

# Successes and Challenges in Deriving 3DHP Hydrography from IfSAR in Alaska

Amar Nayegandhi, CP, CMS, GISP

10/27/2023 Alaska GeoSummit

# Dewberry Engineers

- Established in 1956. Local office in Anchorage.
- 15+ years working with Alaskan communities, primarily through our federal contracts with USGS and NOAA.
- Dedicated to delivering high-quality products/services.
  - Dewberry is ISO 9001:2015 certified
  - Multiple award recipient including the Esri Federal Innovative Partner award



 **2,000+**  
EMPLOYEES

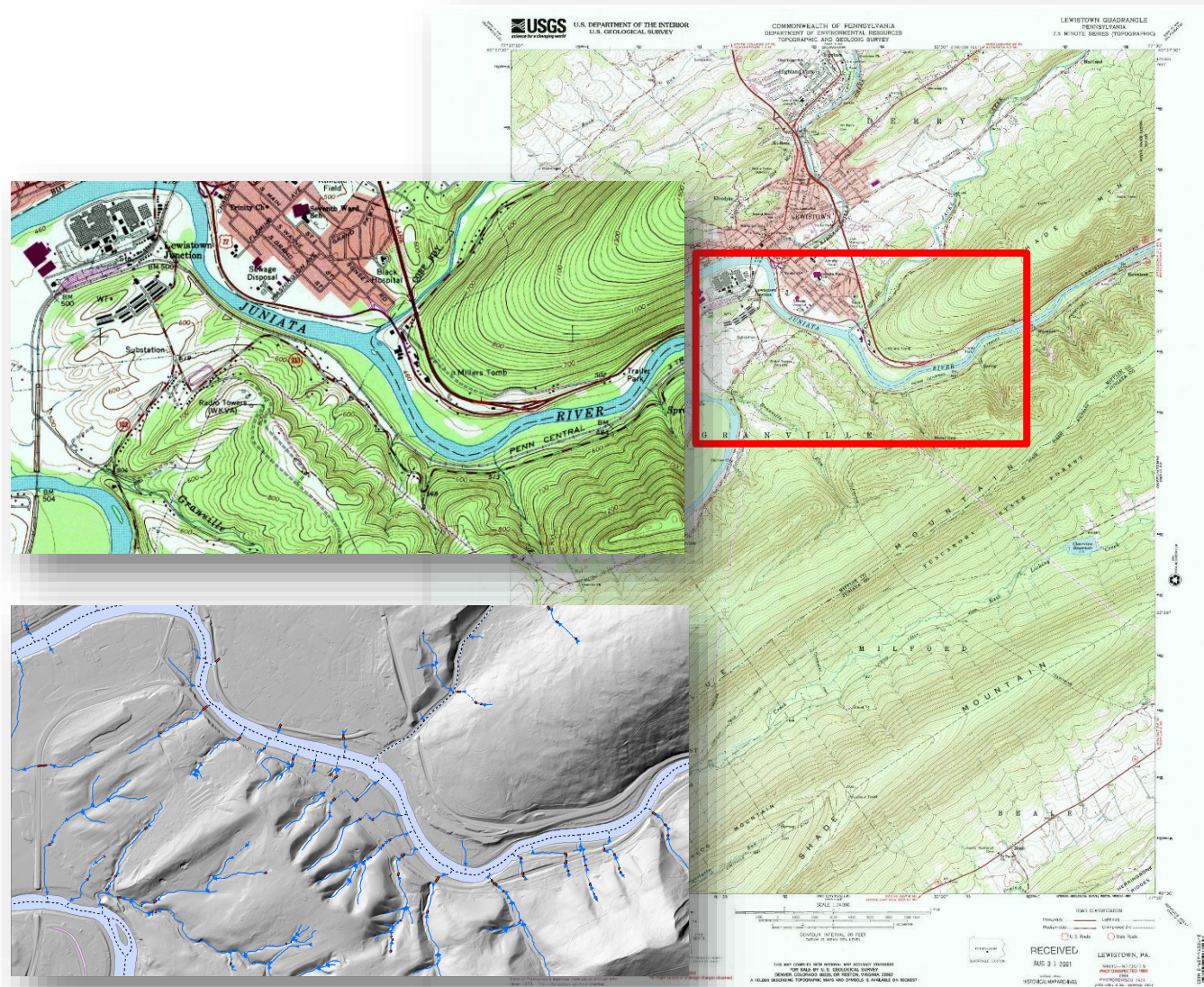
 **>55**  
LOCATIONS  
nationwide

 **\$602.7**  
MILLION  
in 2022 revenue

 **65+**  
YEARS  
helping clients build  
and shape communities

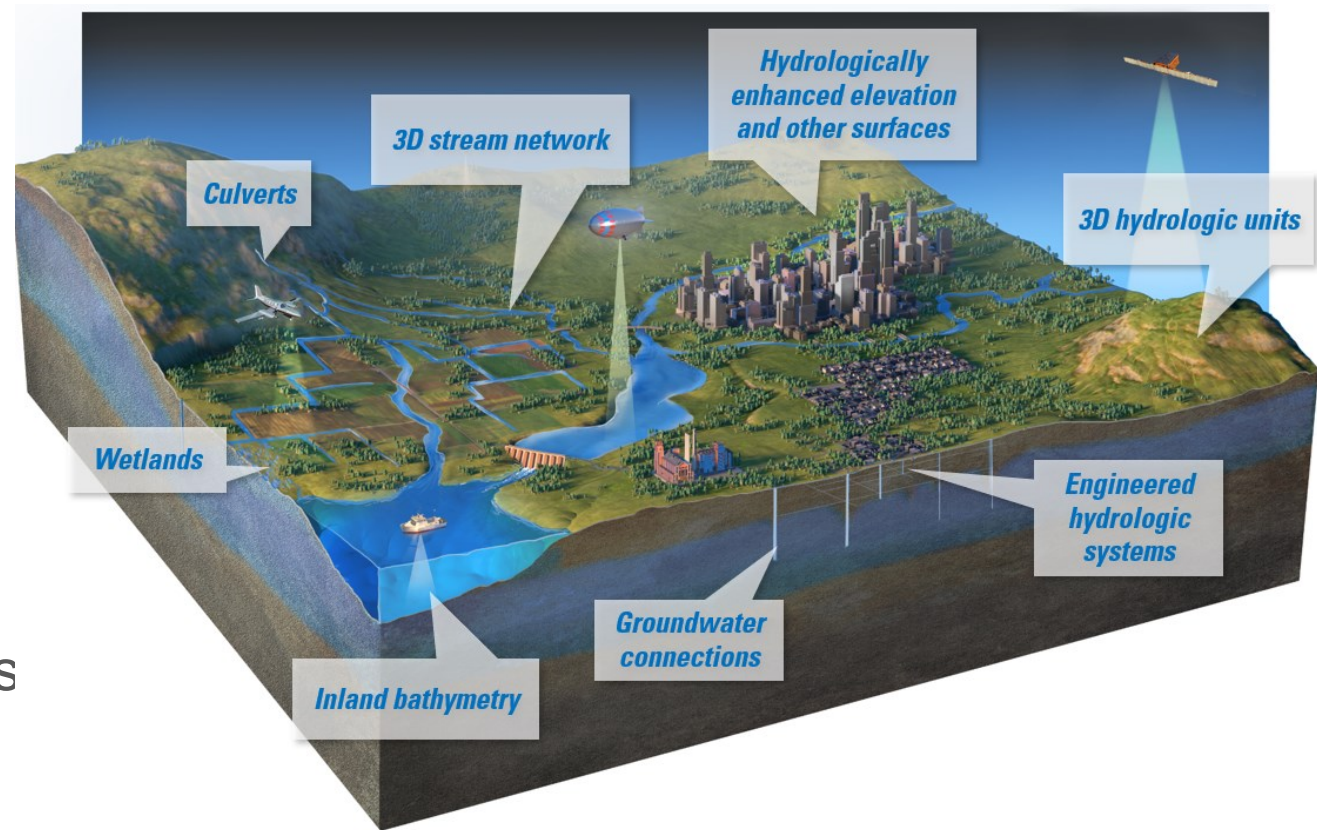
# 3D Hydrography Program

- *3DHP is the first systematic remapping of the Nation's hydrography since the original USGS topographic mapping program was active between 1947 to 1992*



