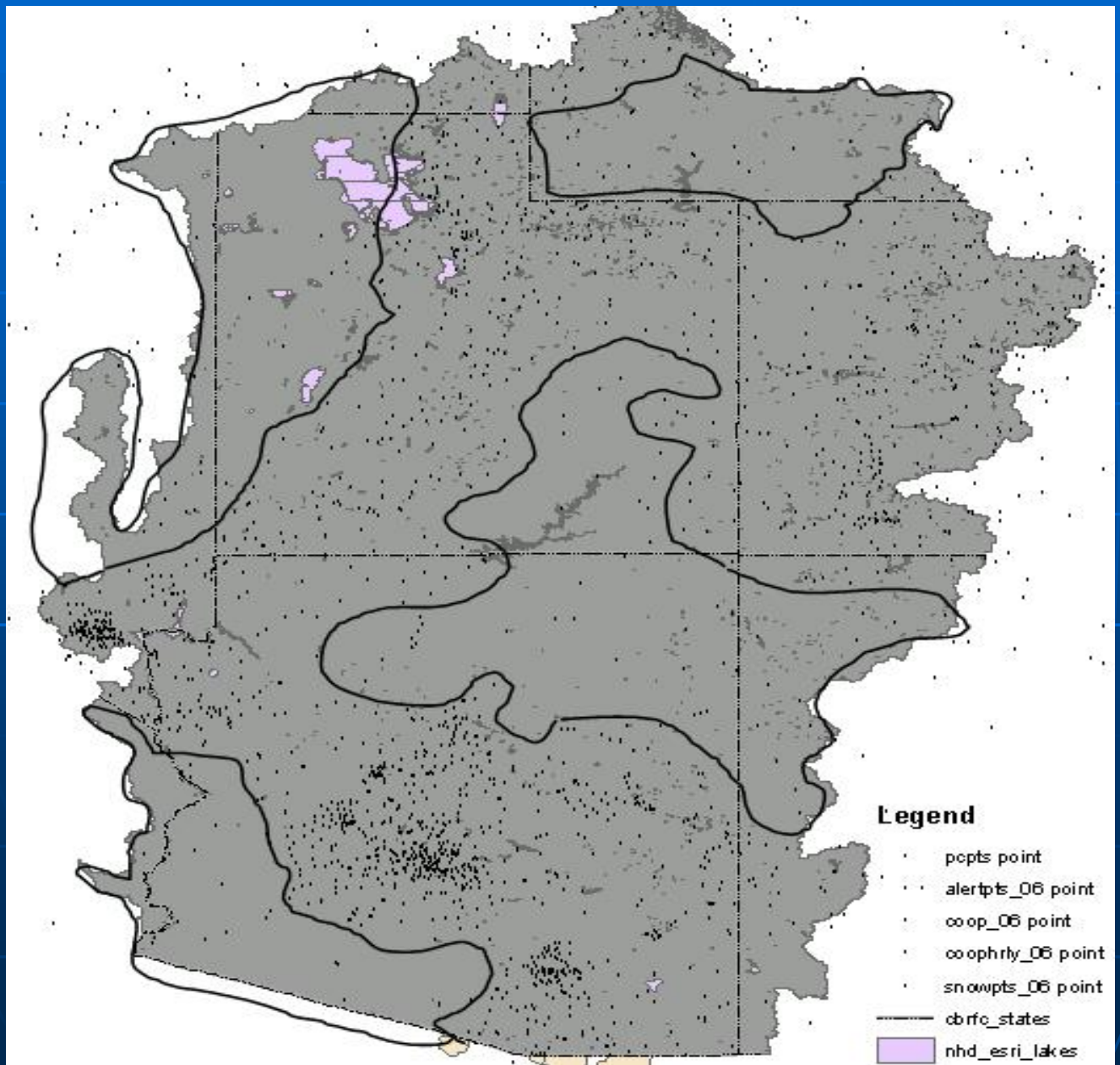
Expand PRISM & QPF ability to Mexico headwater basins

GIS Functionality: Require cell-by-cell comparison of elevation, aspect, precipitation attributes.

