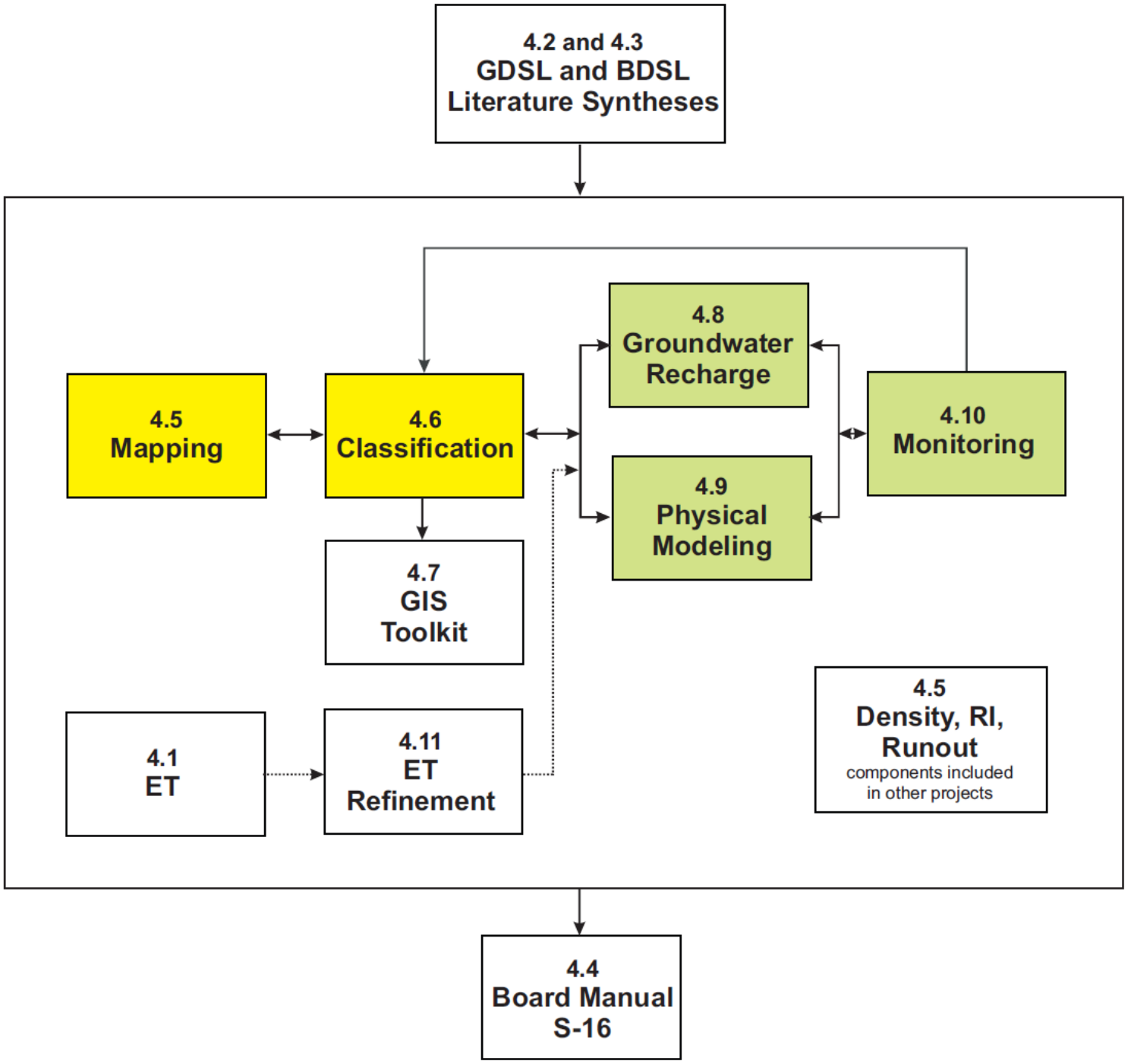
Deep-Seated Landslide Research Strategy

This project:

- *Mapping and Classification*
- *Develop a database of deep-seated landslides, and landslide classes, to aid development of next projects*
- *Classification will facilitate efficient use of resources for next projects*



DSL Mapping and Classification: *questions*

Rule Group Critical Questions:

1. *Can relative levels of response to forest practices be predicted by key characteristics of glacial deep-seated landslides and/or their groundwater recharge areas?*
2. *Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?*
3. *Are unstable landforms being correctly and uniformly identified and evaluated for potential hazard?*

Project Sub-Questions:

1. What are the distinguishing characteristics among DSLs within similar geomorphic, topographic, stratigraphic, hydrologic, and climatic settings?

