A photograph of a Lewis Woodpecker perched on a tree branch. The bird has a black head with a red patch on its forehead, a black back, and a reddish-brown belly. It is standing on a branch next to a cup-shaped nest made of mud and lined with soft material. The background consists of a dense network of dark, bare tree branches against a clear blue sky.

Assessing Lewis Woodpecker Habitat Using Hyperspectral Imagery

Stephanie Jenkins

DeVlieg Undergraduate
Research

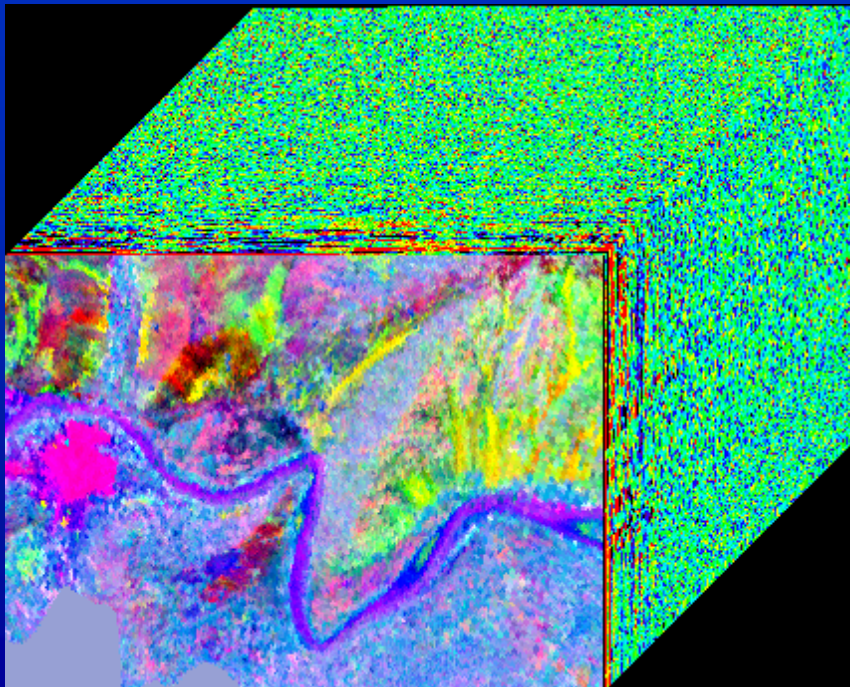
University of Idaho

Major: Natural Resource Ecology

Minor: Wildland Fire Management

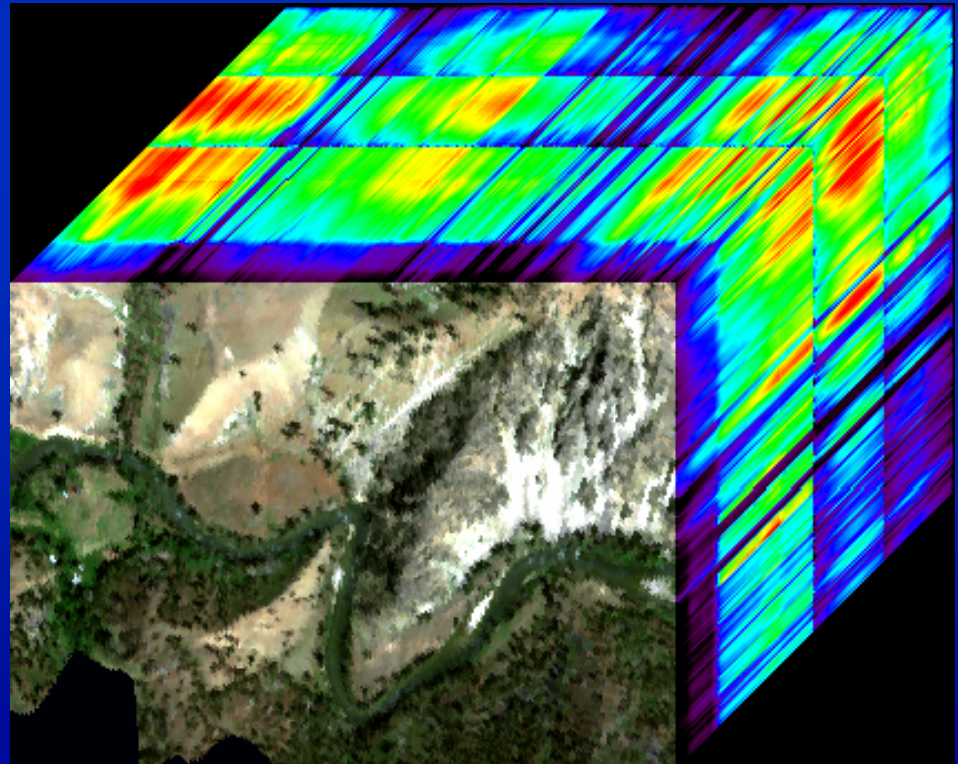
Outline

- What is Hyperspectral Remote Sensing?
- Uses of Hyperspectral Imagery
- My research



