PHASE 1 STUDIES UPDATE
EROSION WORKING GROUP

Presented By
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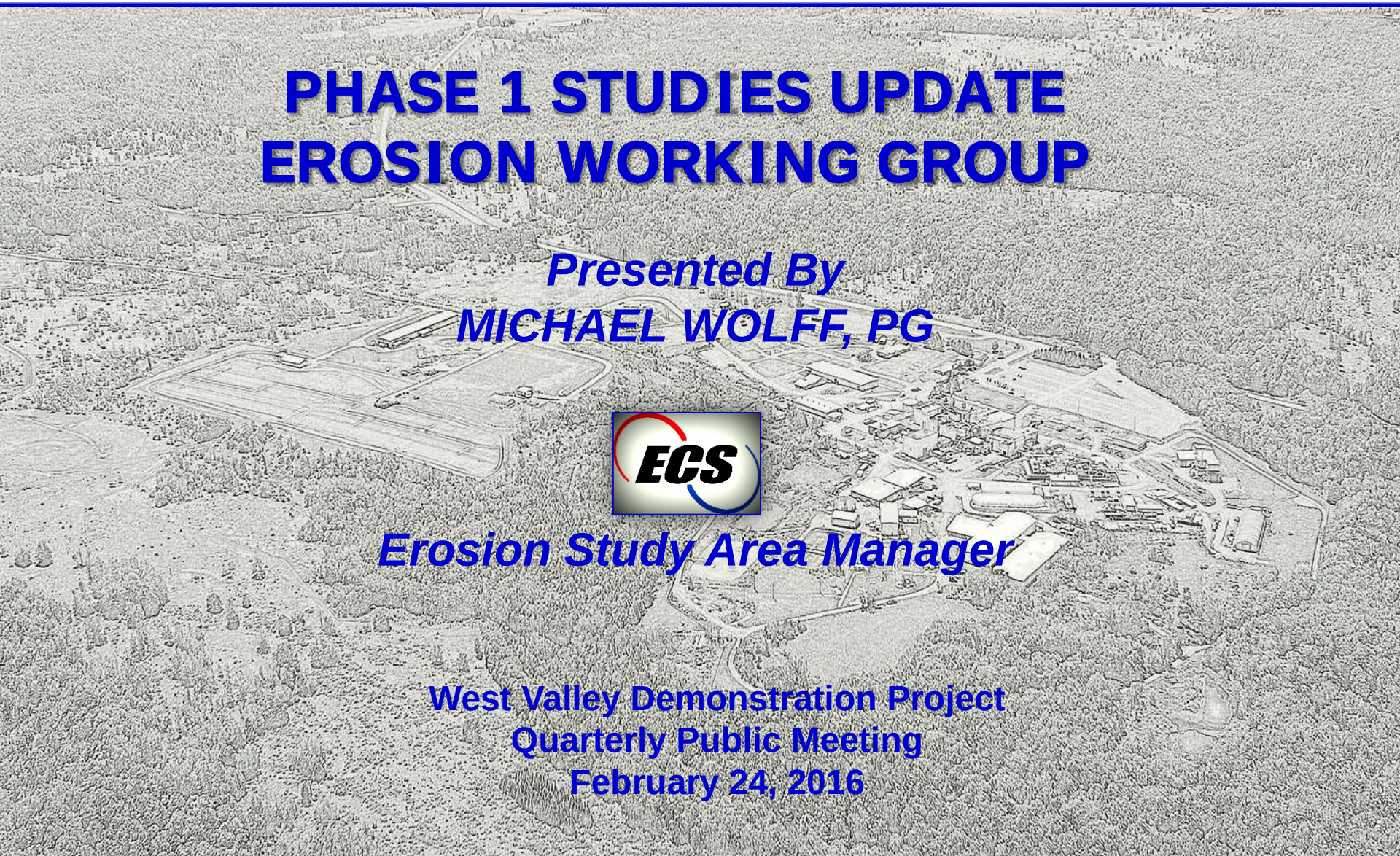
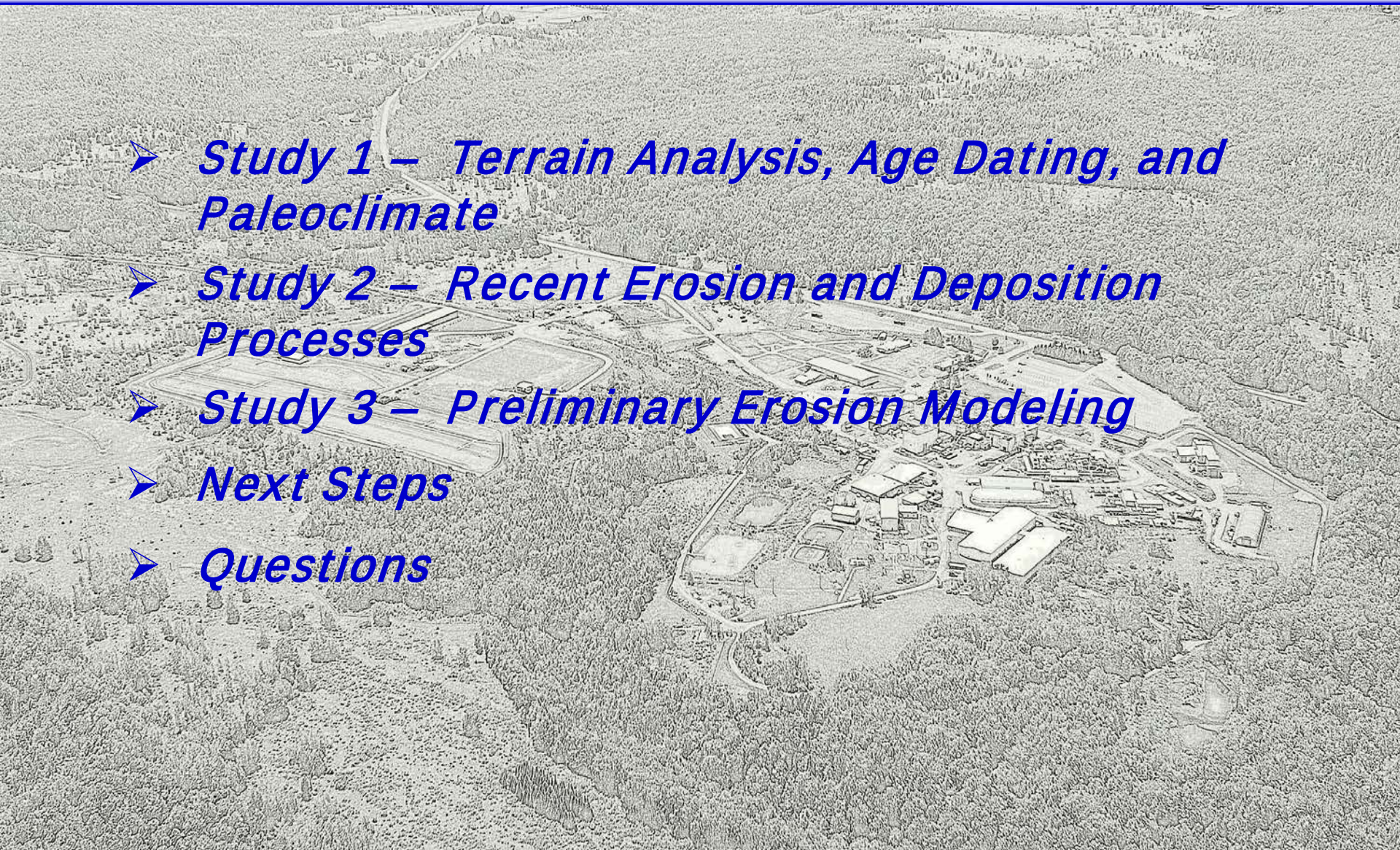
Erosion Study Area Manager



