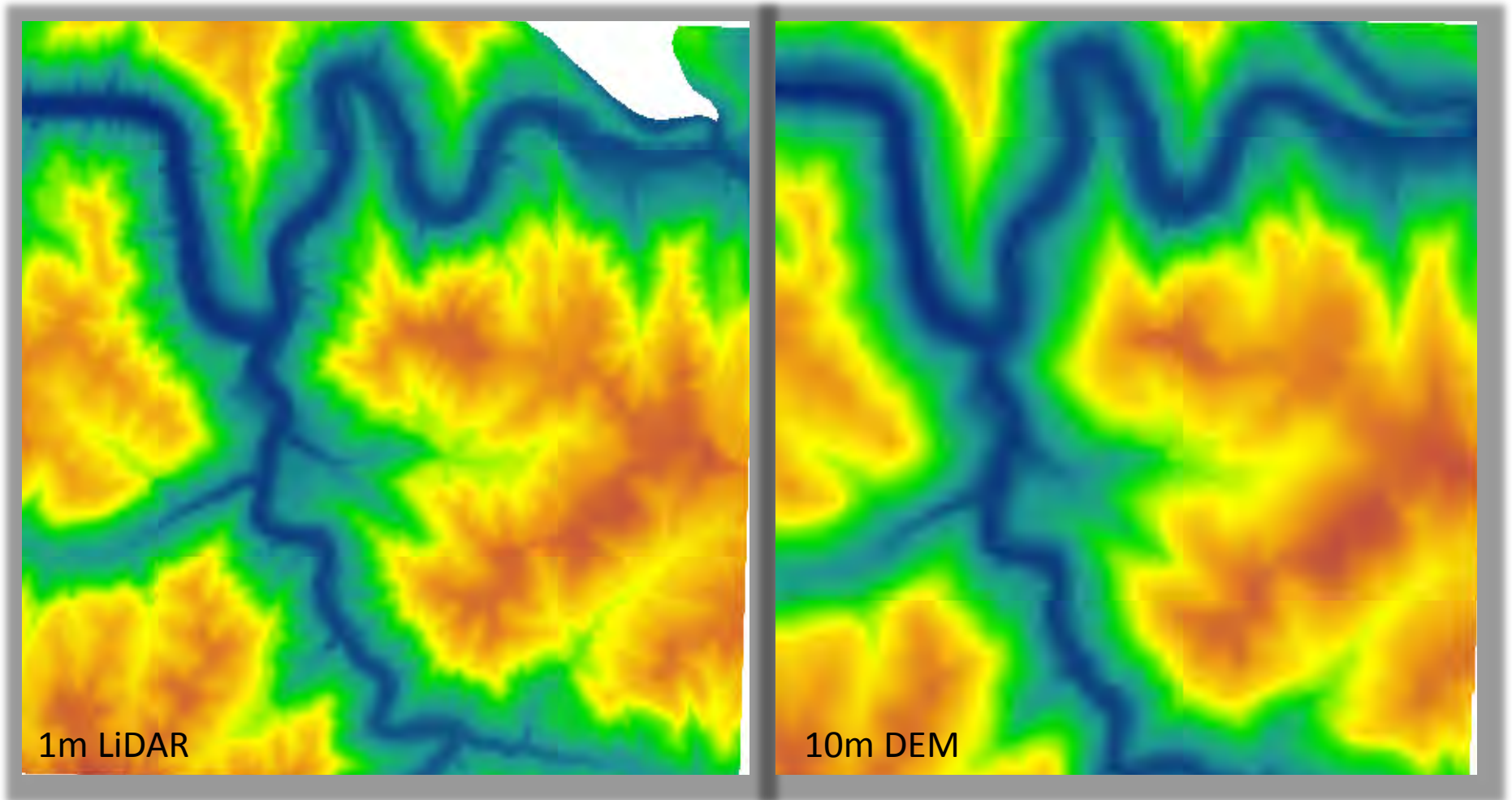


- **Historical Splash-Dam Reservoir Extent Derived from 1-m and 10-m Spatial Resolutions**