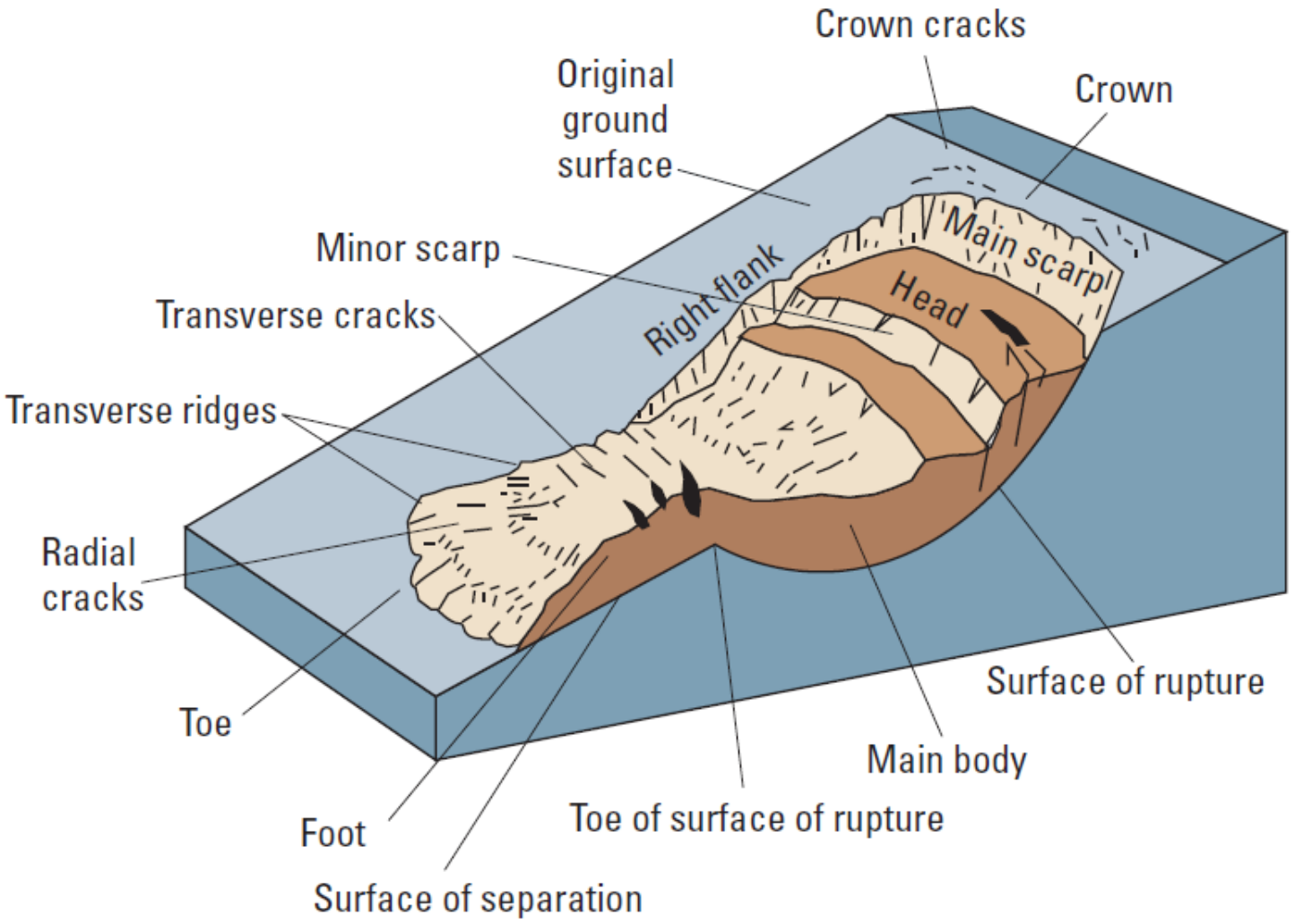
2. Can activity levels of individual DSLs within and between clusters be linked to sensitivity to hydrologic change?