West Valley Demonstration Project
Quarterly Public Meeting
February 24, 2016

OUTLINE



- *Study 1 – Terrain Analysis, Age Dating, and Paleoclimate*
- *Study 2 – Recent Erosion and Deposition Processes*
- *Study 3 – Preliminary Erosion Modeling*
- *Next Steps*
- *Questions*

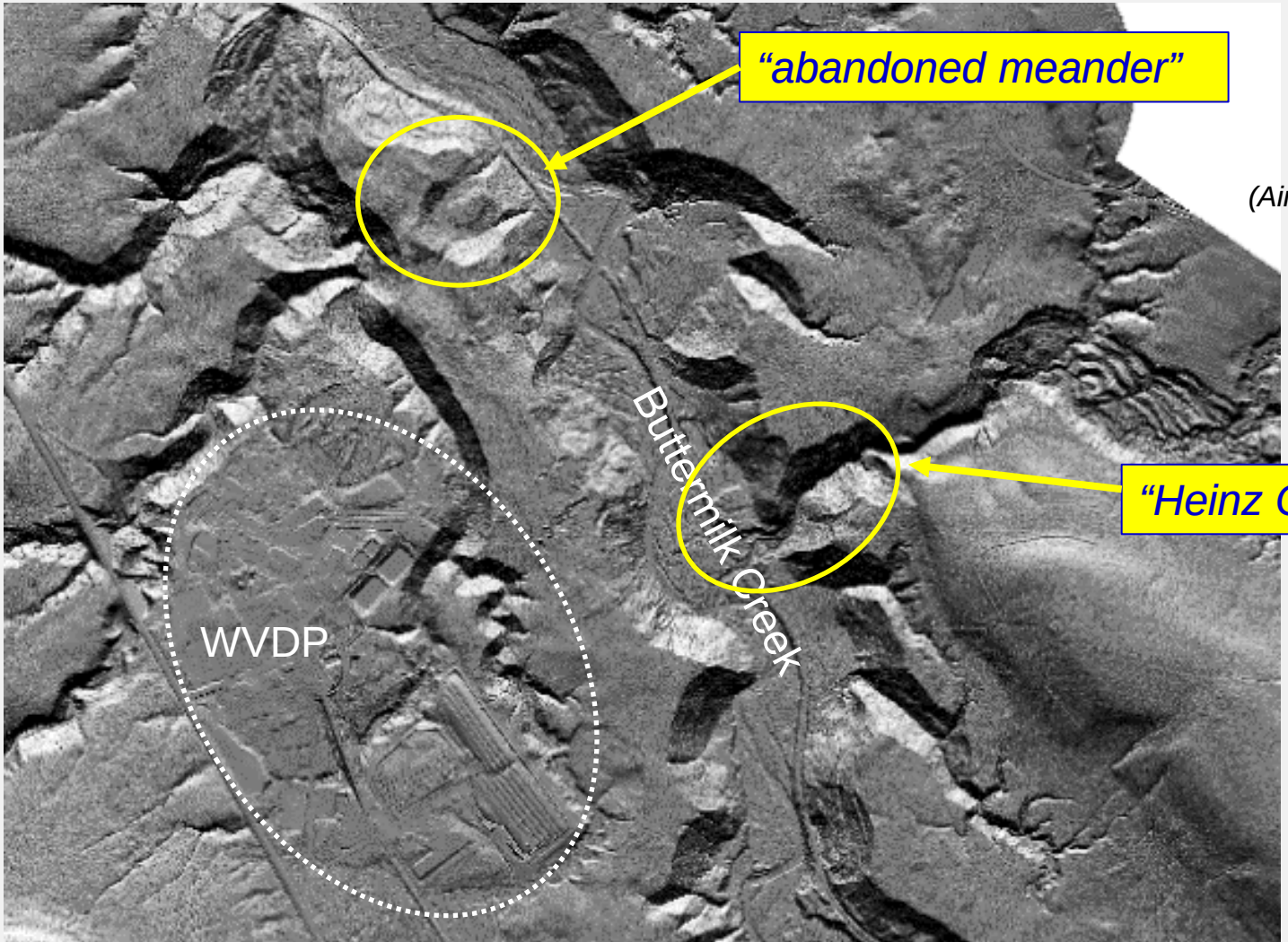
Study 1 – Terrain Analysis, Age Dating, and Paleoclimate