Support CBRFC Daily Operations: Interactive Mileage Map

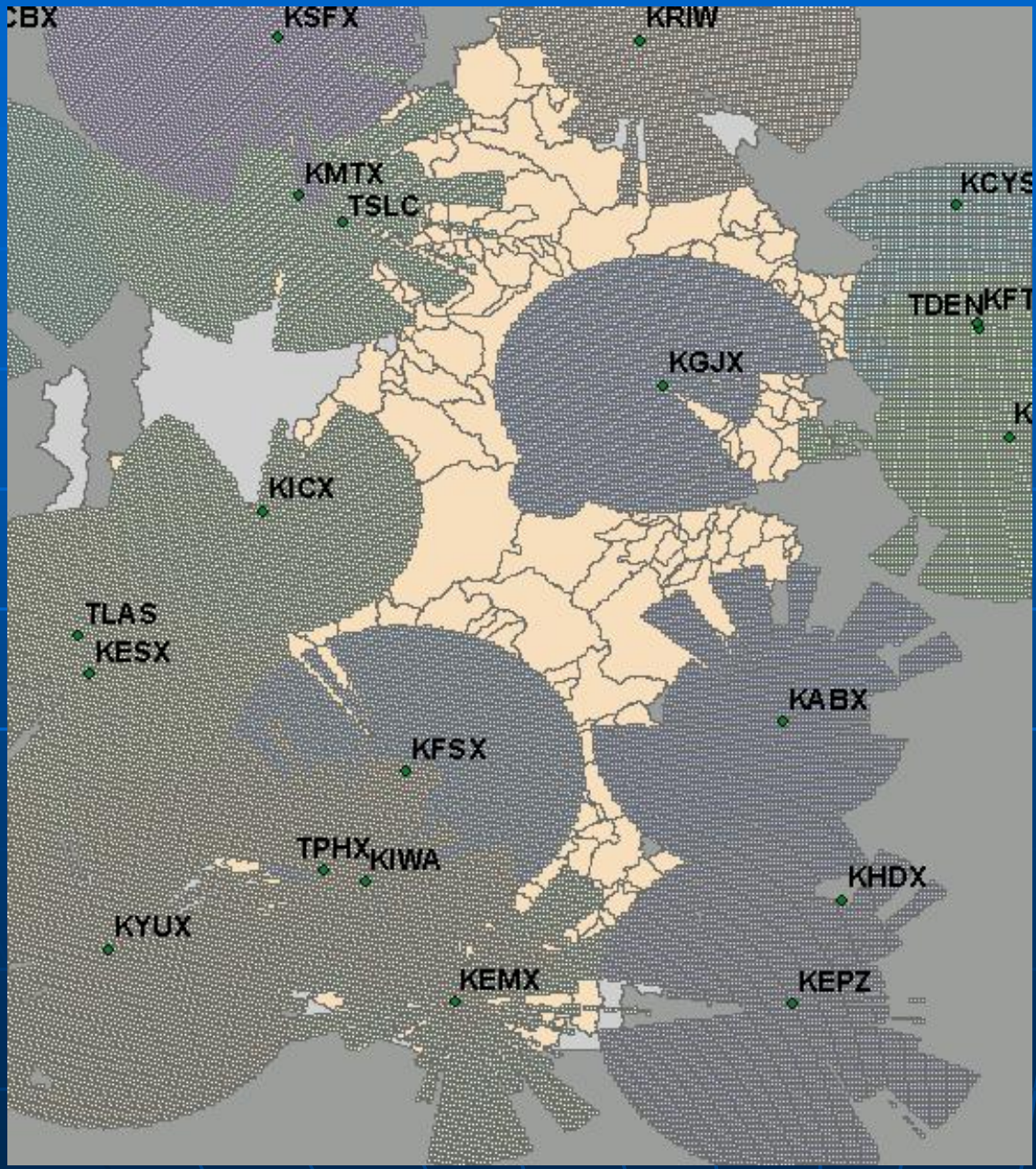


Support CBRFC Daily Operations: Data Sparse Regions

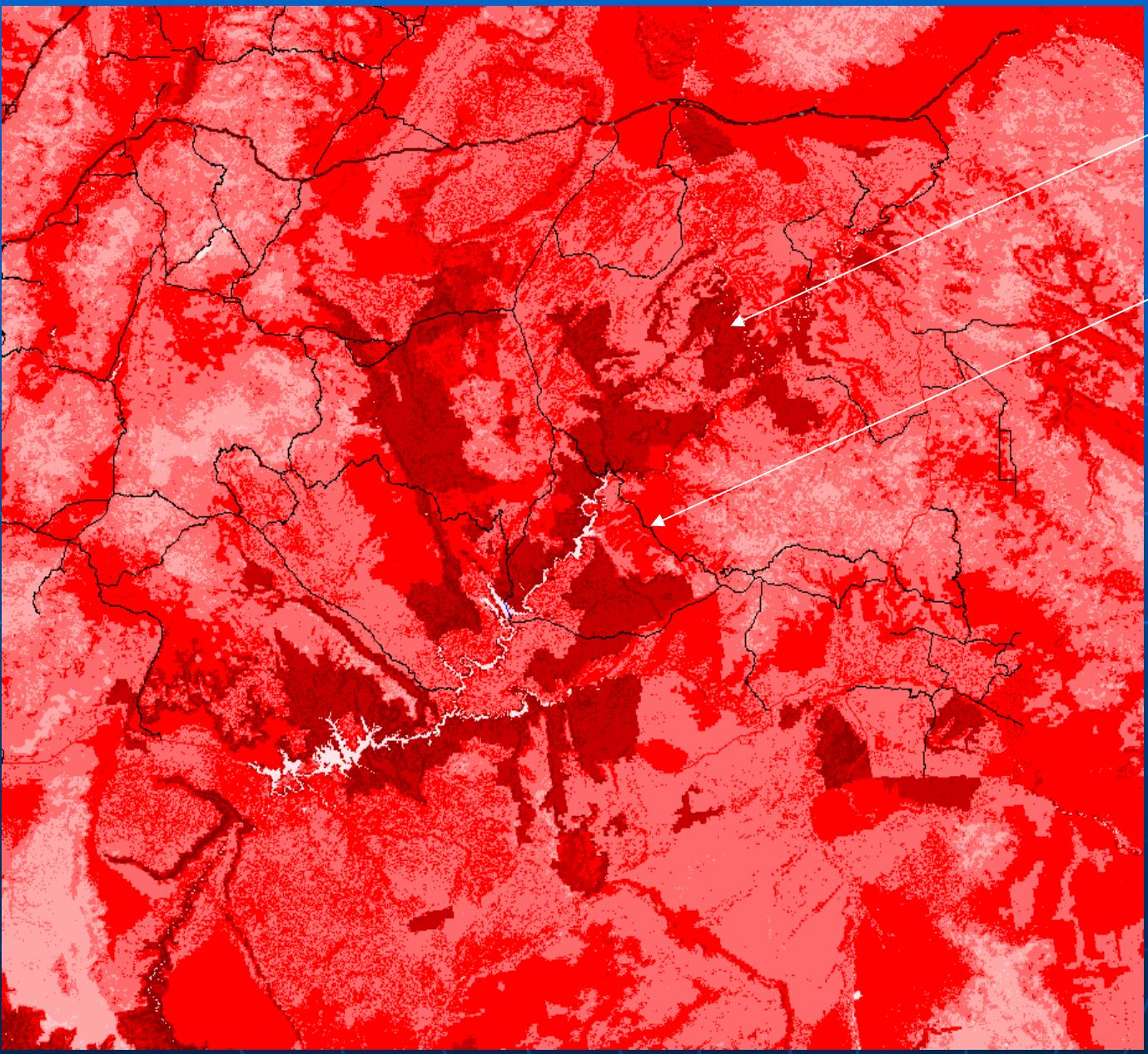


Based on buffering or other proximity rules

Support CBRFC Daily Operations: Radar Masks (Seasonal)



Support CBRFC Users: UDOT – Culverts in FF prone locations?