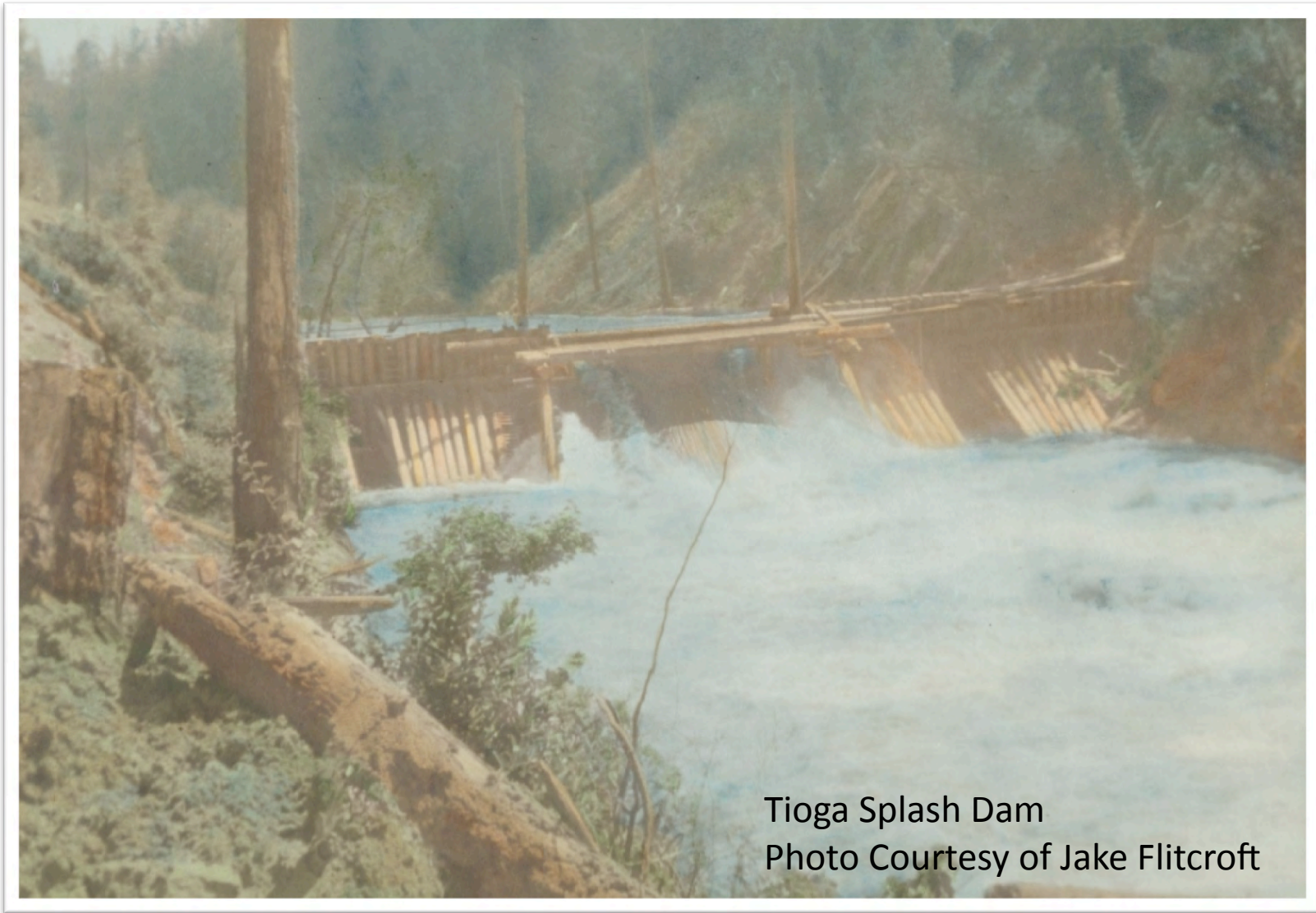


By Rebecca Miller

Geo 580 Final Project

Historical Splash Damming Background:

- Method to transport lumber in Oregon between late 1870's-1956
- Splash Dam reservoirs released a flood of water and logs



Tioga Splash Dam
Photo Courtesy of Jake Flitcroft

- Freshets had considerable stream power which entrained, or swept away any moveable objects -gravel, cobble, natural wood- and scoured the channel to bedrock
- Much literature attributes splash damming as one of the key culprits of the historical decline of PNW salmon runs- evidence based on anecdotal records (Taylor, 1999, Lichatowich, 1999)