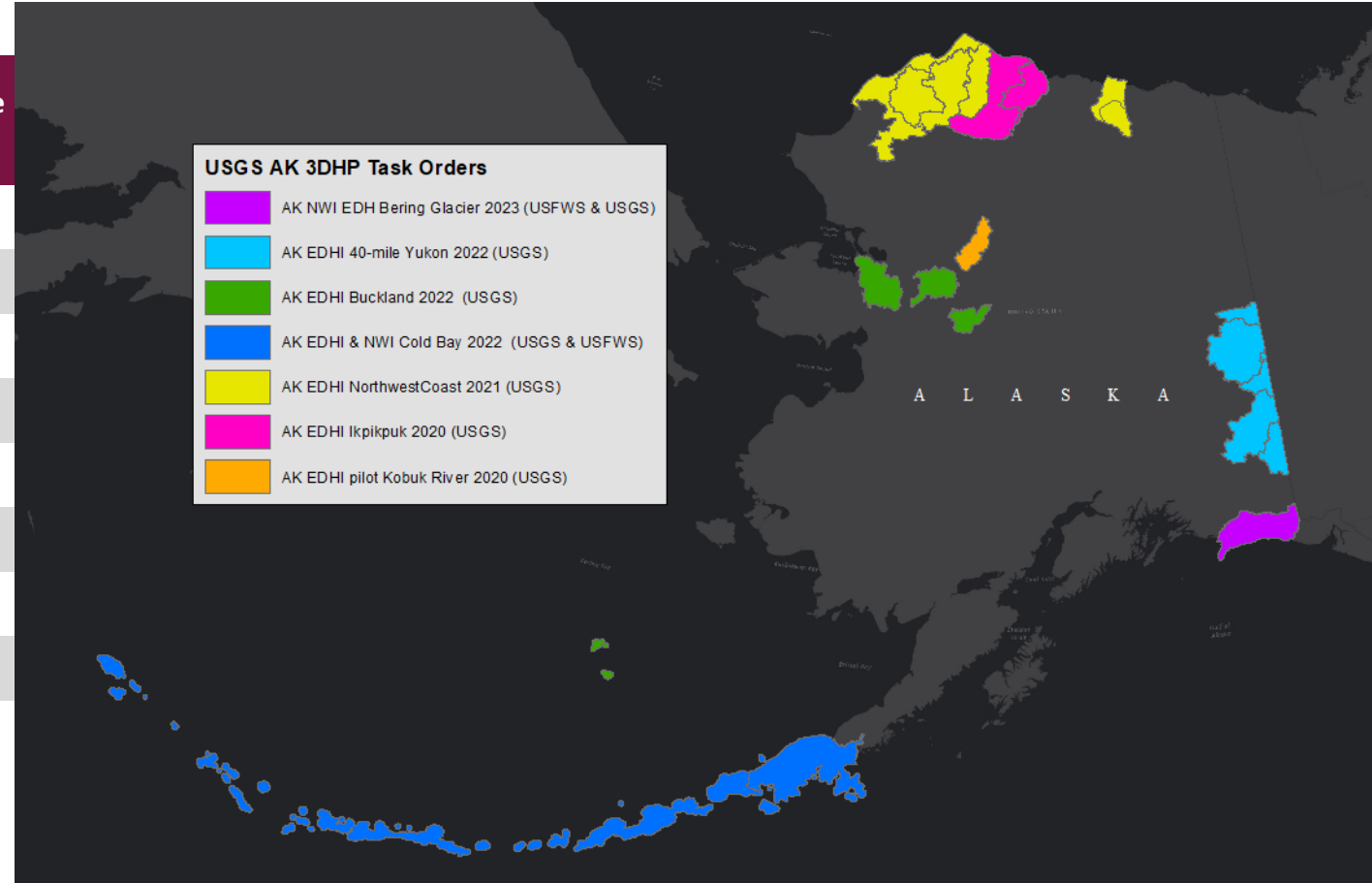
# 3D Hydrography Program Goals

- Align vertically, horizontally, and temporally with 3D Elevation Program (3DEP) data (IfSAR and lidar)
- Data and systems built for hydrologic applications
- Better accounting of the hydrologic cycle through connections to groundwater, U.S. Fish and Wildlife Service National Wetlands Inventory, and engineered hydrography
- Interoperability with other data such as surficial geology, soils, landcover, transportation networks, and other infrastructure