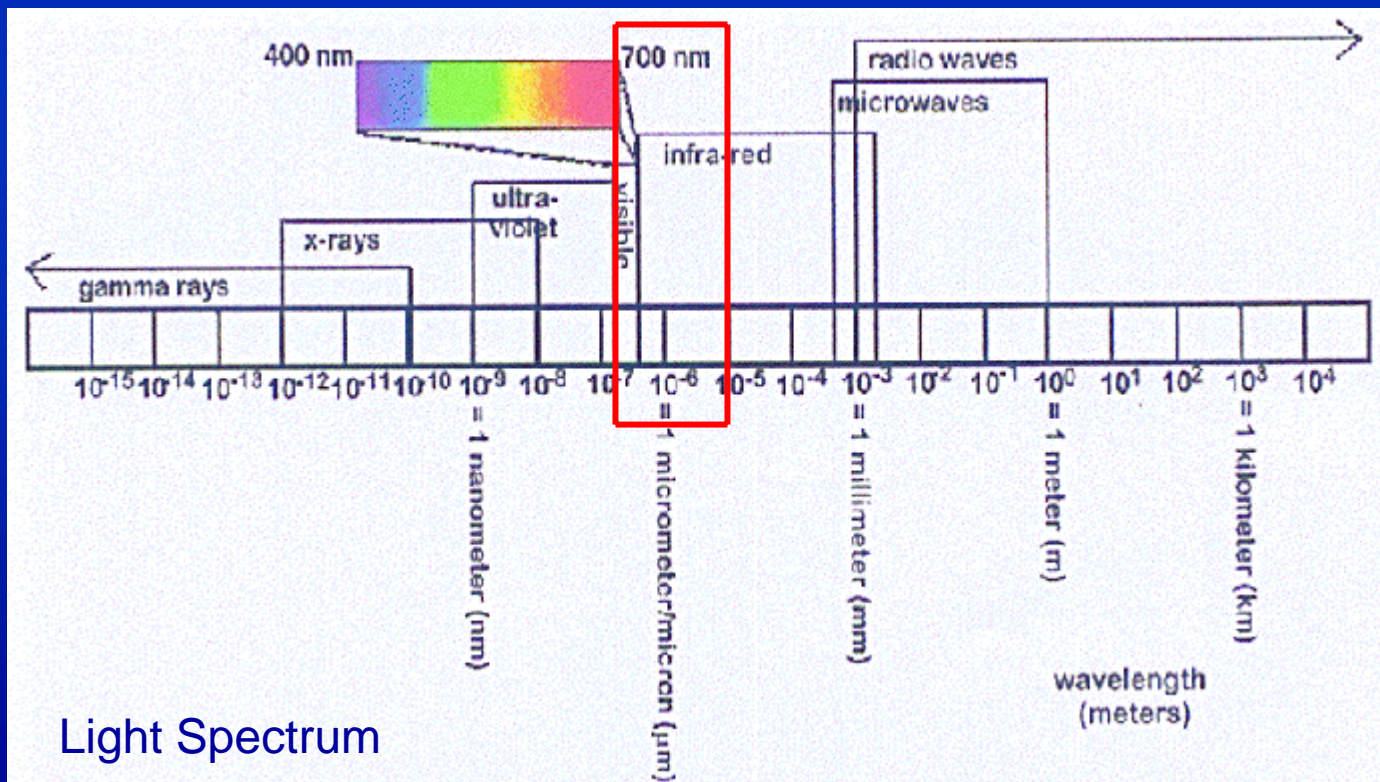
Hyperspectral Imaging

- Measures solar absorption and reflection data on ground surface features in 4m² pixels
- Collected by a fixed wing mounted sensor
- 126 spectral wavelength bands
- Precise