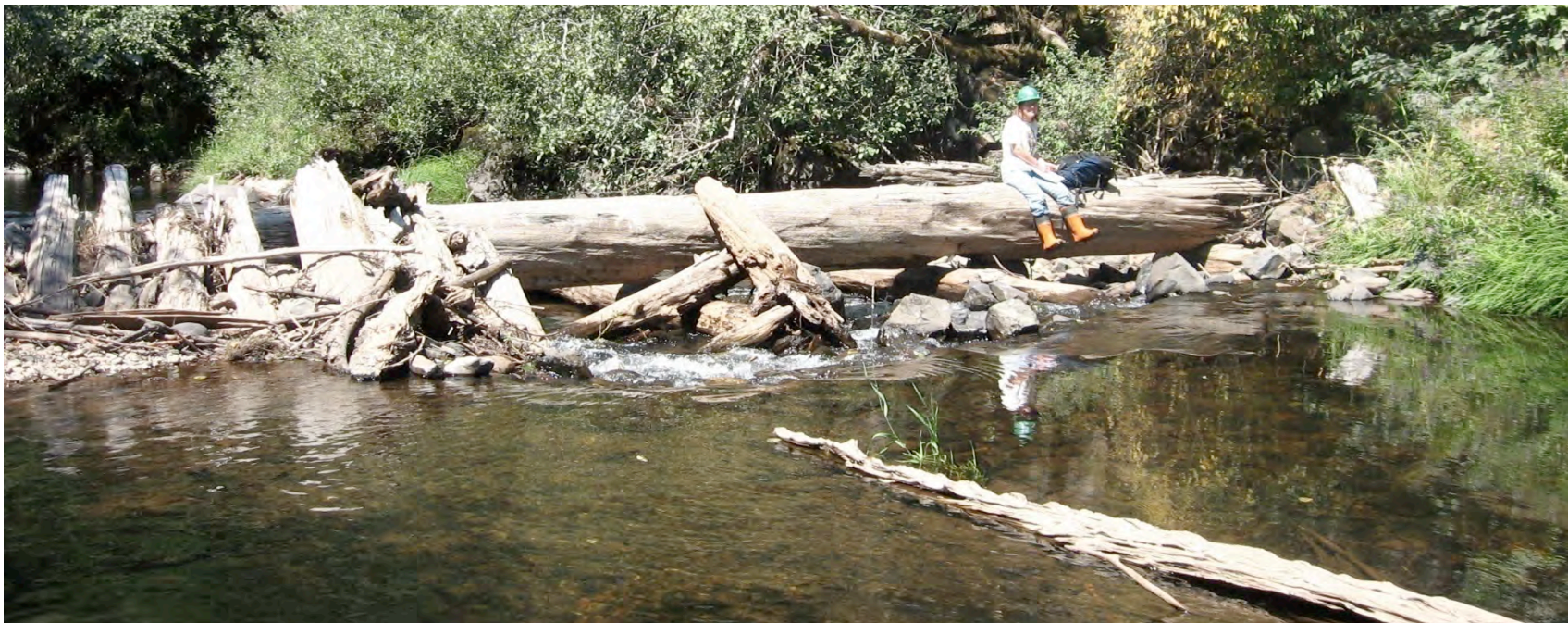


A splashed dammed waterway scoured to bedrock. Port of Coquille 1929

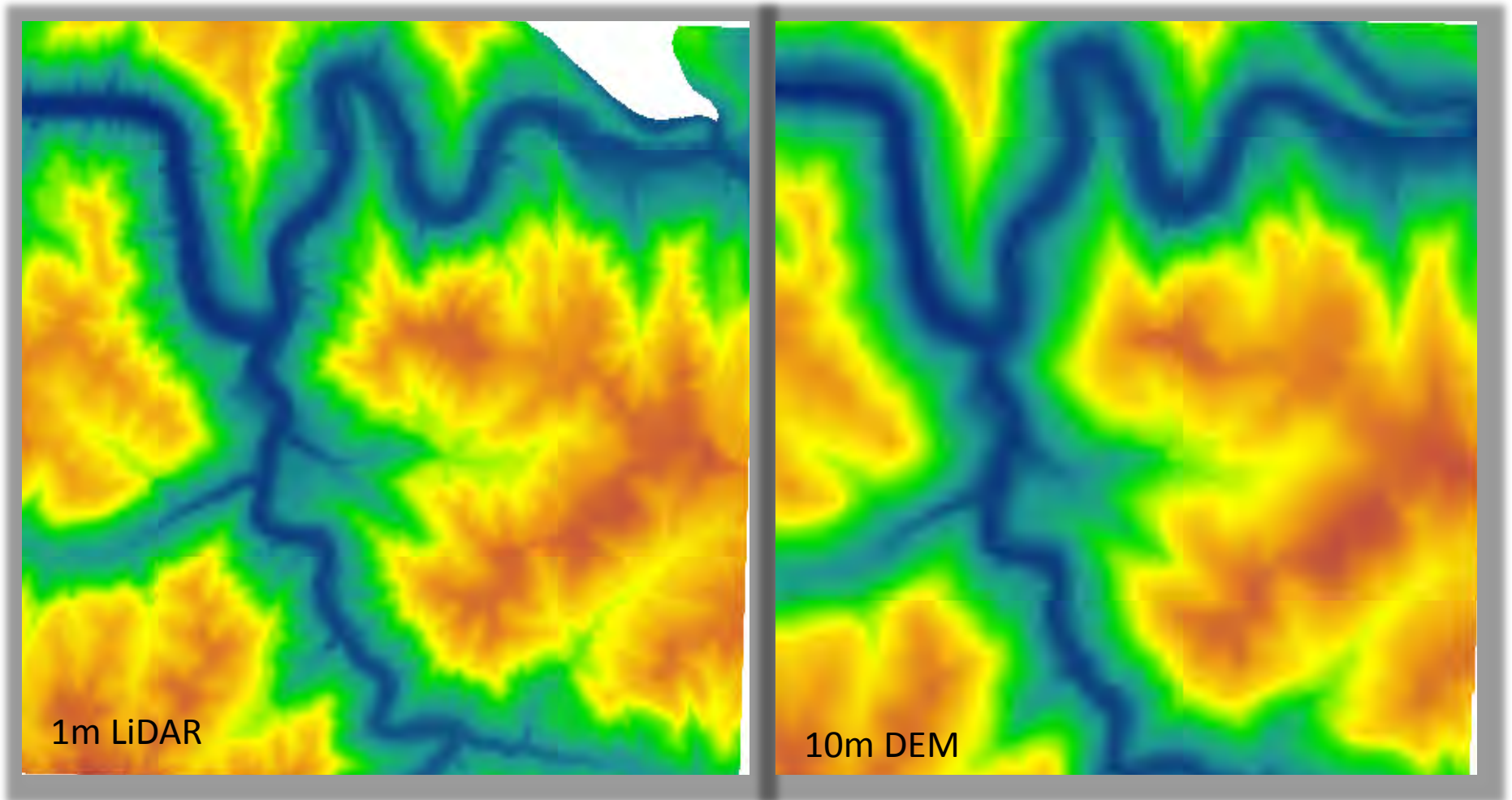
Geo 580 Background:

Masters Thesis -Does the legacy of splash damming freshets still exist in the Oregon Coast Range?

- Compare in-channel variables above and below a splash dam
- Omit the splash dam reservoir section by estimating the extent of the water inundation using topographical contours



- **Geo 580 Data Sets:**
 - Two Topographical Data Sources available
 - 10m Digital Elevation Models (DEMs)
 - 1m Light Detection and Ranging (LiDAR) - in certain portions of the Oregon Coast Range



Geo 580 Objective :

- Work with 1m LiDAR data
- Compare spatial resolution of 1m LiDAR and 10m DEM data

Geo 580 Project Questions :

Goal 1: Will the length and area of computer-generated splash-dam reservoirs be larger using 1m Bare Earth LiDAR Grids or 10m Digital Elevation Model (DEM) Grids?

Goal2: What is the difference between the computer generated splash dam reservoir extent and the reservoir extent seen in a 1950 aerial photograph?

Geo 580 Study Area:



Tioga Splash Dam

S. F. Coos River 1941-1956

‘War time emergency’

Largest splash dam in Oregon

16m (52ft) in height- round up 20m

- Base elevation contour ~130m
- Reservoir height ~150m

Devoe Splash Dam

W.F. Millicoma River ?-1923-?