TASKS:

- **Task 1.1:** Mapping - **completed Summer 2015**
- **Task 1.2:** Field Reconnaissance - **started Fall 2015**
- **Task 1.3:** Site Prioritization - **ongoing**
- **Task 1.4:** Site Walkover - **started Fall 2015**
- **Task 1.5:** Site Sampling - **started Fall 2015**
- **Task 1.6:** Sample Preparation and Selection for Dating - **started**
- **Task 1.7:** Sample Age Analysis, Geologic Interpretation -**started**

STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.2: Reconnaissance data gathering – October 2015



LiDAR Image
(Airborne laser scanning)

STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.2: Reconnaissance data gathering – October 2015

STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.5: Sampling – mid October 2015

Dr. Wilson collecting a tree core to determine age of growth on low terrace surfaces

Location – low terrace near Buttermilk Creek/Heinz Creek confluence

Purposes:

- *Oldest trees suspected to be 200-300 yrs old*
- *Demonstrates stability of low terraces during human-caused deforestation period*
- *Provides recent (2-3 centuries) paleoclimate information*
- *Aids Study 2*

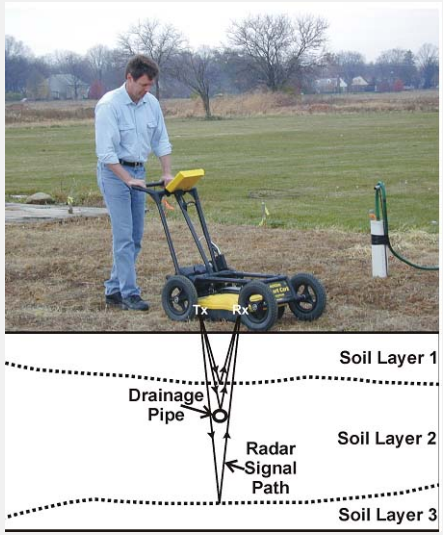
STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Collection of tree cores to determine age of oldest growth on low terrace surfaces helps to determine:

- Length of time low stream terraces have been relatively stable (trees can grow),
- Relative paleoclimate factors during this period,

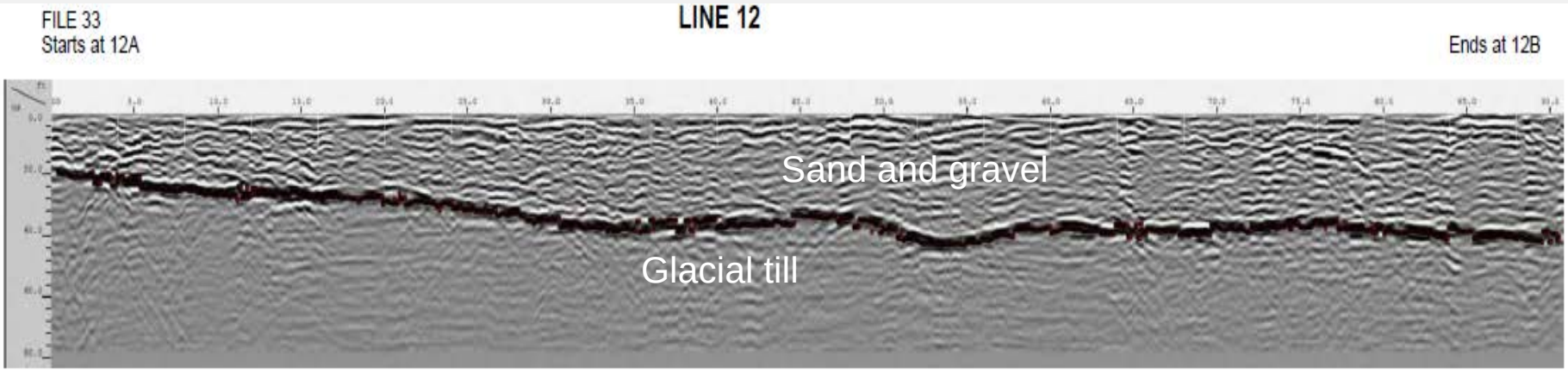
STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.5: Ground Penetrating Radar (GPR) Surveys – November 2015



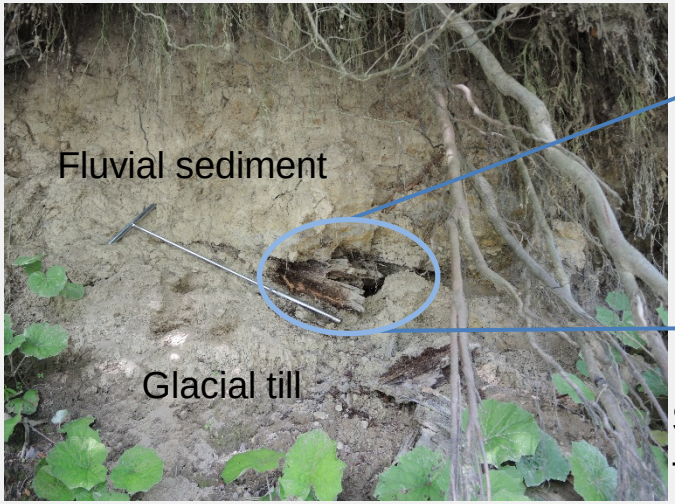
GPR survey:

- Is a rapid, non-invasive geophysical technique for providing information on subsurface layering and locations of anomalies;
- Enables locations of trenches for age dating sample collection to be optimized
- Enables targeting of specific subsurface features of interest



STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.5:Sampling for Age Dating – November 2015



Buried log found in stream bank – suitable for carbon dating

Soil coring tool inserted horizontally in trench wall for collecting a sample for age dating

STUDY 1 - *Terrain Analysis, Age Dating, and Paleoclimate*

Task 1.5:Sampling for Age Dating – November 2015

Trench excavation in progress
(location chosen with assistance of GPR survey)

Trench covered by tarps to enable optically stimulated luminescence (OSL) sampling under low light conditions*

* Avoiding exposure of samples to ambient light is critical in OSL sampling. For this type of sampling, the sampler will enter the trench below the tarp cover, and work in darkness using only a red light for illumination.