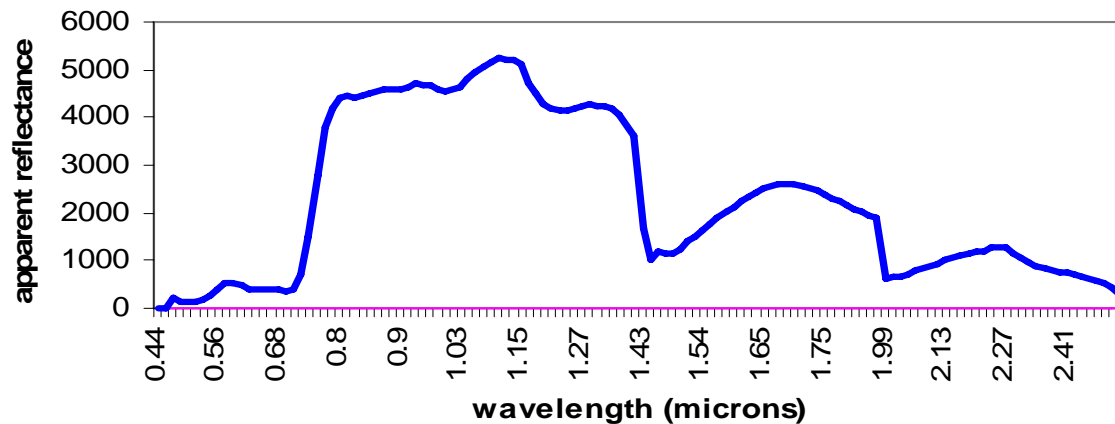
Spectral Wavelengths

- Gathers data on leaf water absorption, chlorophyll reflection, atmospheric light absorption, thermal emissions