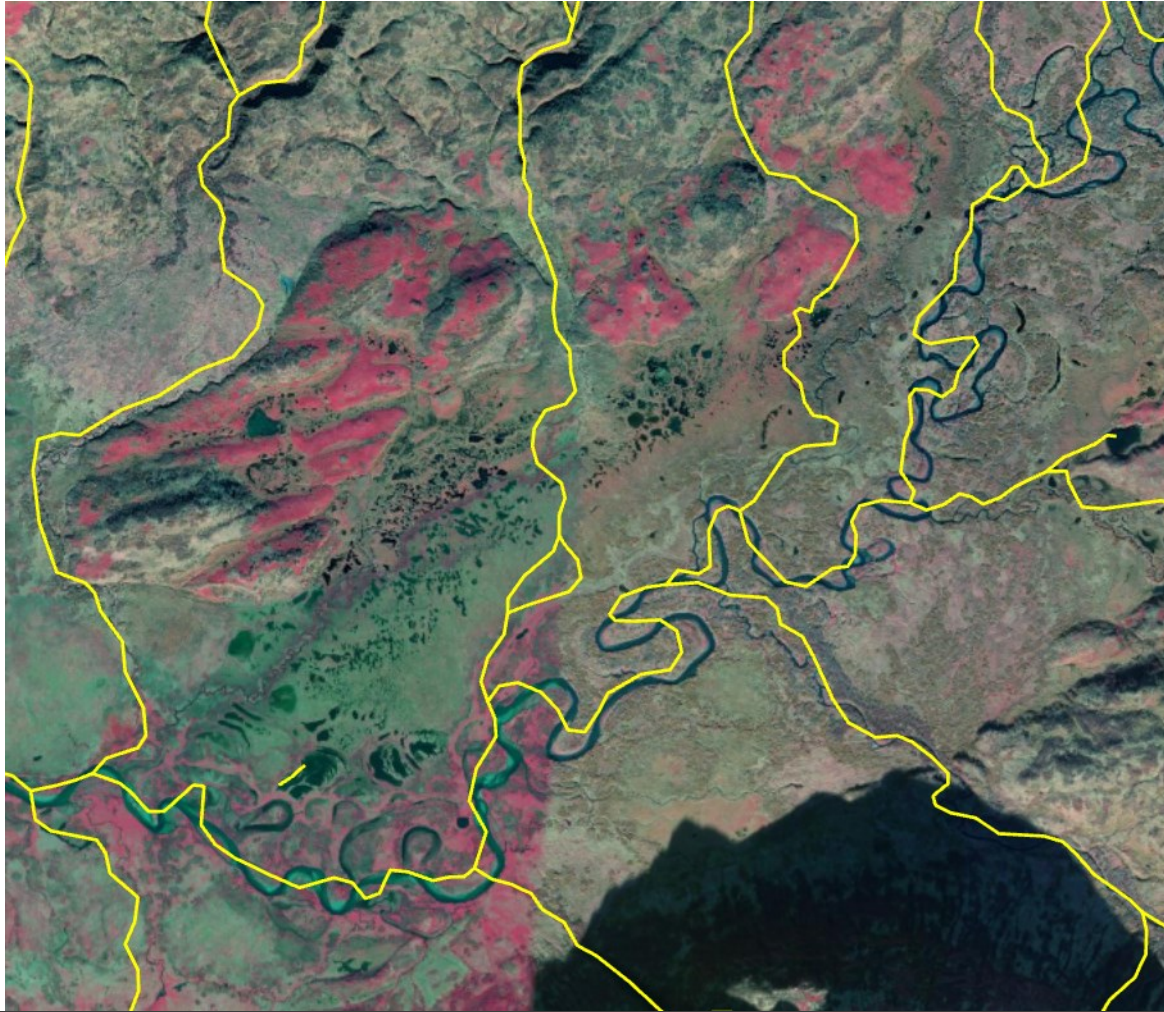
# Dewberry EDH in Alaska

Project Name	Contracting Agency	Total HU8 Areas	Total Square Miles
AK NWI EDH Bering Glacier 2023	USFWS & USGS	1	4,987
AK EDHI 40-mile Yukon 2022	USGS	6	15,452
AK EDHI Buckland 2022	USGS	4	7,828
AK EDHI Cold Bay 2022	USGS & USFWS	3	27,554
AK EDHI Ikpikpuk 2020	USGS	2	9,880
AK EDHI Northwest Coast 2021	USGS	8	25,145
AK EDHI pilot Kobuk River 2020	USGS	1	1,987
	<b>Grand Total</b>	<b>25</b>	<b>92,833</b>



