

# USGS Lessons Learned:

## Migrating to the Topographic Production Service (TPS)

USGS National Geospatial Technical Operations Center

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*Dynamic Mapping Specialist  
U.S. Geological Survey*

ESRI User Conference  
July 2025

# Agenda

- What is topoBuilder
- What are OnDemand Topos
- Topographic Product Service Migration
- Future activities



# topoBuilder is...



on demand



where  
you want



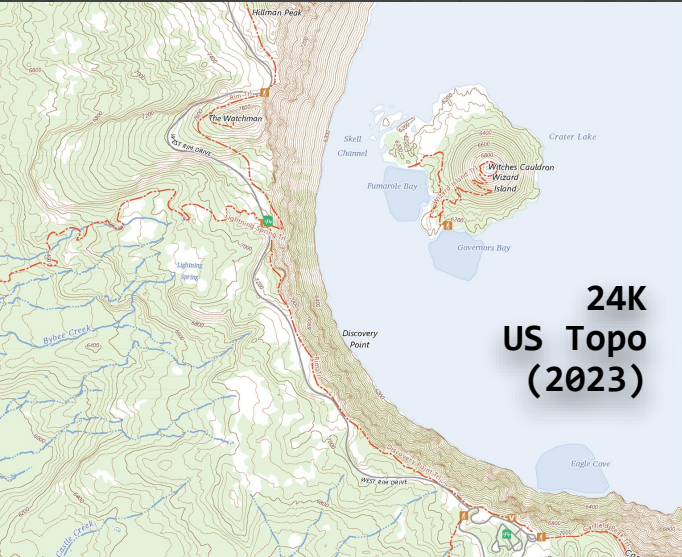
multi-  
scale



best  
available  
data



# Crater Lake, Oregon





# Demo



[topobuilder.nationalmap.gov](https://topobuilder.nationalmap.gov)

# Choose map type

 An official website of the United States government [Here's how you know](#) 



topoBuilder Application

[User Guide](#)

① Map Types

② Maps

③ Cart 0

 Track

 Help



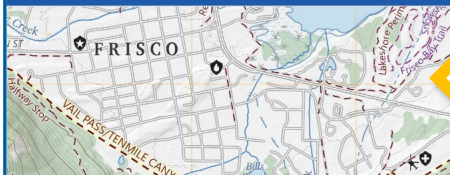
## Map Types

Select an OnDemand Topo type, click Next

### 7.5-Minute Topo



### 25K Recreational Topo



### 100K Topo



**NEXT**



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportati... Powered by Esri



# Zoom to area of interest

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① Map Types

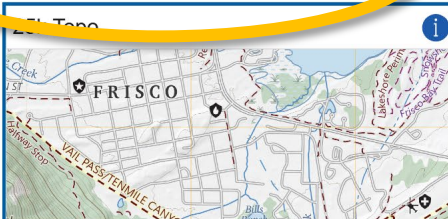
Mans

Select area of interest on the map

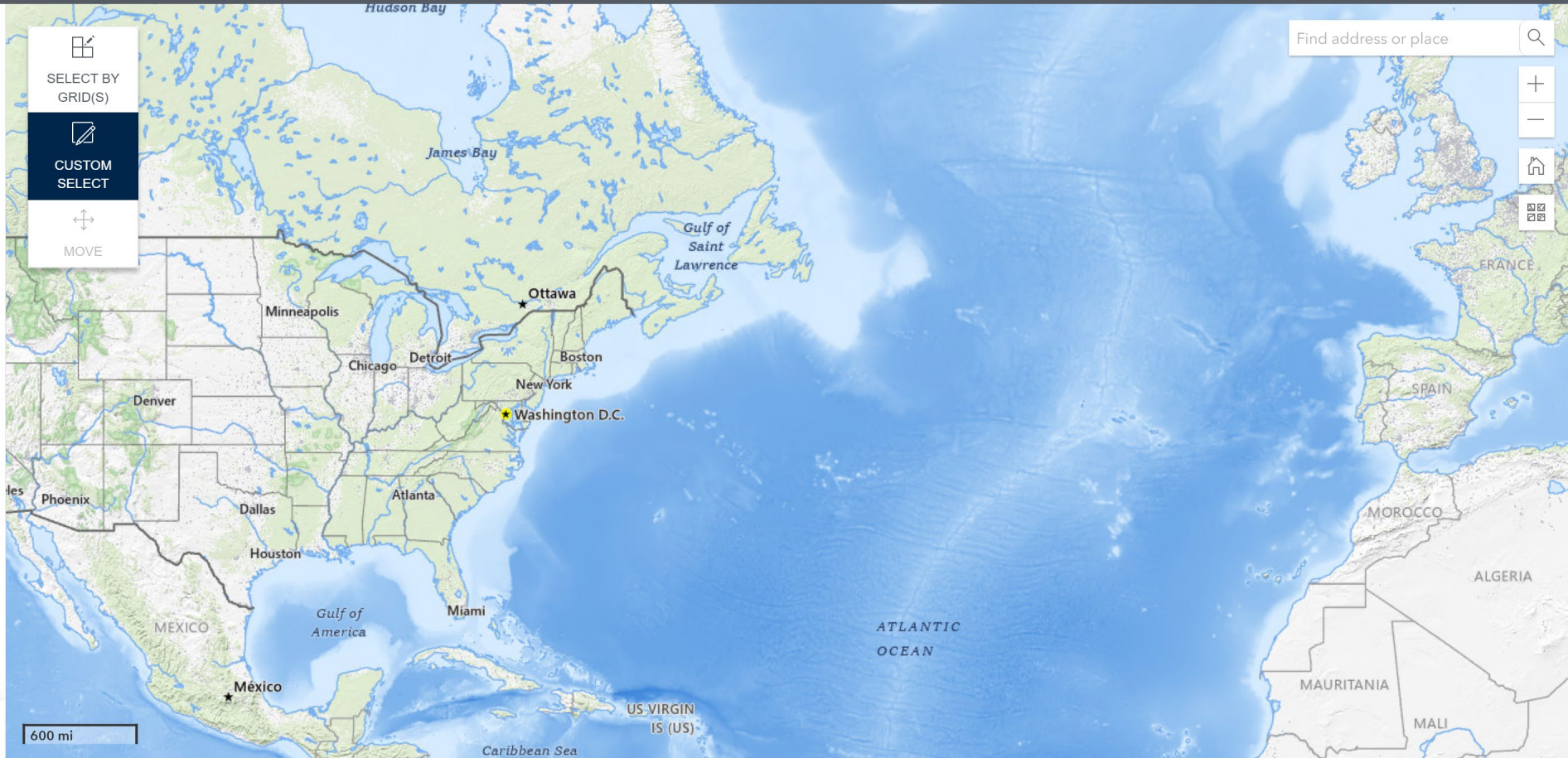
② Map

☐ Zoom in to display Grid

③ Cart 0



Select a map to begin



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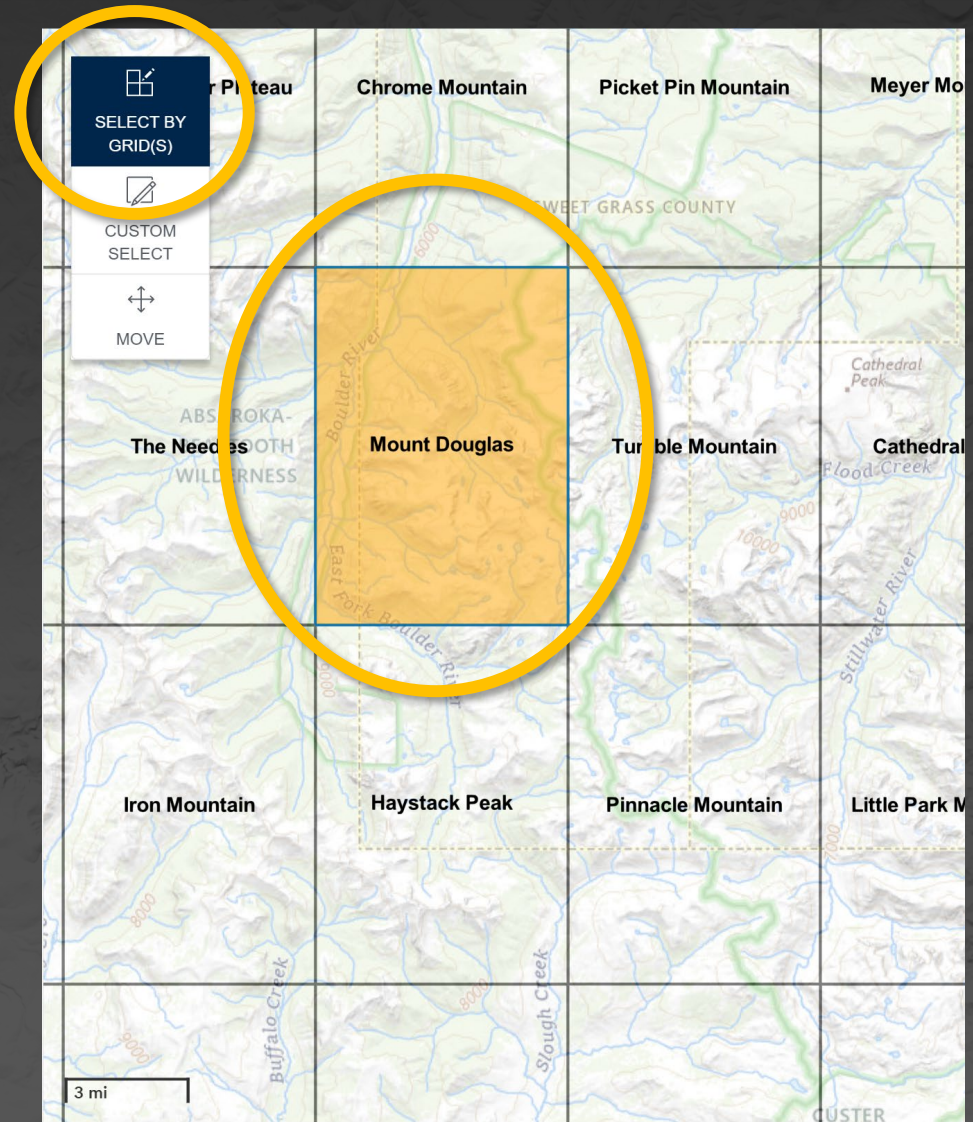
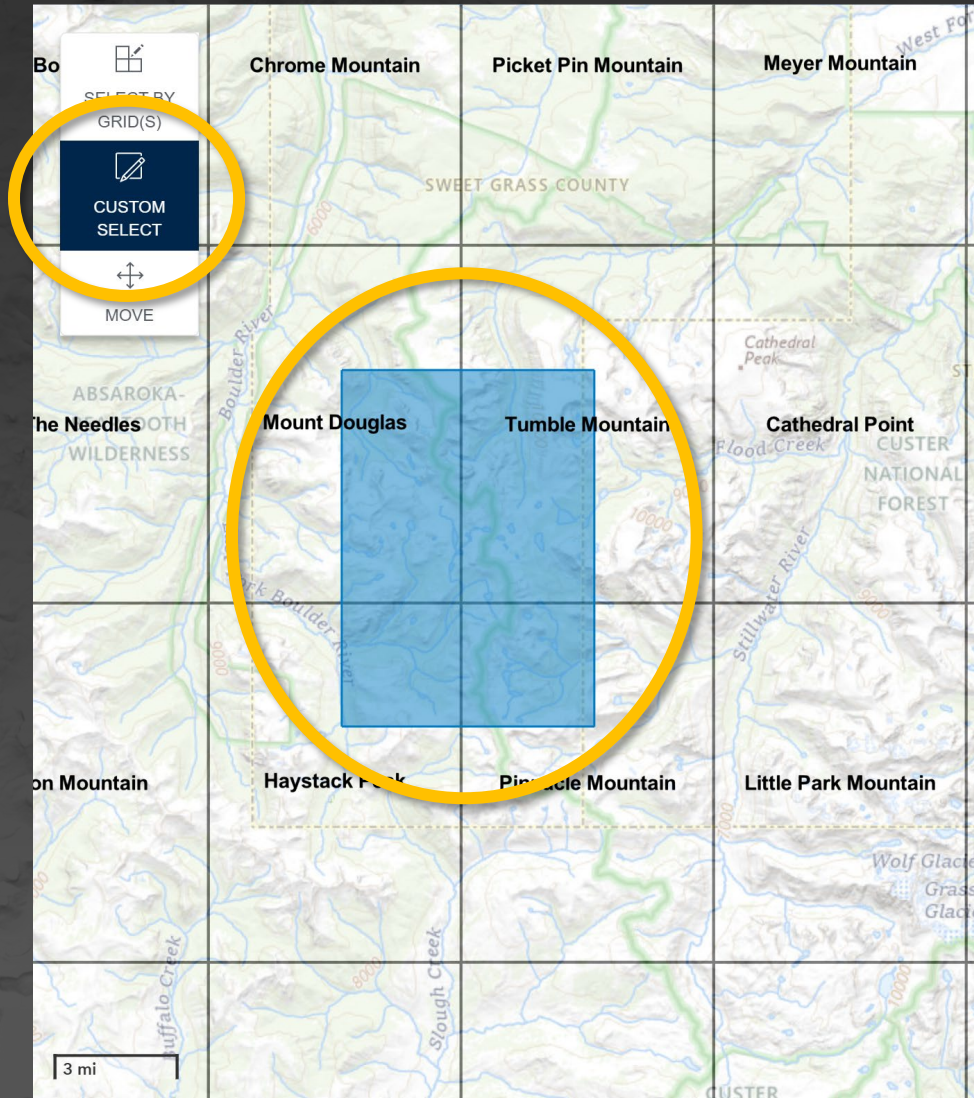


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# Choose map extent





# Choose map layers

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## topoBuilder Application

① Map Types

② Maps

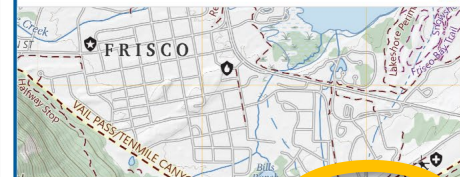
③ Cart **1**

### Maps

Select area of interest on the map

☒ Display Grid

25k Topo



[SELECT ALL](#) [HIDE OPTIONS](#) [EDIT LAYERS](#)

☐ 25k Topo 1

Format

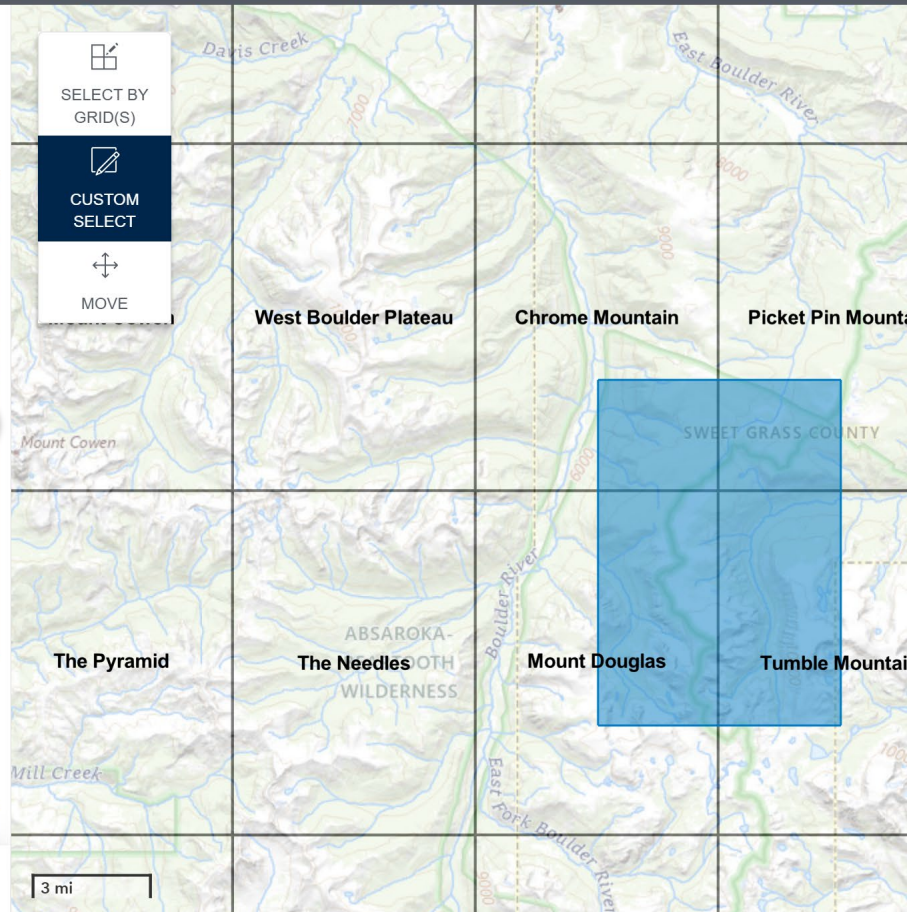
PDF

[BACK TO TOP](#)

[DELETE](#)

[ADD](#)

[GO TO CART](#)



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Wetlands Inventory, National Hydrography Dataset, National Structures Dataset, and National Transportation Dataset

### ← Layers

Only checked layers will be included

✓ ☒ All Layers

✓ ☒ Geographic Names

✓ ☒ Structures

✓ ☒ Emergency Services

✓ ☒ Public Services

✓ ☒ Recreation Services

✓ ☒ Gas & Oil Pipeline

✓ ☒ Transportation

✓ ☒ Roads

✓ ☒ Trails

✓ ☒ Airports

✓ ☒ Railroads

✓ ☒ Hydrography

☐ Wetlands

✓ ☒ Terrain

✓ ☒ Contours

✓ ☒ Shaded Relief Imagery

✓ ☒ Land Cover

✓ ☒ Boundaries

☐ Public Land Survey

✓ ☒ Jurisdictional

✓ ☒ Federal Lands

✓ ☒ Designated Areas

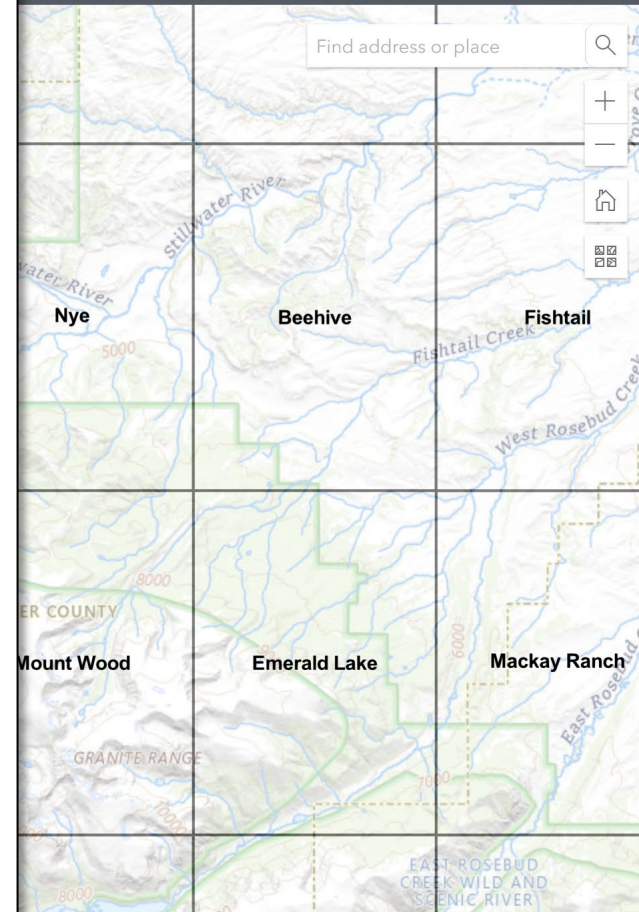
☐ Orthoimage

7.5-Minute Topo only


[CANCEL](#)

