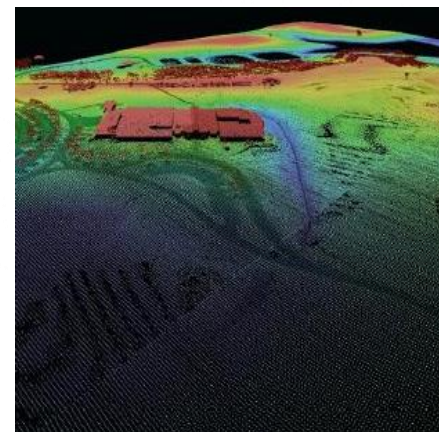
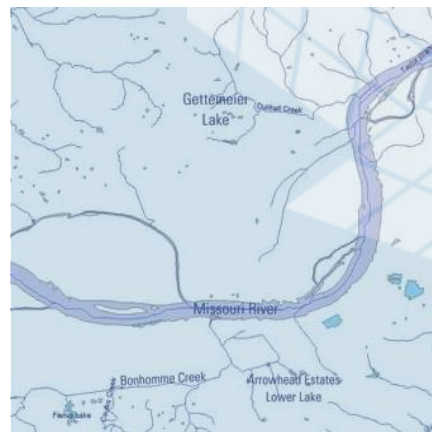
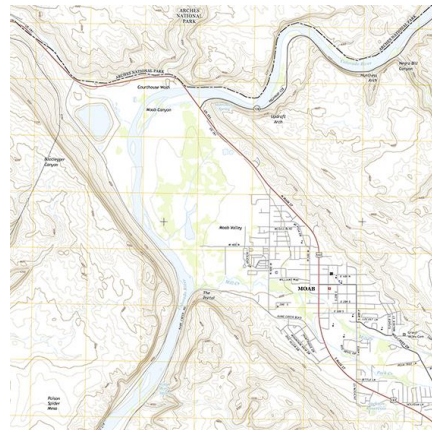




National Digital Trails Network Project

Briefing and Demonstration



10/15/2019

Elizabeth McCartney, Tatyana DiMascio, & Greg Matthews
U.S. Geological Survey

+ Agenda

2

Topics

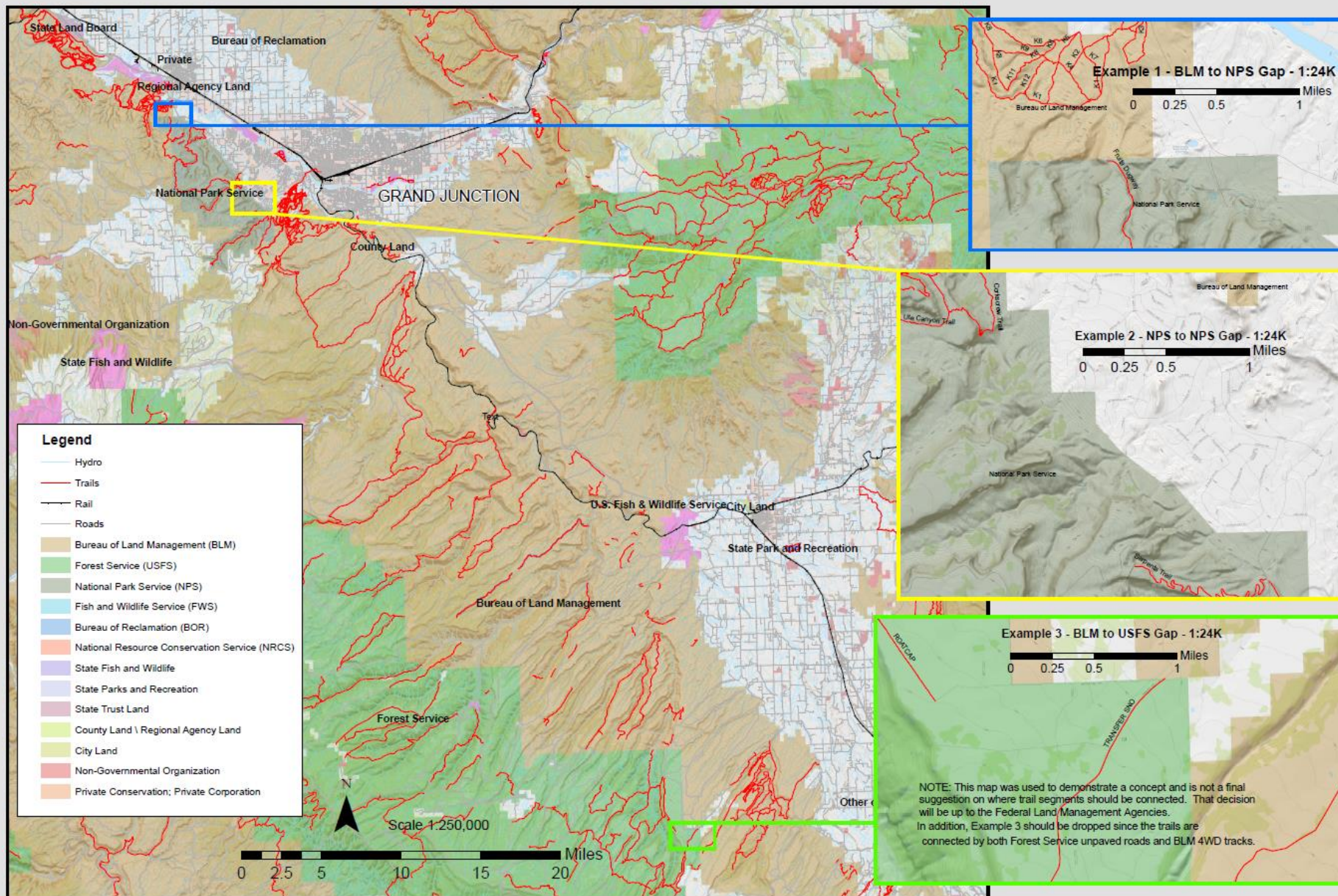
- Project background and overall goals
- Demonstration of TRAILS
- Next Steps
- Questions/Discussion