# Improved Alignment and Increased Density

Before EDH – NHD Flowlines

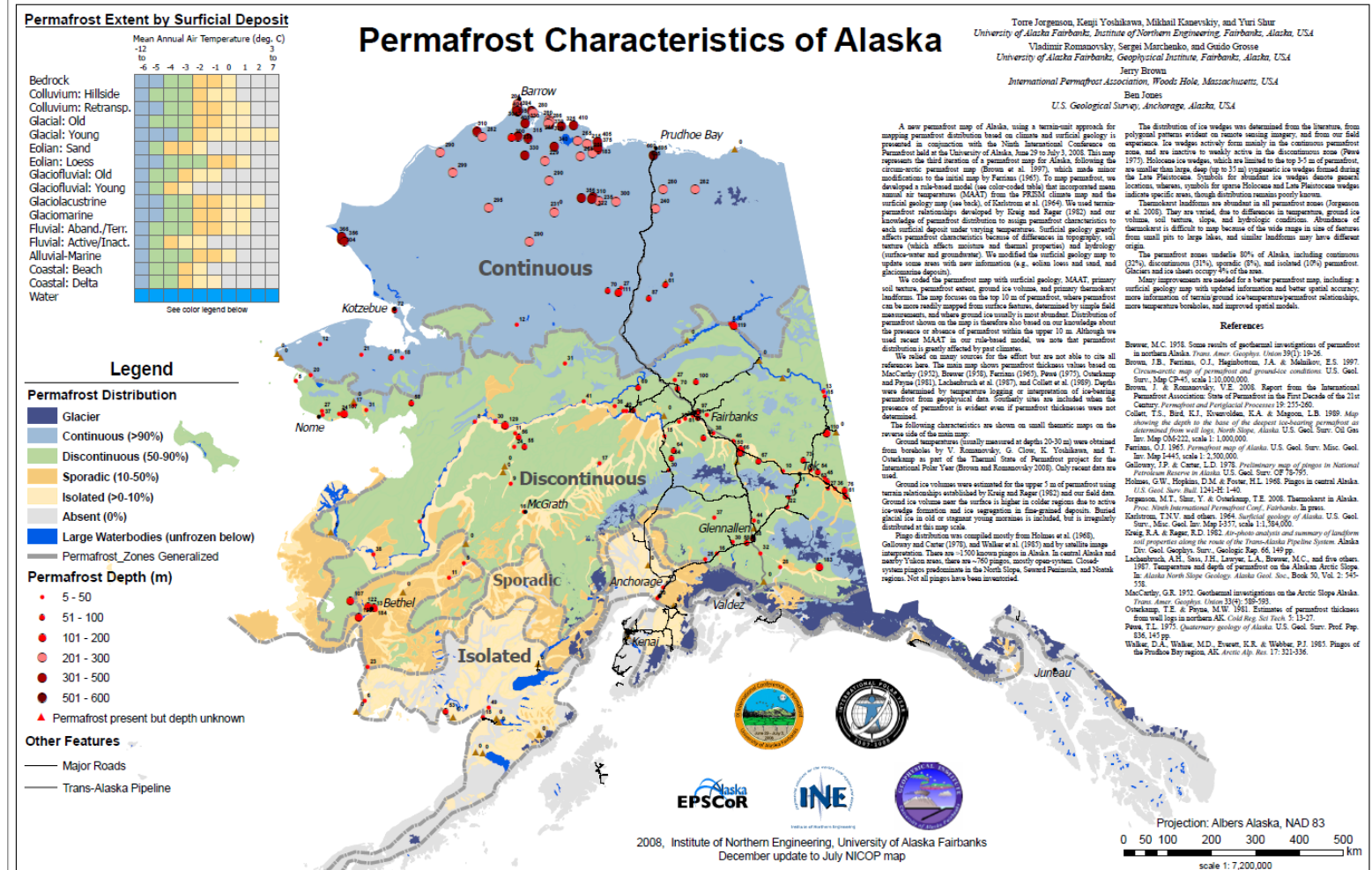


After EDH – EDH Flowlines



# Unique Challenges and Opportunities in Alaska

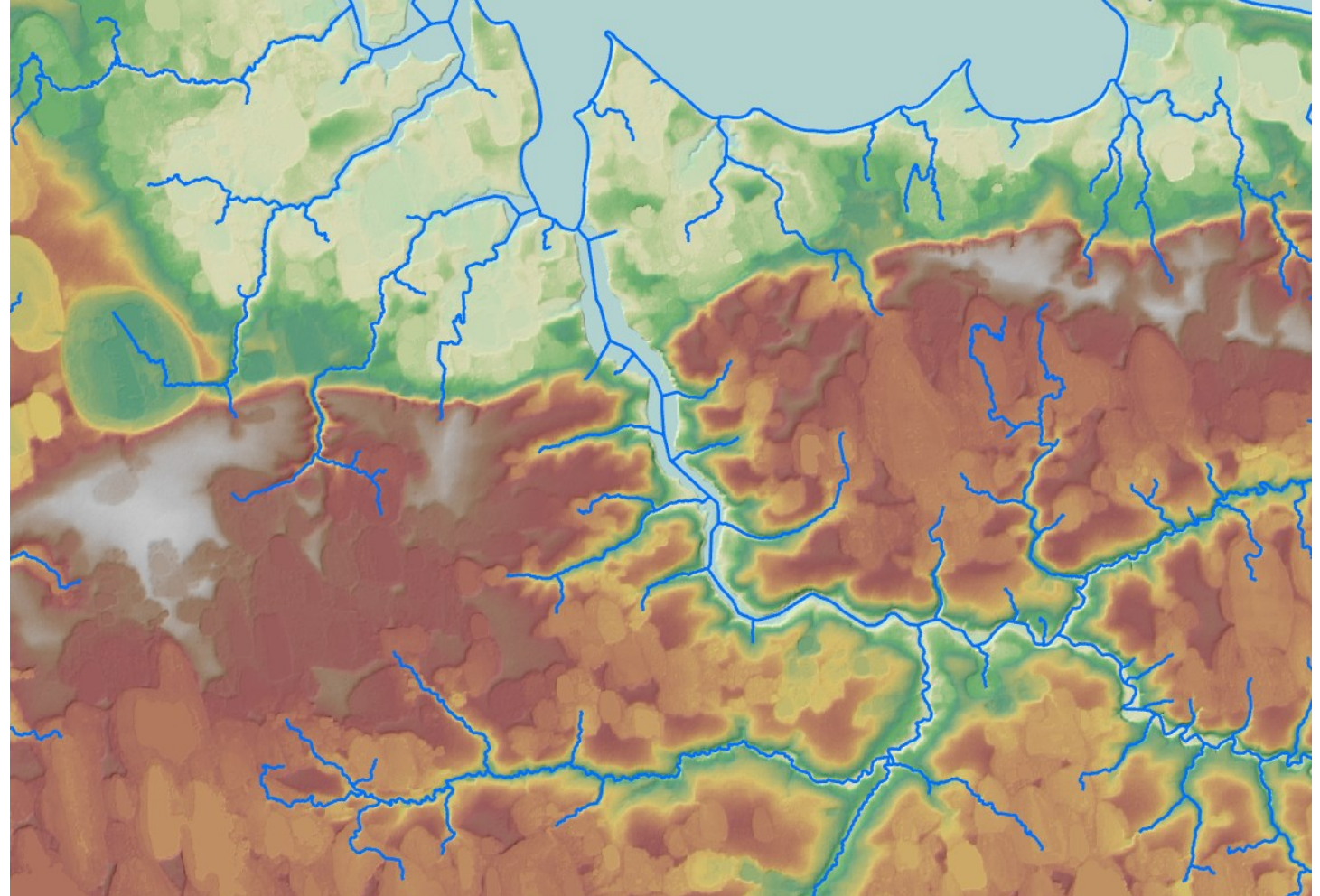
- Thermokarst geology
  - Focus on channelized streams
  - Landcover difficult to model due to deranged terrain.
  - North slope especially challenging due to widespread thermokarst