[SAVE](#)

## User Guide



Database, National Structures Dataset, and National Transportation Dataset. Powered by Esri

 Track


 Help





# Choose export options

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topoBuilder Application

User Guide

① Map Types

② Maps


③ Cart 0

Maps

Select area of interest on the map

Display Grid

25k Topo






SELECT ALL

HIDE OPTIONS

EDIT LAYERS

☐ 25k Topo 1



User Defined Content

Format

PDF

PDF

TIFF

BACK TO TOP

DELETE

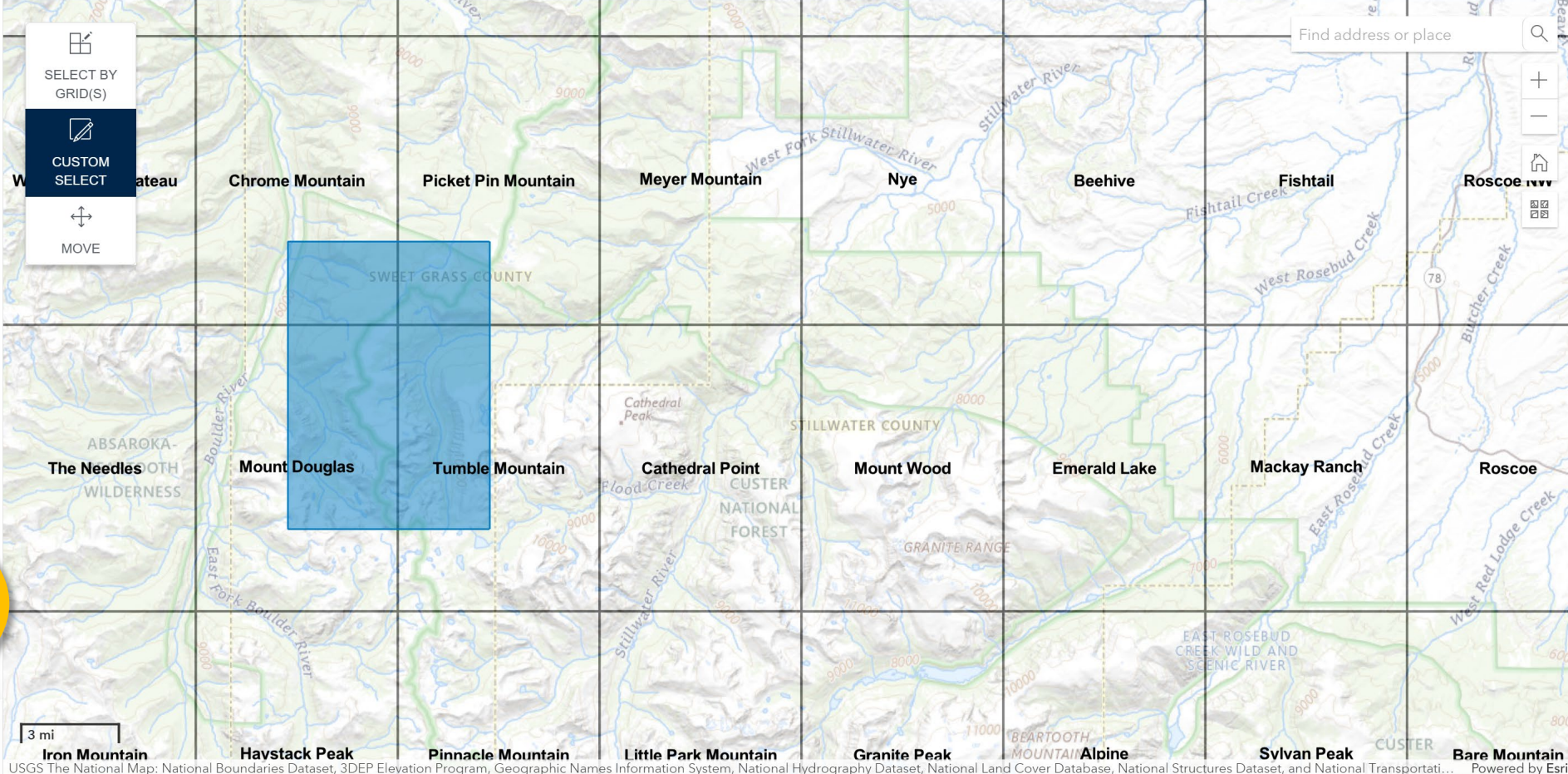
ADD

GO TO CART

SELECT BY GRID(S)

CUSTOM SELECT


MOVE



3 mi

Track

Help



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# Choose contour smoothness

USGS science for a changing world

topoBuilder Application

① Map Types  
② Maps  
③ Cart 2

Maps  
Select area of interest on the map

Display Grid

7.5-Minute Topo

SELECT ALL HIDE OPTIONS EDIT LAYERS

Cathedral Point

Format

PDF

Contour Smoothing

Low Medium High

BACK TO TOP

DELETE ADD GO TO CART

USGS The National Map: National Boundaries Dataset, 3DE

only for 7.5-Minute Topo

## Contour Smoothness Guide

### Low Smoothing

Contours will portray the landscape and topographic features at a high detail allowing the user to better identify geographic surface characteristics. These contours are best for scientific research such as Geology, Geomorphology, and Hazards.



### Medium Smoothing



CLOSE





# Add map to cart

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topoBuilder Application

[User Guide](#)

① Map Types

② Maps

③ Cart **0**

## Maps

Select area of interest on the map

☒ Display Grid

25k Topo



[UNSELECT ALL](#) [HIDE OPTIONS](#) [EDIT LAYERS](#)

☒ 25k Topo 1

User Defined Content

Format

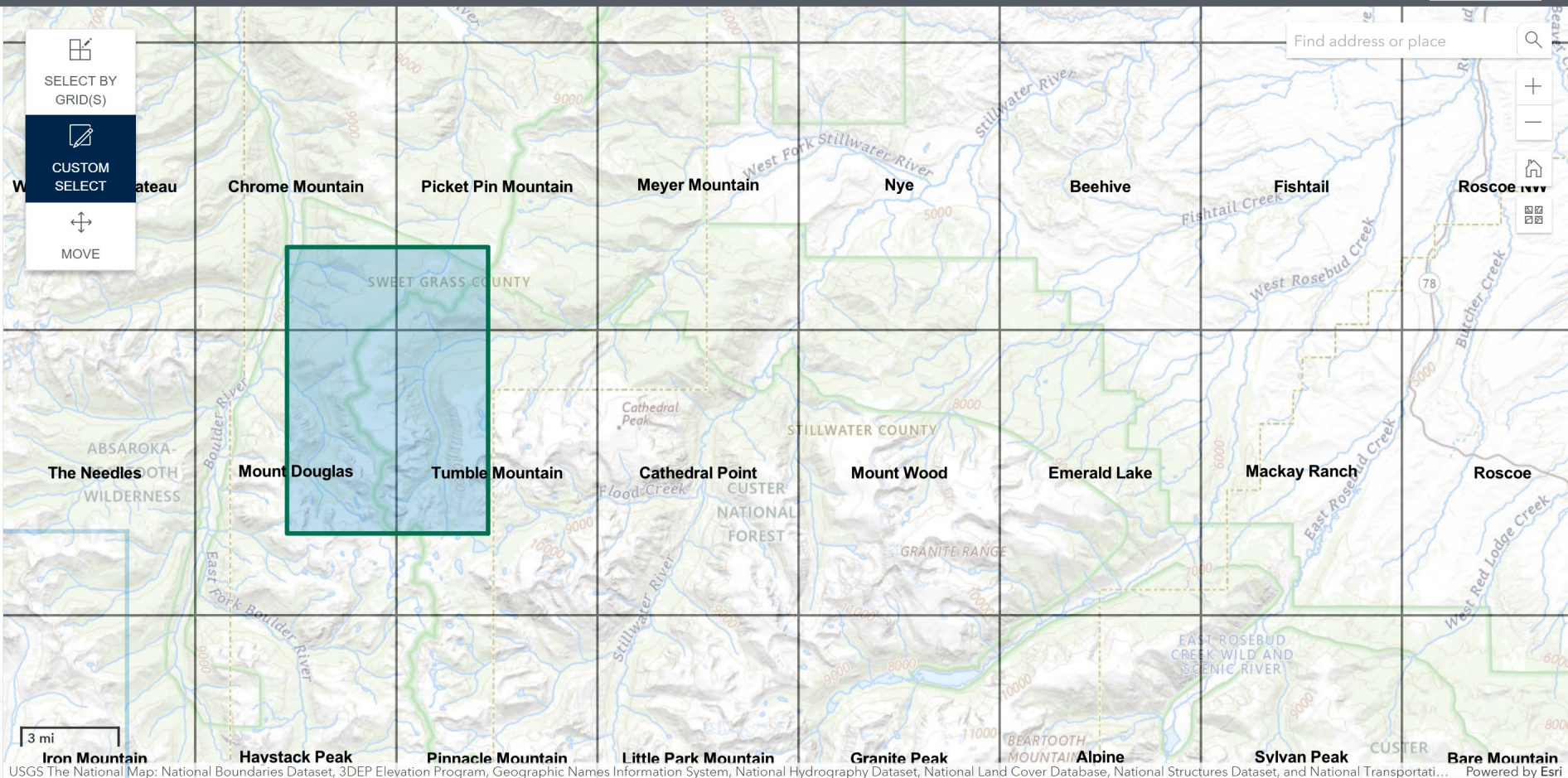
PDF


[BACK TO TOP](#)

[DELETE](#)

[ADD](#)

[GO TO CART](#)



 Track

 Help





# Review selections in cart

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topoBuilder Application

[User Guide](#)

① Map Types

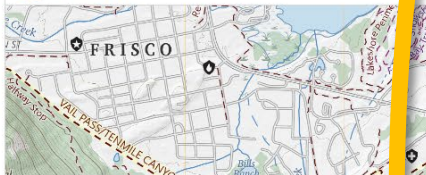
② Maps

③ Cart 3

Cart

Review and finalize map selections

② 25k Topo



Mount Douglas

On-Grid

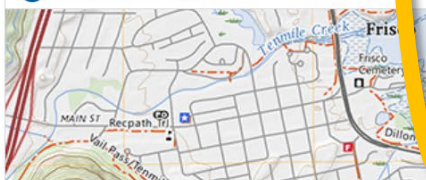
TIFF Format

25k Topo 1

Custom Extent

PDF Format

① 7.5-Minute Topo



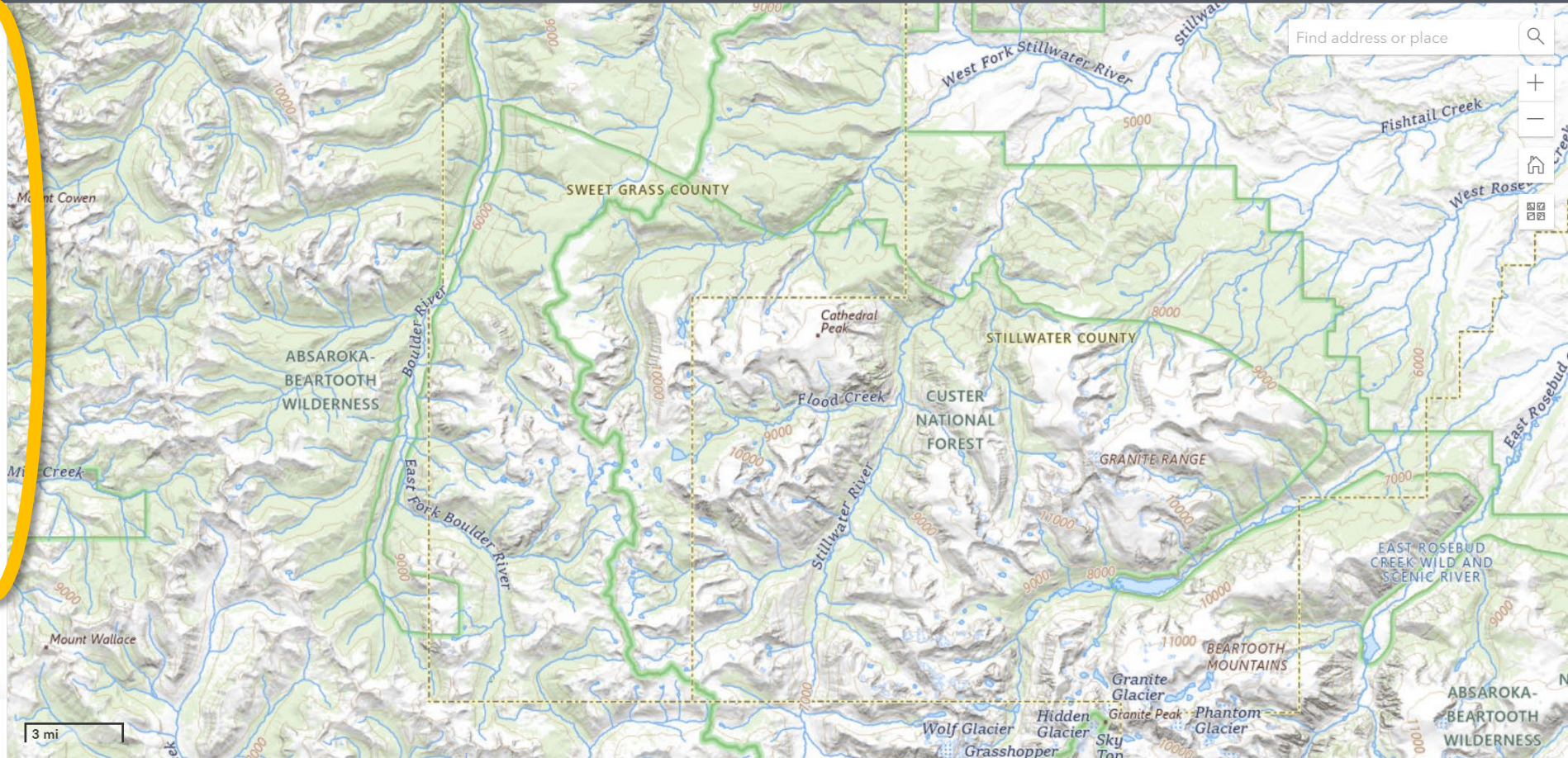
Cathedral Point

On-Grid

[BACK TO TOP](#)

[SELECT MORE MAPS](#)

[CHECKOUT](#)



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# Edit maps (1)

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topoBuilder Application

[User Guide](#)

① Map Types

② Maps

③ Cart 3

## Cart

Review and finalize map selections

### 2 25k Topo



Mount Douglas

On-Grid

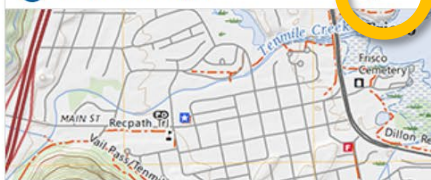
TIFF Format

25k Topo 1

Custom Extent

PDF Format

### 1 7.5-Minute Topo



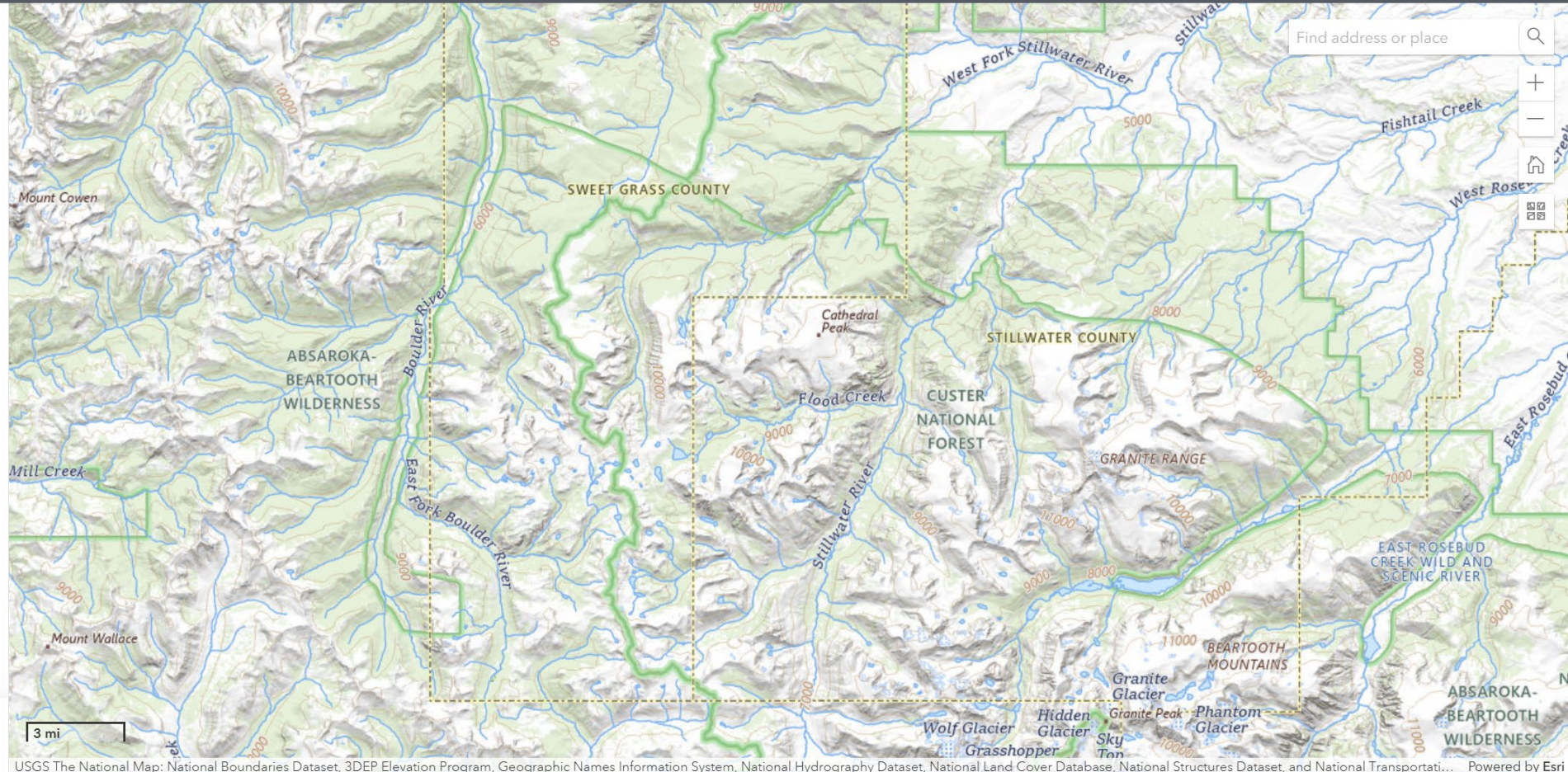
Cathedral Point

On-Grid

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[CHECKOUT](#)