STUDY 2 - *Recent Erosion and Deposition Processes*

TASKS:

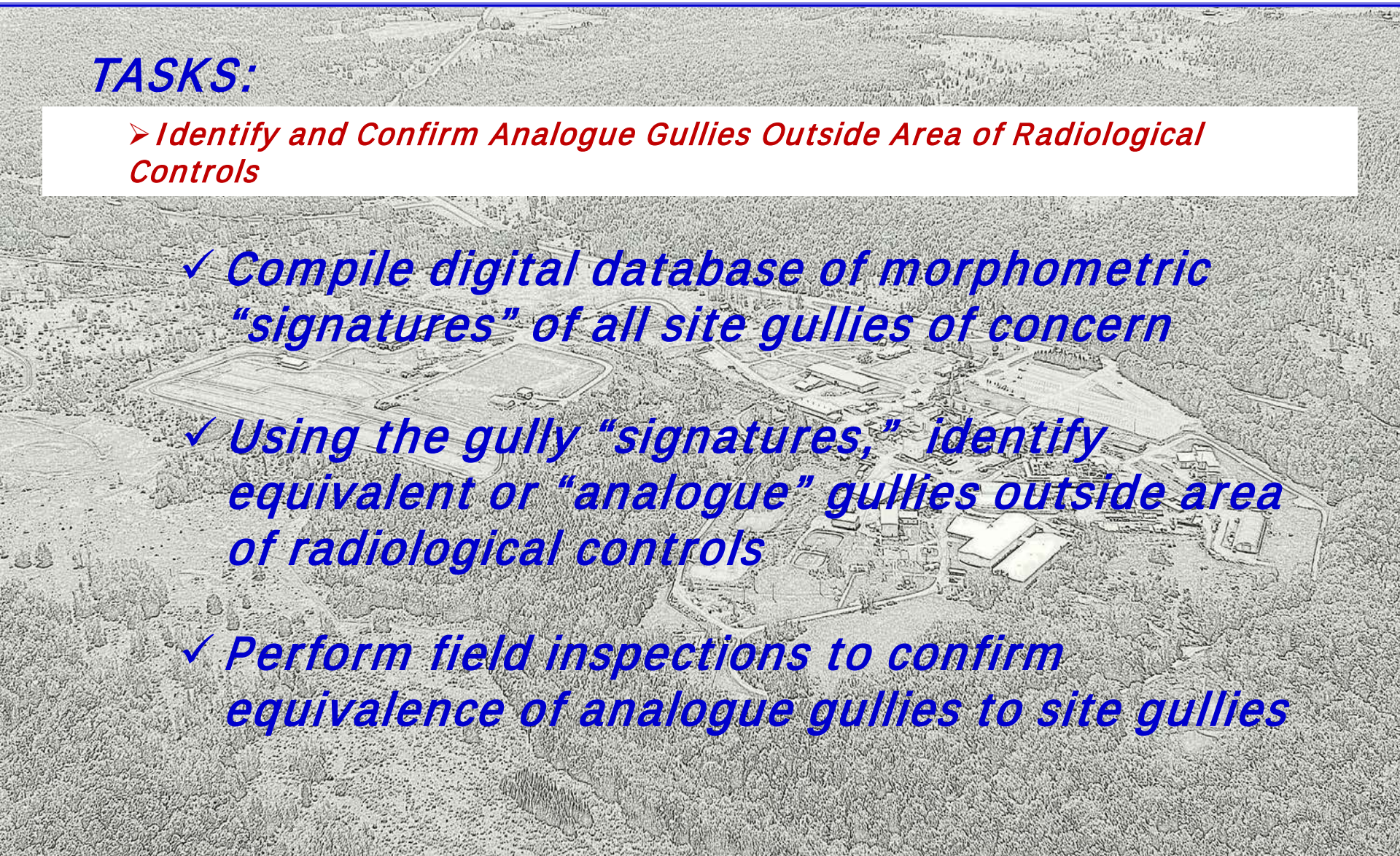
- *Identify and Confirm Analogue Gullies Outside Area of Radiological Controls*

- ***Task 2.1**: Quantify Rainfall Rates and Snow Depth*
- ***Task 2.2**: Quantify Infiltration Capacity or Rate and Soil Moisture for all Surficial Materials*
- ***Task 2.3**: Quantify the Flow Rates and Total Suspended Solids in Select Gullies*
- ***Task 2.4**: Quantify the Flow Rates and Total Suspended Solids at Select Stream Locations*
- ***Task 2.5**: Quantify the Erodibility of the Surficial Materials*
- ***Task 2.6**: Quantify the Entrainment Thresholds for all Bed and Bank Materials within Select Gullies and Stream Channels*
- ***Task 2.7**: Quantify the Topographic Characteristics of Select Gullies*
- ***Task 2.8**: Reports*

STUDY 2 - *Recent Erosion and Deposition Processes*

TASKS:

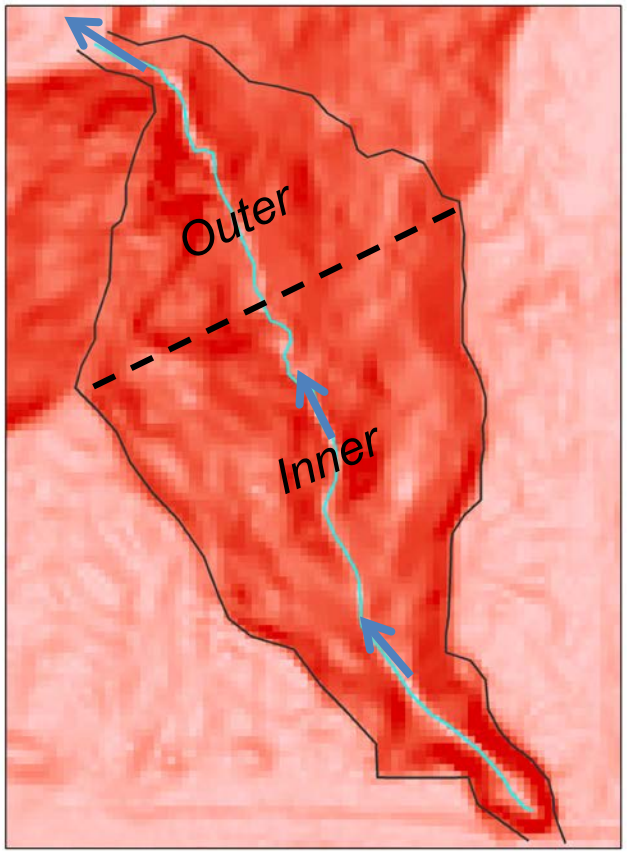
- *Identify and Confirm Analogue Gullies Outside Area of Radiological Controls*



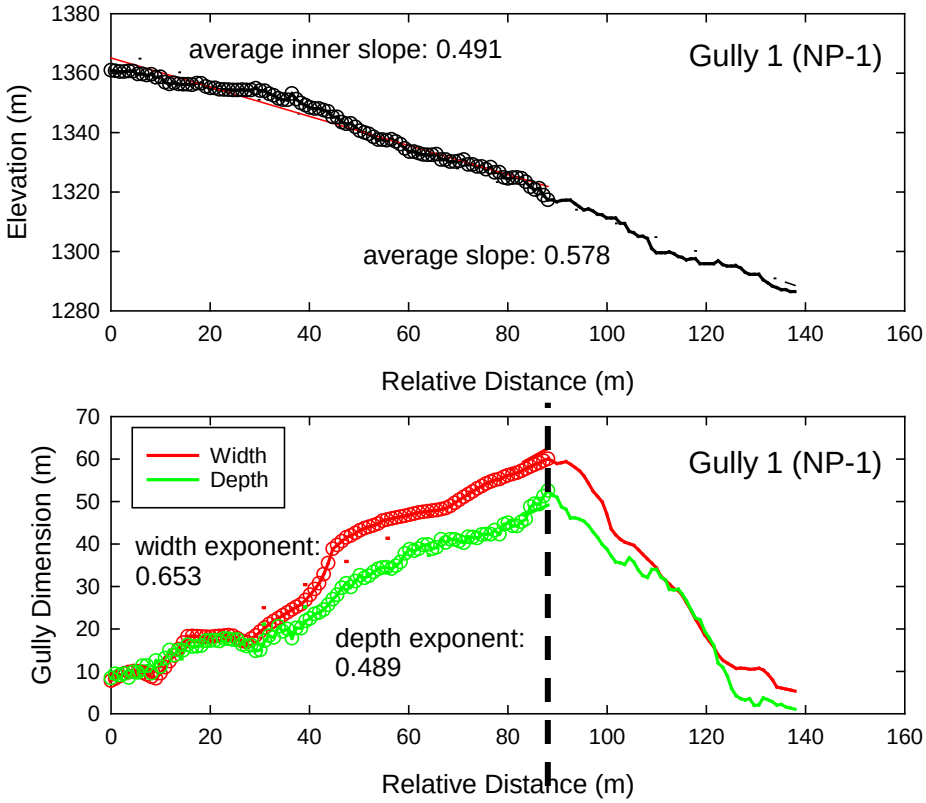
- ✓ *Compile digital database of morphometric "signatures" of all site gullies of concern*
- ✓ *Using the gully "signatures," identify equivalent or "analogue" gullies outside area of radiological controls*
- ✓ *Perform field inspections to confirm equivalence of analogue gullies to site gullies*