Vision

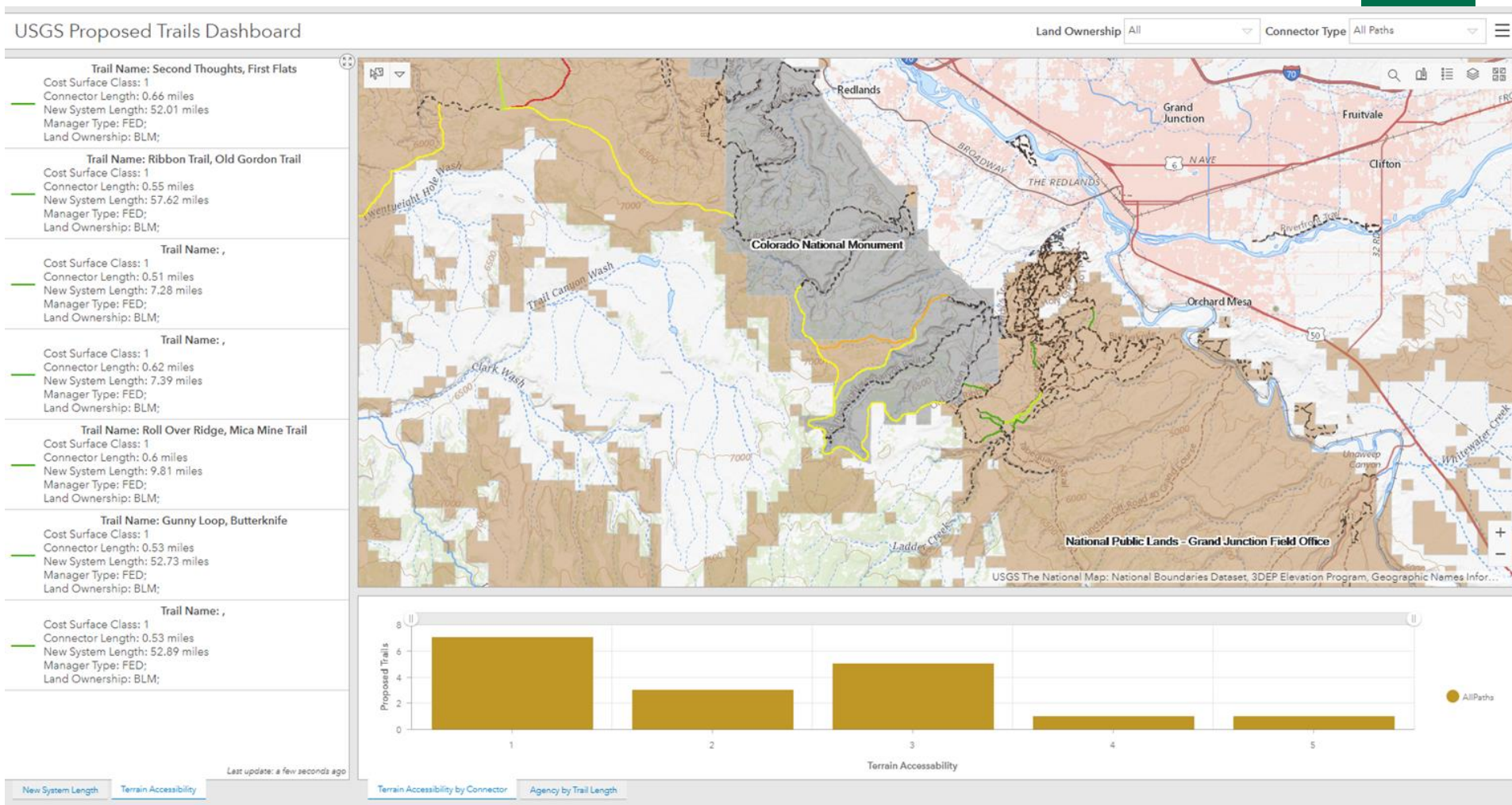
Connect trails systems to expand recreational opportunities on the Nation's public lands





+ Proof of Concept - Decision Support Tool

5





2-Year Goals to Support the Vision

- ❖ **Goal 1:** Create a decision support tool (TRAILS) to assist land managers in identifying connections between existing trails and trail systems.
 - Beta TRAILS decision support tool released 8/2019
 - User testing and proof of concept pilots ongoing
- ❖ **Goal 2:** Create a robust national digital trails database
 - ~200,000 miles of trails aggregated
 - New trail schema implemented
- ❖ **Goal 3:** Develop a mobile responsive editor for maintaining trails
 - Review of existing applications ongoing

+ TRAILS Decision Support Tool

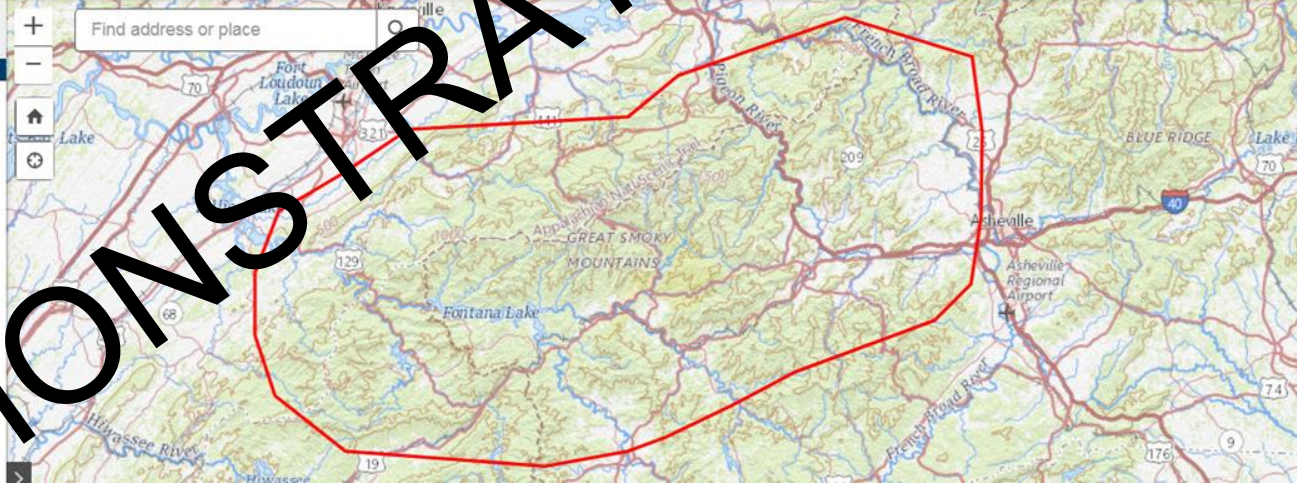
7

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS)

My Projects + 🔄 📍 [Connect Trails](#)

Name	Description	Modified Date
Great Smokey Mountains National Park	Trails	5/9/2019
Finder's Keepers	Natural Treasures	5/9/2019
Elizabeth's Trails	Finding shortcuts...	5/7/2019

Find address or place



+ TRAILS Decision Support Tool

8

The screenshot shows the TRAILS Decision Support Tool interface. On the left is a sidebar with a 'My Projects' dropdown and a 'New Project' button. Below this is a table of 'Trail Connection Projects'. The main area is a map of the Grand Junction area, showing trails, roads, and topography. Various callouts point to specific features: 'Search by address or place' points to the search bar; 'Zoom in and out with + or - or just use the roller on your mouse' points to the map navigation controls; 'Click to zoom to your current location' points to the location pin icon; 'Click and hold left mouse button to drag the map' points to the map area; 'Scale bar' points to the scale bar at the bottom left; 'Latitude/Longitude' points to the coordinates at the bottom left; 'Data Credit' points to the data source information at the bottom right; and 'Collapse or Expand this window' points to the sidebar collapse icon. A callout at the top right says 'See the next slide for more information about the top toolbar'. At the bottom left, a callout says 'Highlight a project above, then use the tools below to manage the project'.

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta

My Projects + - 🔍 📄 🖨️ 👤 Elizabeth McCa...

Trail Connection Projects

Name	Description	Modified
Trail Connections	Checking other connections.	8/15/2019
Grand Junction Area Trails	Looking for better connections in Grand Junction.	8/15/2019
July Heat Test	Pre-Test	7/30/2019
Elizabeth's Trails	Finding shortcuts...	6/14/2019
June Trails	June bugs	6/11/2019
Great Smokey Mountains National Park	Trails	5/30/2019
Finder's Keepers	Natural Treasures	5/9/2019

Callouts:

- Search by address or place
- Zoom in and out with + or - or just use the roller on your mouse
- Click to zoom to your current location
- Click and hold left mouse button to drag the map
- Scale bar
- Latitude/Longitude
- Data Credit
- See the next slide for more information about the top toolbar
- Collapse or Expand this window
- Highlight a project above, then use the tools below to manage the project

Bottom Bar: 🔗 Open 🗑️ Delete 🔗 Share 💬 Comments 🔄 Changes

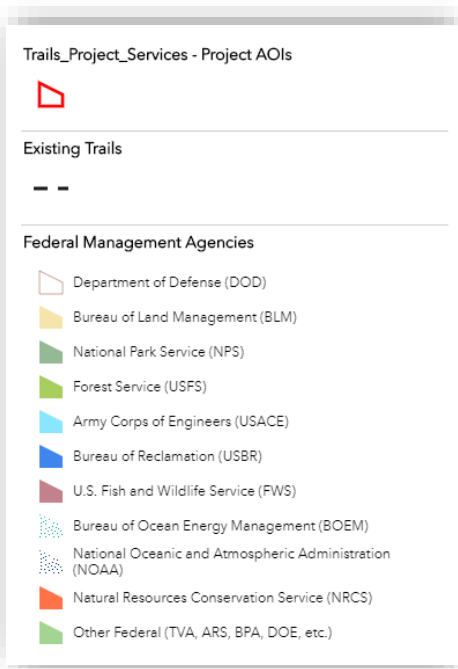
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Pro...