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# Edit maps (2)

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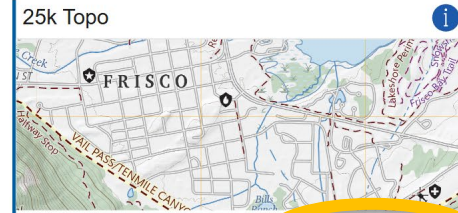
① Map Types

## Edits

Make edits to maps

☒ Display Grid

25k Topo



 EDIT LAYERS

25k Topo 1

User Defined Content

Format

PDF

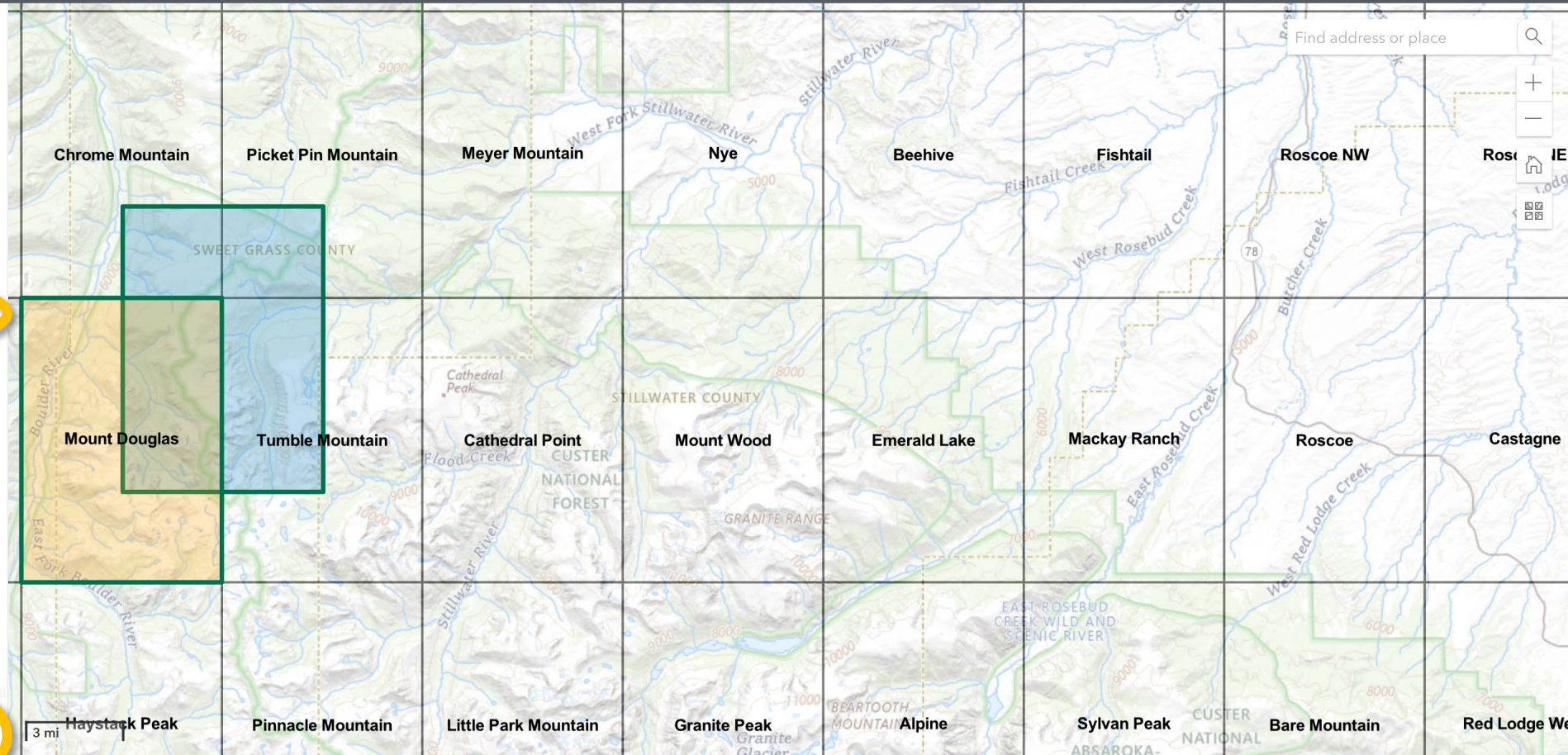
Mount Douglas

User Defined Content

BACK TO TOP

CANCEL

SAVE



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① Map Types

② Maps

③ Cart **3**

Cart

Review and finalize map selections

**2** 25k Topo



Mount Douglas

On-Grid

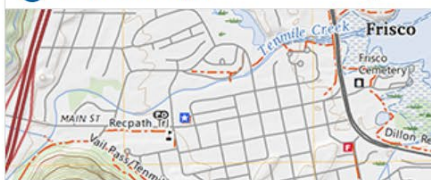
TIFF Format

25k Topo 1

Custom Extent

PDF Format

**1** 7.5-Minute Topo



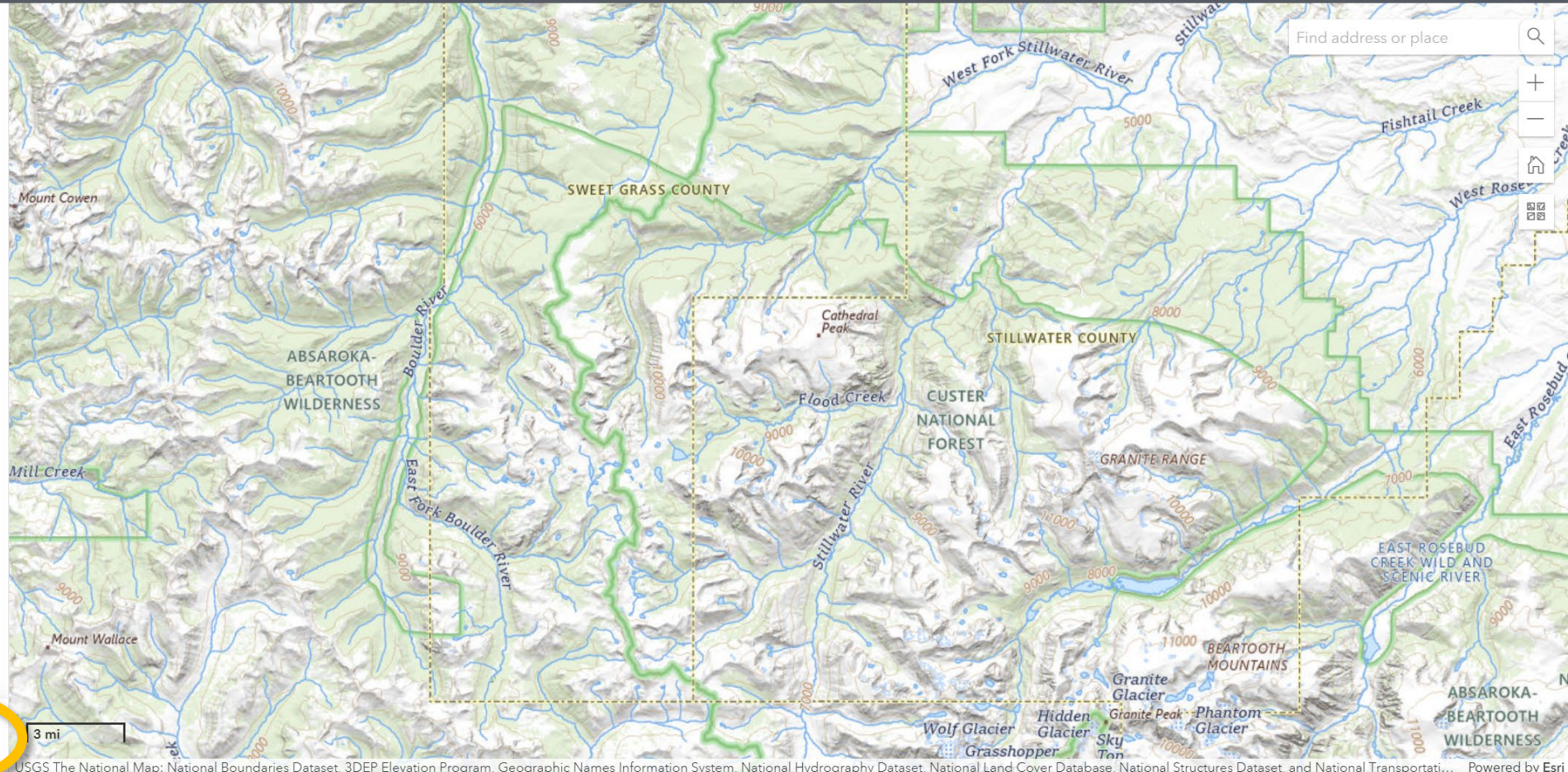
Cathedral Point

On-Grid

[BACK TO TOP](#)

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[CHECKOUT](#)



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# Checkout (2)

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topoBuilder Application

[User Guide](#)

① Map Types

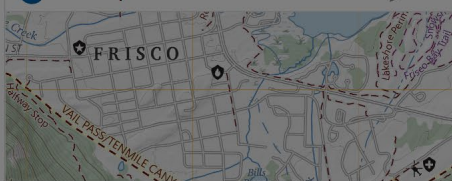
Cart

Review and finalize map selections

② Maps

③ Cart 3

2 25k Topo



25k Topo 1

Custom Extent

PDF Format

Mount Douglas

On-Grid

TIFF Format

1 7.5-Minute Topo



Cathedral Point

On-Grid

[BACK TO TOP](#)

[SELECT MORE MAPS](#)

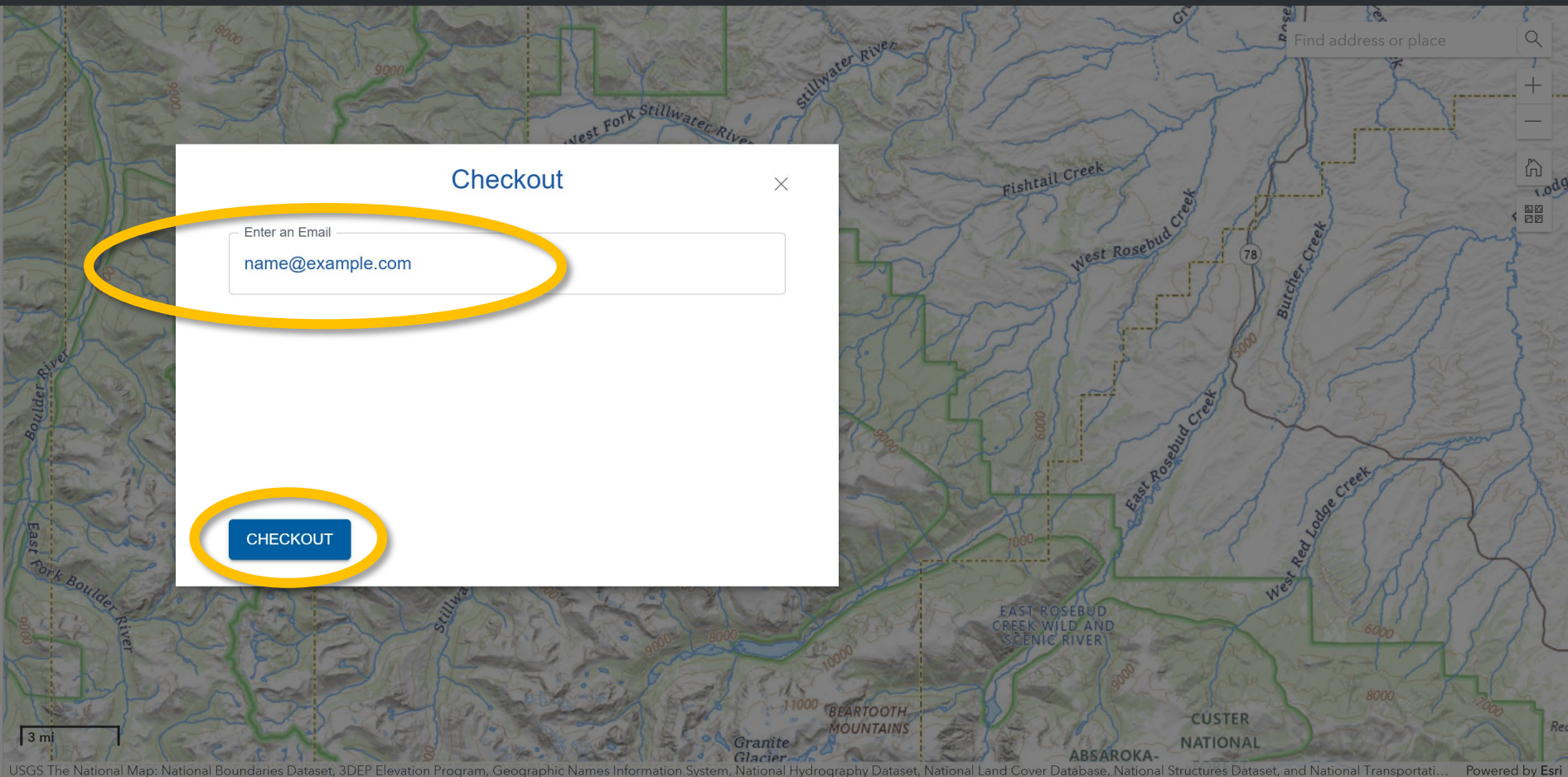
[CHECKOUT](#)

Checkout

Enter an Email

name@example.com


[CHECKOUT](#)




USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportati... Powered by Esri



# Confirmation and delivery emails



science for a changing world




Thank you for your OnDemand Topo request. Your order is being processed.

A separate email with download instructions will be sent for each map as soon as it is available. Maps are often delivered within 24 hours but can take up to 5 business days.

Order confirmation number: 1743000906958868


Order Summary:

---




**Mount Douglas, Montana**  
Selection Type: On-Grid Extent  
Product Type: 25K Topo  
Product Format: TIFF  
Layers Removed: Contours, Public Land Survey

---



**25k Topo 1, Montana**  
Selection Type: Custom Extent  
Product Type: 25K Topo  
Product Format: PDF  
Layers Removed: Contours, Public Land Survey

---







**Cathedral Point, Montana**  
Selection Type: On-Grid Extent  
Product Type: 7.5-Minute Topo  
Product Format: PDF  
Contour Smoothness: High  
Layers Removed: None

---


**Need anything? We're here to help!**

topoBuilder Learn More Help Desk





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Your OnDemand Topo from topoBuilder is ready for download!

This map will remain available until 60 days after date of delivery. For a detailed overview of OnDemand Topo maps, please see the [user guide](#).

Order number: 1743000906958868

Delivery Summary:

---

**Cathedral Point, Montana**  
Selection Type: On-Grid Extent  
Product Type: 7.5-Minute Topo  
Product Format: PDF  
Contour Smoothness: High  
Layers Removed: None




[Download Map](#)

[Click here to download your map.](#) This link will expire on May 25, 2025


---

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The National Map  
OnDemand Topo

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A separate email with download instructions will be sent for each map as soon as it is available. Maps are often delivered within 24 hours but can take up to 5 business days.