Unknown height- use 10 m as default

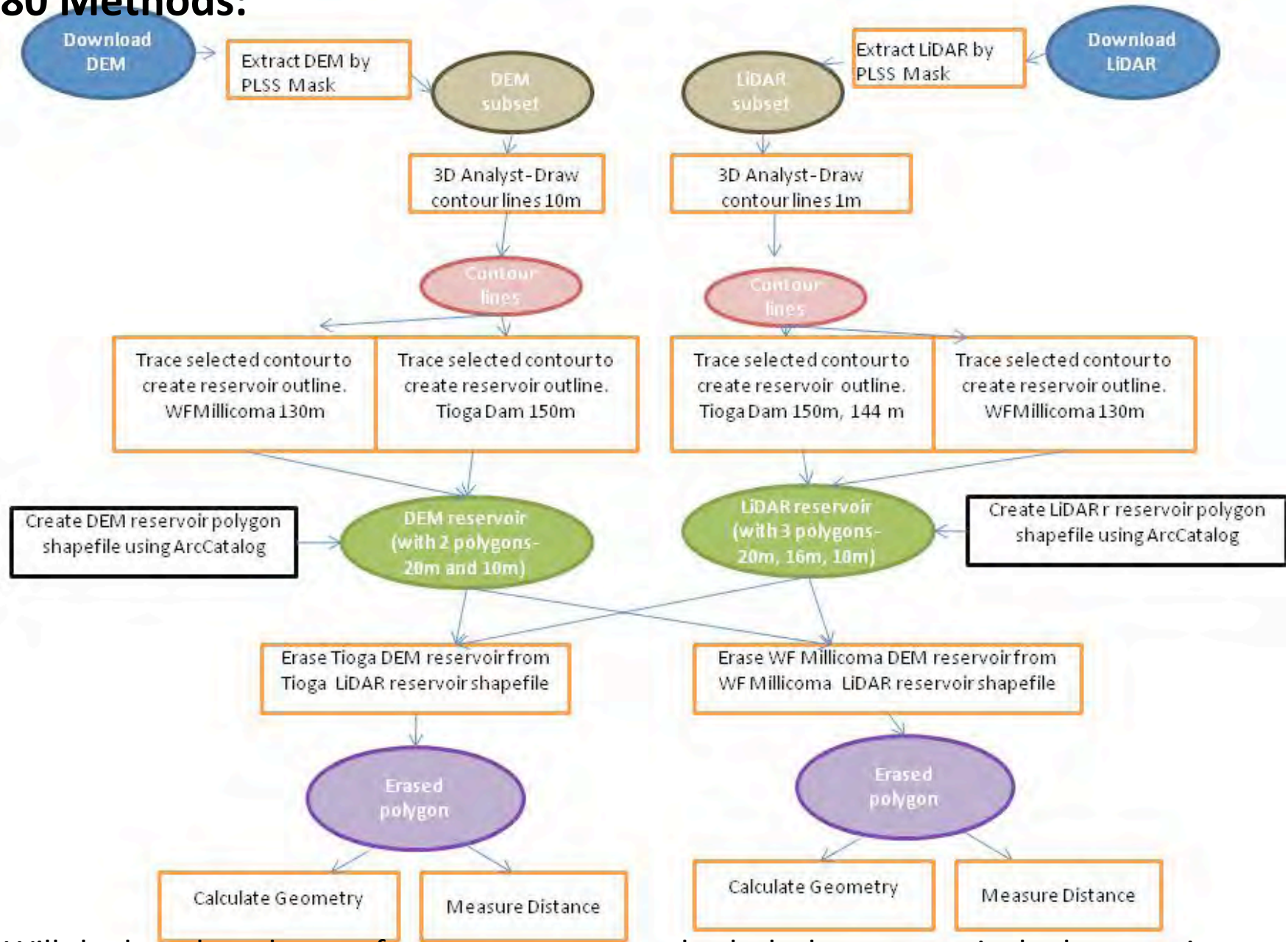
- Base elevation contour ~120m
- Reservoir height ~130m

1950 Aerial photo of the
Tioga Dam

Reservoir extent
North arm 2,891 m (1.7 miles!)



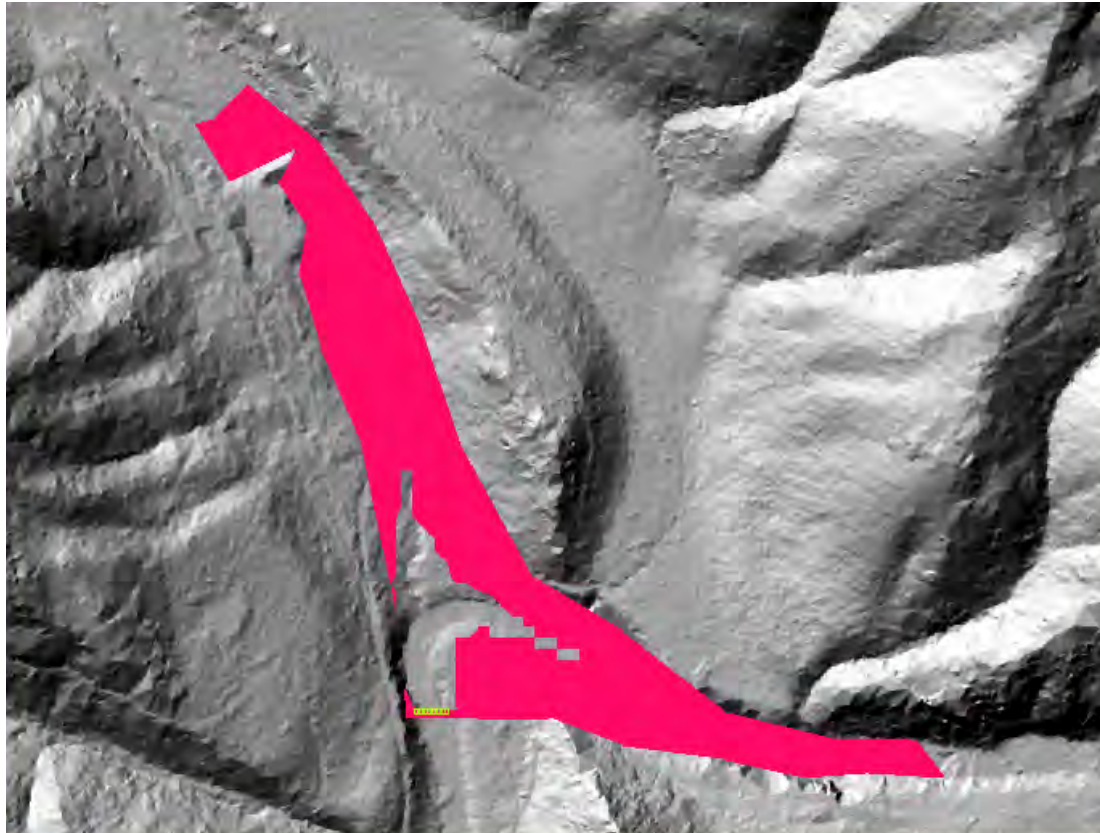
Geo 580 Methods:



Goal 1: Will the length and area of computer-generated splash-dam reservoirs be larger using 1m Bare Earth LiDAR Grids or 10m Digital Elevation Model (DEM) Grids?

Geo 580 Results:

Goal 1: Will the length and area of computer-generated splash-dam reservoirs be larger using 10m Bare Earth LiDAR Grids or 10m Digital Elevation Model (DEM) Grids?