+ Top – Right Toolbar

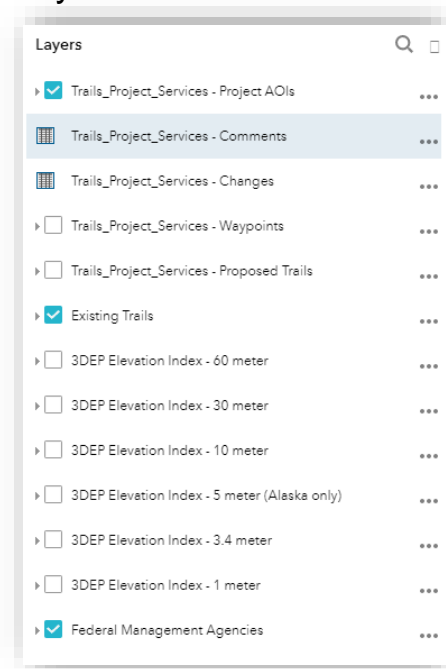
9



Legend



Layers



Add Base Layer



USGS Topo



USGS Hydro Cached



USGS Imagery Only

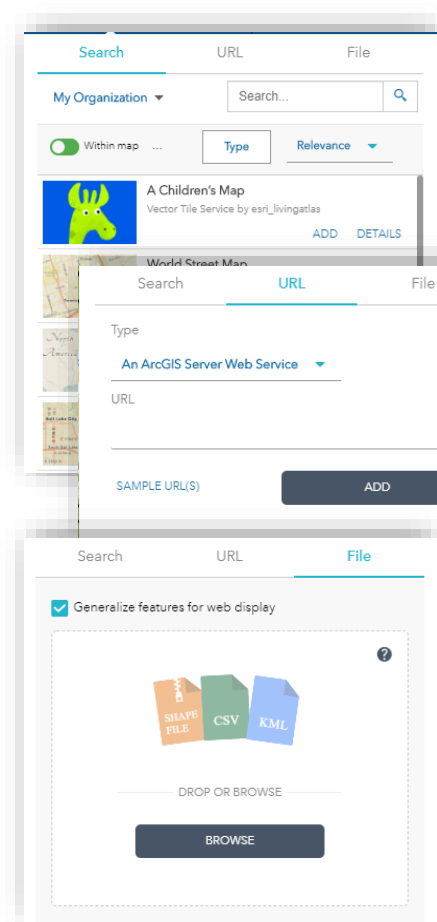


USGS Imagery Topo



USGS Shaded Relief

Add Data



+ Create a New Project

10

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta
science for a changing world

My Projects **New Project**

Trail Connection Projects

Name	Description	Modified
Grand Junction Area	Looking for better connections in	8/16/2019
		8/15/2019
July Heat Test	Pre-Test	7/30/2019
Elizabeth's Trails	Finding shortcuts...	6/14/2019
June Trails	June bugs	6/11/2019
Great Smokey Mountains National Park	Trails	5/30/2019
Finder's Keepers	Natural Treasures	5/9/2019

Click here to create a new project

Find address or place

WYOMING

Continental Divide Nat'l Scenic Area

189

80

191

50

70

COLORADO

lake well

Basic Project Information

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta
science for a changing world

Create Project Close

1 Project Information

1 Project Information

2 Define Area of Interest

3 Refine Scenarios and Explore Results

4 Share Project

Project Name:

1. Enter Project Name here

Description:

2. Create a short description of your project

3. Lead Organization:

NPS

NPS

BLM

USFS

USFWS

Other

4. Previous Save & Next

+ Define Area of Interest (AOI)

12

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta

Create Project Close

Find address or place

1 Project Information

2 Define Area of Interest

3 Refine Scenarios and Explore Results

4 Share Project

1. Zoom to an area of interest

2. Click to begin digitizing AOI

3. Double-click to start and end.

4. Click to continue

Zoom with mouse or + and - or search for a place

Some Analysis Resolutions Unavailable

The 1 meter analysis resolution is not available. The area of interest X dimension exceeds 4,000 meters.

Stop These Warnings

Once you've created your AOI, you can move or reshape as needed.

Stay within the black hash marks for faster analysis and access to higher resolutions

Click below to digitize an Area of Interest

Sketch Area of Interest

Use the tools below to edit or delete the Area of Interest ☒ Show analysis resolution warnings

Previous Save & Next

Additional Tools

Toggle Warnings On/Off

Analysis Resolution	Max AOI Extent Dimensions (km)	Max AOI Extent Dimensions (mi)
1 m	8 km x 8 km	4.97 mi x 4.97 mi
3.4 m	27.2 km x 27.2 km	16.9 mi x 16.9 mi
5 m (Alaska only)	40 km x 40 km	24.85 mi x 24.85 mi
10 m	80 km x 80 km	49.71 mi x 49.71 mi
30 m	240 km x 240km	149.12 mi x 149.12 mi
60 m	480 km x 480 km	298.26 mi x 298.26 mi
90 m	720 km x 720 km	447 mi x 447 mi

Note: Max AOI Extent Dimension calculations assume 8,000 x 8,000 3DEP max image height

Assumption: If multiple DEM resolutions cover an AOI, we will default to coarsest resolution that covers the entire AOI

Assumption: We will display above Analysis Resolutions (which are the 3DEP native resolutions) in the dropdown in the application

+ Generate Trails - All Existing Trails

14

The screenshot displays the USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta interface. The left sidebar shows a project progress list with four steps: 1. Project Information, 2. Define Area of Interest, 3. Refine Scenarios and Explore Results (active), and 4. Share Project. The main panel is titled '3. Refine Scenarios and Explore Results' and contains a 'Scenario' dropdown set to 'All Existing Trails'. Below this is the 'Scenario Settings' section, which includes options to 'Generate trails to connect:' (radio buttons for 'All existing trails in the Area of Interest' and 'User-specified waypoints in the Area of Interest') and 'Generate all connectors' (radio buttons for 'Generate all connectors' and 'Generate minimum connectors'). An 'Advanced Settings' link is also present. A green 'Re-connect Trails' button is at the bottom of the settings panel. The right side of the interface shows a topographic map with a red polygon outlining the 'Area of Interest'. A search bar at the top right of the map area says 'Find address or place'. Callout boxes with numbers 1 through 4 point to specific UI elements: 1. 'Create new scenario' (plus icon), 2. 'Name Scenario' (text input), 3. 'Choose Scenario Settings' (Scenario Settings tab), and 4. 'Reconnect Trails' (Re-connect Trails button).



Generate Trails - Add Waypoints

15

USGS Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta

Elizabeth McCa...

Edit Project Close

3 Refine Scenarios and Explore Results

Scenario: Using Waypoints (Default)

1. Click to define waypoints

2. Click to begin adding waypoints

3. Click here when finished (Note: the "Add" and "Stop" toggle on/off)

4. Generate all connectors

5. Connect Trails

Add more meaningful names if desired

Check out the Advanced Settings to see default or change terrain analysis criteria

Scenario Settings Explore Trails

Generate trails to connect:

☐ All existing trails in the Area of Interest

☒ User-specified waypoints in the Area of Interest

☒ Restrict waypoints to federal land

Add Waypoints to Map Stop Adding Waypoints

Waypoint	Latitude	Longitude
Interesting Viewpoint	39.1227	-108.7553
Watersource	39.1088	-108.7593
Trail1	39.1204	-108.7424
Trail2	39.1038	-108.7658
Trail3	39.1257	-108.7502

☒ Generate all connectors

☐ Generate minimum connectors

Advanced Settings

Connect Trails

Finished connecting trails

Click below to digitize an Area of Interest

Show analysis resolution warnings

Connecting trails... Cancel

Show detailed status messages

The process may take awhile...