Order confirmation number: 1743000906958868


Order Summary:



**Mount Douglas, Montana**  
Selection Type: On-Grid Extent  
Product Type: 25K Topo  
Product Format: TIFF  
Layers Removed: Contours, Public Land Survey






**25k Topo 1, Montana**  
Selection Type: Custom Extent  
Product Type: 25K Topo  
Product Format: PDF  
Layers Removed: Contours, Public Land Survey




**Cathedral Point, Montana**  
Selection Type: On-Grid Extent  
Product Type: 7.5-Minute Topo  
Product Format: PDF  
Contour Smoothness: High  
Layers Removed: None

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Track Your Order

Enter a confirmation number to track an order

Order Confirmation Number  
1743000906958868

① Map Types


② Maps

③ Cart 0

Track

Help

TRACK



topoBuilder Application

Track Your Order

Enter a confirmation number to track an order

Order Confirmation Number  
1743000906958868

Order date: Wed Mar 26 2025

Processing (33%)

① Map Types

② Maps

③ Cart 0

Track

Help

REFRESH


TRACK

# Track and filter orders



① Map Types

② Maps

③ Cart 

## Track Your Order

Enter a confirmation number to track an order

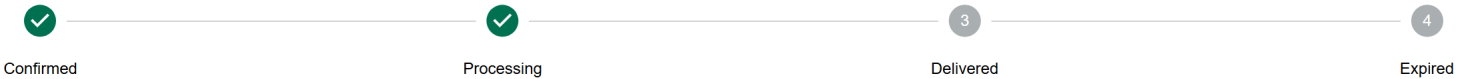
1743000906958868

Order date: Wed Mar 26 2025

Processing (33%)

1743000906958868

Order Date: Wed Mar 26 2025



- All
- Delivered
- In Queue
- Failed
- 100K Topo
- 7.5-Minute Topo
- On-Grid
- Custom
- PDF
- TIFF

Mount Douglas 

In Queue

On-Grid

Expires: Sun May 25 2025

Product Type

25k Topo

Product Format

TIFF

Layers Removed

Contours, Public Land Survey

25k Topo 1 

In Queue

Custom

Expires: Sun May 25 2025

Product Type

25k Topo

Product Format

PDF

Layers Removed

Contours, Public Land Survey

Cathedral Point 

Delivered

On-Grid

Expires: Sun May 25 2025

Product Type

7.5-Minute Topo

Product Format

PDF

Layers Removed

Contour Smoothness

High

Download



Download

 Track

 Help



# Track and filter orders

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[User Guide](#)


① Map Types

② Maps

③ Cart 0

## Track Your Order

Enter a confirmation number to track an order

1743000906958868 

Order date: Wed Mar 26 2025

Processing (33%)

 Track

 Help



REFRESH

TRACK

1743000906958868

Order Date: Wed Mar 26 2025

  
Confirmed

  
Processing

3  
Delivered

4  
Expired





- All
- Delivered
- In Queue
- Failed
- 100K Topo
- 7.5-Minute Topo
- On-Grid
- Custom
- PDF
- TIFF

1 products

Cathedral Point Delivered

On-Grid

Expires: Sun May 25 2025



Product Type

7.5-Minute Topo

Product Format

PDF

Layers Removed

Contour Smoothness

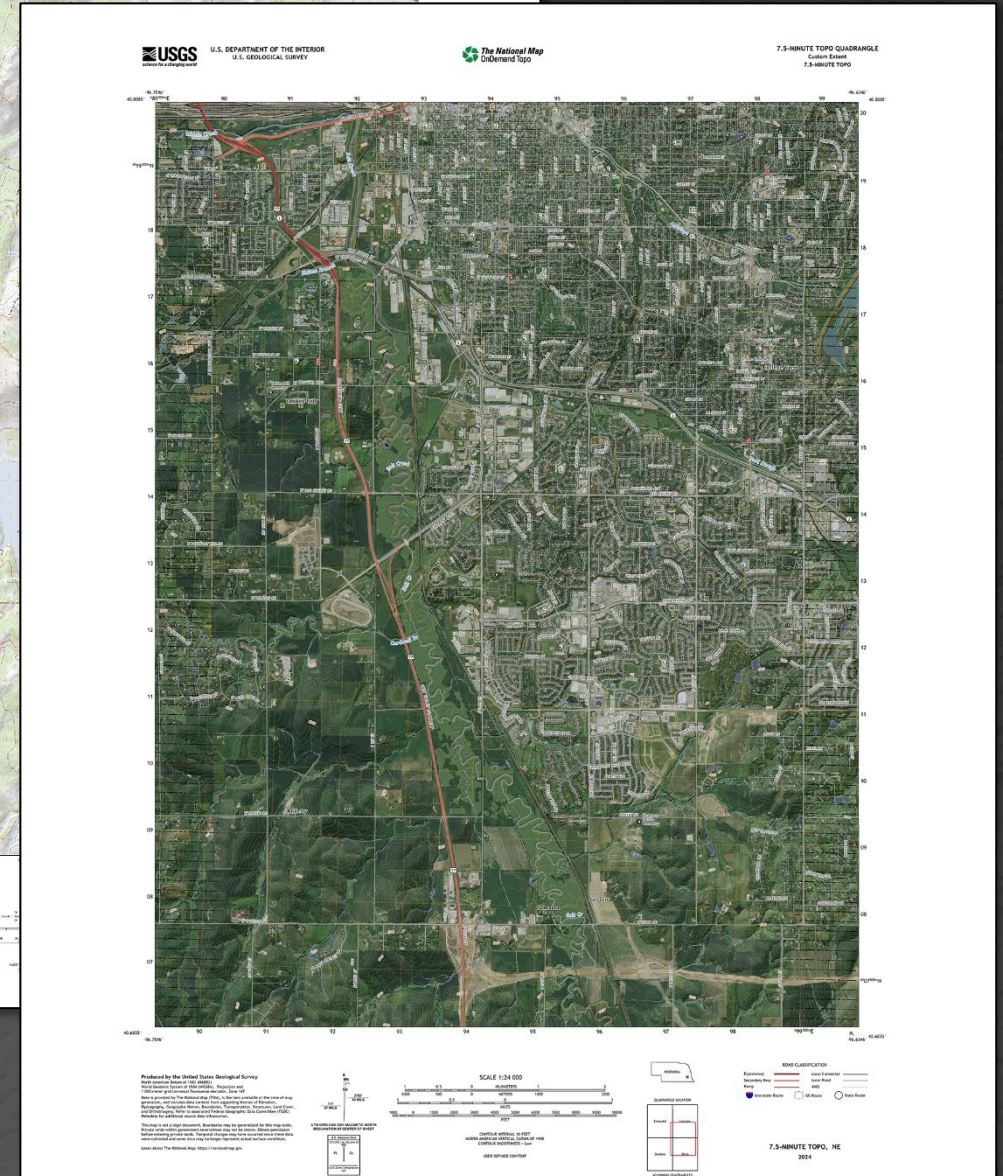
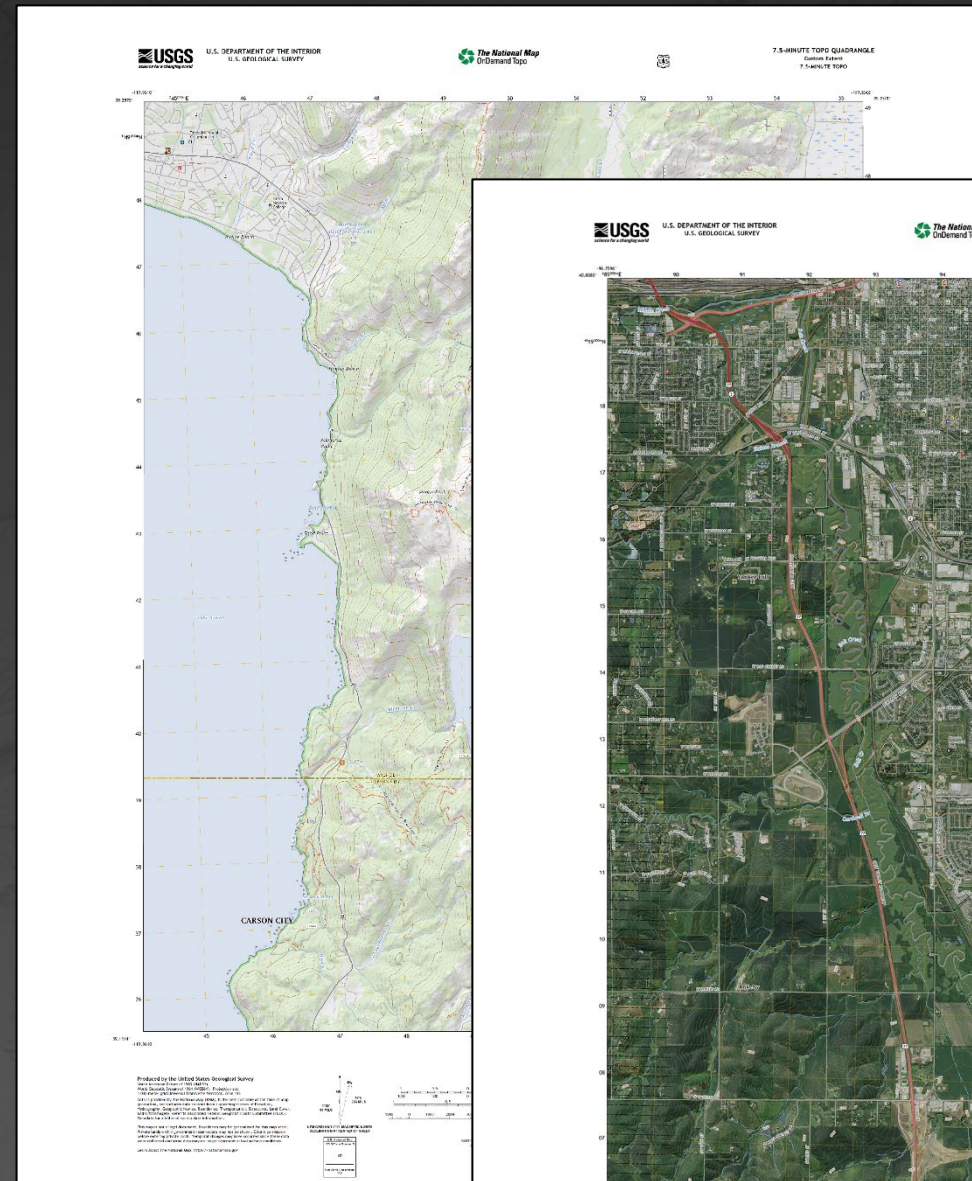
High

# OnDemand Topo Map Types



# 7.5-Minute Topo

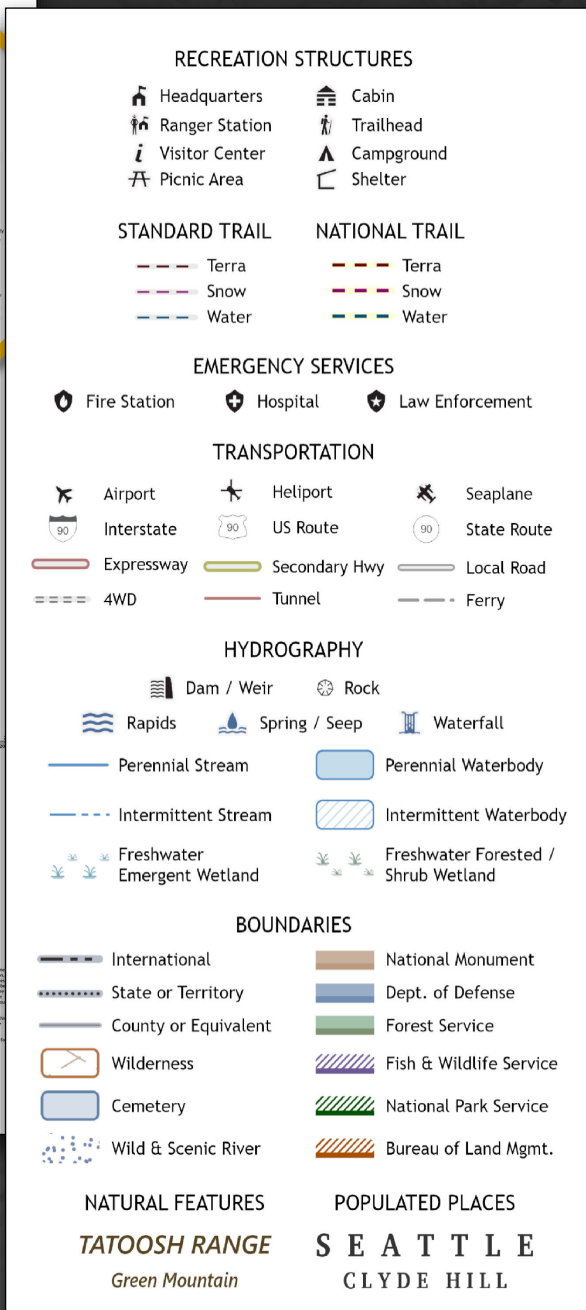
- 1:24,000 in CONUS & Hawai'i
- 1:25,000 in Alaska
- 1:20,000 in Puerto Rico, U.S. Virgin Islands, American Samoa, Guam, Commonwealth of the Northern Mariana Islands





- 7.5-minute
- 1:25,000
- Recreation & outdoors
- Excluded data

## Imagery





# 25K Recreational Topo

- New trail symbols

 Terra

 Water

 Snow

 National Terra

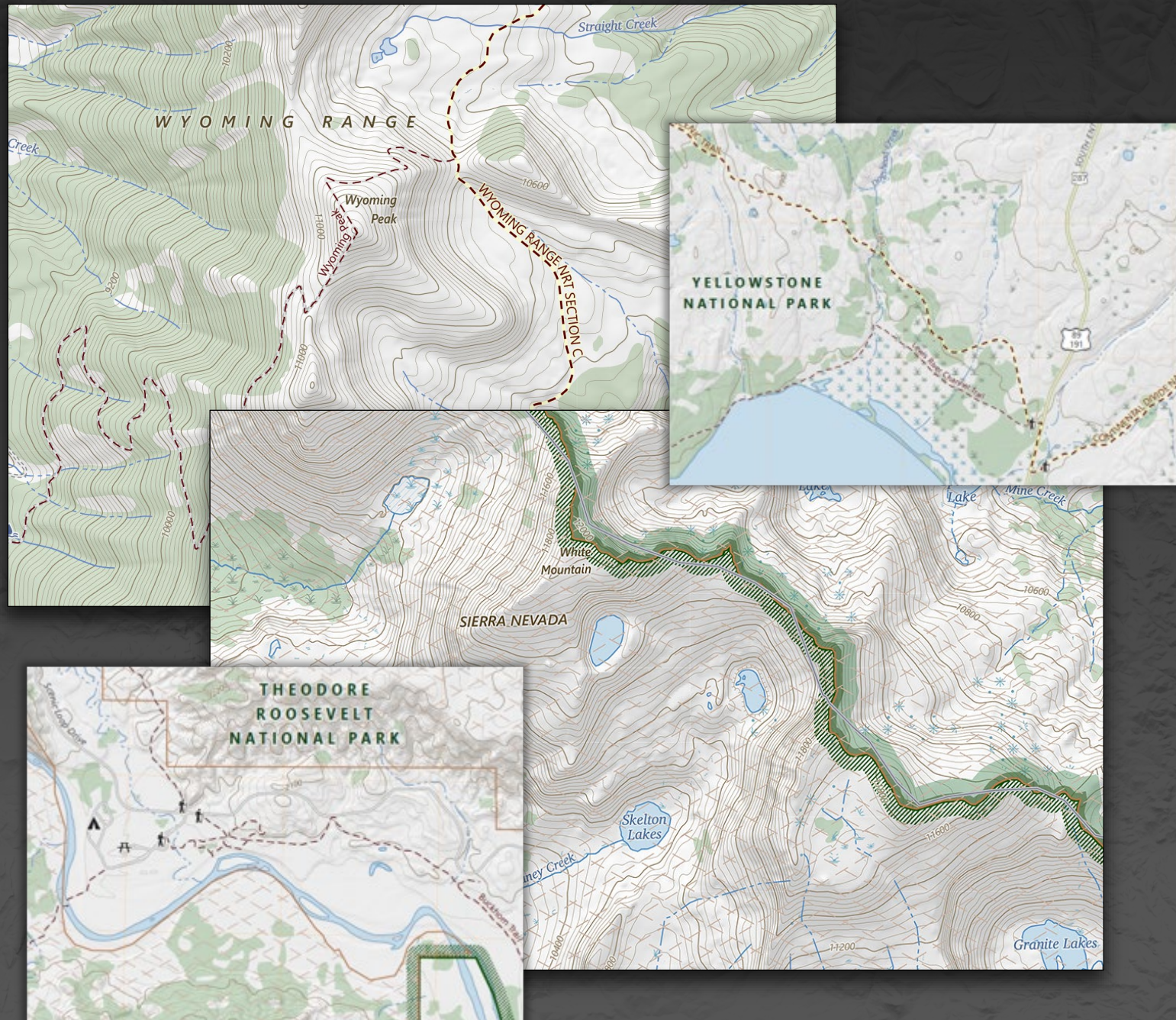
- New boundary symbols



- New point symbols



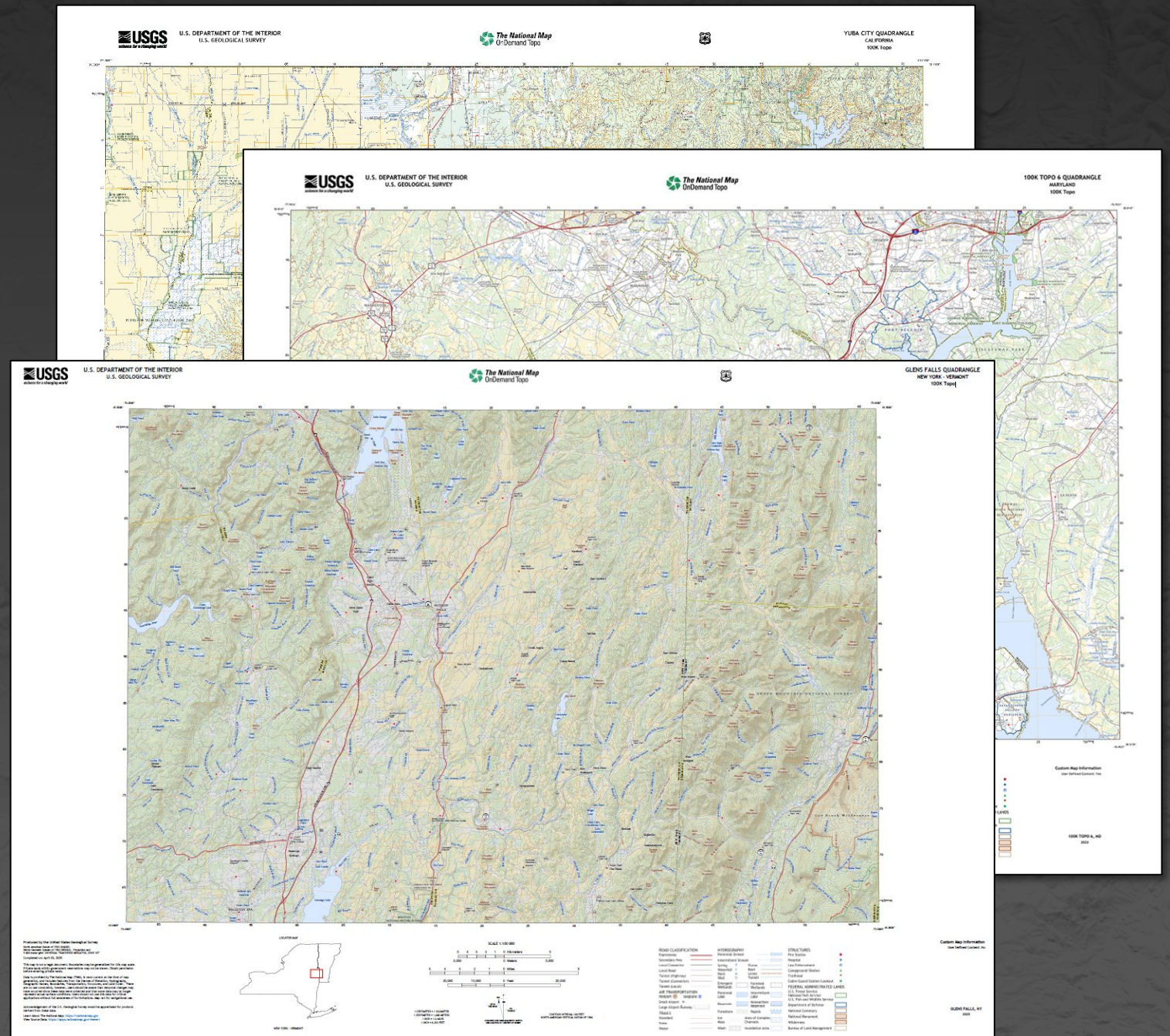
- Updated contour intervals





# 100K Topo

- 1:100,000
- Covers all states and territories
- Planning, land management, recreation