WF Millicoma Dam

Erased 130m DEM from 130Lidar

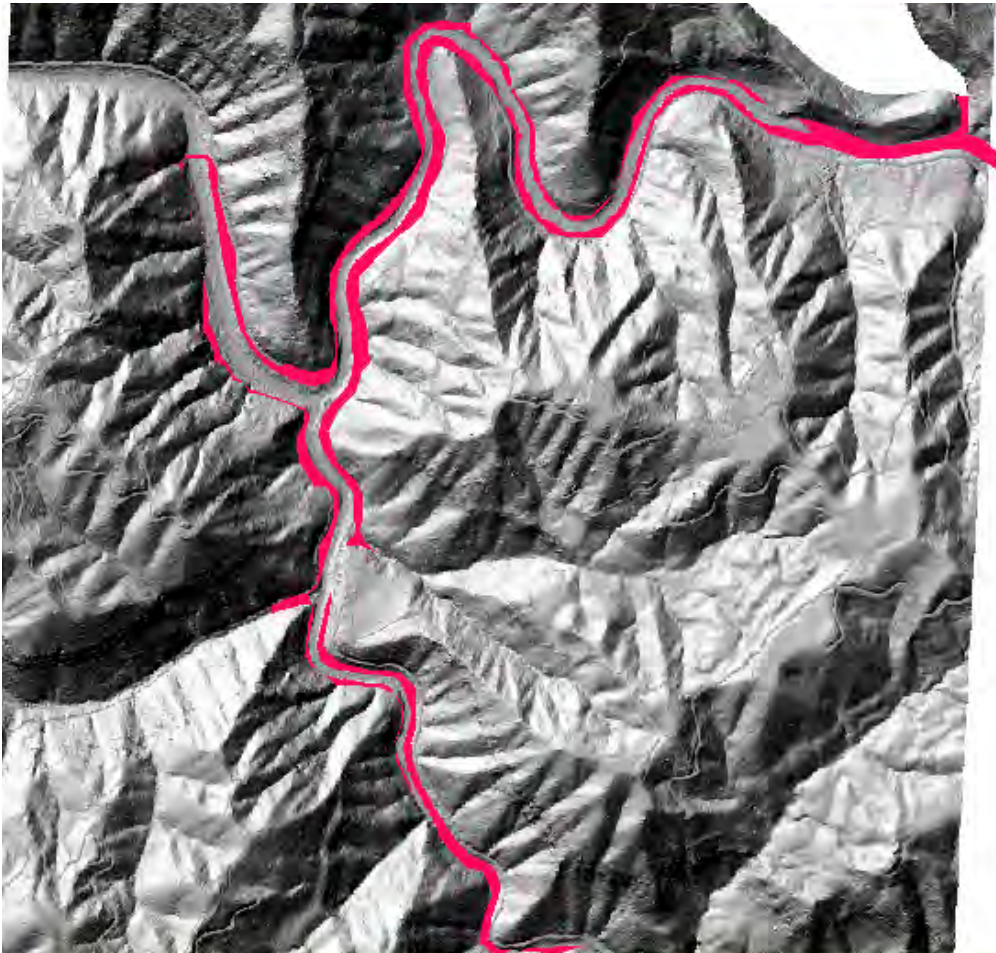
65,389 m² more area

LiDAR Reservoir extended
337m further

0 75 150 300
Meters

Geo 580 Results:

Goal 1: Will the length and area of computer-generated splash-dam reservoirs be larger using 20m Bare Earth LiDAR Grids or 20m Digital Elevation Model (DEM) Grids?