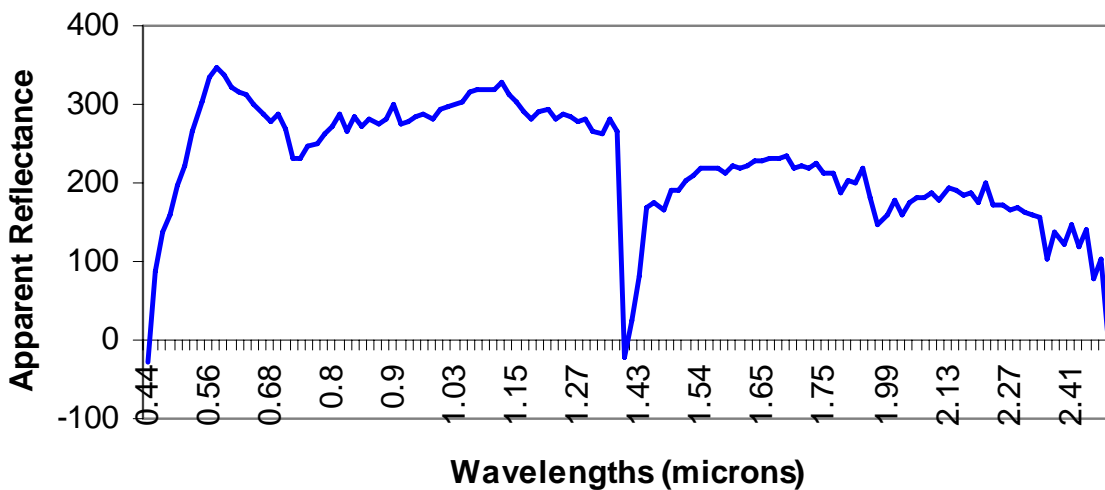


Spectral Profile

Cottonwood

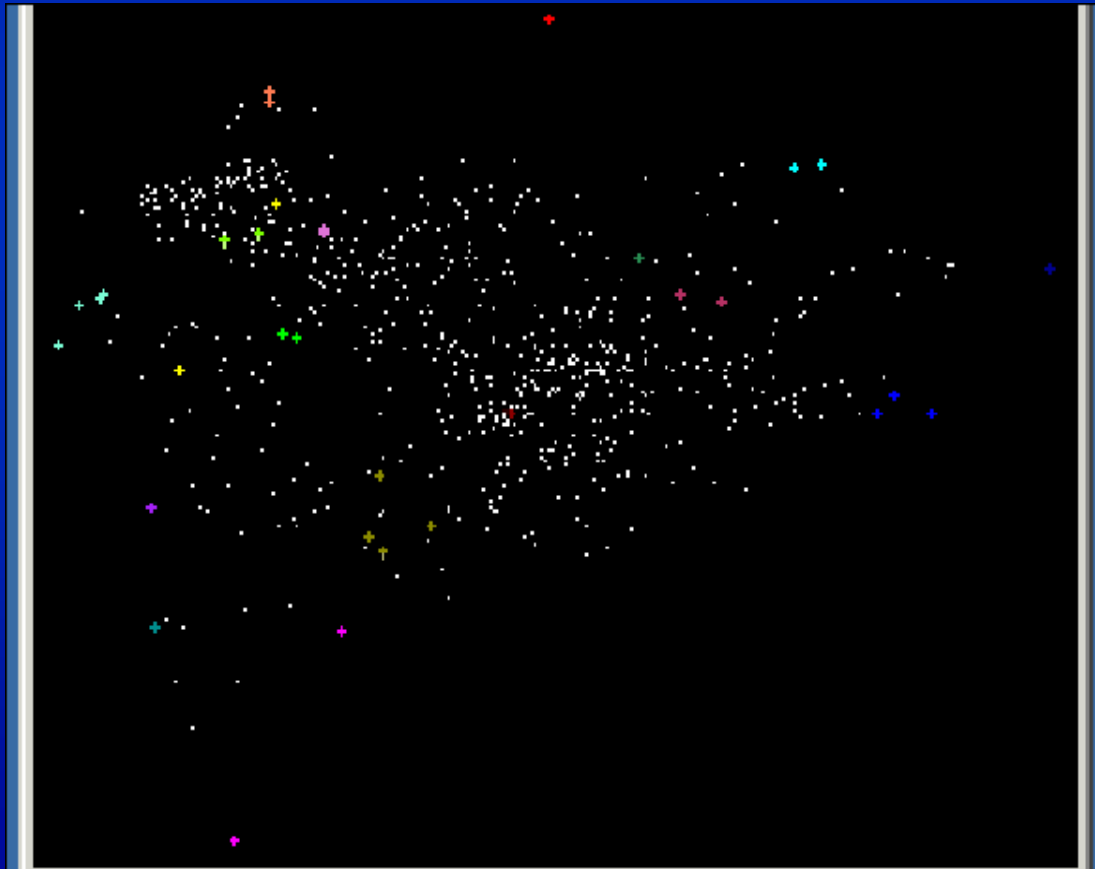


Water