# 100K Topo

- Five land cover classes

Woodland



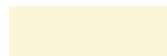
Shrub/Scrub



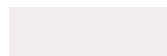
Grassland



Crop/Pasture

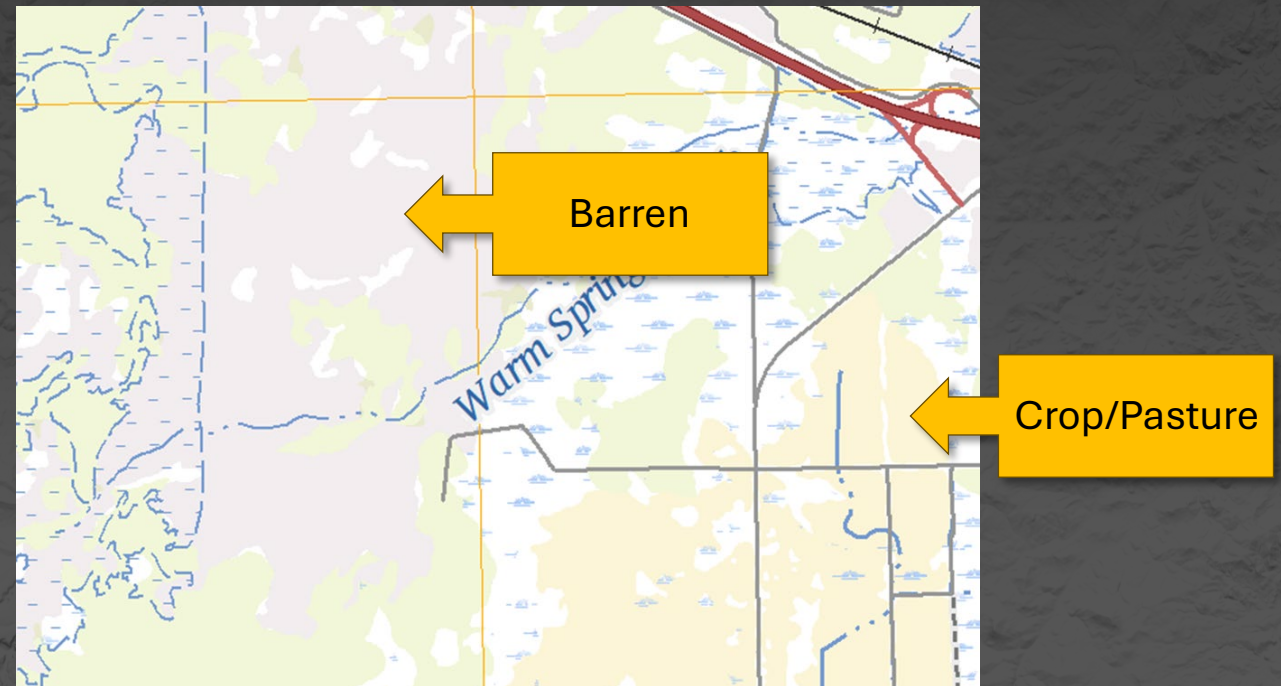
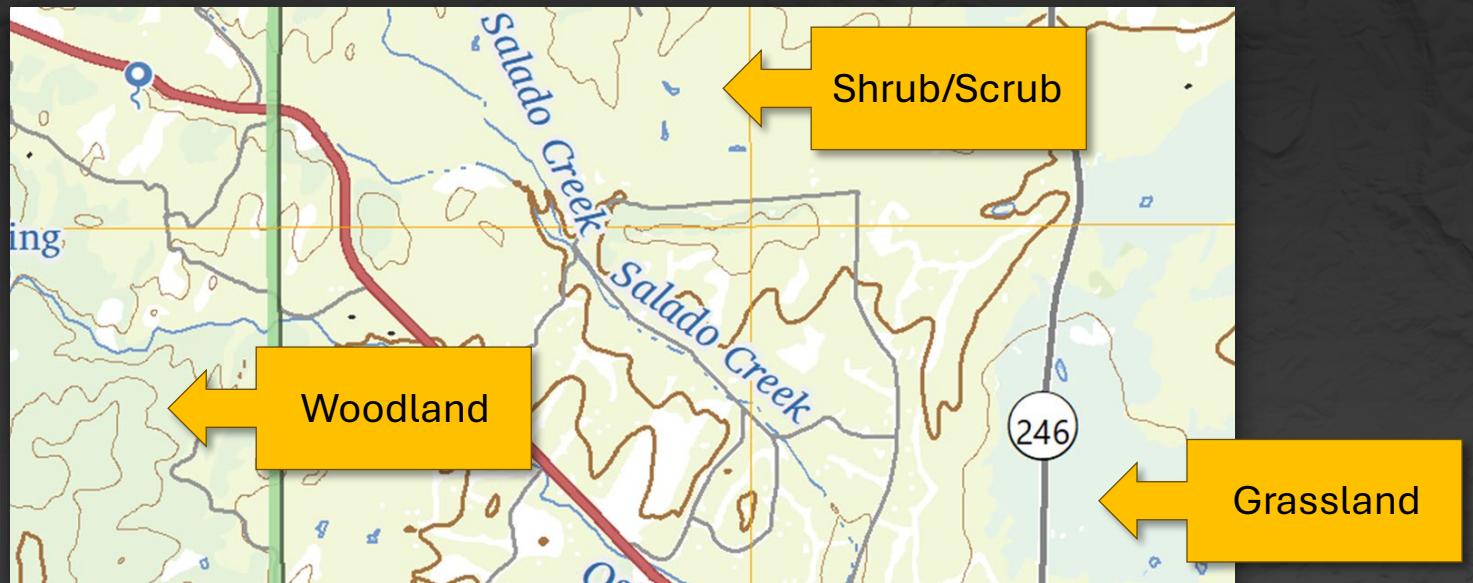


Barren



- No imagery

- No contour smoothing





# Topographic Production Service Migration



# Call to Adventure

*Why did the migration happen?*

What be  
my quest?

OnDemand  
Topo



Image Source: Britannica.com (Knight Crusader)





# The Quest

- OnDemand Topo was happy and stable being made using ESRI Products on Demand (PoD)
  - ❖ ArcMap Desktop
  - ❖ POA&M (Plan of Action & Milestones): need to migrate to ArcGIS Pro
- Now must be made using ESRI Topographic Production Service (TPS)
  - ❖ ArcGIS Pro
  - ❖ Make OnDemand Topo appear the same (or better) in TPS as it did in PoD





# The Journey Begins

## *How the Migration Happened – Part 1*

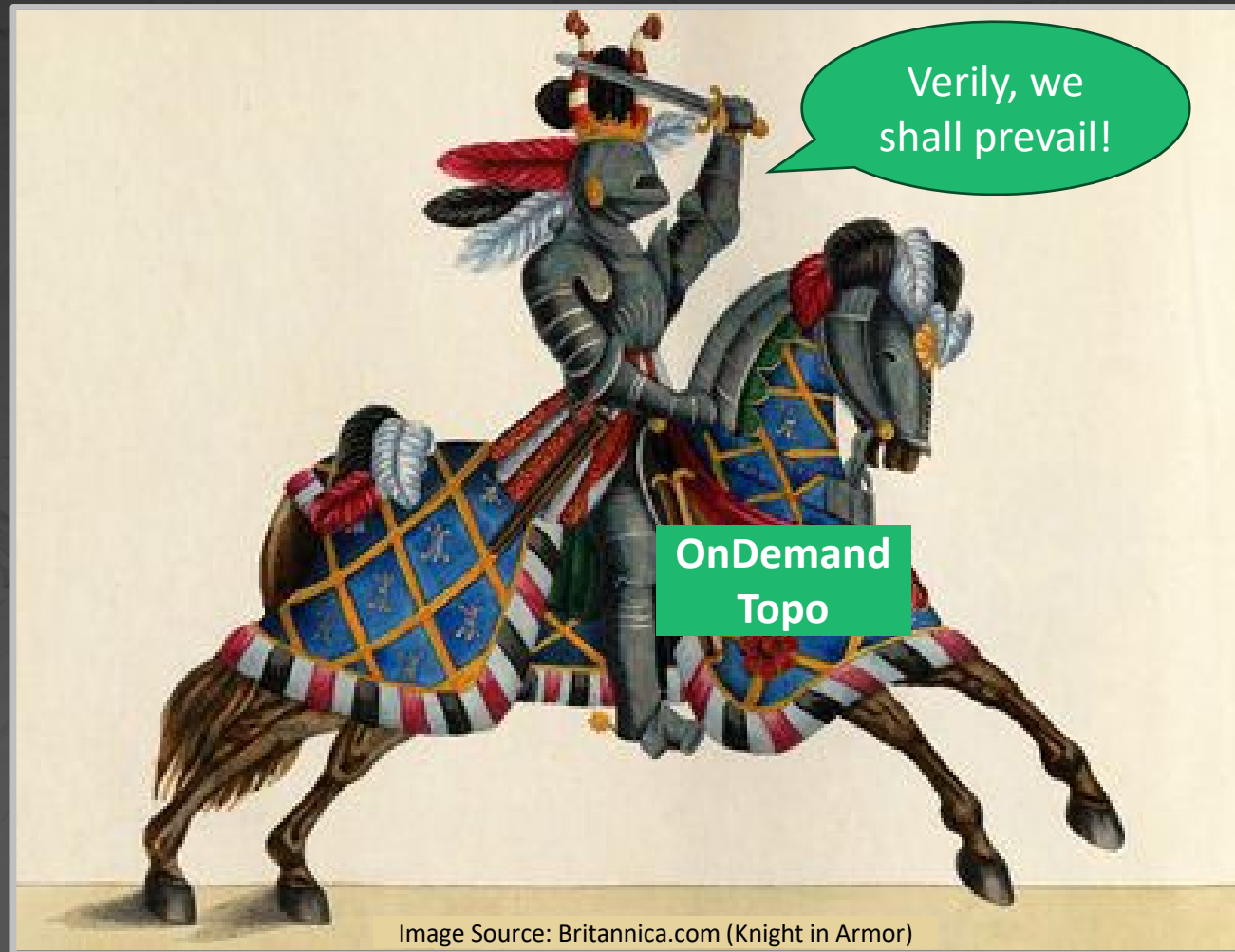
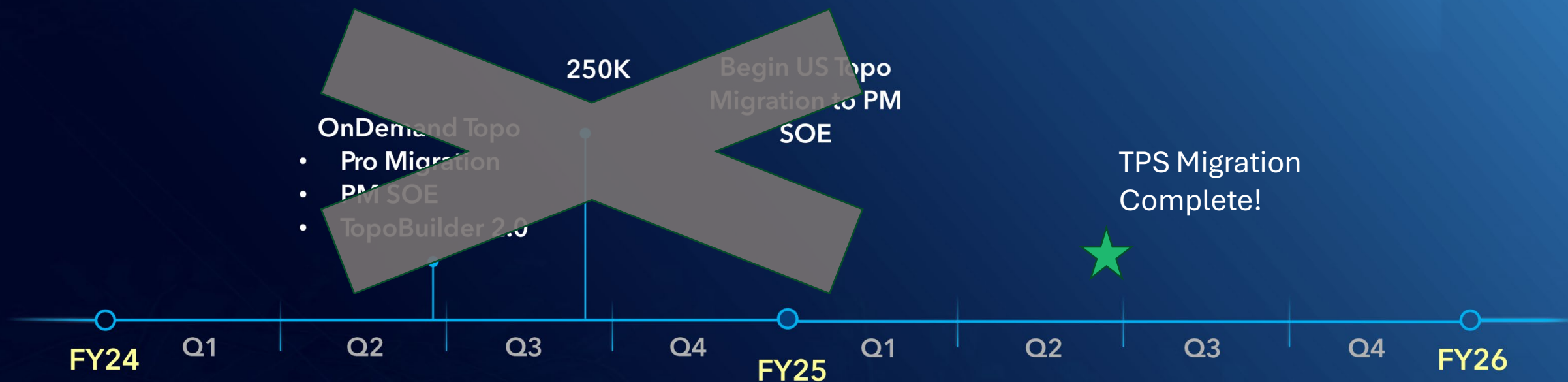


Image Source: Britannica.com (Knight in Armor)