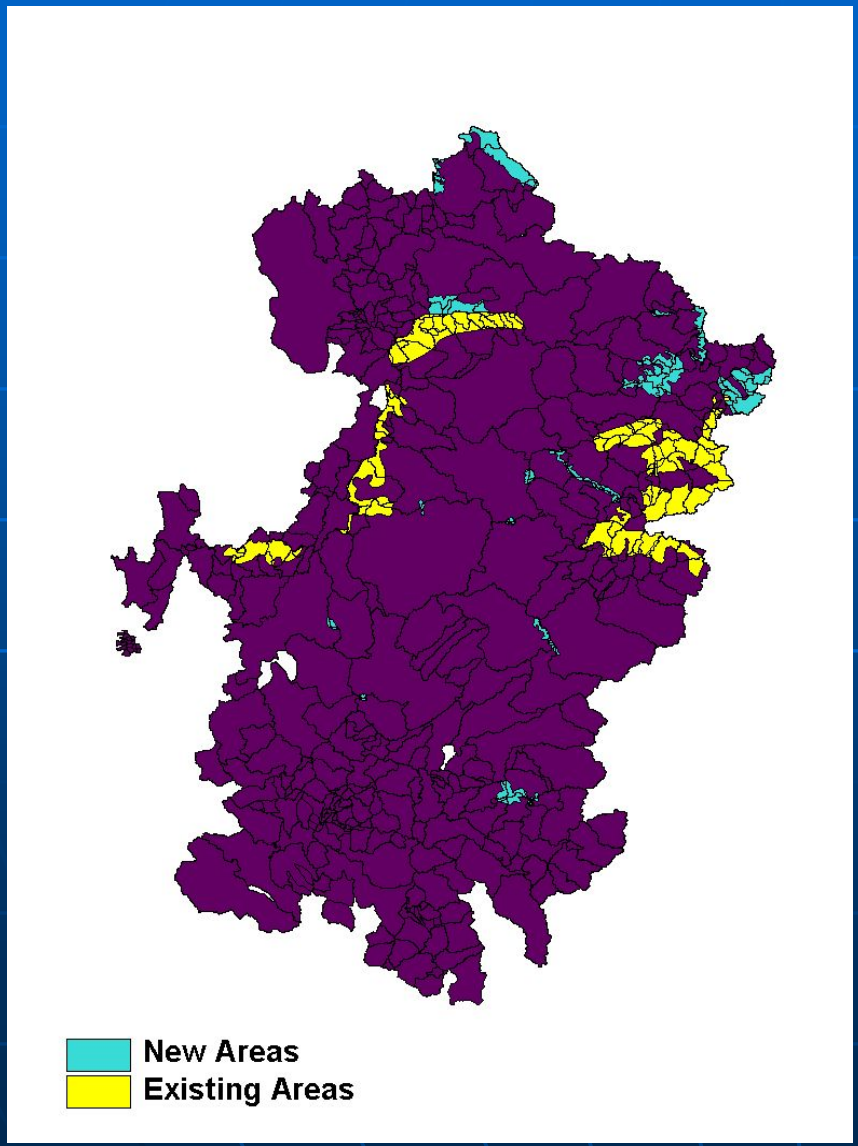


Gridded FFPI

Road Network

Support CBRFC Users: Bureau of Reclamation

Weather Modification Project



GIS geo-processing functionality:

Identify the modeled basins affected by the operation

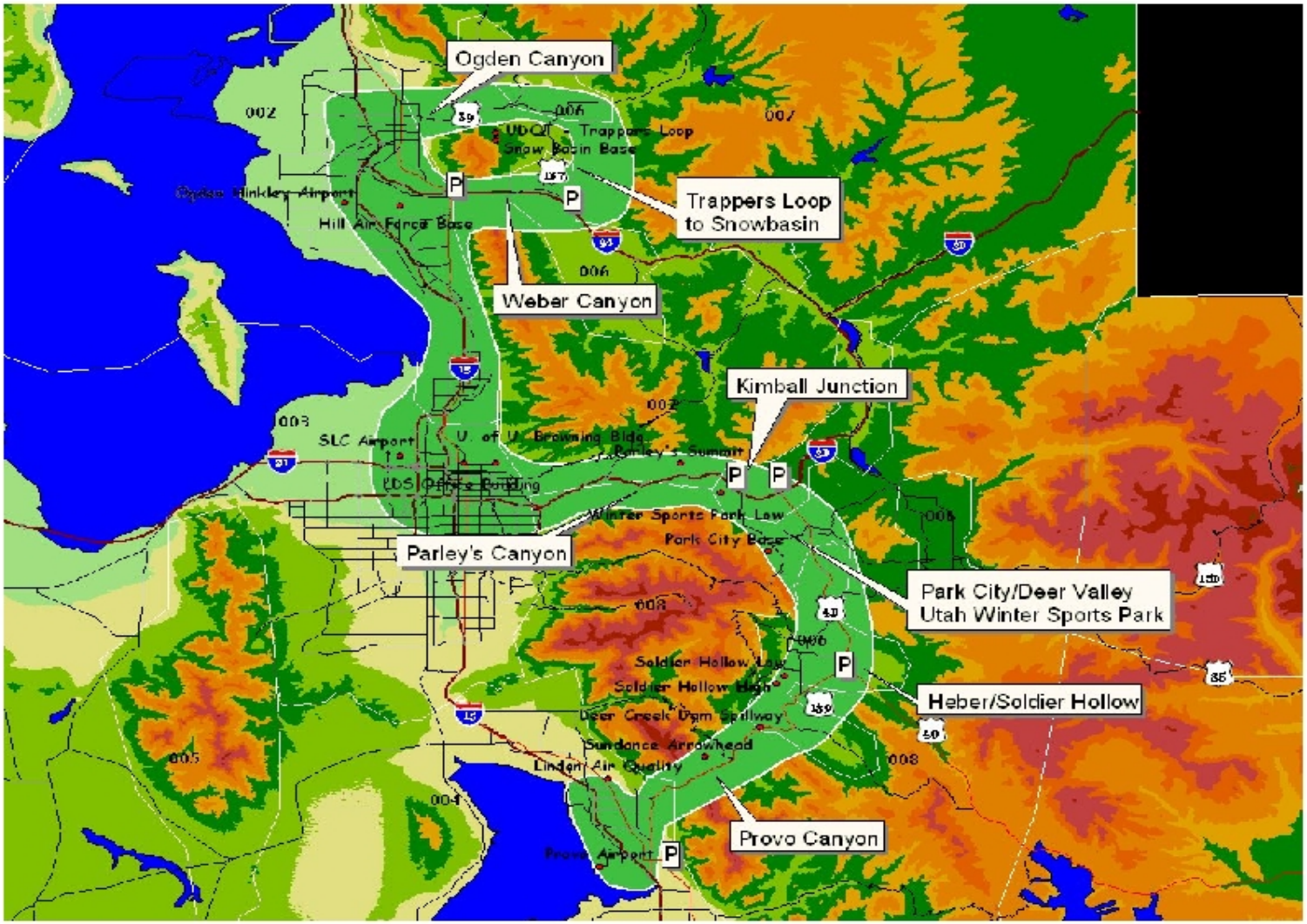
Determine the percent of sub-basin areas where runoff contribution would be affected.

Adjust appropriate model parameters.

Provide a summary of results

Support CBRFC Users: WFO SLC

2002 Winter Olympics Support



That’s It !

Thank You