+ Generate Trails - Advanced Settings

16

▼ Advanced Settings ?

Analysis Resolution ?

PAD-US Weight ?



▶ Detailed Cost Scores

NHD Weight ?



▶ Detailed Cost Scores

Transportation Weight ?



▶ Detailed Cost Scores

Slope Weight ?



▶ Detailed Cost Scores

Masking Parameters

Existing Trails Cost Factor (0-100%) ?

☐ Include 4x4 roads ?

☐ Include local roads ?

Connect Trails →

Connecting trails... Cancel

Show detailed status messages

+ Explore Trails

17

The screenshot displays the USGS TRAILS Beta web application interface. The top navigation bar includes the USGS logo, the title "Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta", and a user profile for Elizabeth McCa... The main interface is divided into several sections:

- Edit Project:** Includes a "Close" button and a "Share Project" button.
- Refine Scenarios and Explore Results:** Features a "Create New Scenario" button and a "Scenario: Using Waypoints (Default)" dropdown.
- Scenario Settings:** A tab for configuring trail parameters.
- Explore Trails:** A section for filtering and sorting trails. It includes a "Filter" button and a "Sort: Name" dropdown. A list of trails is displayed with columns for "null to null", "Terrain Constraint", "Connector Length", "Proposed Network Length", and "Scenario".
- Map:** A topographic map showing the trail network. A red line indicates the selected trail. A yellow box highlights a specific trail segment.
- Elevation Profile:** A chart showing the elevation profile of the selected trail. The y-axis is "Elevation in Feet" (4,800 to 5,800) and the x-axis is "Distance in Miles" (0 to 1). A red 'X' marks a specific point on the profile, with a callout showing "5,231.22 Feet" and "+130.92".

Callout boxes provide additional information:

- "Go back to adjust Scenario Settings" points to the "Scenario Settings" tab.
- "Filter by Agency, Trail Length, or Connector Type" points to the "Filter" button.
- "Collapse Window" points to the left sidebar collapse button.
- "To Share Project and move to next step click here" points to the "Share Project" button.
- "Sort by Name, Length, Terrain Constraint, or Total Network Length" points to the "Sort: Name" dropdown.
- "Delete" points to the delete icon for a trail.
- "More Info" points to the information icon for a trail.
- "Elevation Profile" points to the "Elevation Profile" button.

Buttons at the bottom include "Previous", "Save & Next", "Check All", "Uncheck All", and "Delete Checked".

+ Share Trails

18

Click here to Share Project (step 4)

Previous

Save & Next



Trail Routing, Analysis, and Information Linkage System (TRAILS) Beta

Edit Project

Close

4 Share Project

- ✓ 1 Project Information
- ✓ 2 Define Area of Interest
- ✓ 3 Refine Scenarios and Explore Results

4 Share Project

Dashboard

File Geodatabase

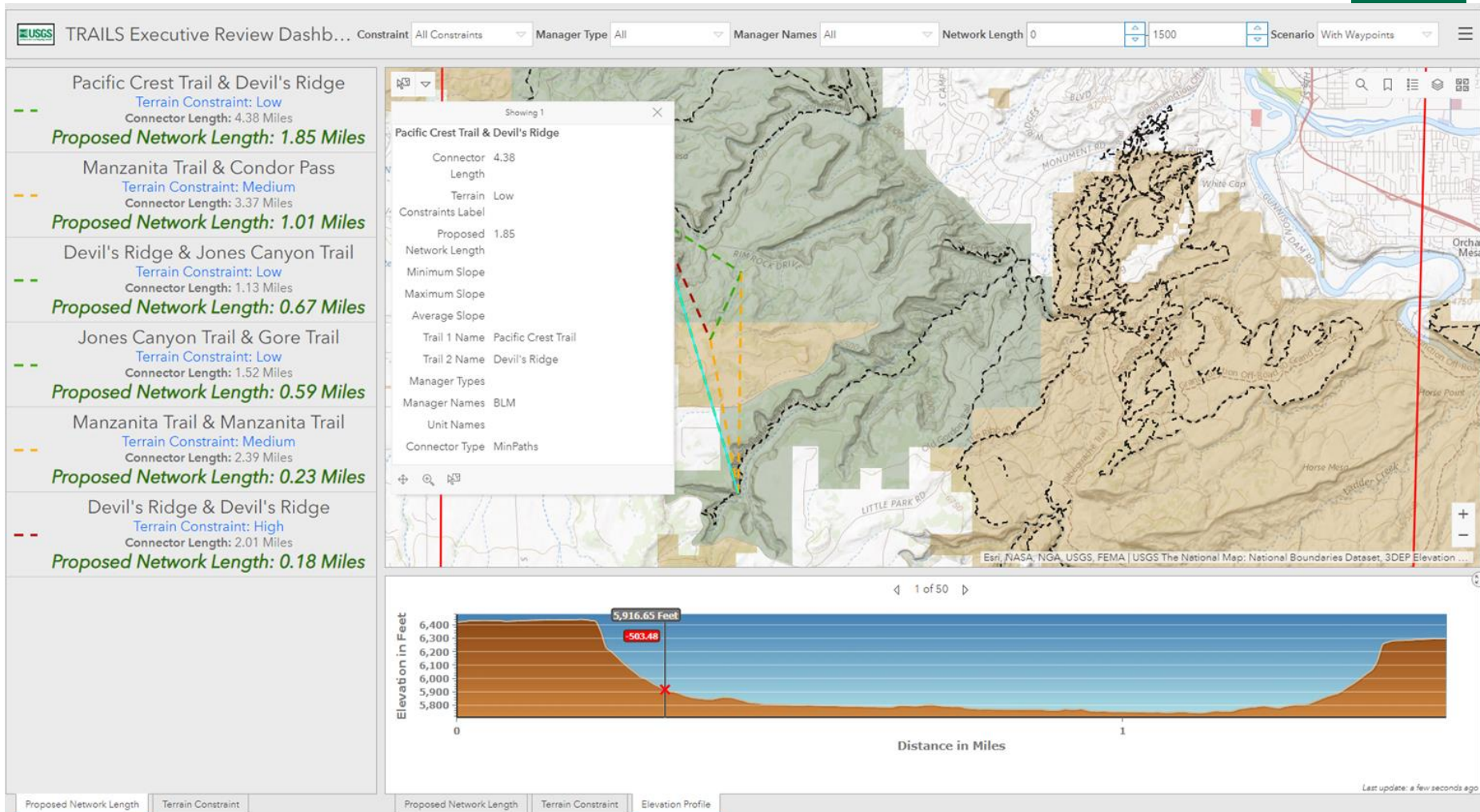
```
https://usgspod.esri.com/portal/apps/opsdashboard/  
index.html#/ba1dde0922d048cc922d8e840541dda8?  
ProjectID=%7B1C2B5CB8-72E3-47A6-87BA-  
B564C5B5F300%7D&extent=-108.790,39.085,-108.719,39  
.131
```