STUDY 2 - *Recent Erosion and Deposition Processes*

NP-1 Gully



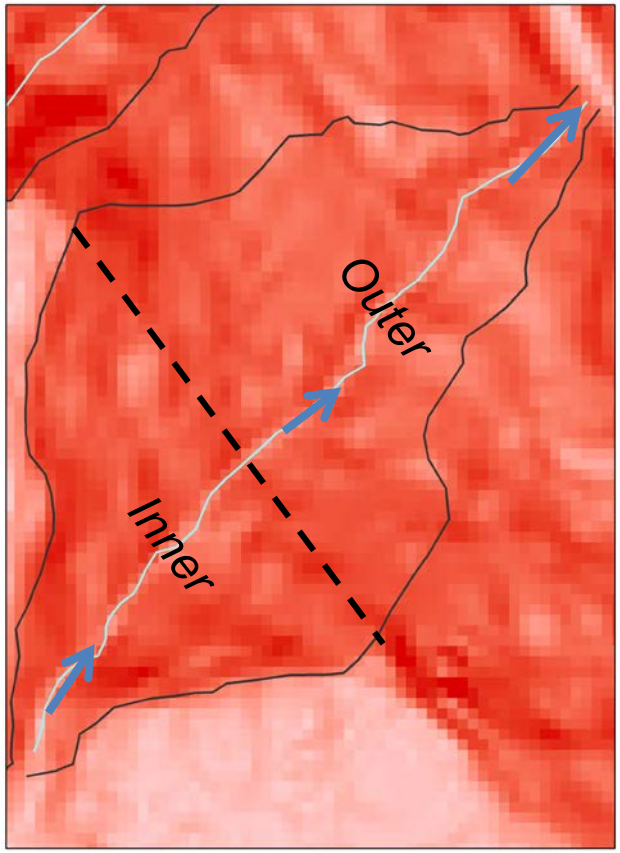
Slope map



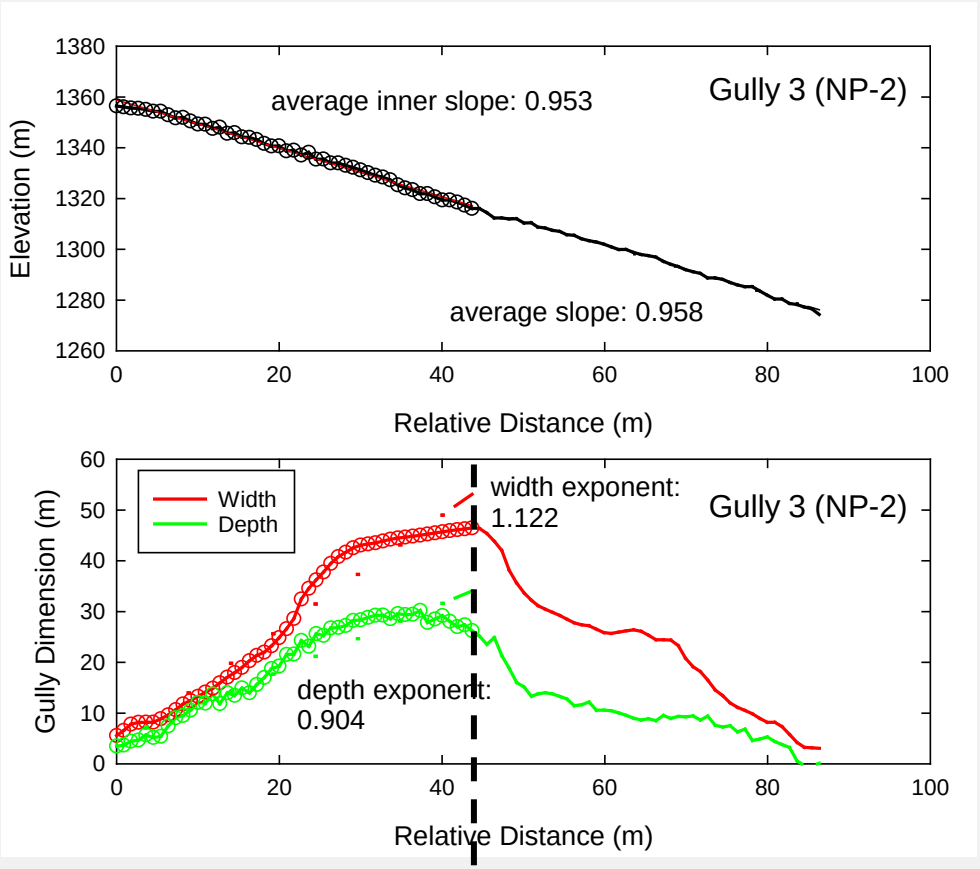
Inner Gully ***Outer Gully***

STUDY 2 - *Recent Erosion and Deposition Processes*

NP-2 Gully



Slope map



Inner Gully | ***Outer Gully***

STUDY 3 – *Preliminary Erosion Modeling*

TASKS:

- ***Task 3.1:*** *New Data-Collection Support and Evaluation*
- ***Task 3.2:*** *Preparatory Work for Model Selection and Component Testing*
- ***Task 3.3:*** *Design Model Calibration and Testing Strategy*
- ***Task 3.4:*** *Select, Extract, and Analyze Topographic Metrics*
- ***Task 3.5:*** *Generate Model Grids*
- ***Task 3.6:*** *Design Strategy and Select Site for Model Validation*
- ***Task 3.7:*** *Report Progress to Agencies and Stakeholders*
- ***Task 3.8:*** *Identify, Obtain, and Become Familiar with Computing Resources*
- ***Task 3.9:*** *Create Preliminary Design for Future-Erosion Projection*
- ***Task 3.10:*** *Compile and Analyze New Available Climate/Hydrology Data and Define Parameter Ranges*

STUDY 3 – *Preliminary Erosion Modeling*

Task 3.2 - Preparatory Work for Model Selection and Component Testing

- ***A primary objective is to reduce uncertainty in erosion projections***
- ***First, we need to understand and quantify degree of uncertainty in previous projections…***
  - ✓ ***Developed code to extract and statistically analyze data used in FEIS modeling***
  - ✓ ***Completed quality assurance assessment of the methodology***
  - ✓ ***Will complete uncertainty evaluation after selecting model parameters for Phase 1 Studies erosion projections…***

STUDY 3 –*Preliminary Erosion Modeling*

Task 3.2 - Preparatory Work for Model Selection and Component Testing

- ***Assessed modeling improvements published since FEIS modeling (8-10 years ago)***
- ***Started developing code using most useful and computationally-efficient models currently available***
- ***Developed a code structure that can readily incorporate external data such as digital topography data, etc.***