Hyperspectral

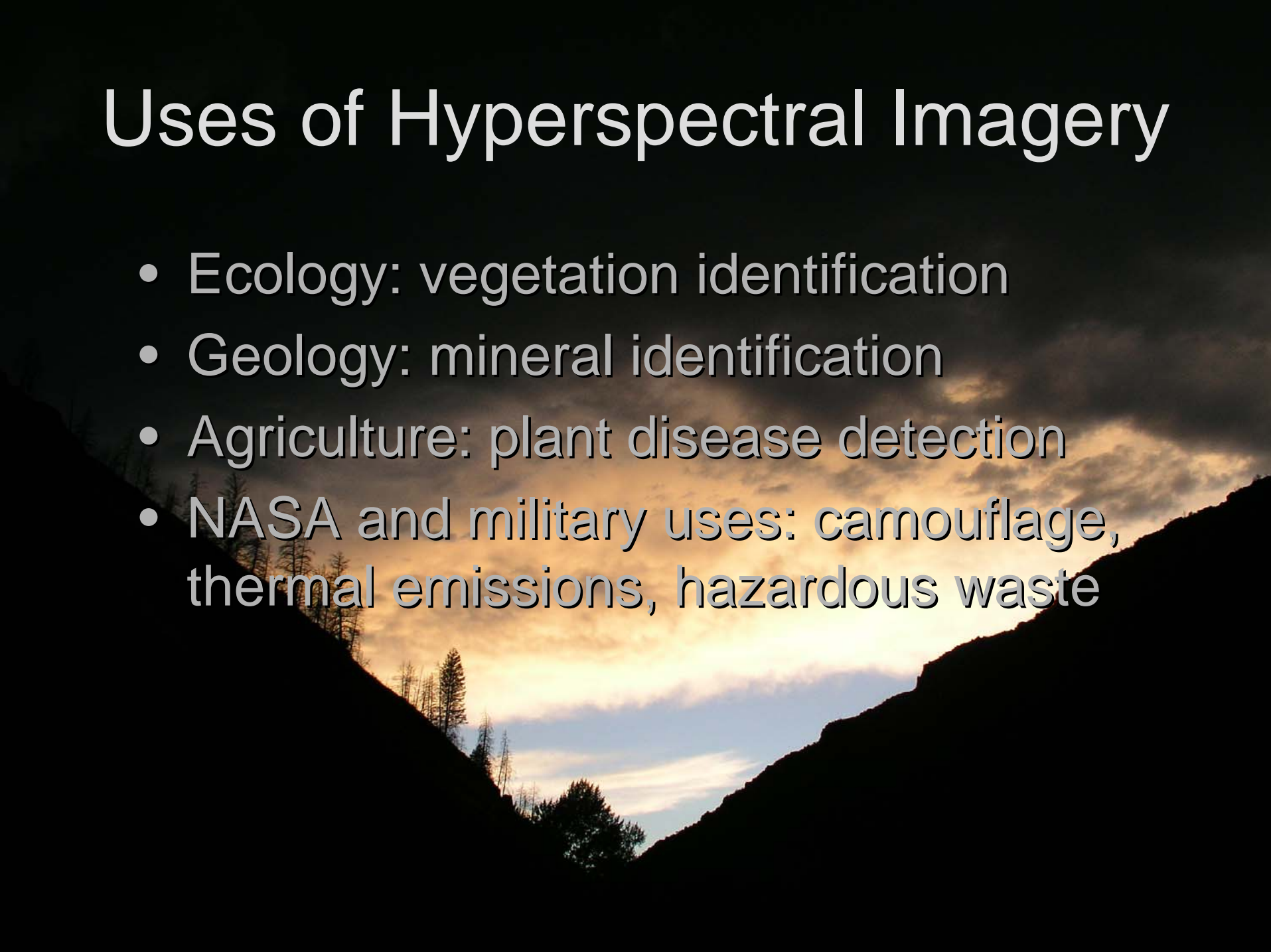
- Series of processing steps
 - Distinguish a unique pixel and map it