Jorgensen et al. 2008, Institute of Northern Engineering, University of Alaska Fairbanks

# Unique Challenges and Opportunities in Alaska

- Deranged terrains across thermokarst landscapes
- Only channelized streams requested in these areas.





# Unique Challenges and Opportunities in Alaska

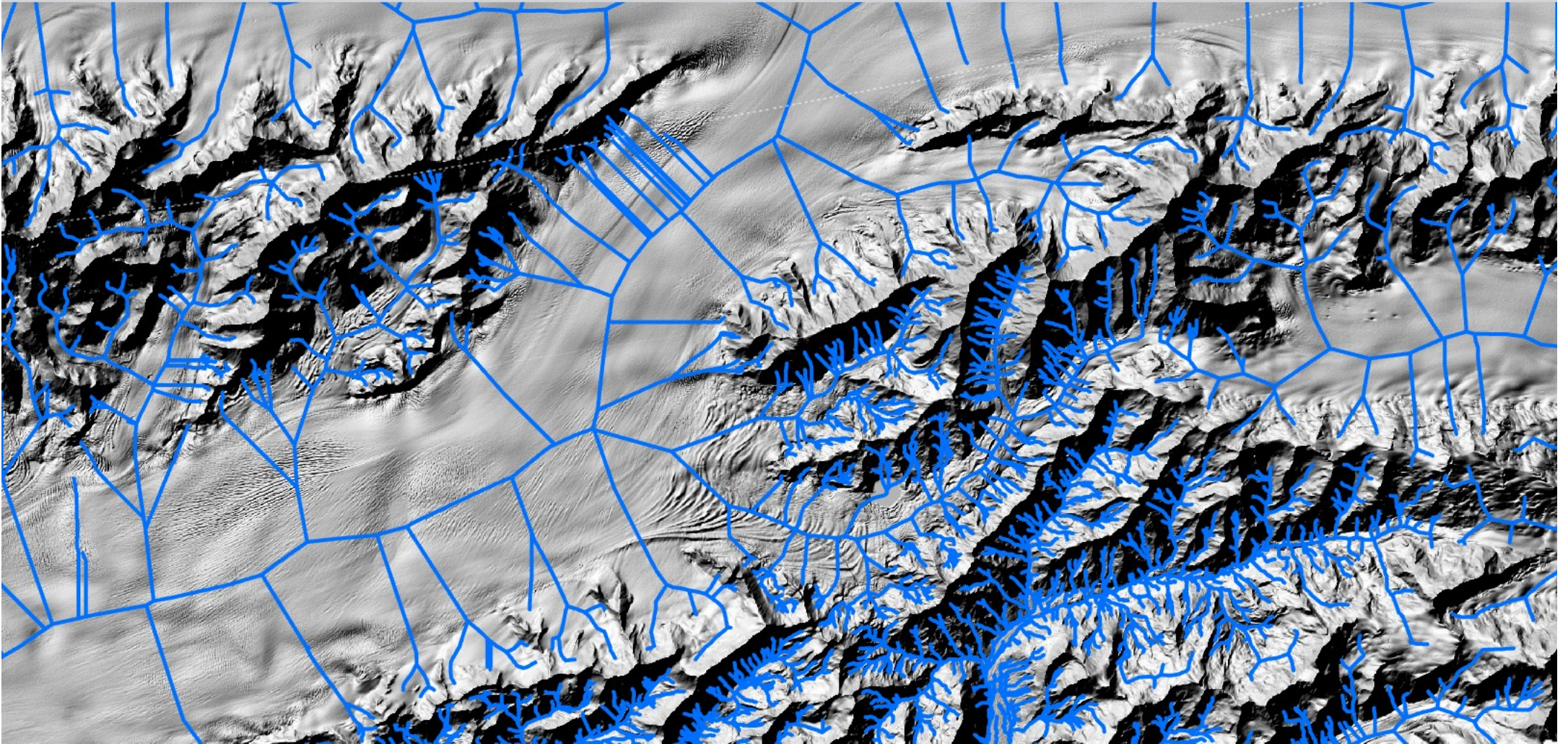
## EDH Modeling – Bering Glacier, Alaska