3. What are the critical independent variables necessary to define DSL classes?

4. What data are necessary to estimate the relative sensitivity of DSLs within a class?

DSL Mapping and Classification: *scoping alternative*

- *Attribute and classify DSLs in recently completed Washington Geological Survey landslide inventories (Whatcom, Snohomish, King, and Pierce)*
- *Define landslide attributes that control occurrence and kinematics of failure*



Slump-Earthflow

DSL Mapping and Classification:

study plan outline

Step 1: Develop initial GIS database and cluster selection

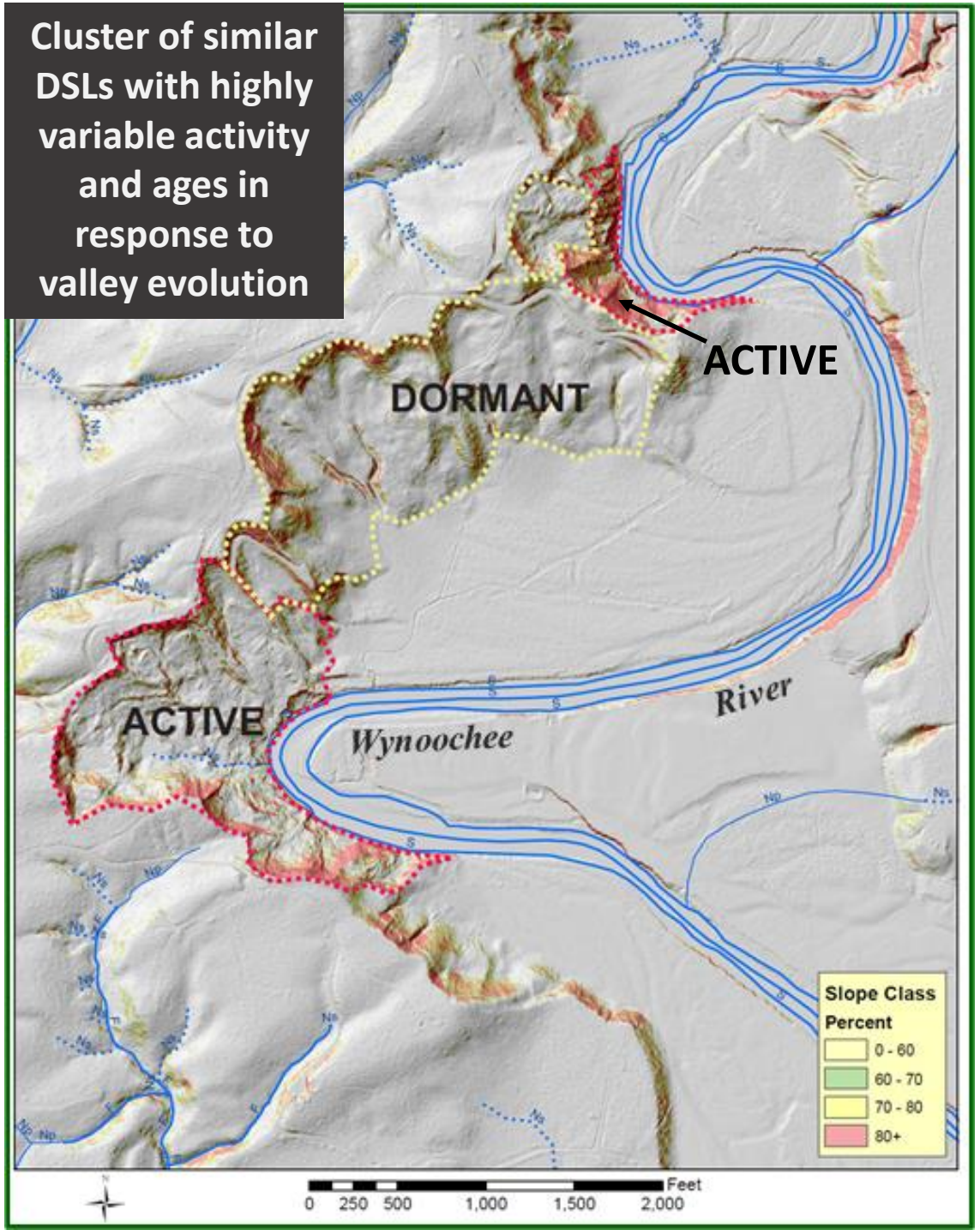
- *WGS inventory, lidar, mapped geology, CMER lands*

Step 2: Refine remote cluster selection

- *LDEM derivatives, geologic reports, historical imagery, activity levels*

Clusters:

DSLs in similar geomorphic, topographic, hydrologic, and stratigraphic settings.