N-dimensional
Visualizer

Uses of Hyperspectral Imagery

- Ecology: vegetation identification
- Geology: mineral identification
- Agriculture: plant disease detection
- NASA and military uses: camouflage, thermal emissions, hazardous waste



My Research

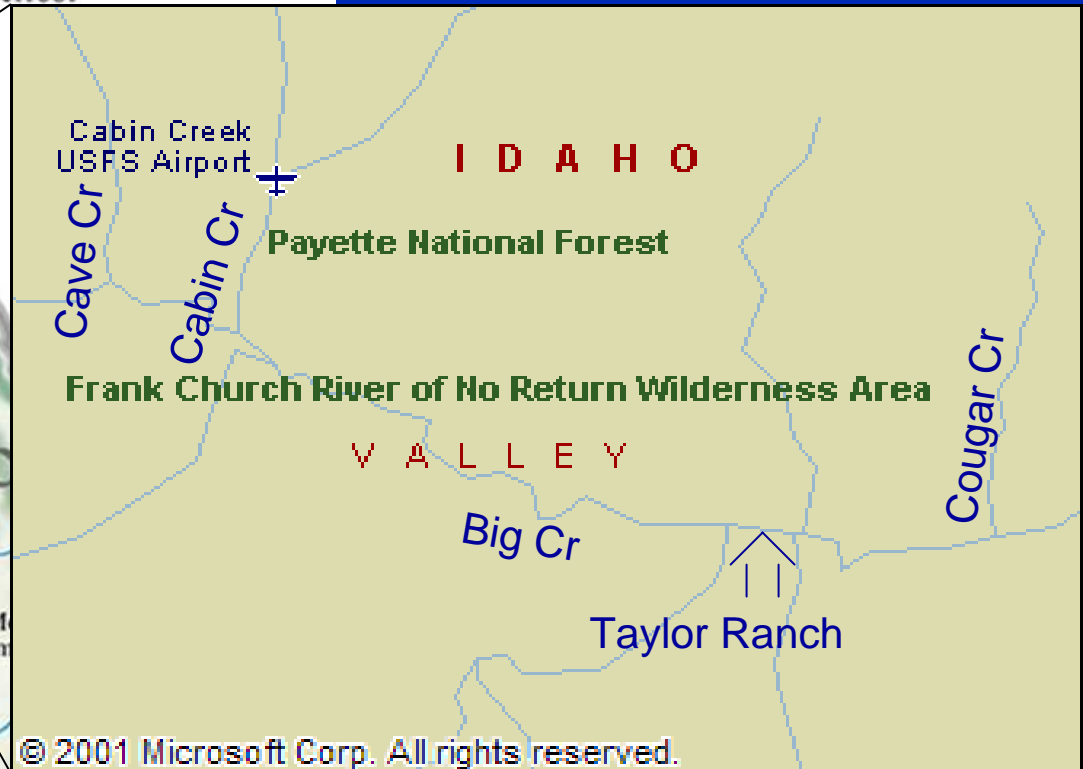
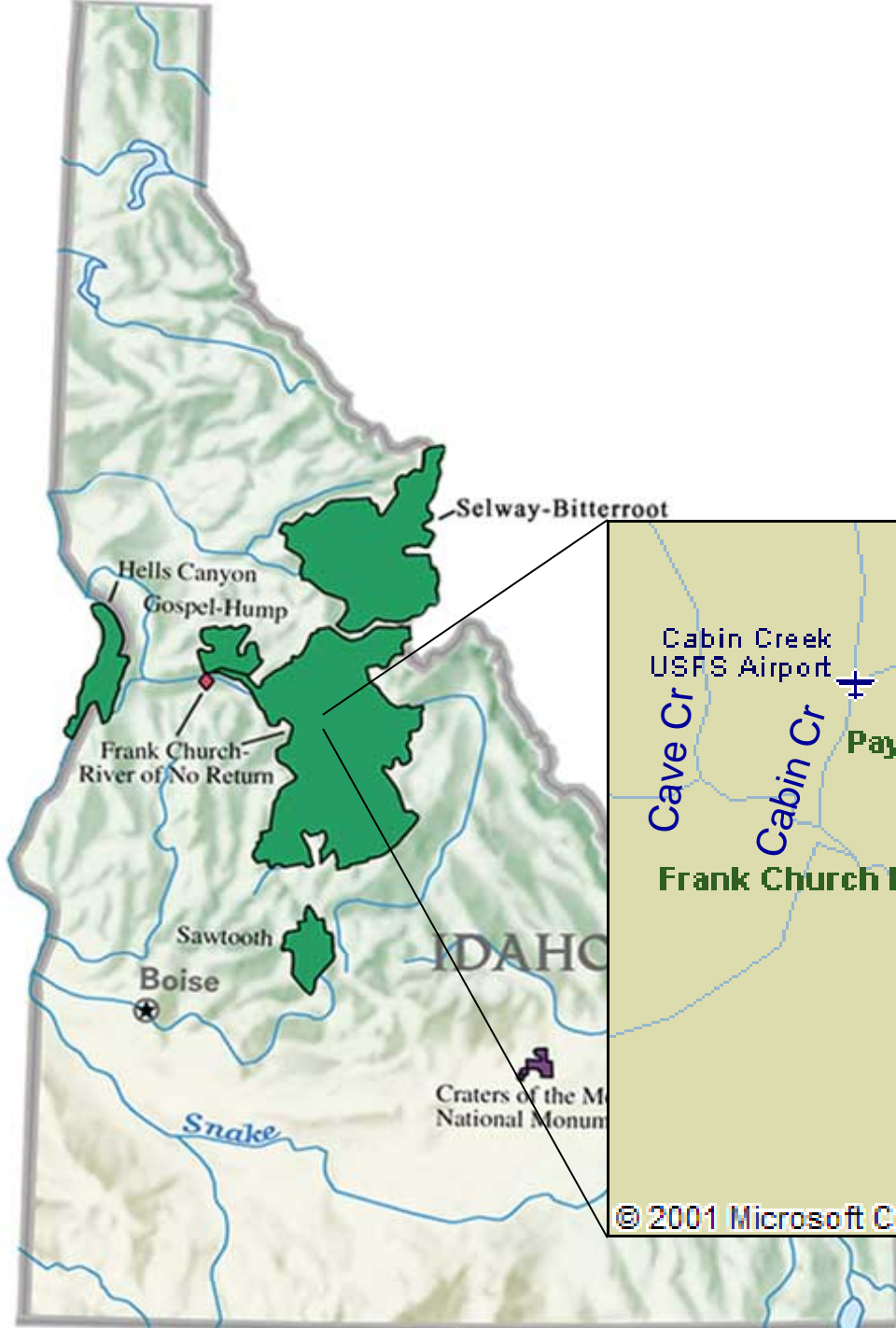
- Recent wildfire of 2000 on Big Creek
- Burnt cottonwood snags
- Potential habitat for Lewis' woodpecker