Image Source: Esri

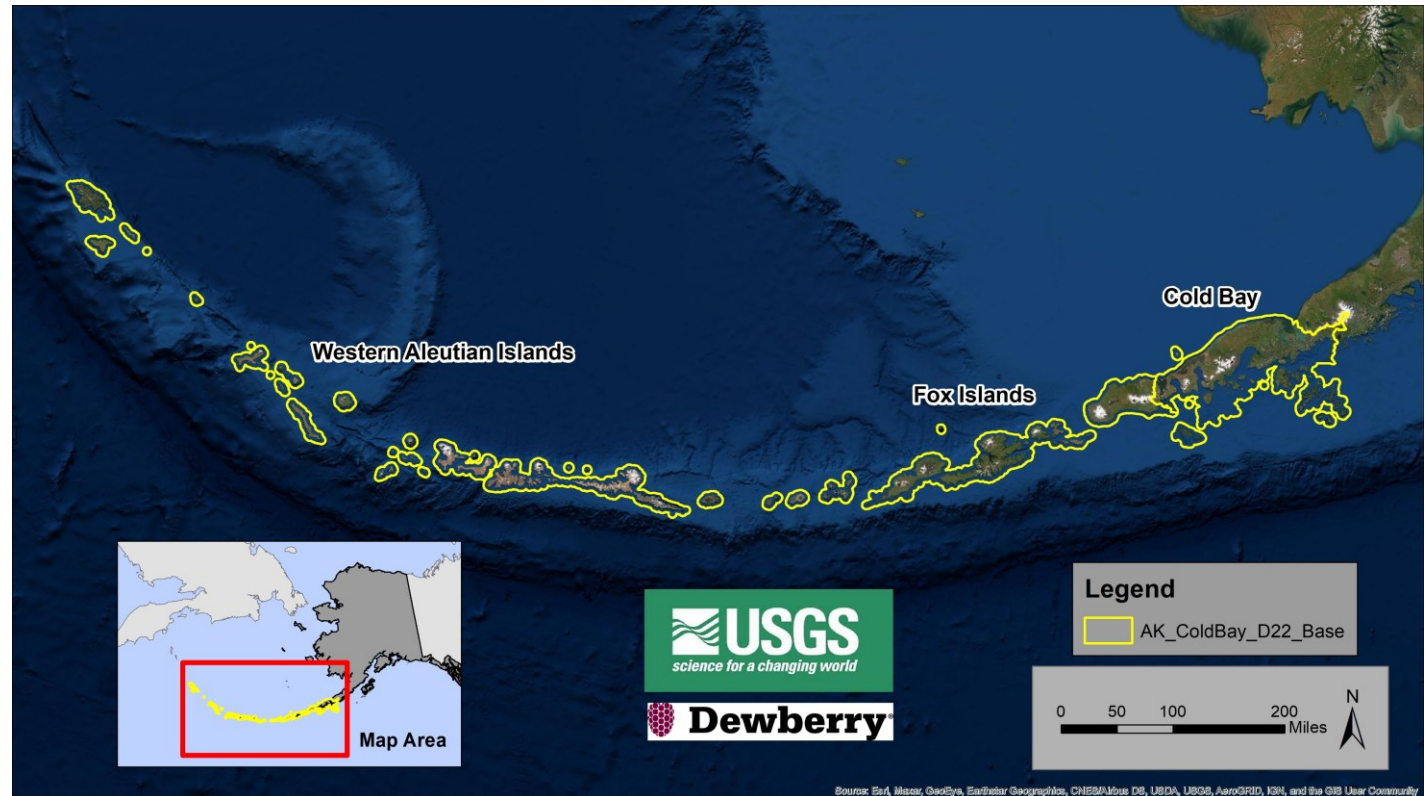
# Unique Challenges and Opportunities in Alaska