Tioga Dam

Erased 150mDEM from 150mLidar

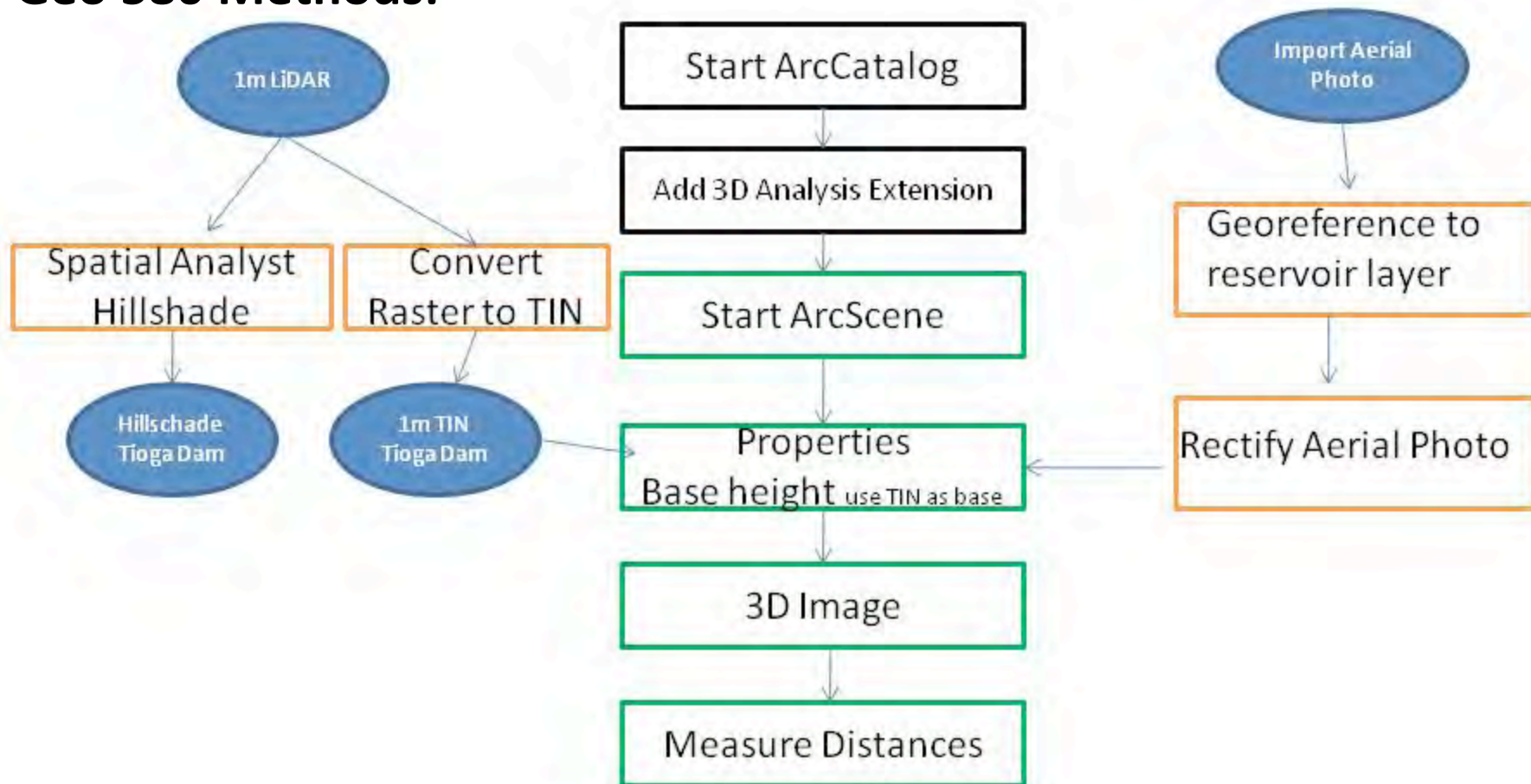
288,072 m² more area

N. Arm LiDAR extended
> 683 m further. Did not clip big
enough LiDAR raster!

S. Arm LiDAR extended
866 m further

0 225 450 900
Meters

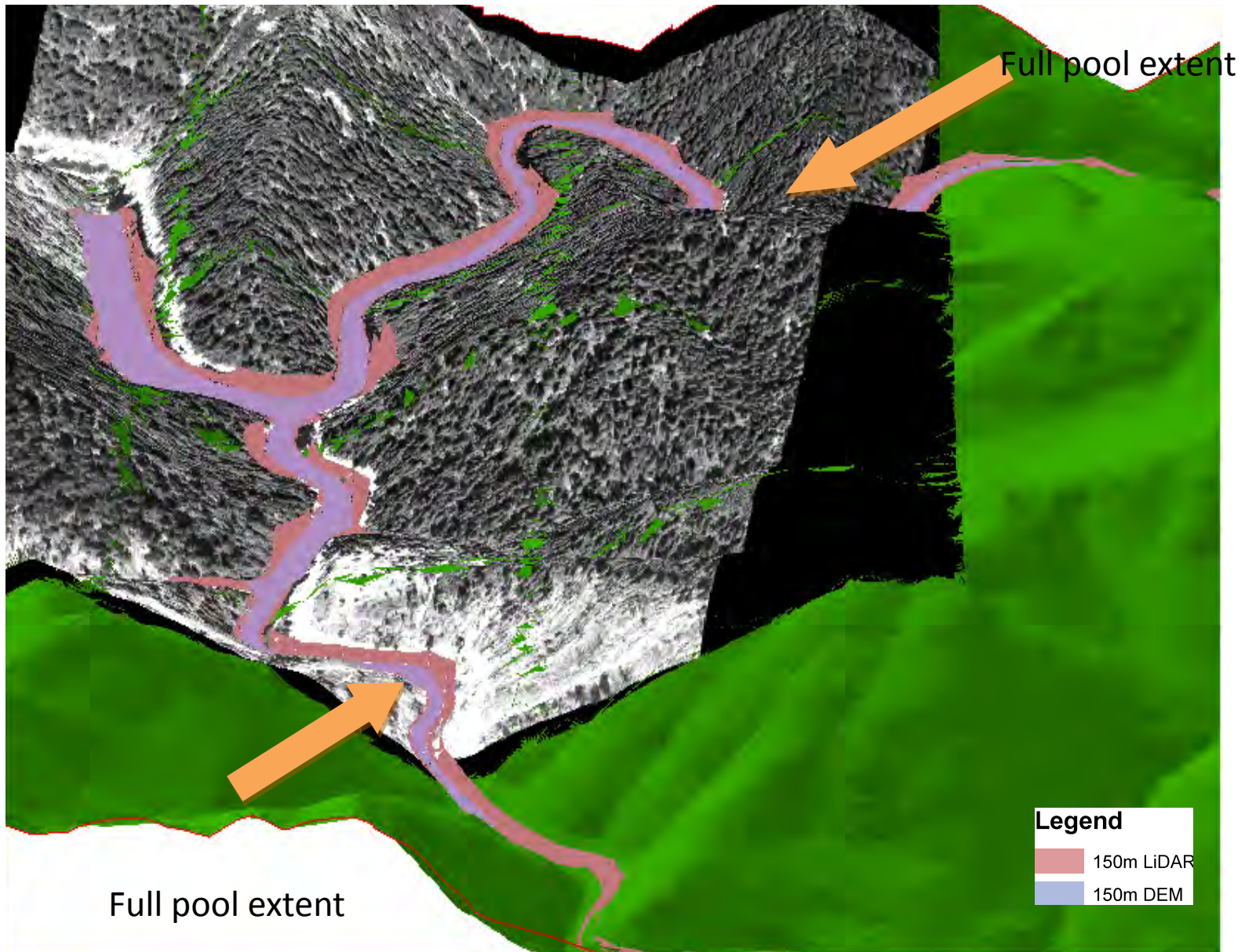
Geo 580 Methods:



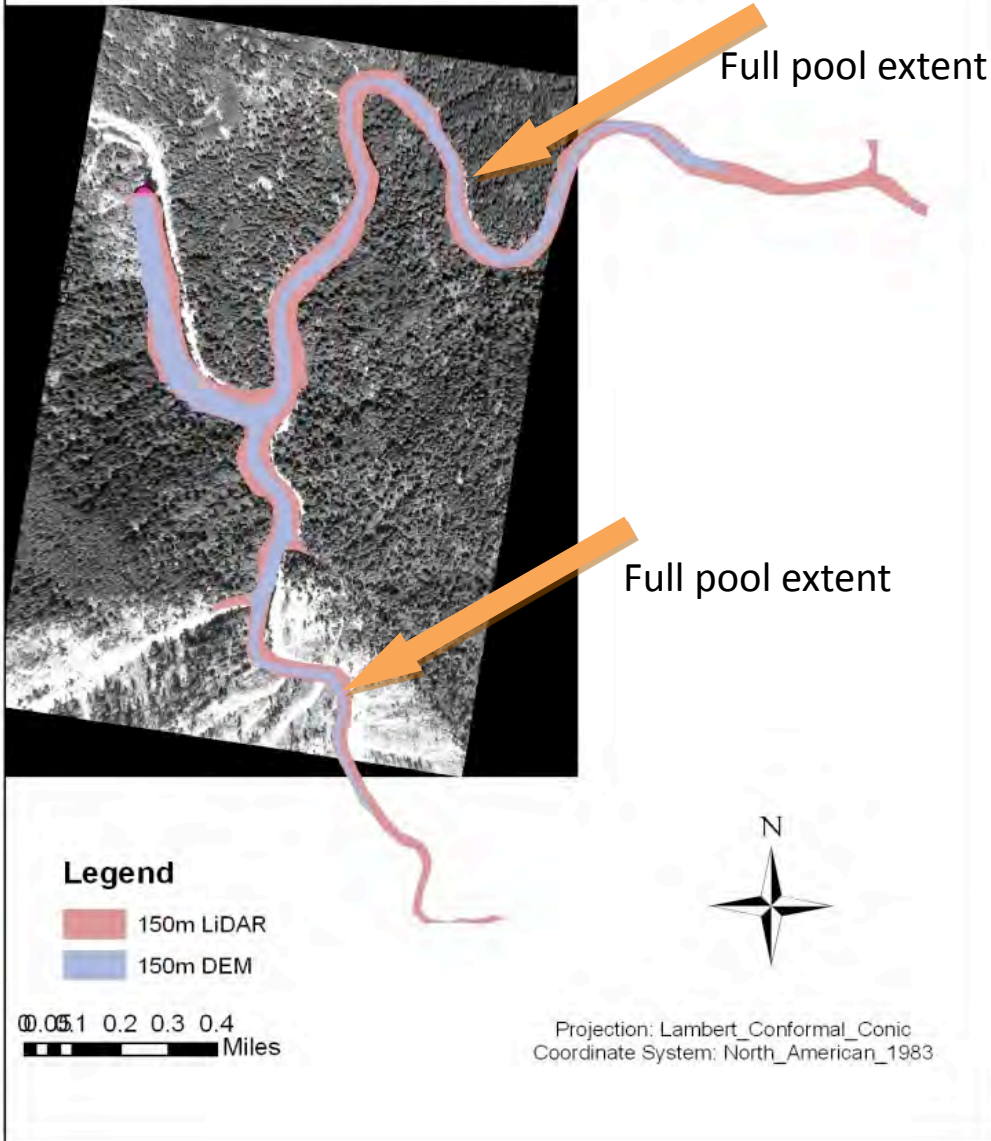
Goal 2: What is the difference between the computer generated splash dam reservoir extent and the reservoir extent seen in a 1950 aerial photograph?

Geo 580 Results:

Goal 2: What is the distance between the computer generated splash dam reservoir extent and the reservoir extent seen in a 1950 aerial photograph?



Tioga Splash Dam S. F. Coos River

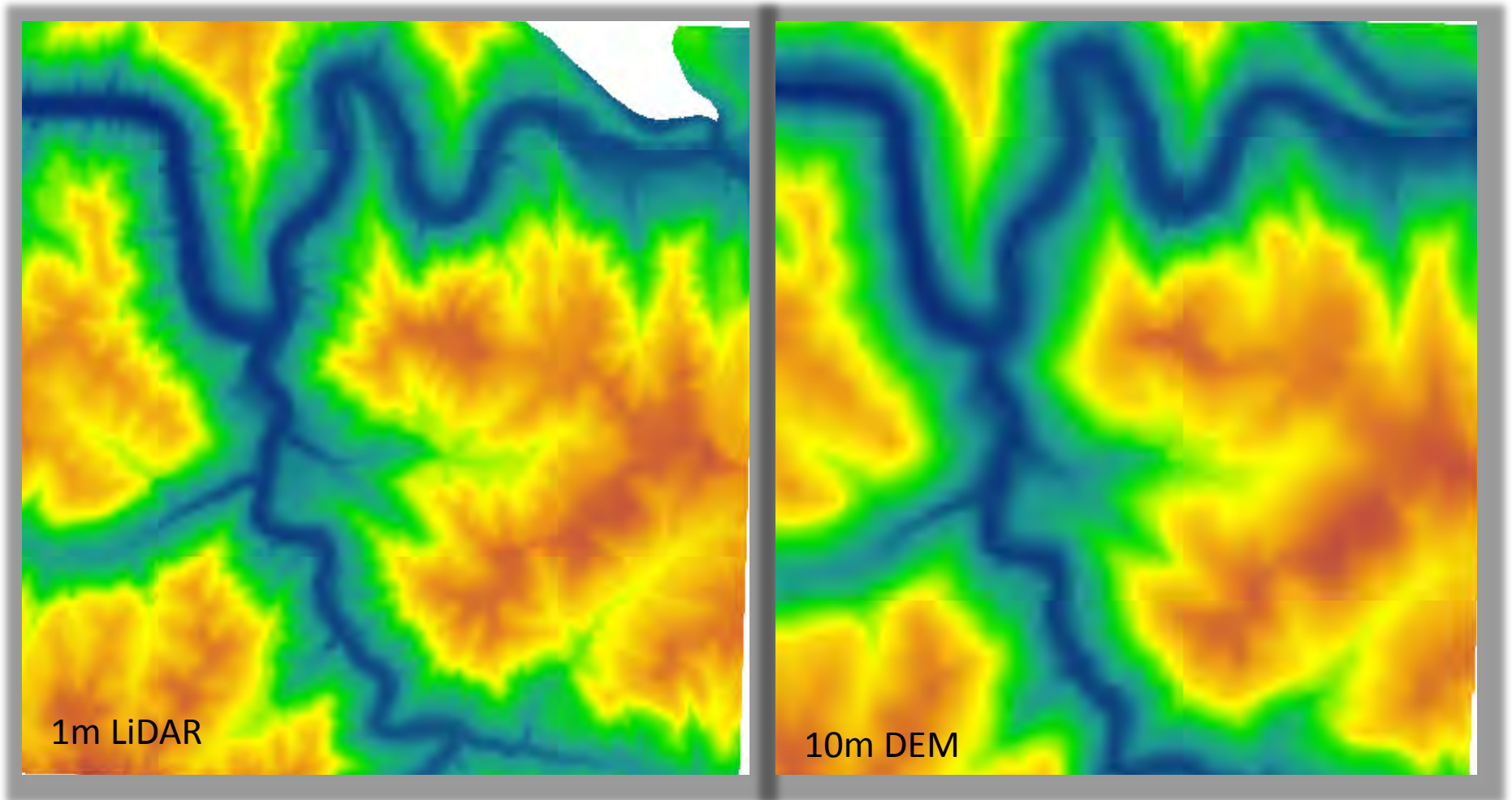


Geo 580 Results:

Goal 2: What is the distance between the computer generated splash dam reservoir extent and the reservoir extent seen in a 1950 aerial photograph?