Study Area

Frank Church Wilderness

Big Creek Drainage



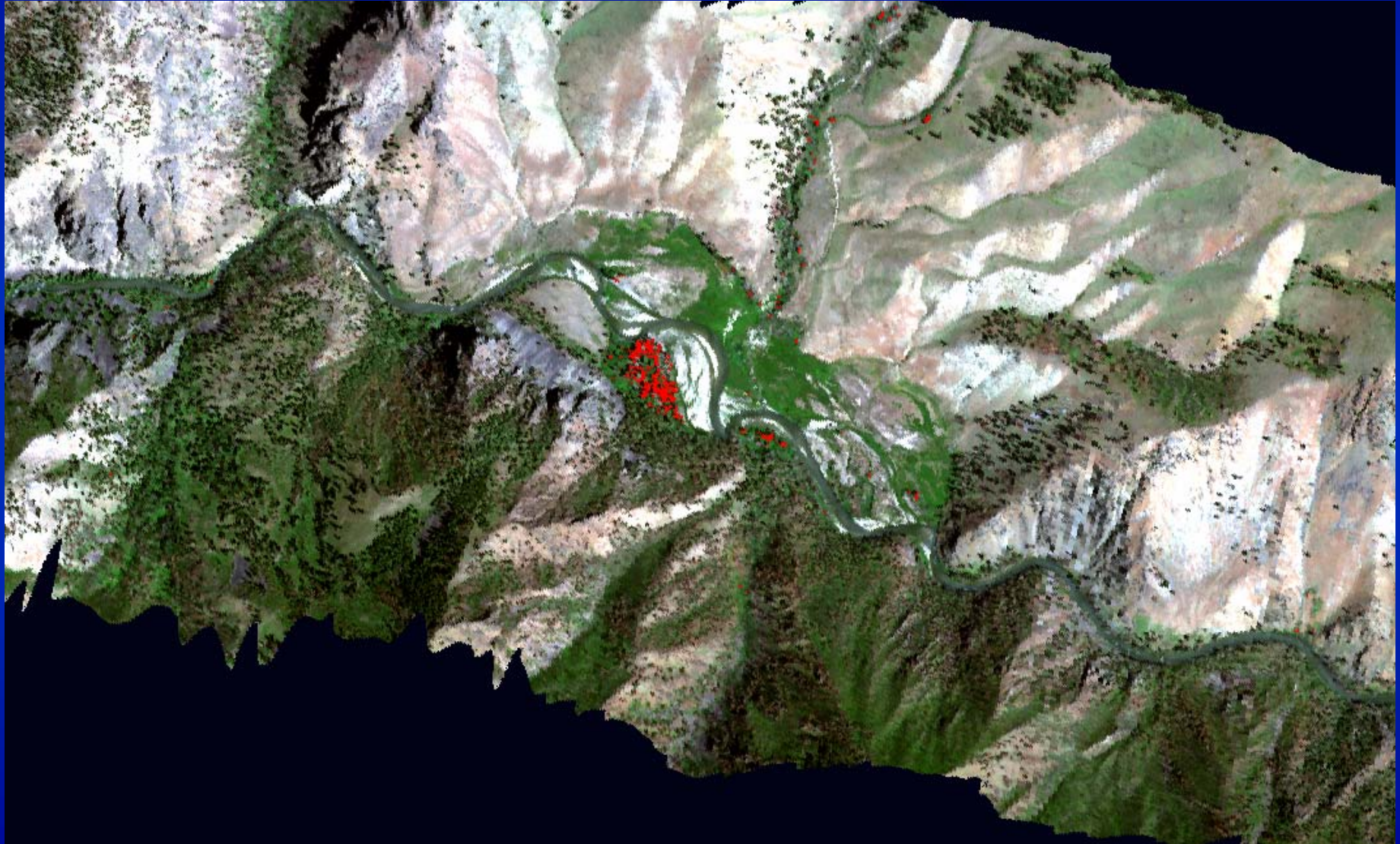
Objectives

- Assess accuracy of mapping live cottonwood distribution
- Determine if dead cottonwoods are identified by mapping of live cottonwoods
- Evaluate Lewis' woodpecker use

Cabin Flat



Cabin Flat Cottonwood Distribution



Taylor Ranch



Taylor Cottonwood Distribution



Methods

A scenic landscape photograph showing a river flowing through a valley. The river is in the foreground, with water splashing over rocks. The middle ground is filled with tall, thin trees, possibly cottonwoods, along the riverbank. In the background, there are rolling hills and mountains under a blue sky with scattered white clouds. The overall scene is bright and natural.