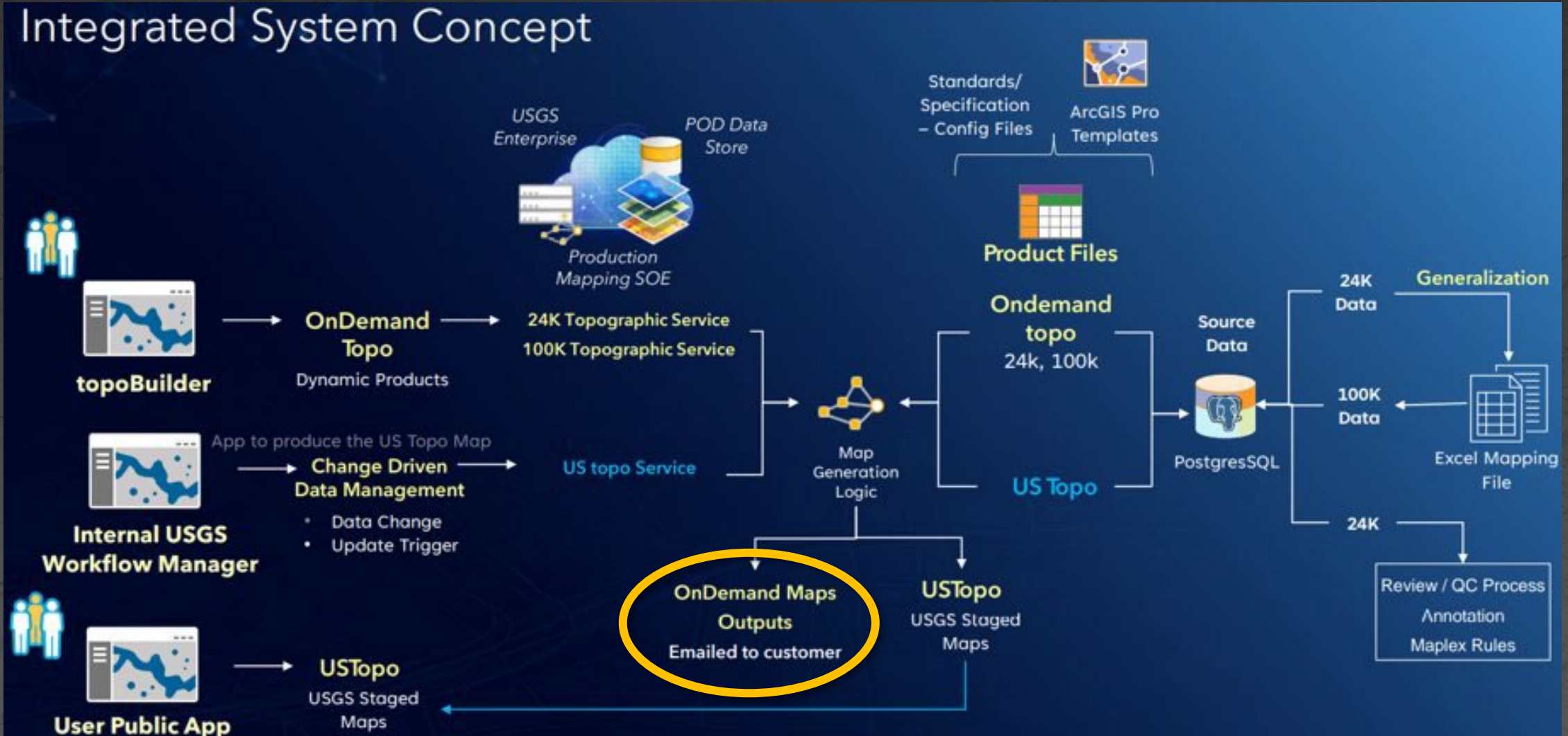


# Implementation Timeline & Plan

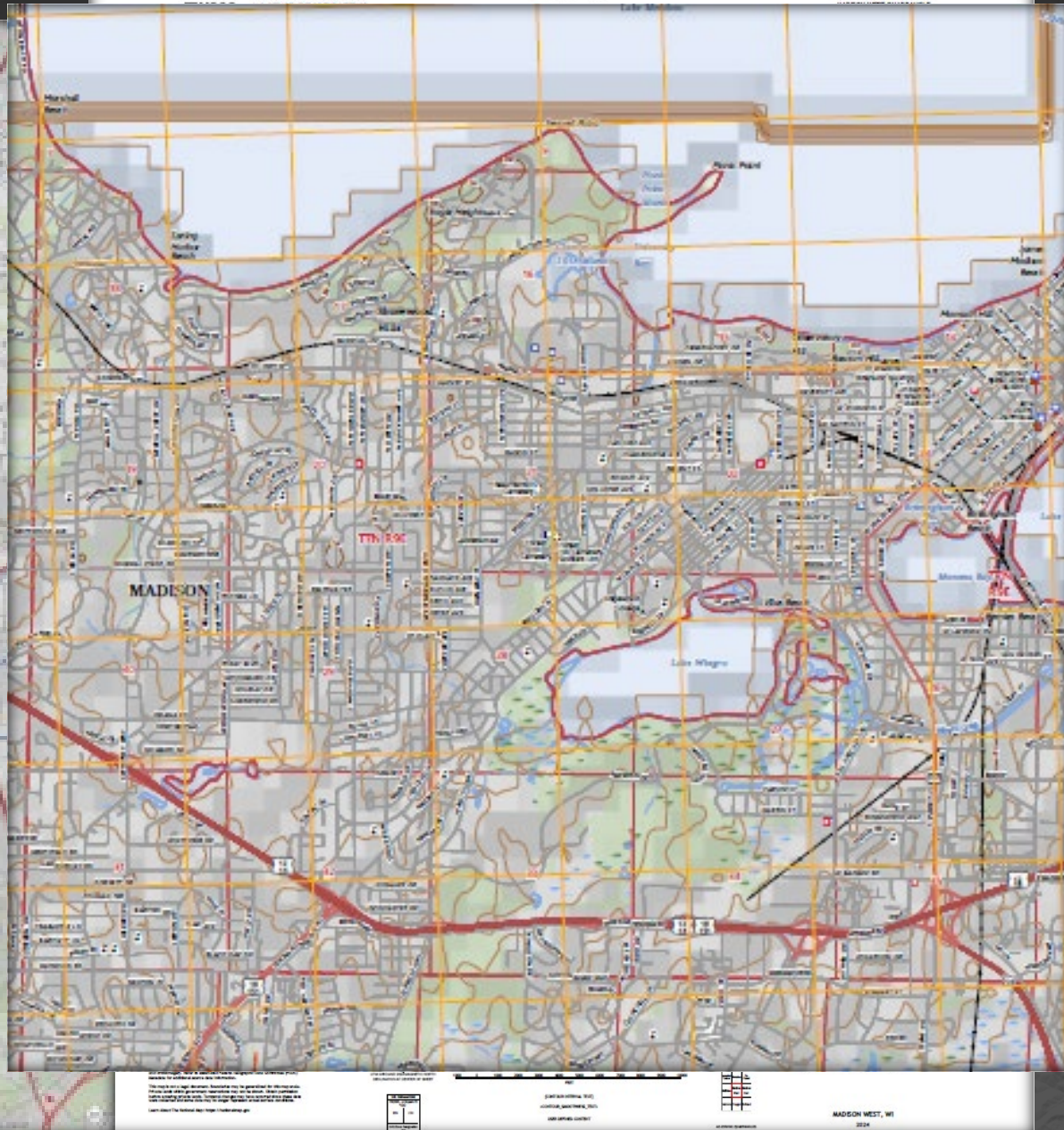
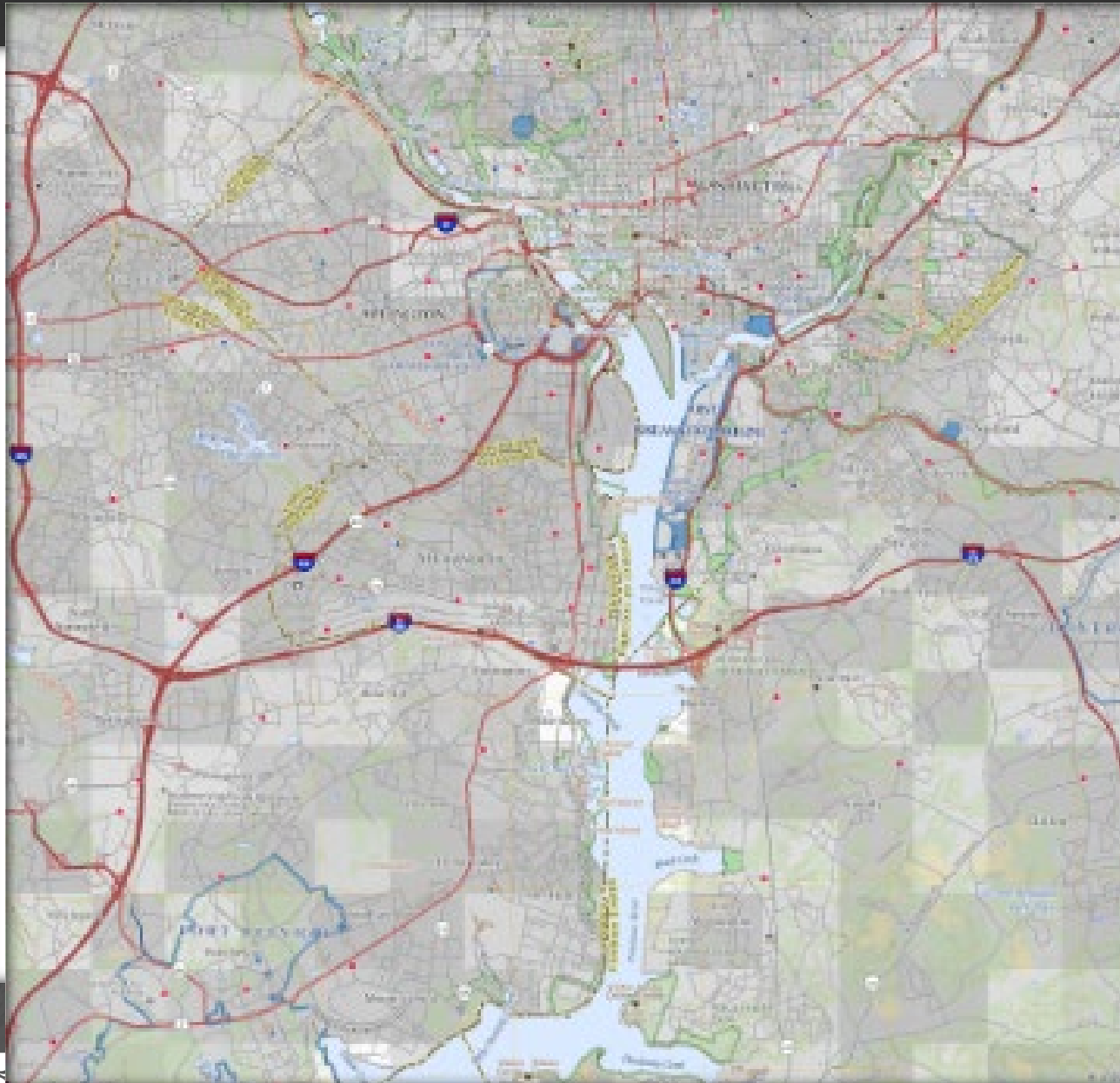




# Setting expectations and timelines







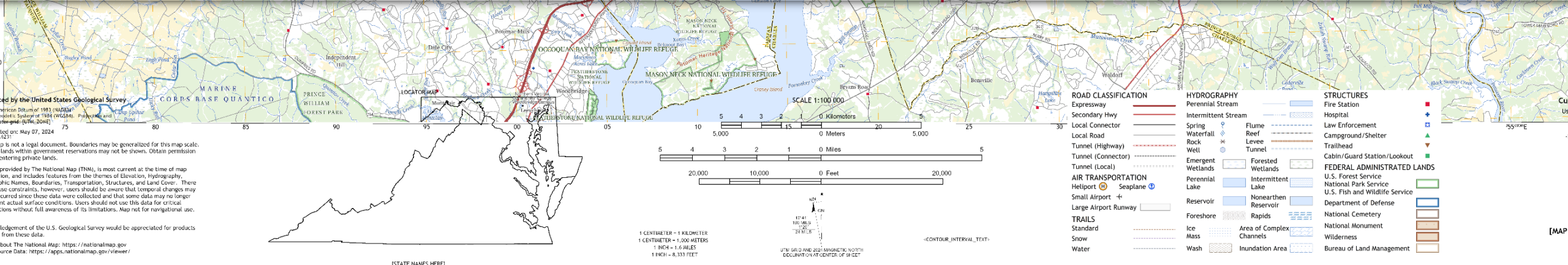
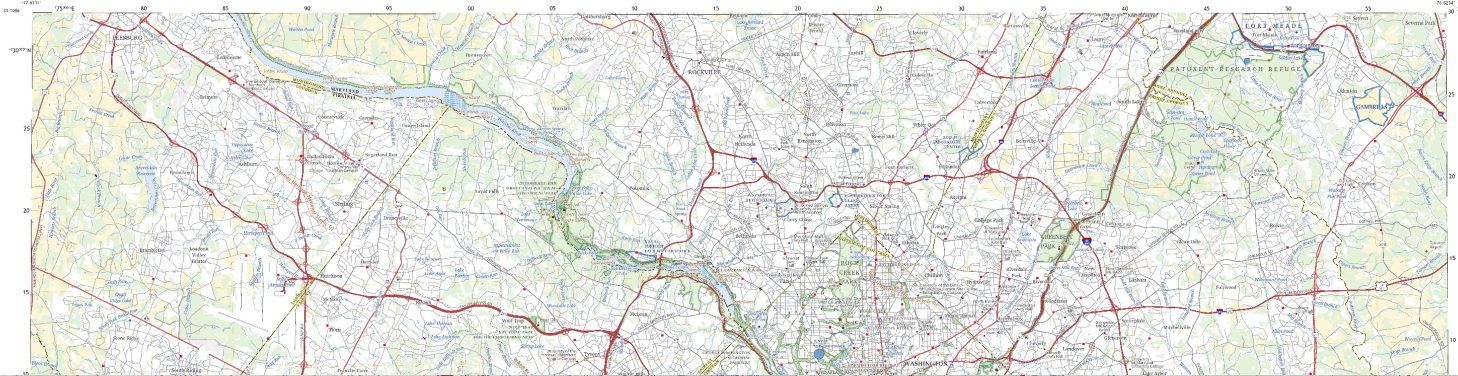




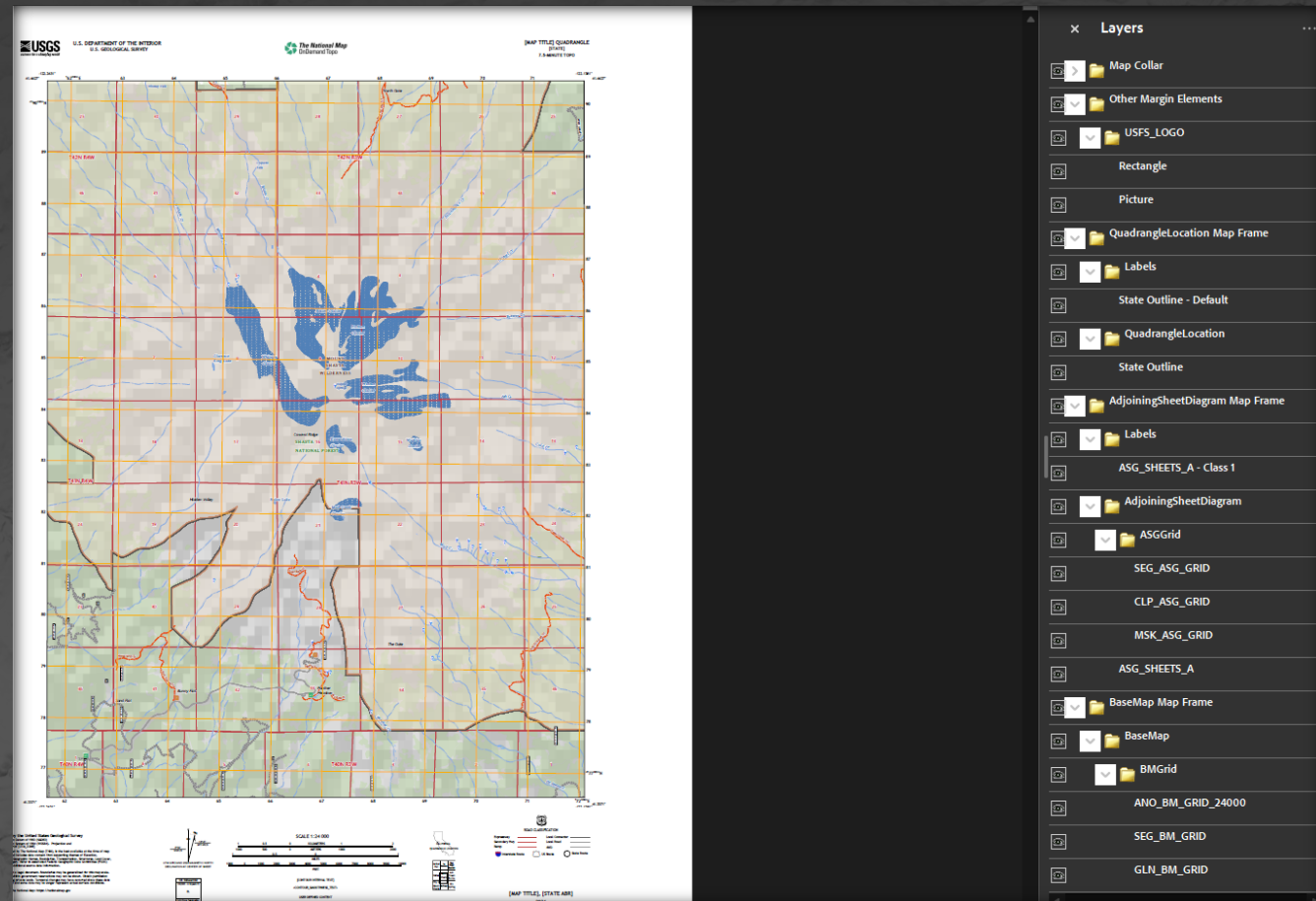
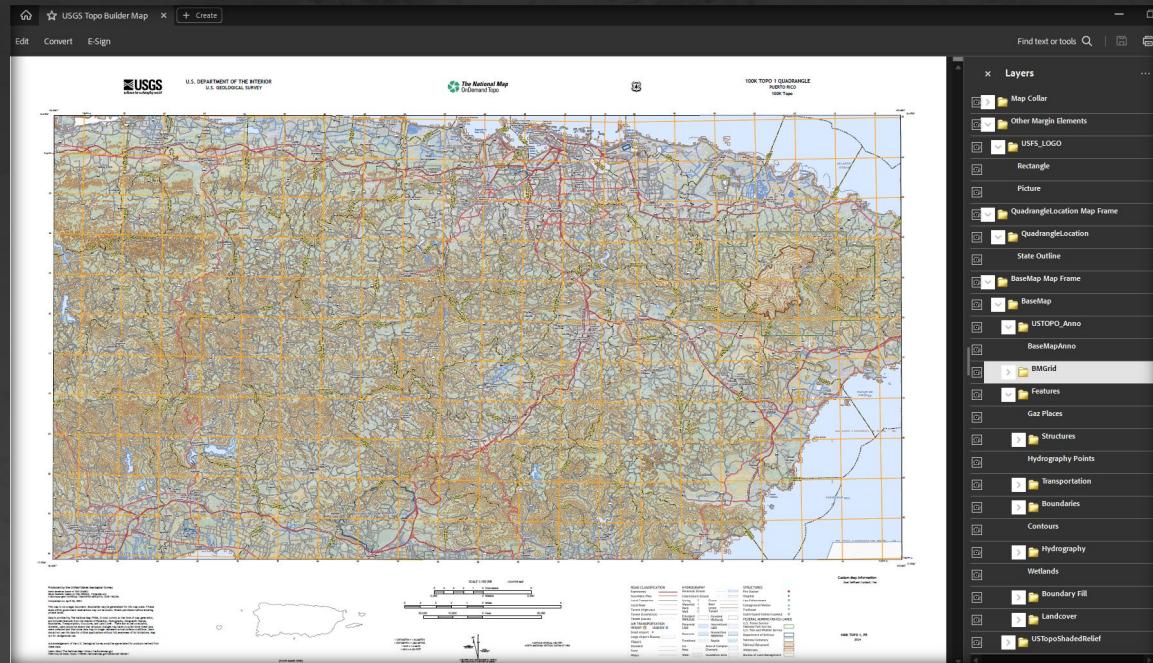
U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY



[MAP TITLE] QUADRANGLE  
[STATE]  
100K Topo



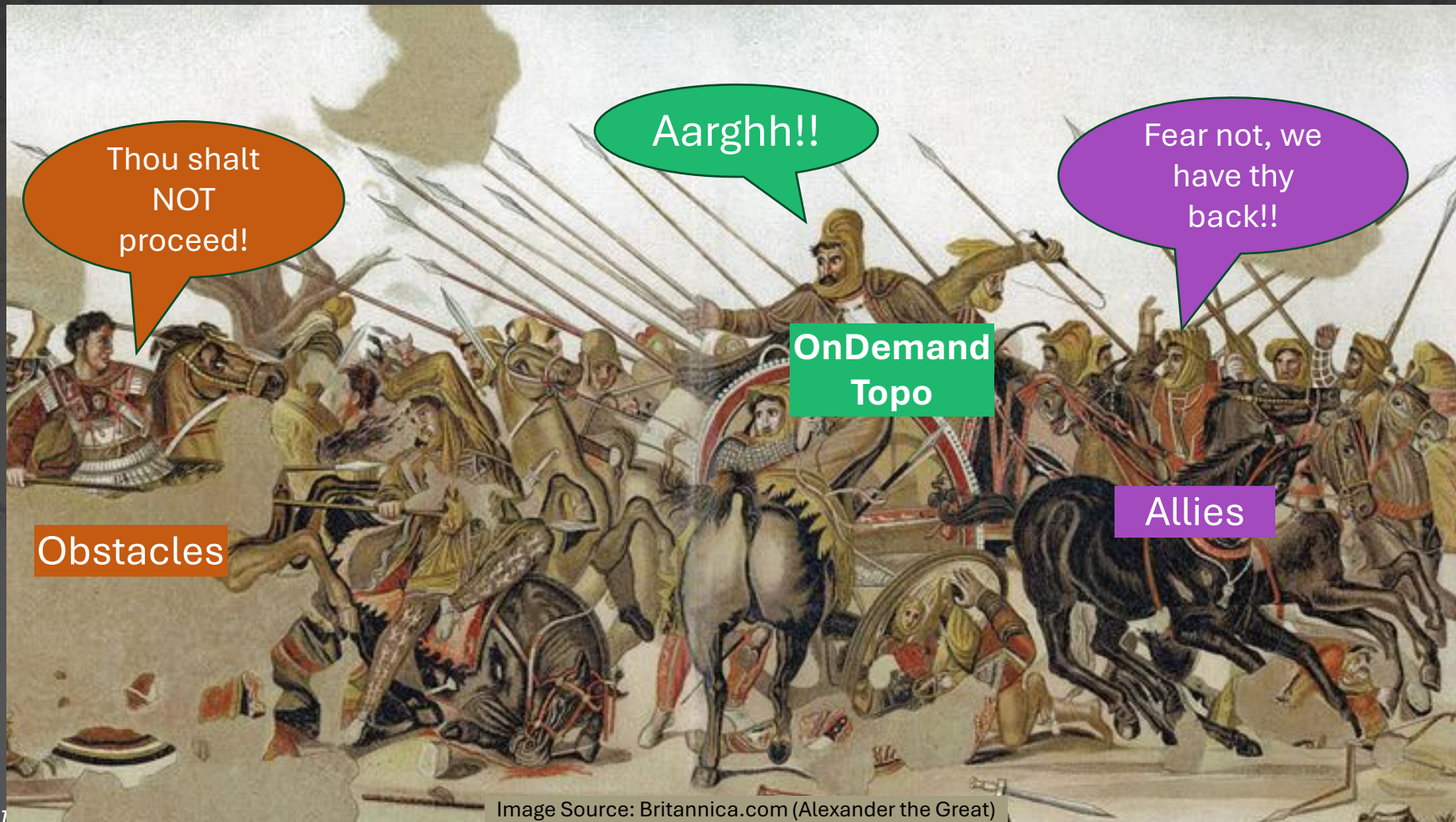






# Obstacles and Allies

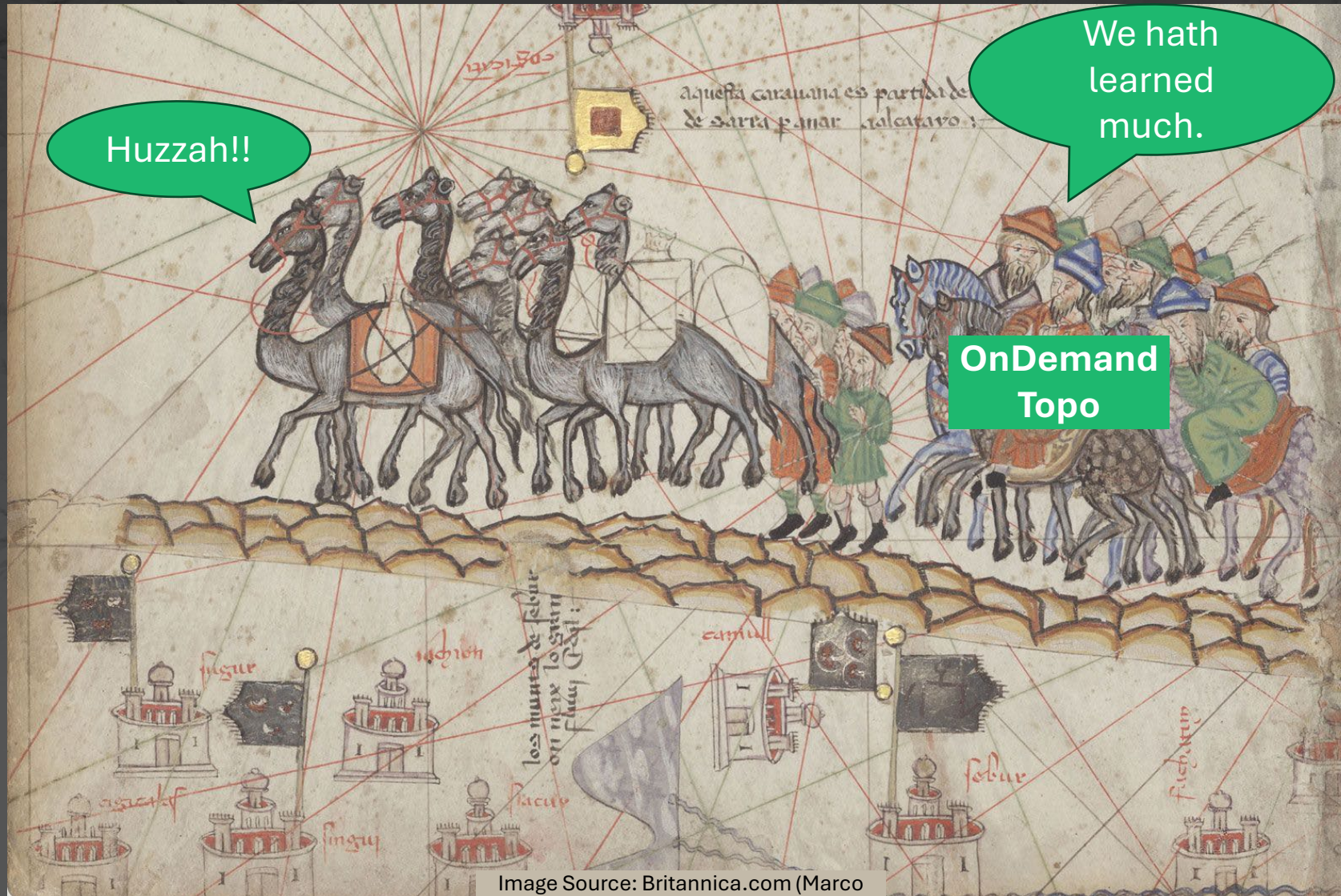
## *How the Migration Happened – Part 2*





# The Return Home

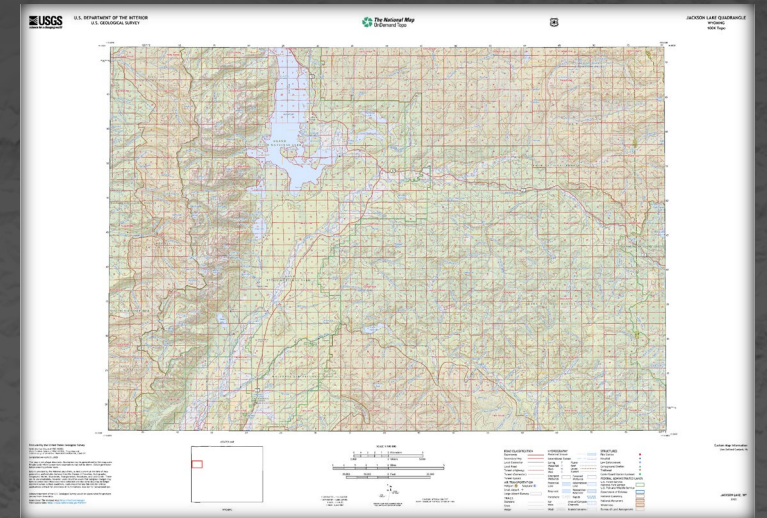
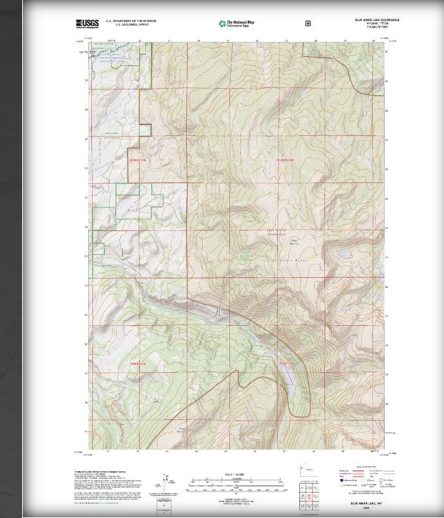
## *What did we learn?*





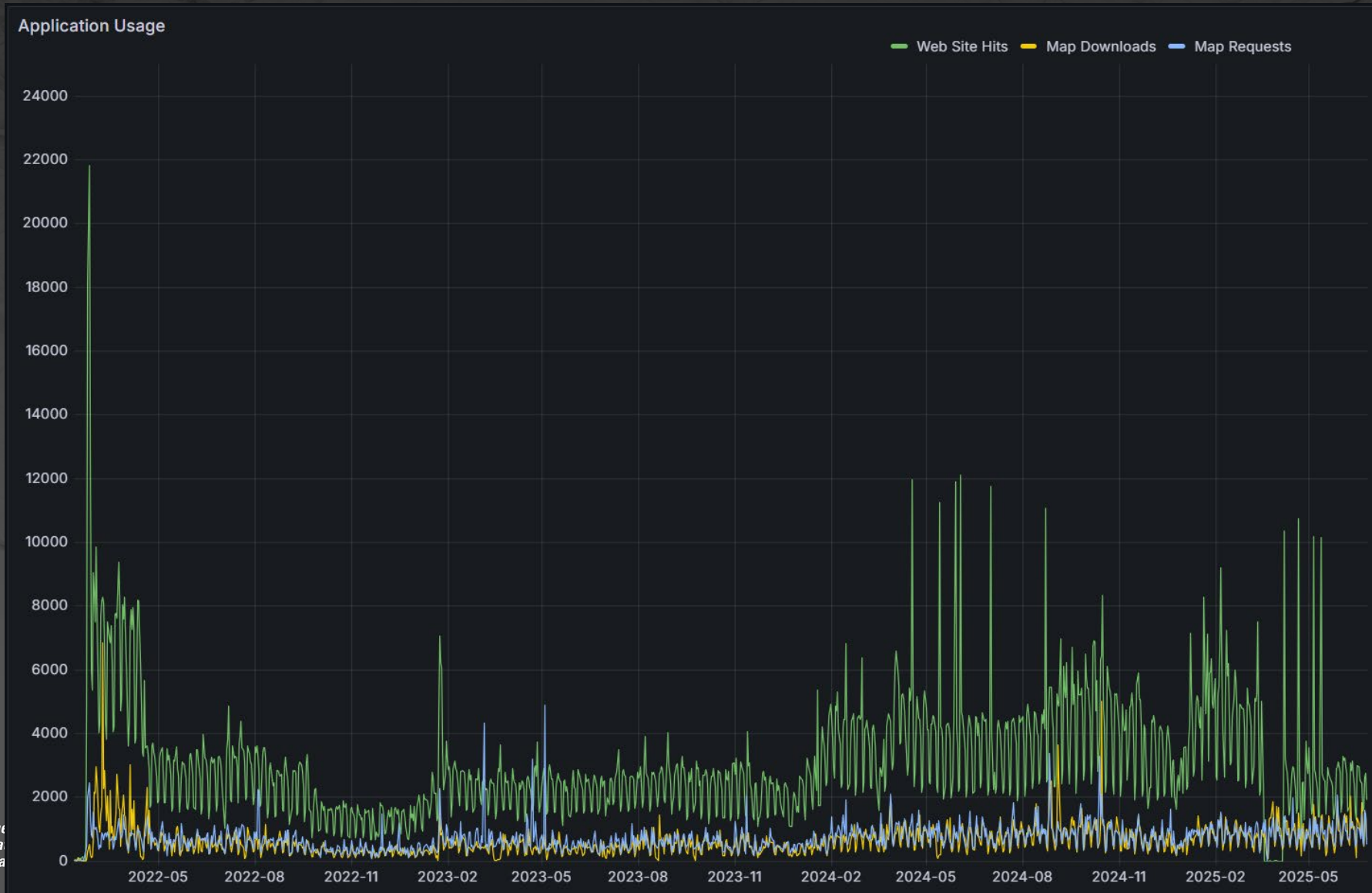
# Victories – New and Improved OnDemand Topo

- *Migration completed on March 18, 2025!*
- Maps should look the same or better...
- Shaded Relief added to 100K Topos
  - Previous limitation of POD (ArcMap) platform
- More cartographic design options in ArcGIS Pro:
  - Donut Effect
  - Blend Modes for Polygon Fills
  - Enhanced Label Placement Styles
  - Improved Conflict Resolution for Label Placement
- Improved map turnaround and delivery time:
  - POD (ArcMap) = Avg ~1.5 hours
  - TPS (ArcGIS Pro) = Avg ~30 minutes



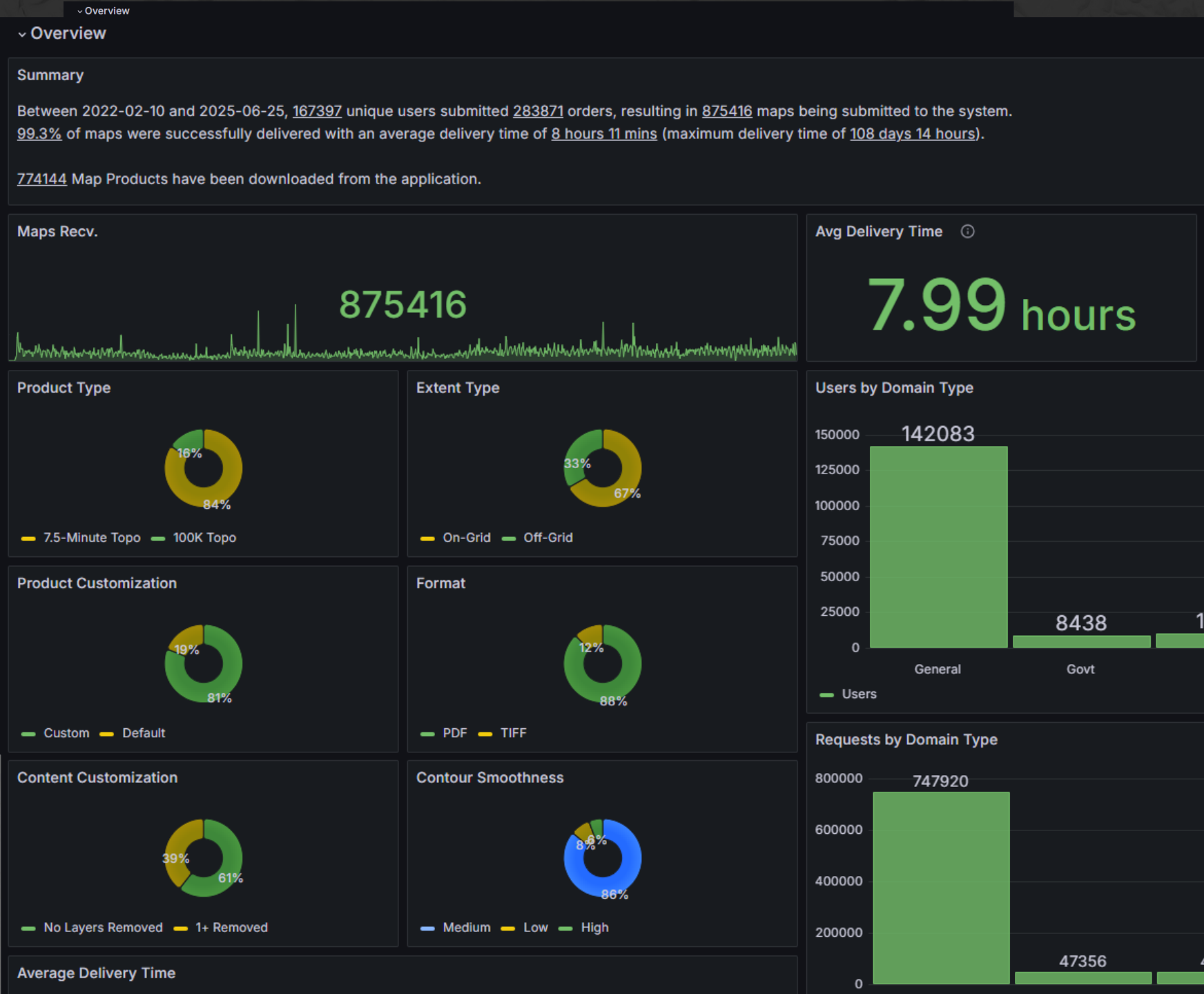


# topoBuilder Metrics – Since launch





# topoBuilder Metrics – Since launch



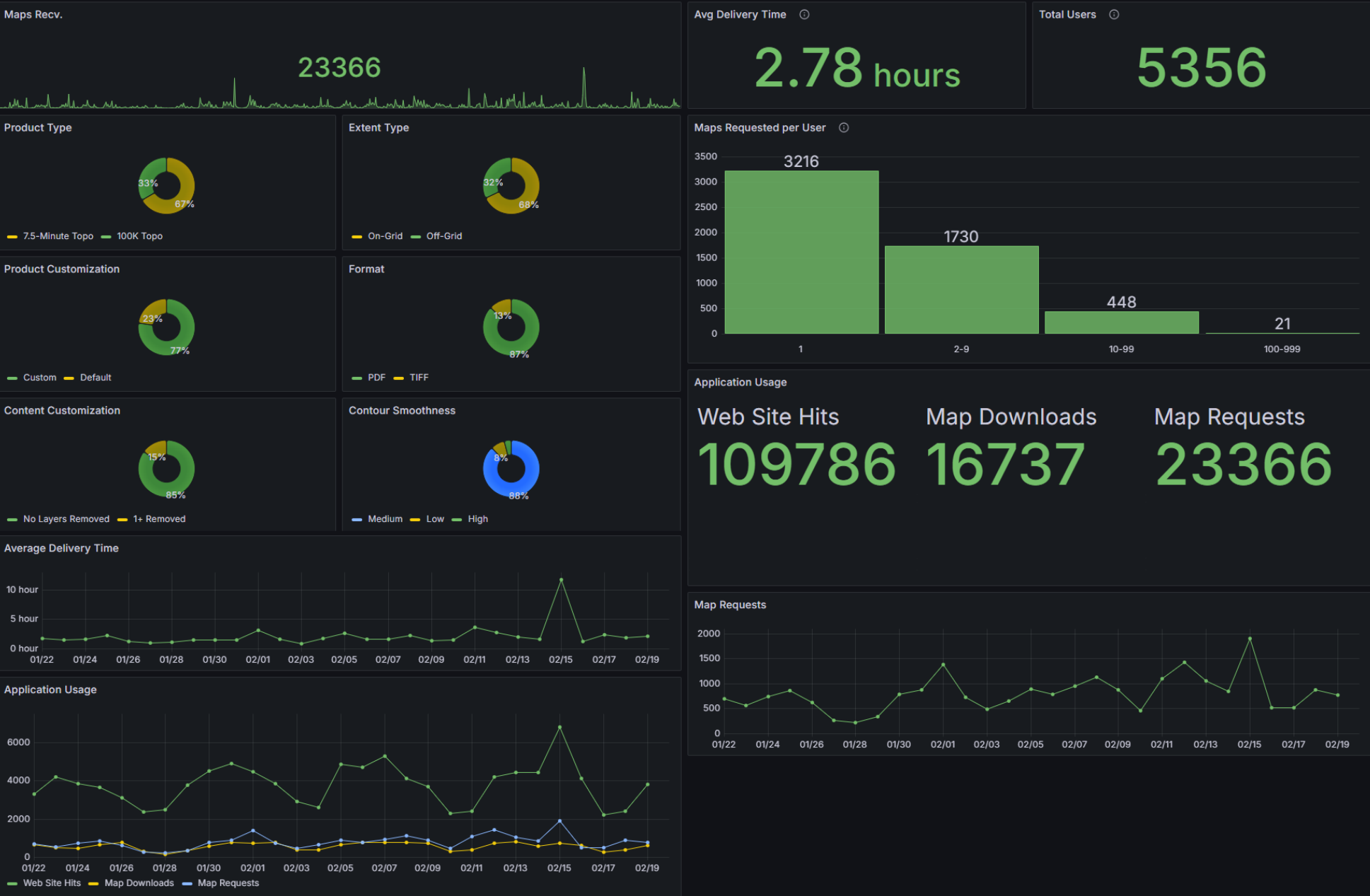


# Pre-TPS Metrics

Summary

Between 2024-01-22 and 2024-02-19, **5356** unique users submitted **7615** orders, resulting in **23366** maps being submitted to the system. **99.7%** of maps were successfully delivered with an average delivery time of **2 hours 47 mins** (maximum delivery time of **1 days 3 hours**).