Reservoir	Data Source	Splash dam height	Contour height (m)	Stream Length -from historic full pool (m)
Tioga N. Arm	DEM	20m	150	+1425
Tioga N. Arm	LiDAR	20m	150	+1974
Tioga S. Arm	DEM	20m	150	+593
Tioga S. Arm	LiDAR	20m	150	+1391

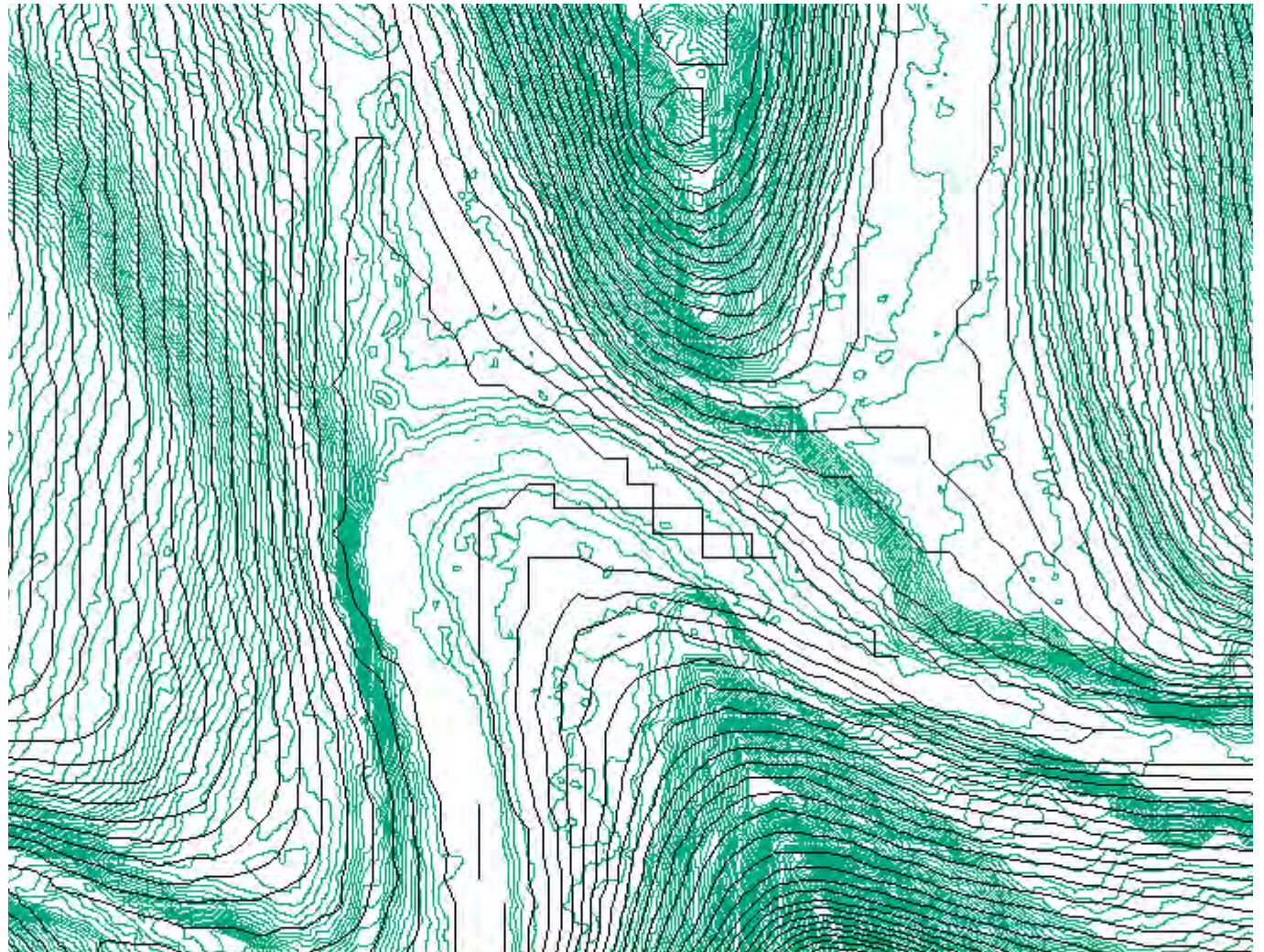
- **Geo 580 Discussion:**
 - 1-m LiDAR data 10X spatial resolution of 10m DEM data set
 - 1-m LiDAR more sensitive to low gradient areas and small scale features- as exhibited in streams, therefore splash dam reservoir extent further



Discussion: Spatial Resolution

- Spatial resolution important in Ecology (Wiens 1989)
- Patterns observed are dependent on scale
- Scale needed depends on question asked

An example of the comparison between resolutions
10 m DEM (shown in black)
and 1m LiDAR (shown in green)



Geo 580 Sources of Error, Thoughts and Future Work:

- Goal 1
- LiDAR slow to process –*frustrating!*
- Difficulty in tracing reservoir contour lines –resorted to hand digitization
- Slight reservoir area and length inaccuracies may arise from hand digitization

- Goal 2
- Not known if historical photo was taken during maximum capacity
- Generate LiDAR contour line at 144 m (actual contour of Tioga dam)

Geo 580 Conclusion:

- **Goal 1** Will the length and area of computer-generated splash-dam reservoirs be larger using Bare Earth LiDAR Grids or Digital Elevation Model (DEM) Grids?
 - 1m LiDAR extent was larger, for both Devoe and Tioga Dams
- **Goal 2** What is the distance between the computer generated splash dam reservoir extent and the reservoir extent seen in a 1950 aerial photograph?
 - 10m DEM closer to actual extent seen in 1950 aerial photo

Any Questions?