Copy URL

Open in New Window

+ Dashboard

19

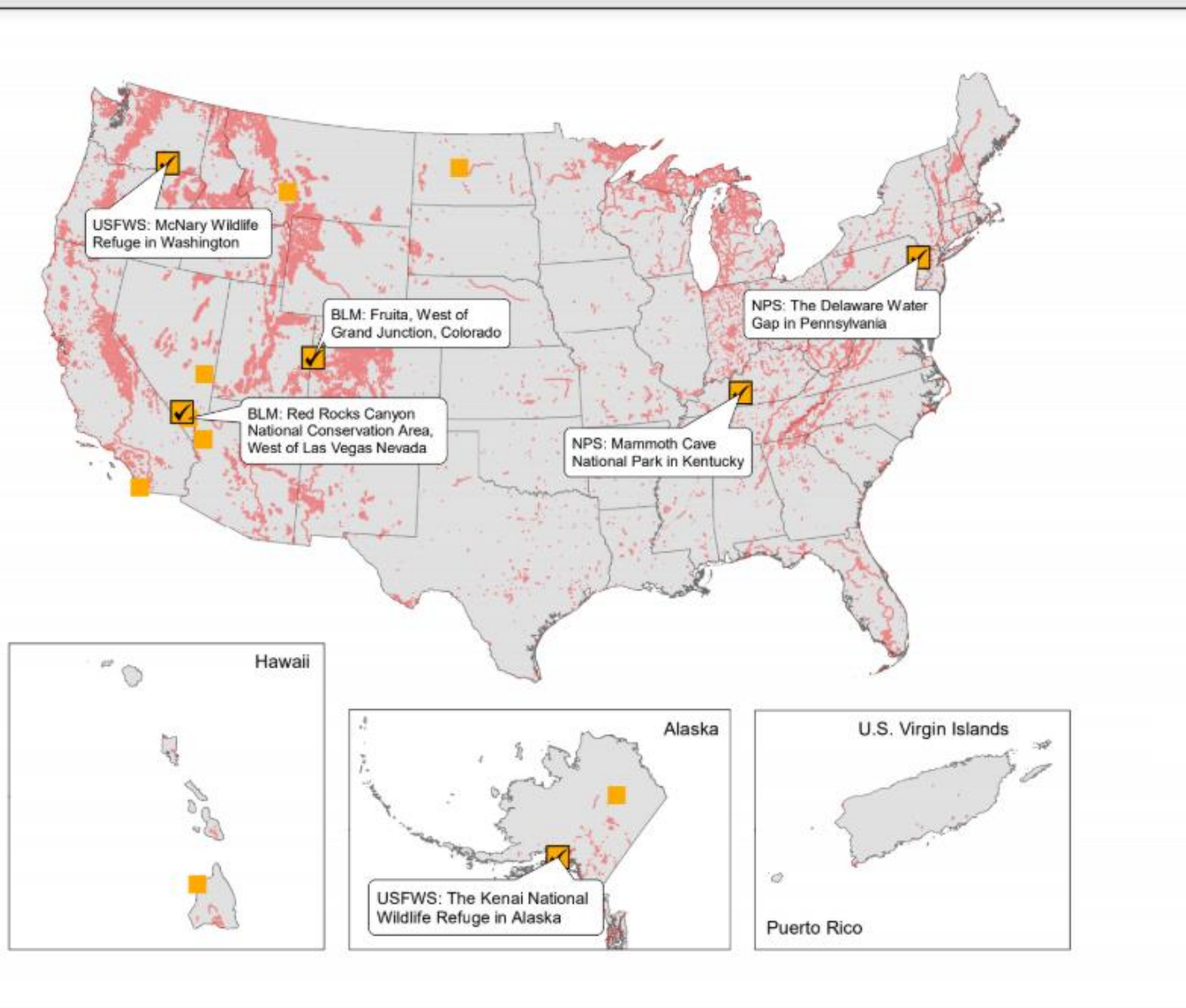


+ Short-Term Tasks from Acting DOI Deputy Director Kate MacGregor

- ❖ Identify management lead & technical POCs for pilots
- ❖ Provide data to USGS to populate the National Trails Database
- ❖ Work with bureau agencies to learn the TRAILS tool and evaluate trail-connection candidates
- ❖ Report progress to the Secretary's office and other stakeholders

+ Overview of Bureau Pilot Projects

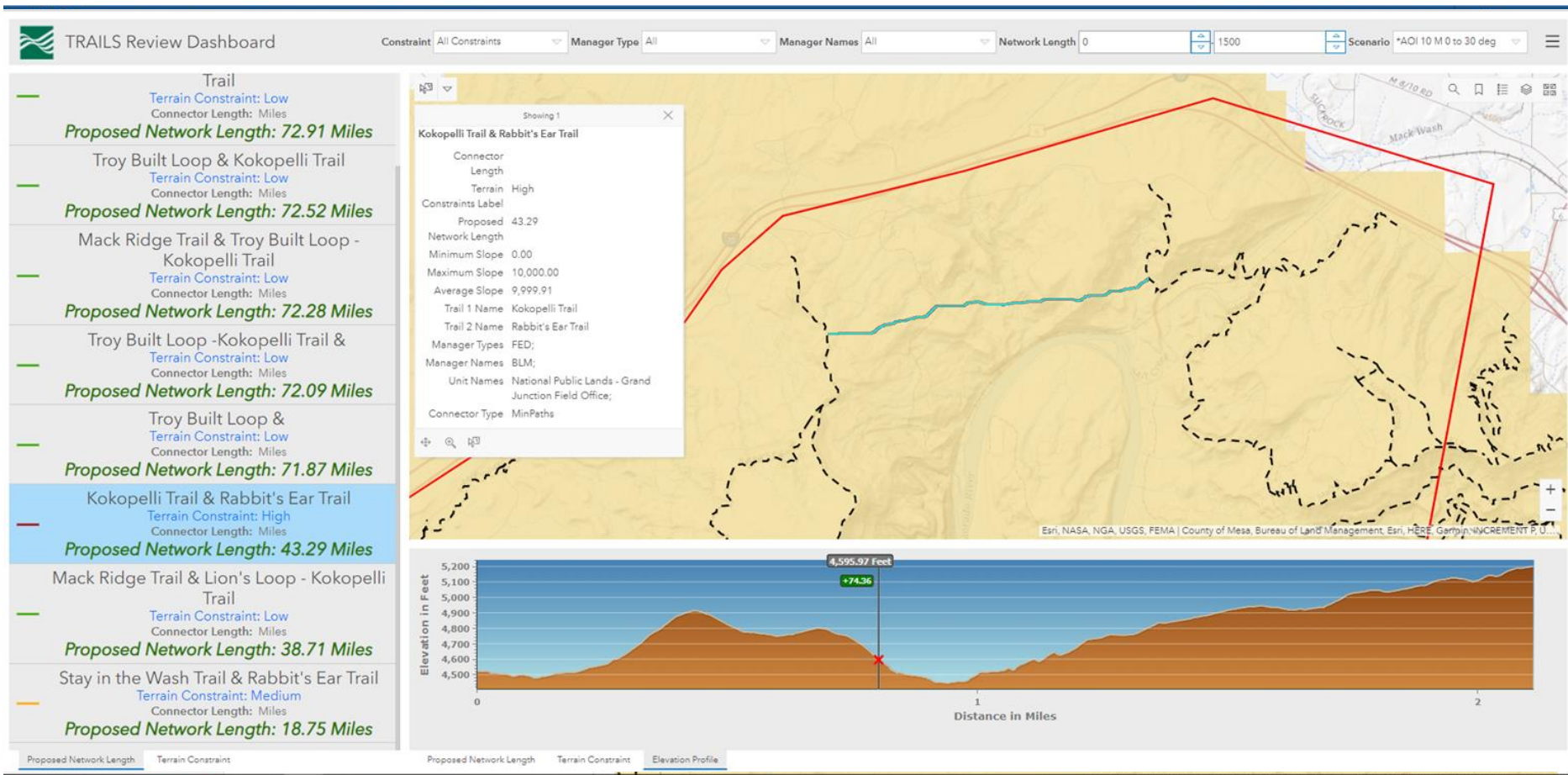
21



+ BLM - Fruita to McInnis Canyons National Conservation Area, Near Grand Junction Colorado