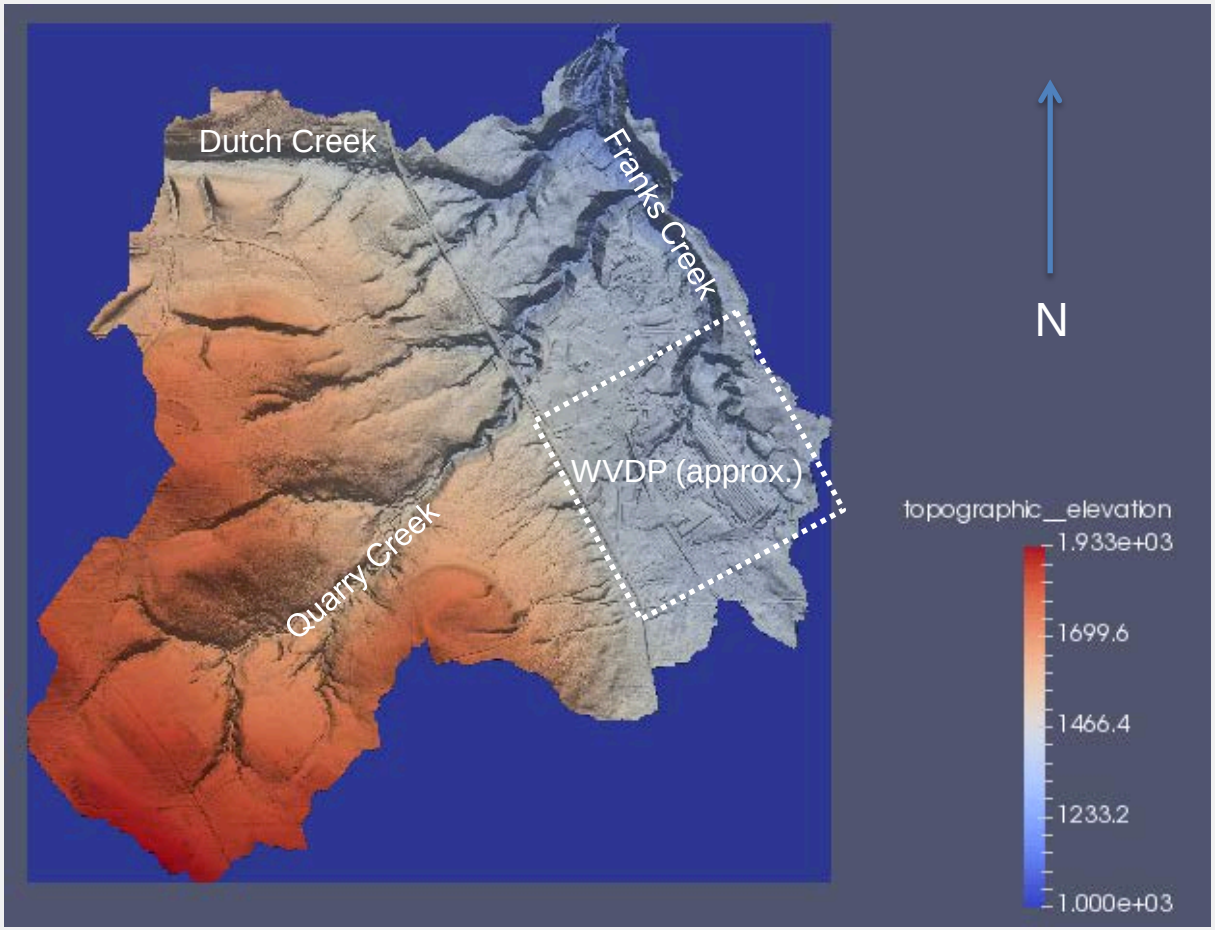
STUDY 3 –*Preliminary Erosion Modeling*

Task 3.5 Generate Model Grids

- ***Developed and documented workflows to produce model grids from LiDAR***
- ***Created grids for two areas: (1) Buttermilk Creek watershed, and (2) Site watershed (Franks Creek, and tributaries Erdman Brook, Quarry Creek, and Dutch Creek)***
- ***Created grids at five resolutions: 3, 6, 12, 24, and 48 feet***
- ***Completed quality control evaluation for input of grids into erosion-modeling software***

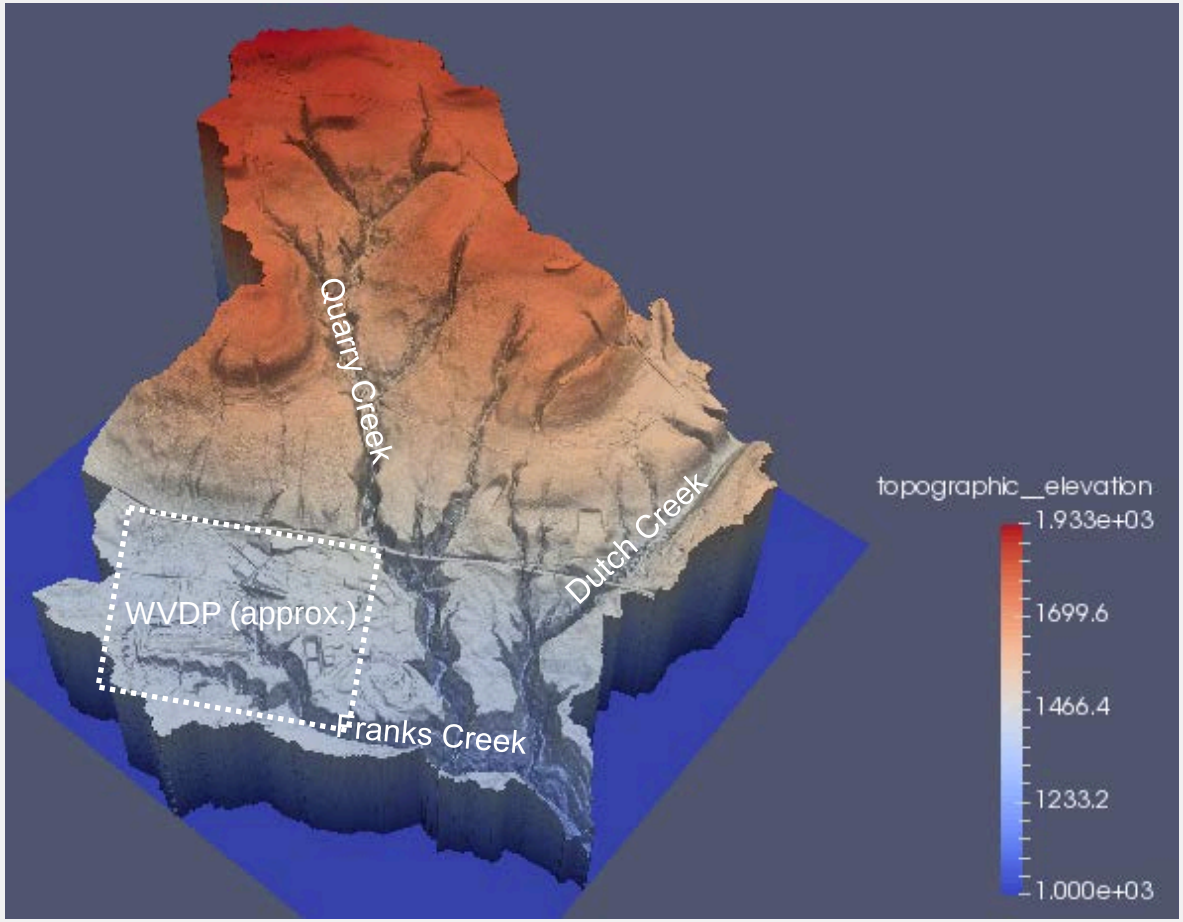
STUDY 3 – *Preliminary Erosion Modeling*