DSL Mapping and Classification: *study plan*

Step 3: Remote analysis and development of working hypotheses for processes and triggers

(groundwater flow, surface hydrology and GW recharge, landslide evolution, natural triggers, potential forest practices influences, kinematics)

Steps 4 and 5: Field Plan and Protocols

Step 6: Data Analysis, Products, Maps

Step 7: Synthesis and Report

DSL Mapping and Classification: *challenges*

Critical variables

- *what are they? how do we consistently measure remotely and via field sampling?*

Clusters and classes

- *subjectivity - lumping vs splitting*

Extrapolation and inference

- *we won't be able to field verify all DSLs in a cluster, or all clusters, or all geographies*

Methods for data analysis

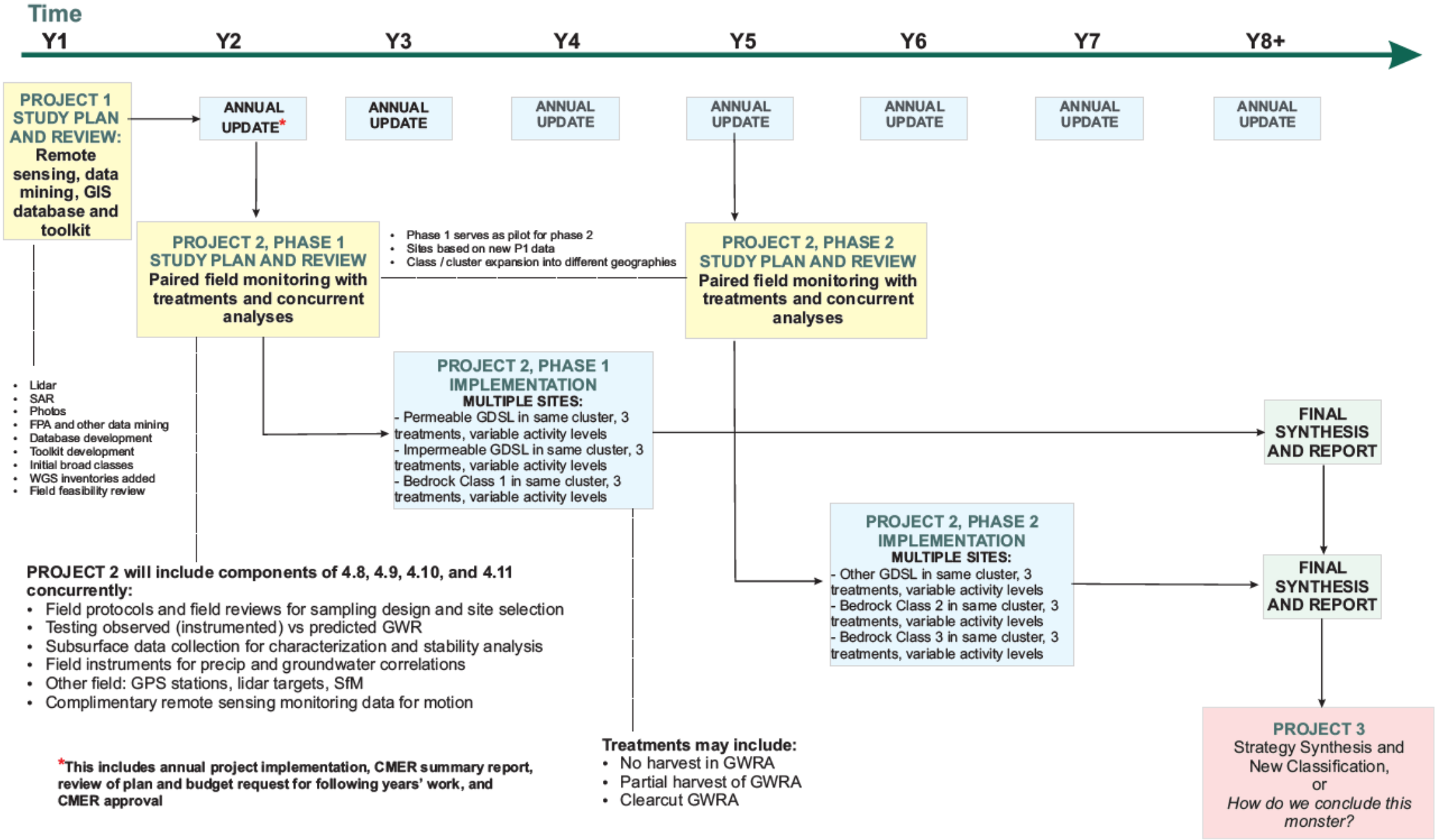
Expectations for deliverables

- *e.g., classification as final vs initial product of strategy*

Group dynamics and communication

Inherent challenges with classification of highly complex and variable subsurface systems using mostly remotely sensed data

DSL Mapping and Classification: *pivot example*



DSL Mapping and Classification: *pivot to RFP*

UPSAG next steps….

- *RFP for study plan development by contractor*
- *Two potential approaches:*
  - *Approved alternative and critical questions*
  - *Modify to provide more flexibility for contractor to develop alternative approach*