22

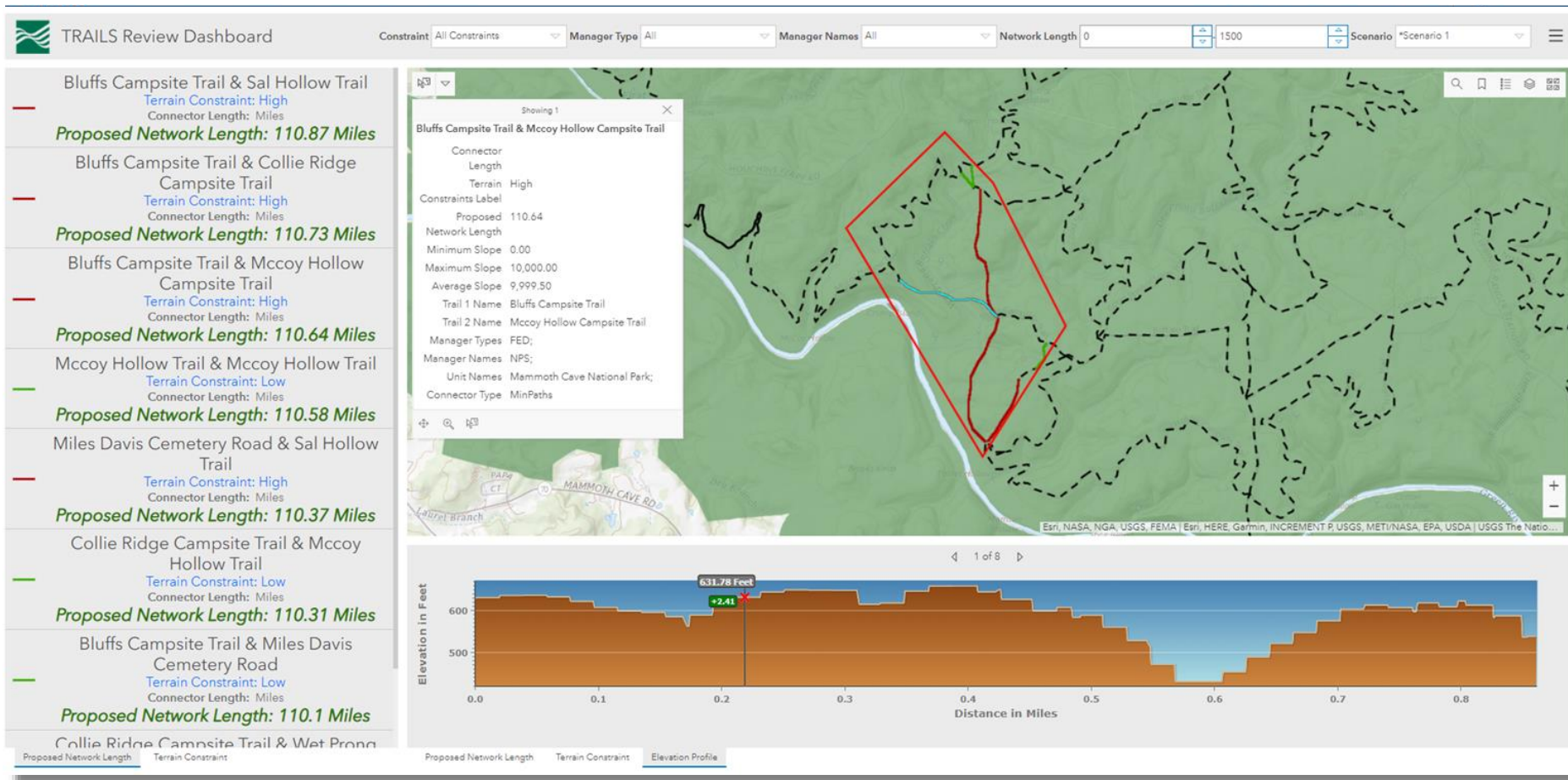
- ❖ Partners: CO BLM, City of Fruita, Grand Valley Trail Alliance, CO Plateau Mountain Bike Trail Association, and Mesa County
- ❖ Primary goal: Work with a variety of partners to provide better trails connectivity for long distance recreational experiences.



+ NPS - Mammoth Cave National Park, KY

23

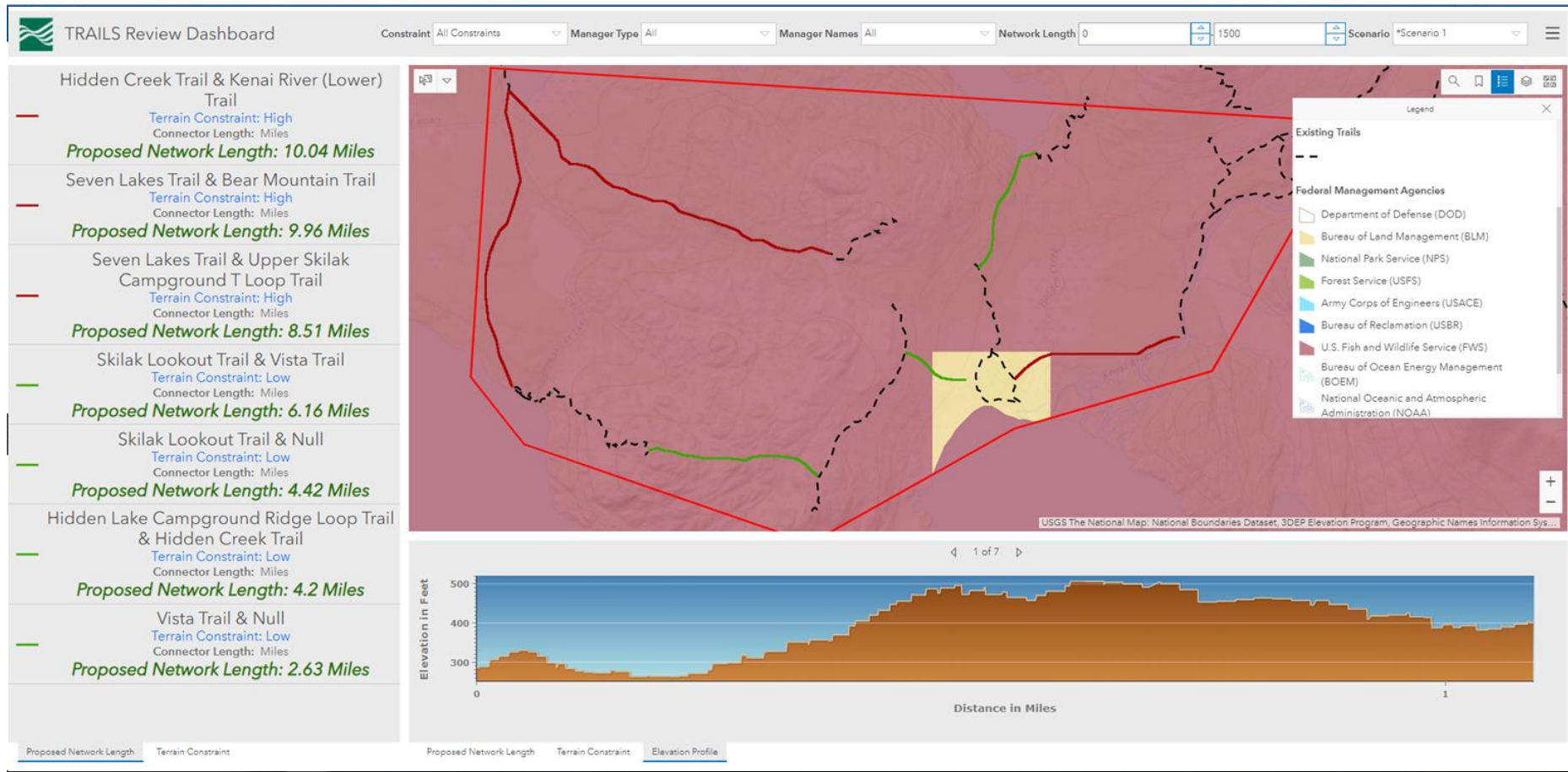
- ❖ Increase connectivity within the existing trail systems
- ❖ Long-term plan to explore connectivity to the adjacent City of Brownsville, recently designated as a Trail Town