## EDH Modeling – Bering Glacier, Alaska

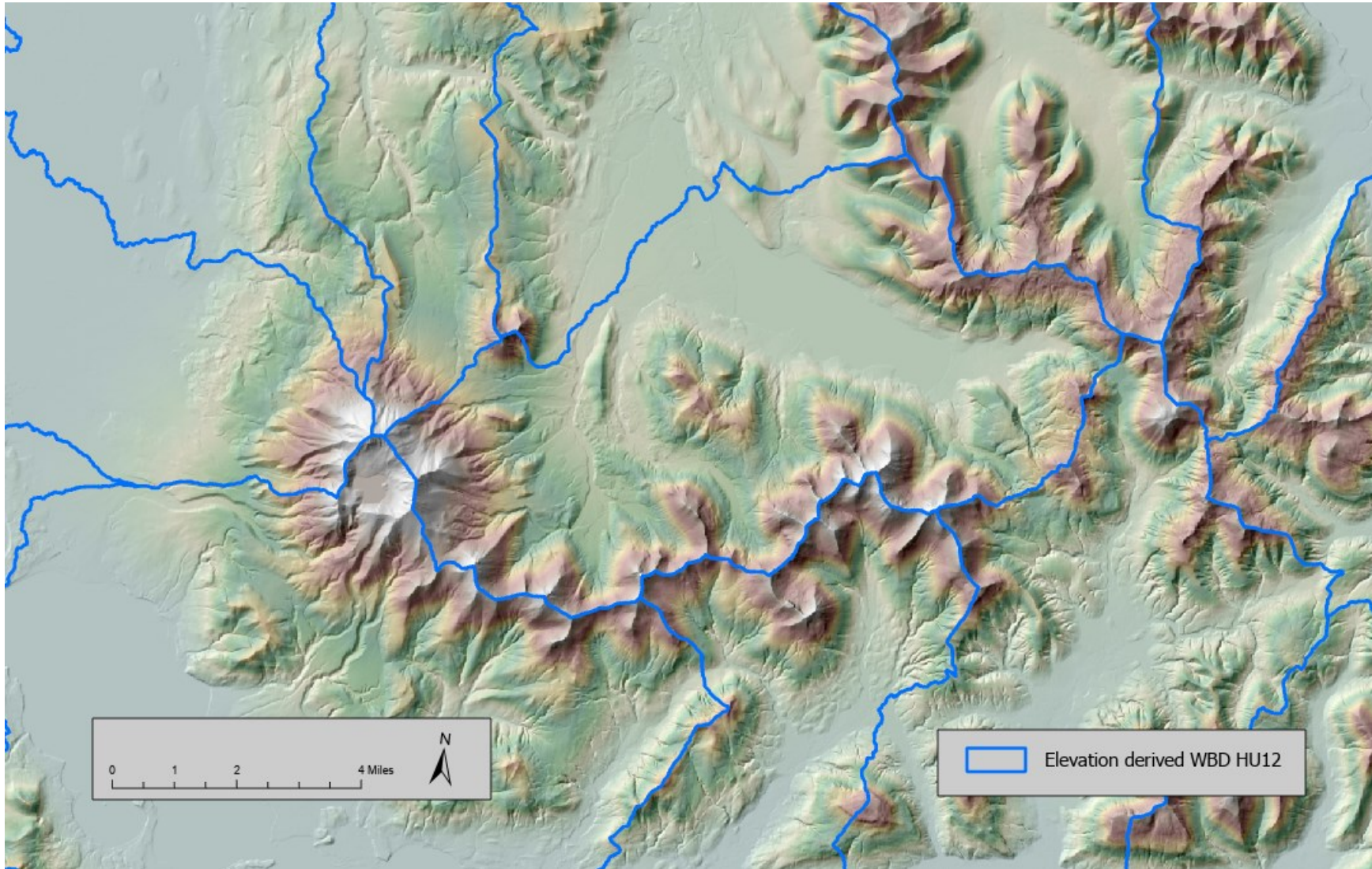


# Unique Challenges and Opportunities in Alaska

- Watershed Boundary Delineation
  - Cold Bay & Fox Islands have existing HU8, HU10, & HU12 Watershed Boundaries
  - Western Aleutian Islands have **never** had HU10 or HU12 WBDs.
  - Dewberry is developing the first ever HU10 & HU12 WBDs for the Western Aleutian Islands



# Elevation derived HU12 Watershed Boundaries



# Unique Challenges and Opportunities in Alaska

- Cold Bay EDH & NWI
- USGS & USFWS Partnership
- NWI coordination:
  - Prep and timing for field work
  - De-duplication of efforts (map once, use many)
  - Use EDH to support NWI mapping



# Business Use Cases for 3DHP in Alaska

- Risk mitigation including flood forecast modeling
  - Coastal hazard identification and management
  - FEMA flood modeling and risk analysis



Image Source: NOAA ShoreZone of Old Harbor, Kodiak Island

# Business Use Cases for 3DHP in Alaska

- Surface and ground water quality and quantity
  - Drinking water protection
  - Permitting
  - Contaminant and spill prevention and response



Image Source: USFS Pacific Northwest Research Station

# Business Use Cases for 3DHP in Alaska

- Resource management
  - Habitat identification and protection for fish and other species
  - Watershed and ecosystem management
  - Forest land management
  - Wetland mapping