Shaded relief image of Franks Creek watershed digital elevation model (6-foot resolution)
(image width approximately 1.8 miles)

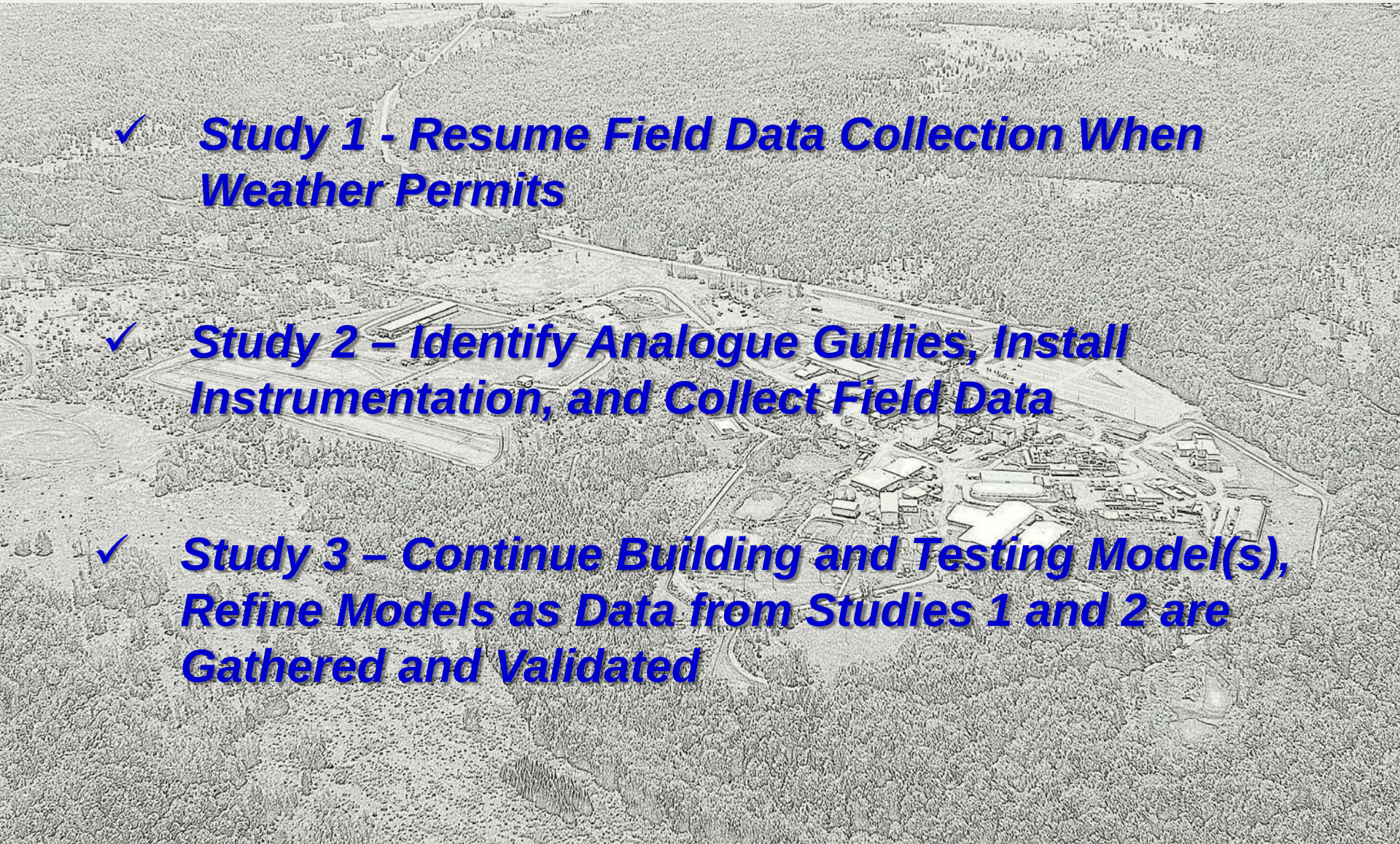


STUDY 3 – *Preliminary Erosion Modeling*

Oblique view, looking toward the southwest



NEXT STEPS



- ✓ Study 1 - Resume Field Data Collection When Weather Permits
- ✓ Study 2 – Identify Analogue Gullies, Install Instrumentation, and Collect Field Data
- ✓ Study 3 – Continue Building and Testing Model(s), Refine Models as Data from Studies 1 and 2 are Gathered and Validated


QUESTIONS?