+ USFWS - Kenai National Wildlife Refuge, AK

24

- ❖ ~Two million acres, 80 miles of trails
- ❖ Tourism - major economic driver
- ❖ Rebuilding trails as a result of this summer's Swan Lake fire



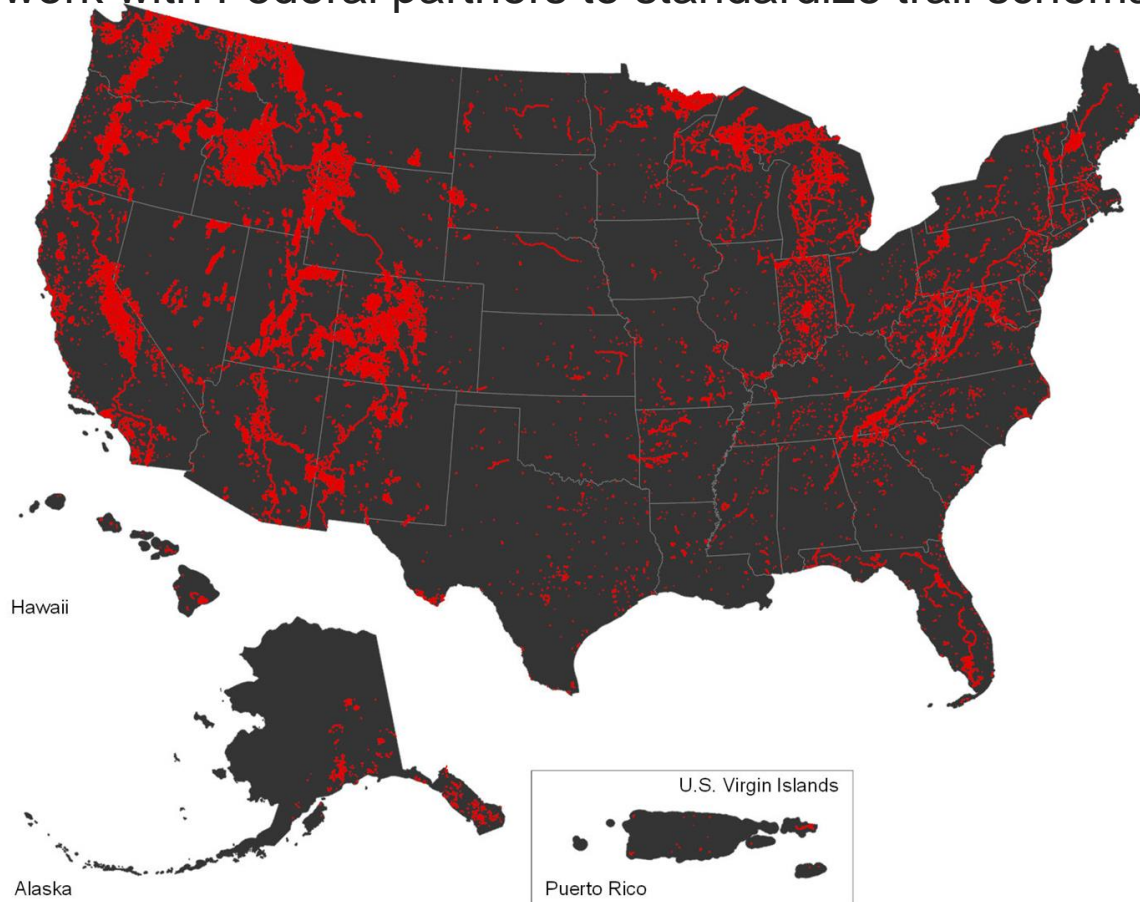
+ Next Steps...Goal 1 - TRAILS Decision Support Tool

- Initial focus DOI; future expansion to other Federal agencies and advocacy groups
- Launch of operational prototype on GeoPlatform - December 2019
- Work with stakeholders to identify additional groups/people for feedback
- Prioritize and incorporate additional requirements
- Future maintenance and update plans

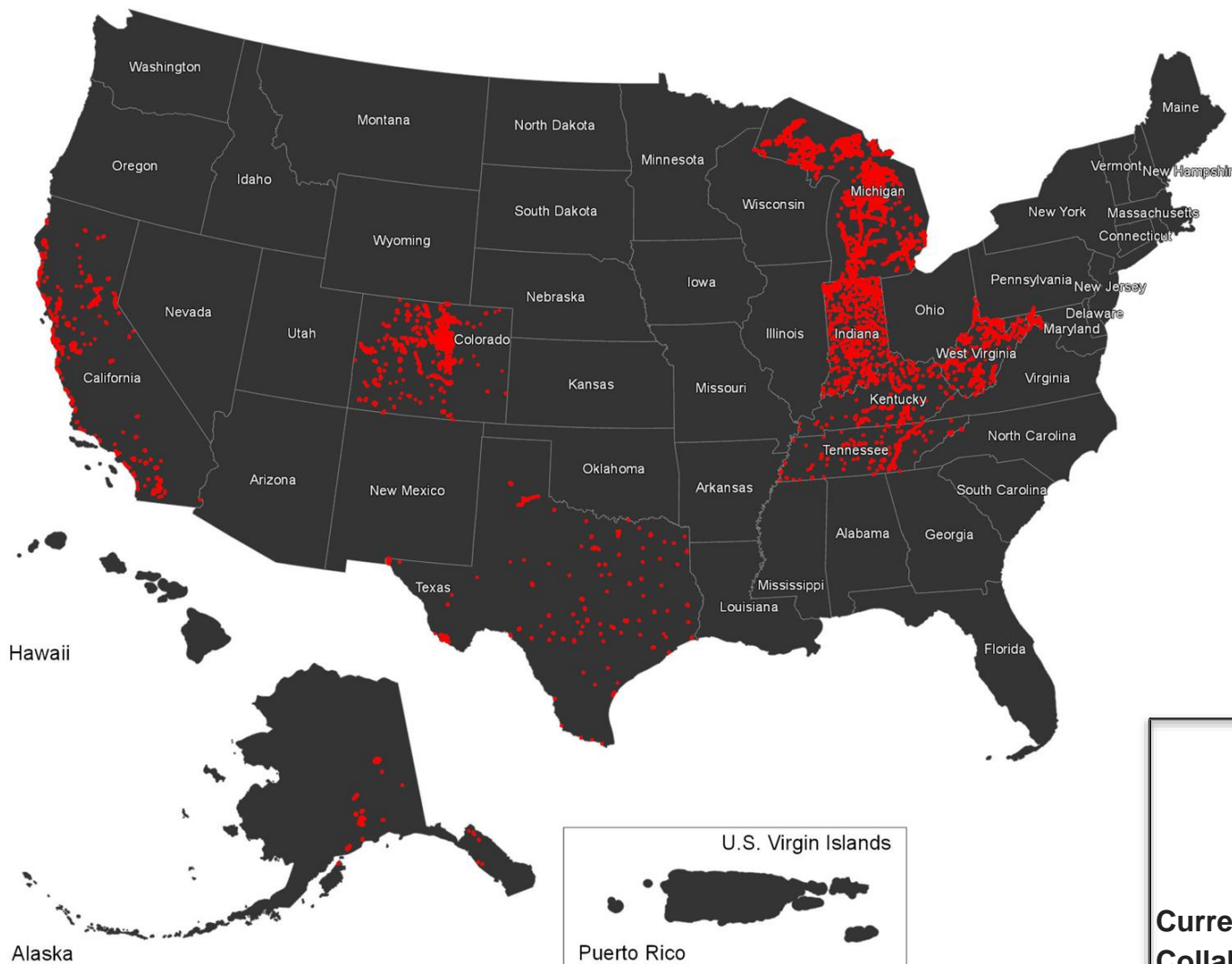
+ Next steps Goal 2 - National Digital Trails Database

26

- ❖ USGS has aggregated 199,067 miles of trails as of 9/24/19
- ❖ Continue to build partnerships with Federal, state, and other organizations
- ❖ Continue work with Federal partners to standardize trail schema