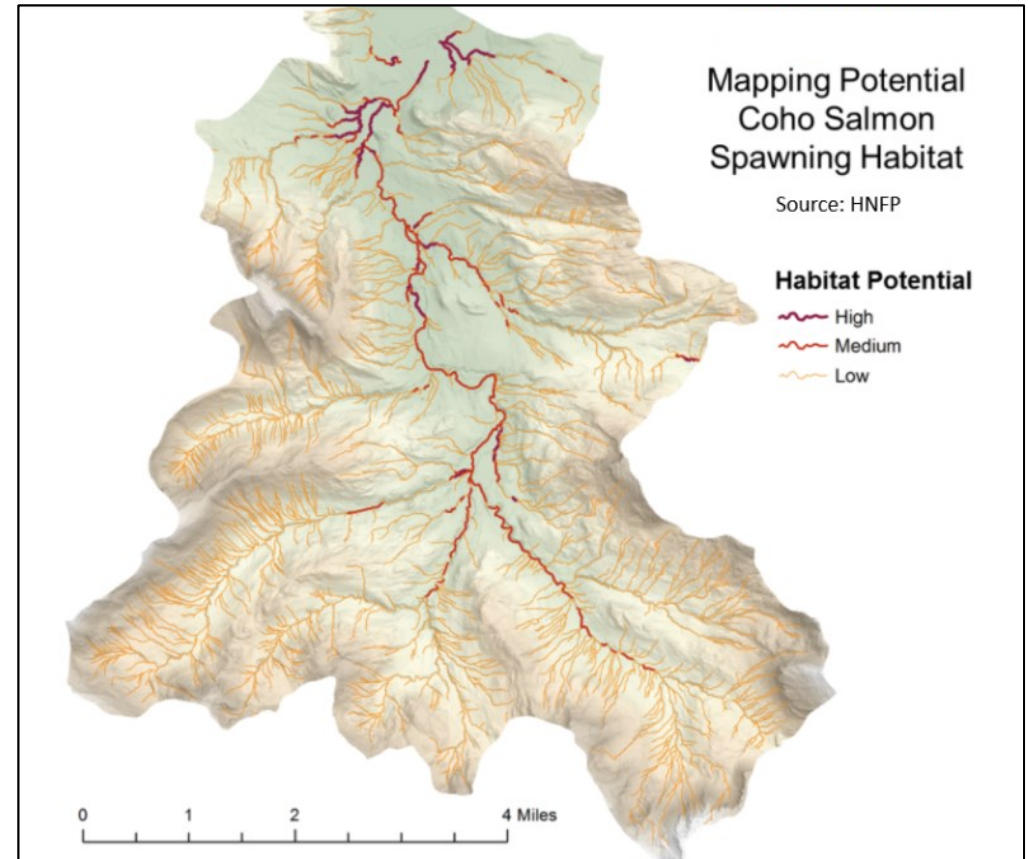


Image Source: Hoonah Native Forest Partnership



# Questions/Open Forum

## Contact

Amar Nayegandhi, CP, CMS, GISP  
[anayegandhi@dewberry.com](mailto:anayegandhi@dewberry.com)

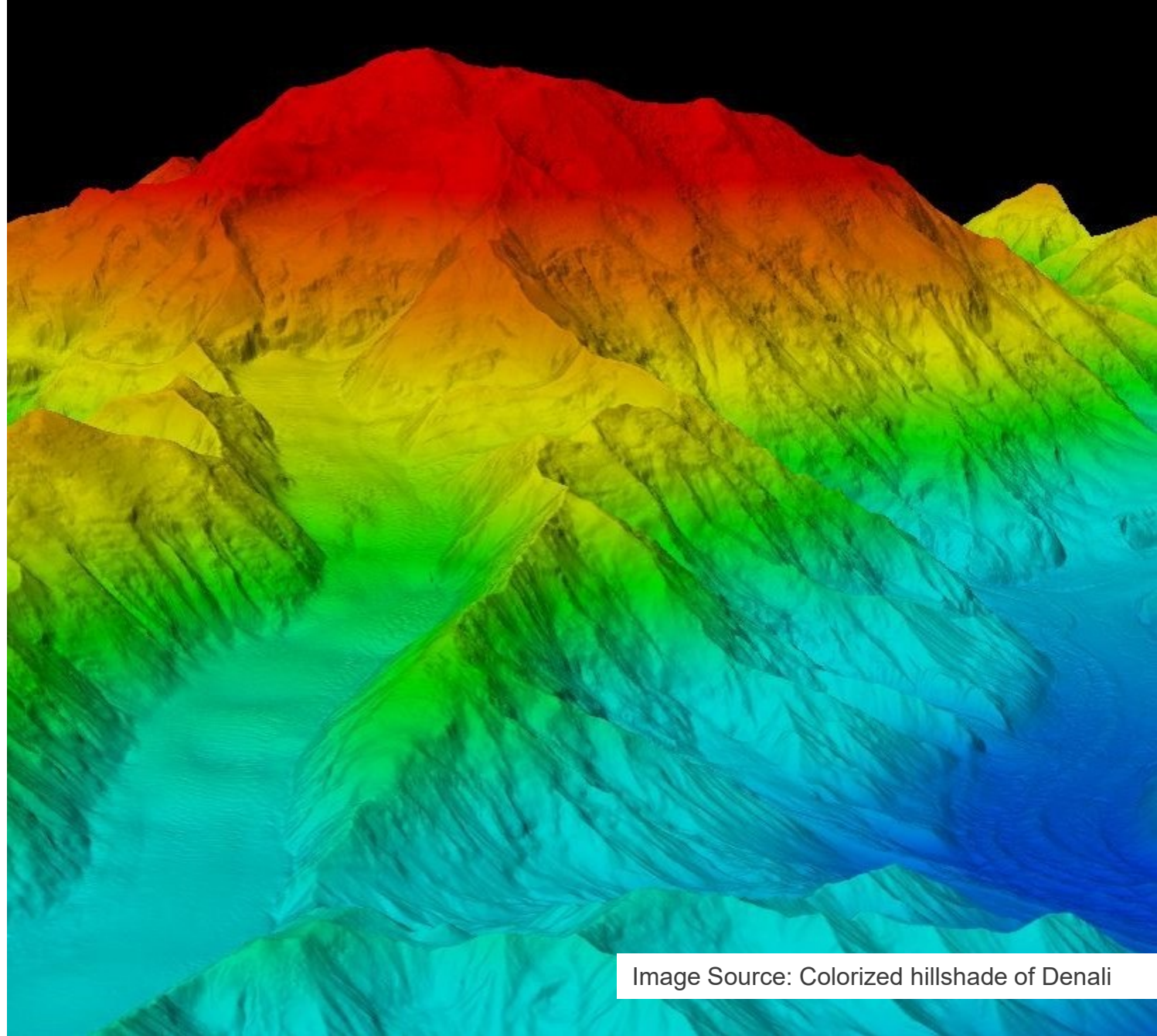


Image Source: Colorized hillshade of Denali