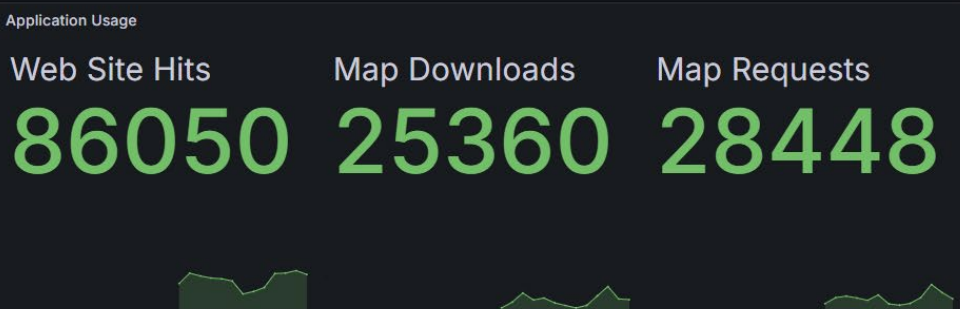
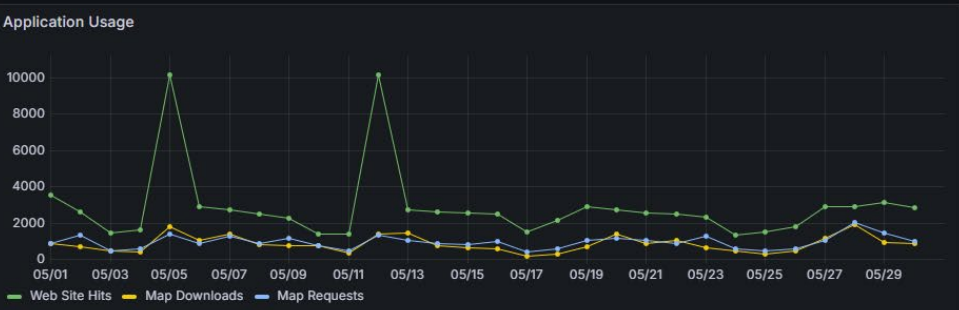
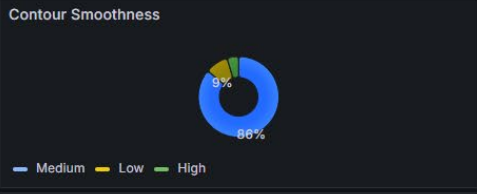
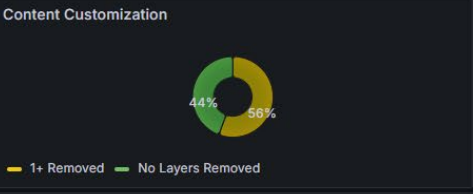
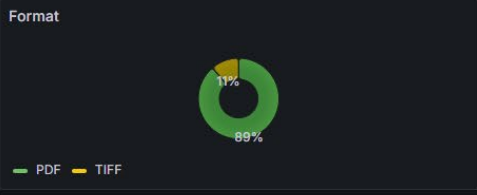
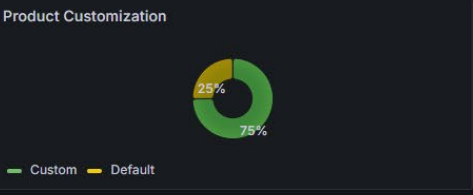
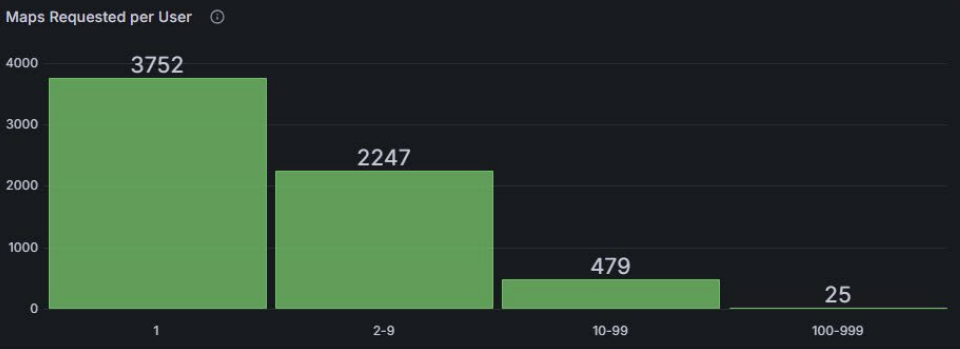
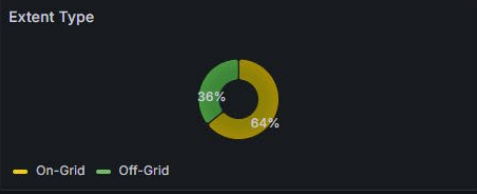
**16737** Map Products have been downloaded from the application.



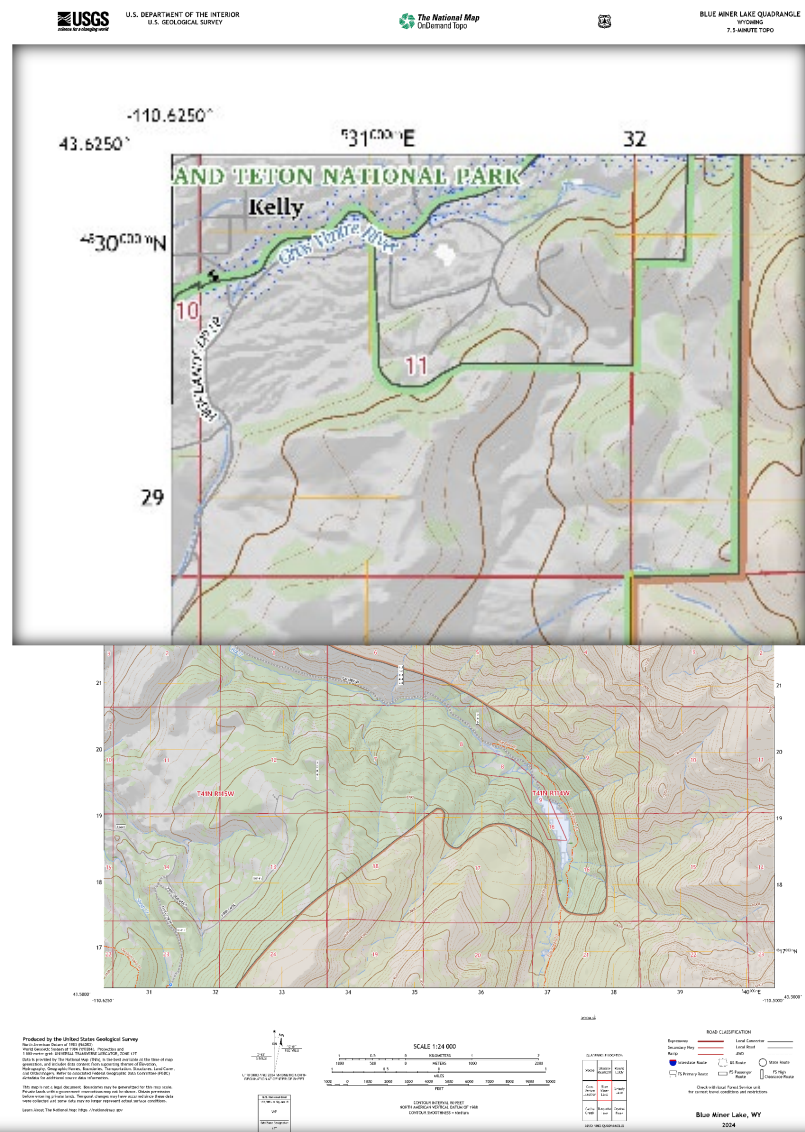


# TPS Metrics

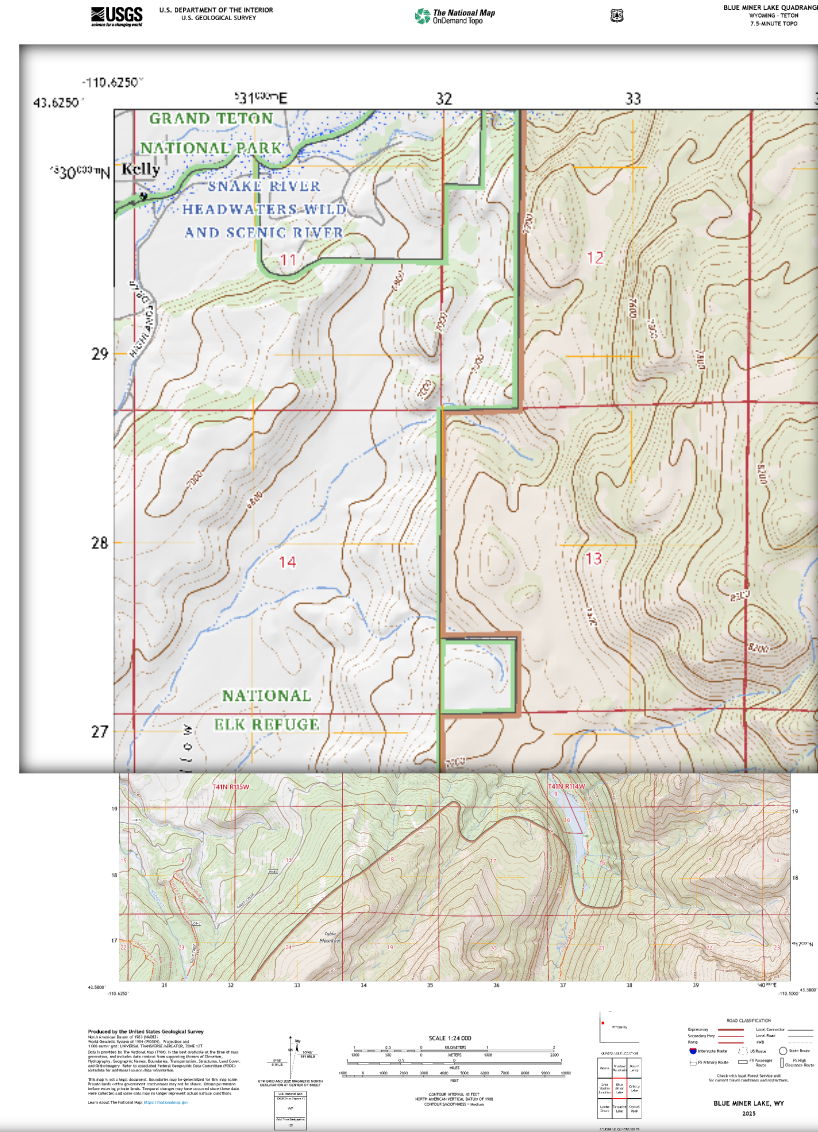
**Summary**  
Between 2025-05-01 and 2025-05-30, 6440 unique users submitted 9579 orders, resulting in 28448 maps being submitted to the system. 99.8% of maps were successfully delivered with an average delivery time of 30 mins (maximum delivery time of 10 hours 22 mins).  
  
25360 Map Products have been downloaded from the application.



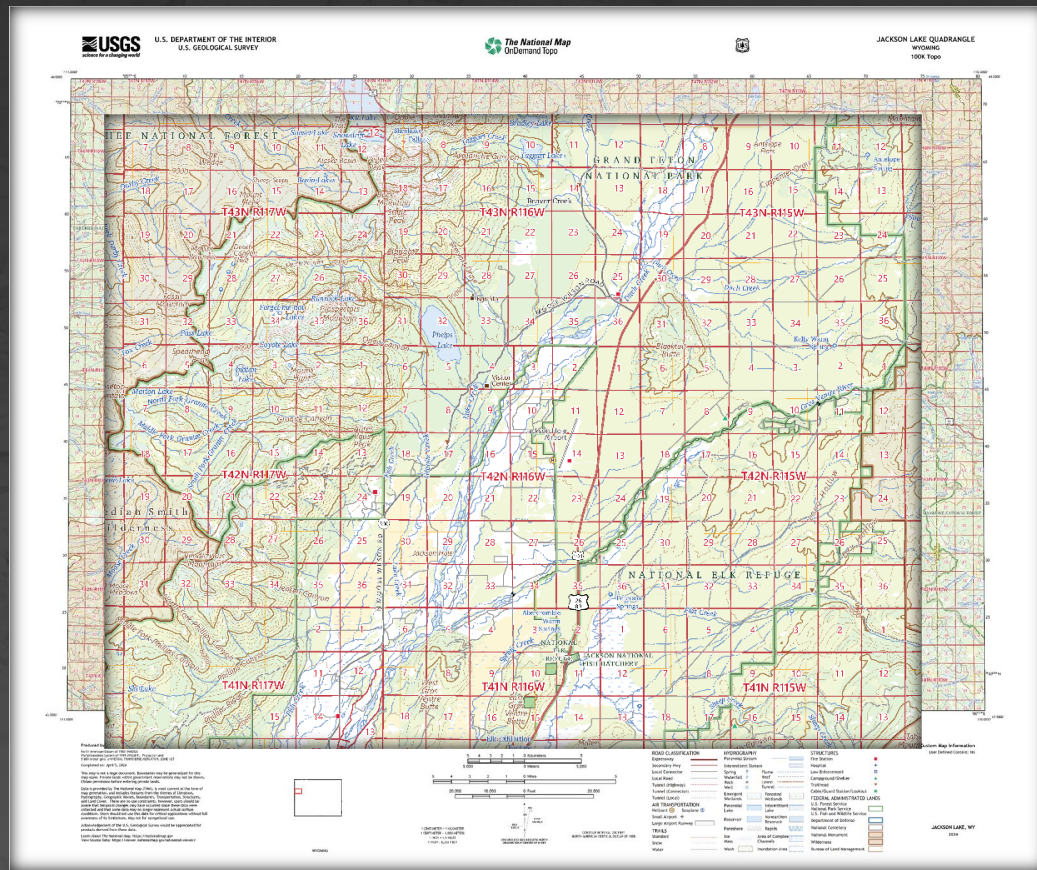




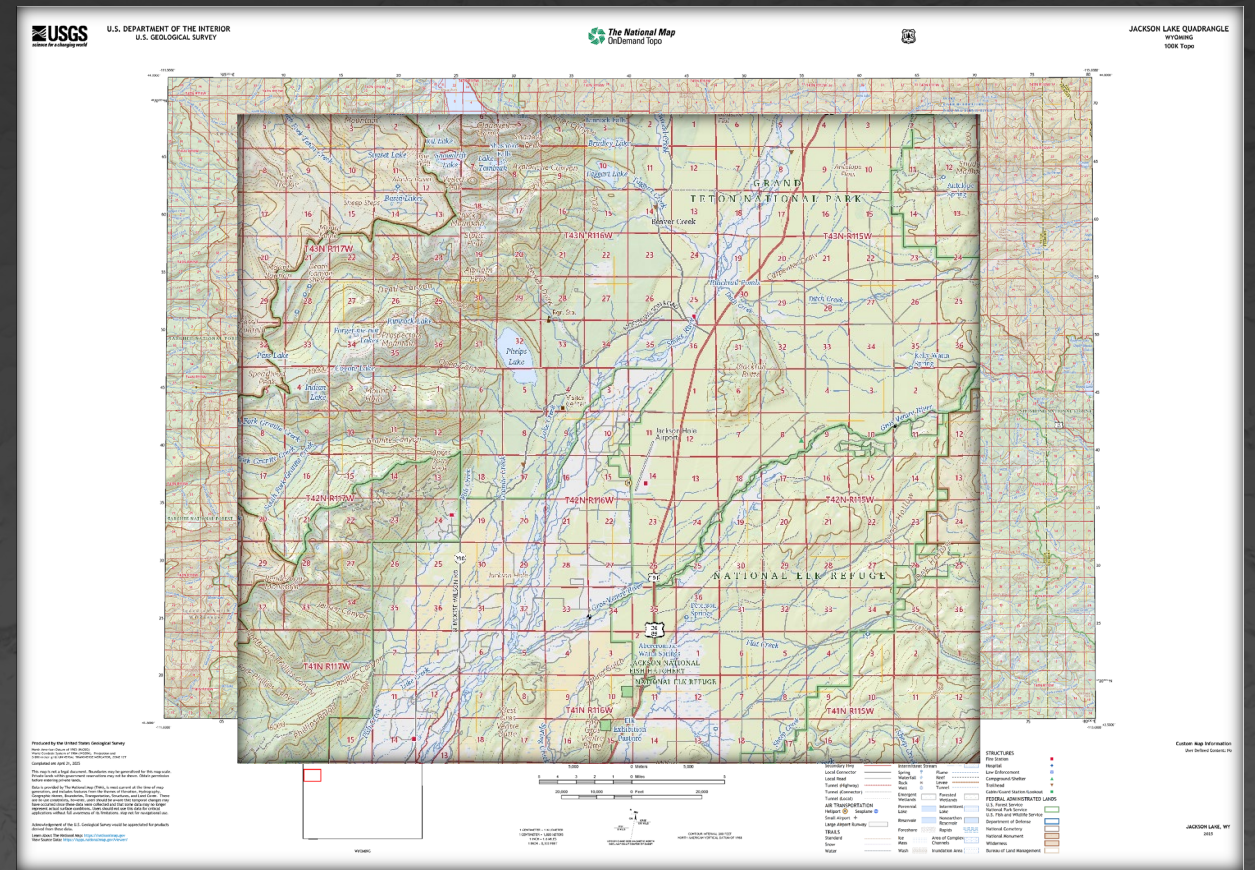
2024 – 7.5-Minute OnDemand Topo  
Blue Miner Lake, WY







2024 – 100K OnDemand Topo  
Jackson Lake, WY (Grand Teton NP)



2025 – 100K OnDemand Topo  
Jackson Lake, WY (Grand Teton NP)



# New Knowledge – Lessons Learned

- Specifications need to come first!
- Be flexible, creative, and patient in response to the unexpected:
  - Changes in project scope or resources
  - Unpredictable consequences to initial steps
  - Unforeseen changes to source data
- Collaboration is crucial for addressing challenges with newer platforms and software:
  - TPS/ArcGIS Pro are evolving – there will naturally be unknowns and limitations
  - ESRI worked in close concert with us and advocated to their CORE development team
    - MVP blocker bugs requiring ‘hot fixes’
    - Identifying lowest-hanging fruit (easy to resolve) issues



Image Source: en.wikipedia.org (King Arthur Round Table)



# Future Quests!

- Many positives with migrating to a TPS (ArcGIS Pro) system
  - Enhanced performance, labeling, and symbology
- Additional map scales:
  - 1:25,000 (25K) Recreational Topo
  - 1:250,000 (250K) Topo
  - Dynamic page sizes
- Lessons learned can inform future modernizations and migrations



Image Source: [en.wikipedia.org](https://en.wikipedia.org) (Soria Moria Palace shimmered like Gold by Theodor Kittelsen (1900))



# topoBuilder is...



on demand



where  
you want



multi-  
scale



best  
available  
data



# Questions and discussion

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Cartographer

U.S. Geological Survey

[akaufman@usgs.gov](mailto:akaufman@usgs.gov)

For feedback, help, or support:

[tnm\\_help@usgs.gov](mailto:tnm_help@usgs.gov)



We thank thee for thy time!