State Trail Contributions to USGS National Trails Database



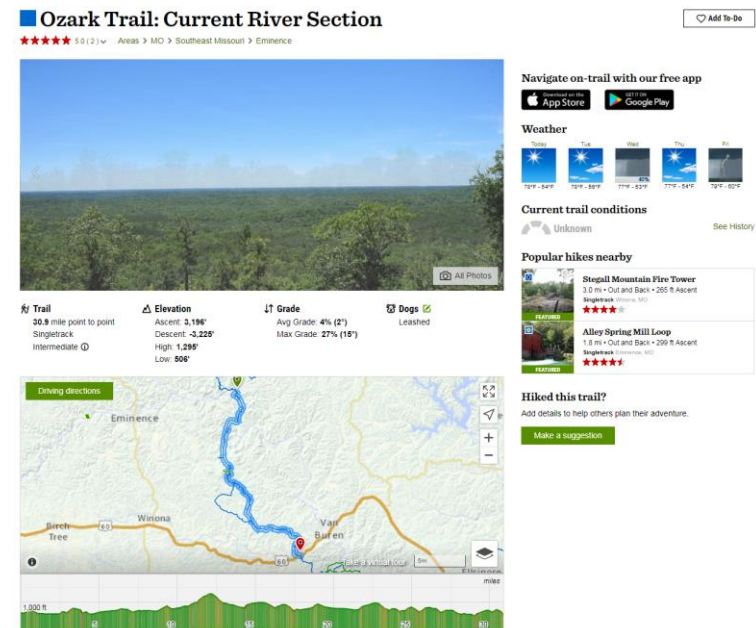
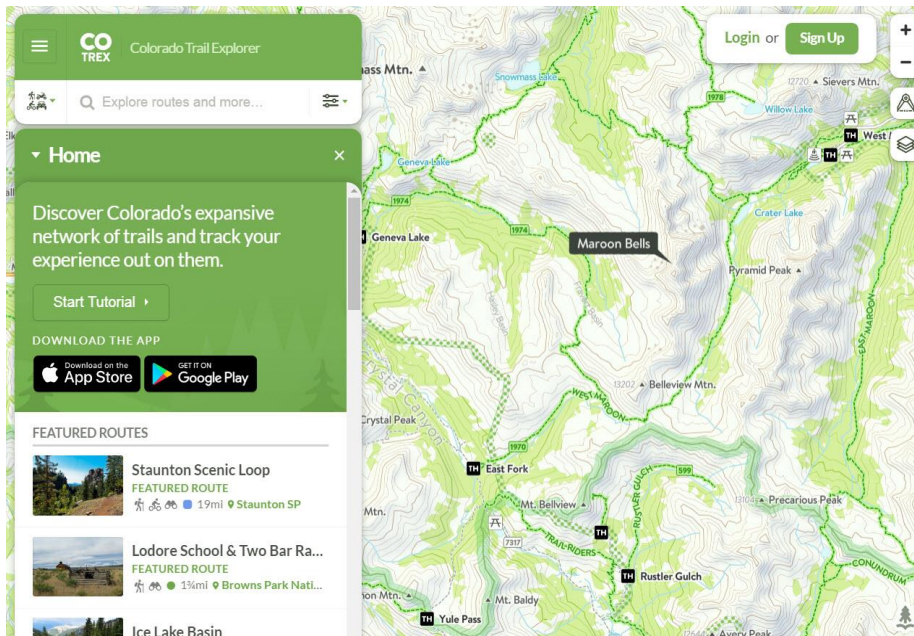
This status map shows state trails contributions to the U.S. Geological Survey, National Geospatial Program. Currently, the U.S. Geological Survey is focused on Federal land management agency partnerships as a top priority but as these mature and require less time, staff will focus on aggregating this additional trails data. Where the data meets program quality needs, and is available as Public Domain, partnerships are built to include states trails data into our national trails database.

Current Collaborators	State	Year	Miles
	AK	2014	684
	MI	2016	8938
	WV	2016	2277
	CA	2018	1708
	TX	2018	1305
	CO	2019	5846
	IN	2019	3574
	TN	2019	1083
	KY	2019	1135
Total Miles			26,550

Future Potential	State	Year
	Washington	2020
	Alabama	2020
	Ohio	2020

+ Next Steps Goal 3 - Develop a mobile responsive editor for maintaining trails

- ❖ Work with DOI partners and others to identify existing maintenance applications
- ❖ Evaluate existing mobile-friendly applications



+ Future Work - Recreational Points of Interest

Features

The following recreation POIs have been approved by the USGS, FS, NPS, BLM, & FWS and will be added to US Topo quads

- Trailheads
- Visitors Centers
- Campgrounds
- Shelters



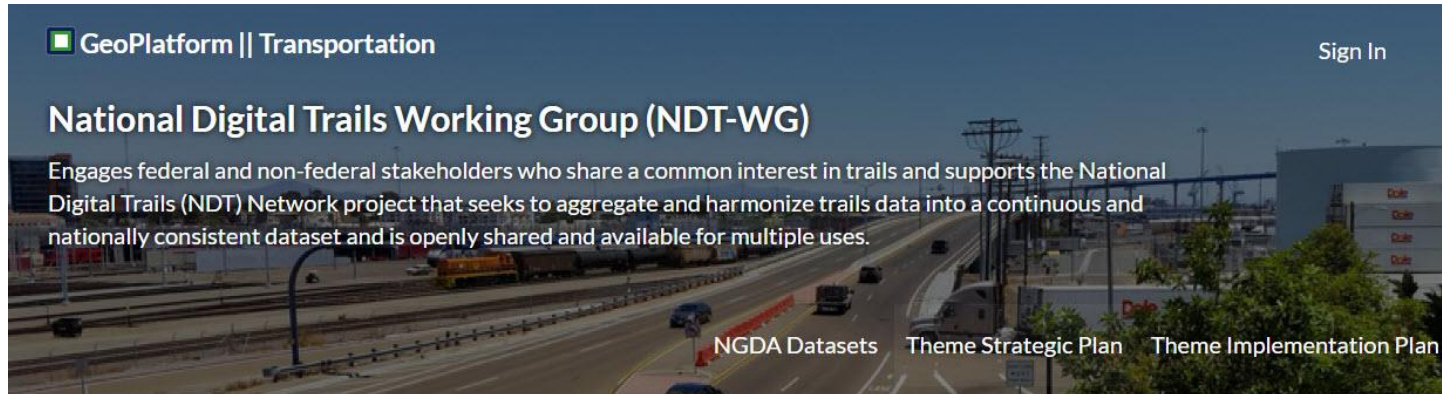
These POIs are in the process of being approved and acquired:

- Ranger Stations
- Park Headquarters
- Cabins
- Picnic Facilities



+ Future Work - Project Outreach/Communication

30



First meeting is TBD.

NDT-WG Areas for Interest

1. **Trails Decision Support Tool.** Provide technical and strategic guidance on the development of this tool.
2. **Data Aggregation.** Develop a vision and eventually a product that better aggregates trails data from multiple agencies. Goals may include:
 - Adopting a common schema where core attributes are the same or very similar across agency.
 - Striving toward using service endpoints for data sharing/distribution.
 - Establishing agreed upon snap points on agencies boundaries where trail jurisdiction changes. Business rules would state who is responsible for what.
3. **Crowdsourcing.** Work with partners to establish a mobile friendly application that will allow trails stewards, including employees of land management agencies as well as members of the public to maintain trails information.

Meeting Minutes and Presentations (*coming soon*)

★Transportation Theme

Community Type: NGDA

Sponsor: FGDC

Sponsor Email:

NGDATeam@fgdc.gov

Theme Lead Agency: Department of Transportation (DOT)

Theme Lead: Derald Dudley (DOT)



Questions?

trails@usgs.gov

gdmattthews@usgs.gov

emccartney@usgs.gov