- 53 cottonwood sites
- At each site location Record Data
 - GPS Location of site
 - Number of live and dead cottonwoods
 - Lewis' woodpecker survey
 - Record Data for 30 minutes
 - Presence/Absence, #, behavior, and active nest

Preliminary results

- Effectively map live cottonwoods
 - Accurately mapped 98% of live cottonwoods
- Mapped dead with live cottonwoods
 - 80% of hyperspectral mapped sites contained dead trees
 - Dead ranging from 6%-100% of total trees on site
- Lewis' woodpecker use
 - 14 nest sites located in burned cottonwood snags
 - 4 in hyperspectral sites (29%), 10 in unmapped sites (71%)

Cottonwood and Lewis' Identification Form Hyperspectral Analyses Project

Field invest
Site #

Cottonwood

Date
GPS Coordi

General Des

Are cottonw
Cause of de

Woodpecke




Date
Presence/ A
Active Nest
Bark ON/
Location c
Tree size:
GPS of ne

Behavior: 1
5)fly to ca
6)social in
Comments

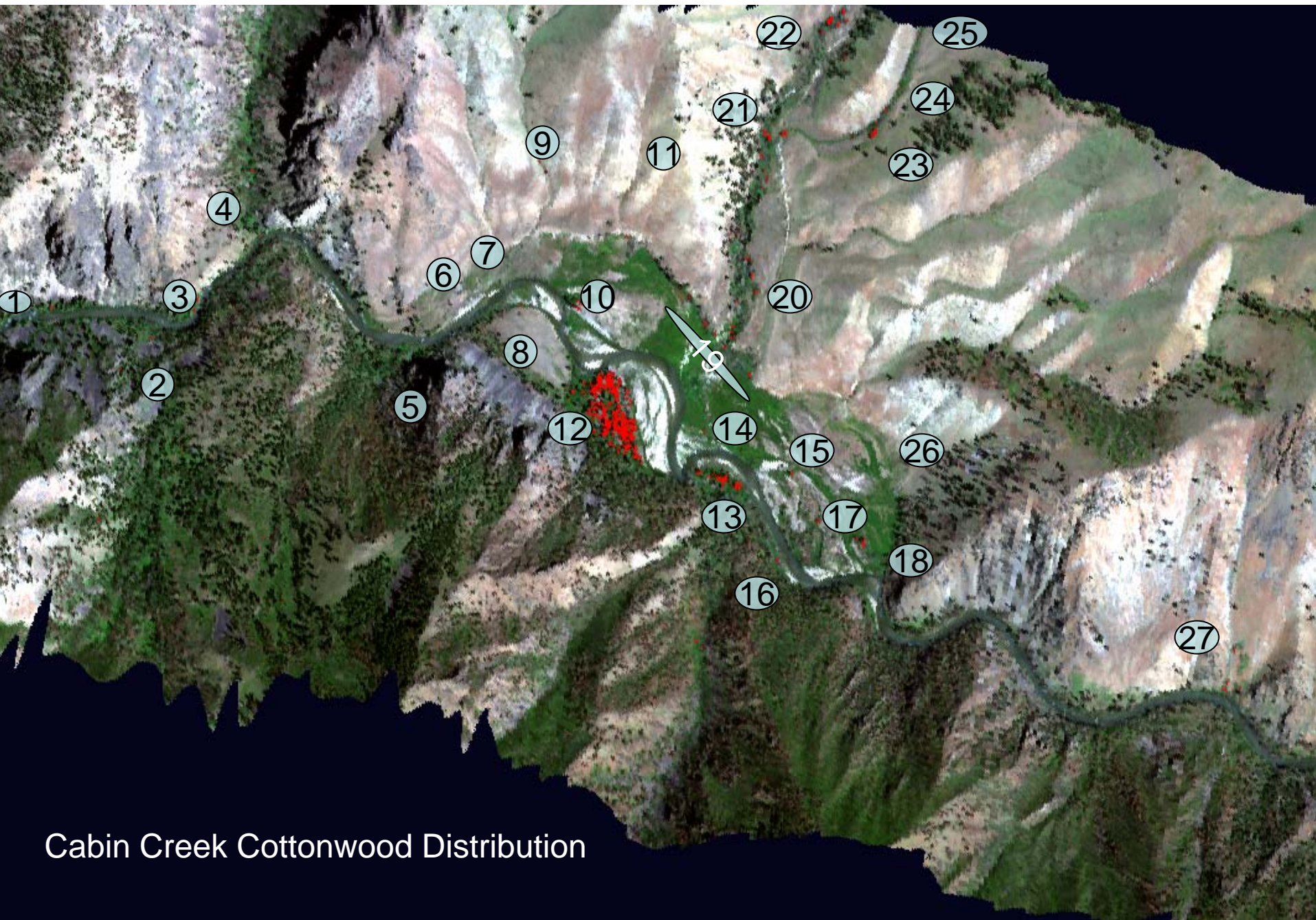
Presence of
Specific B
Other:



Acknowledgements

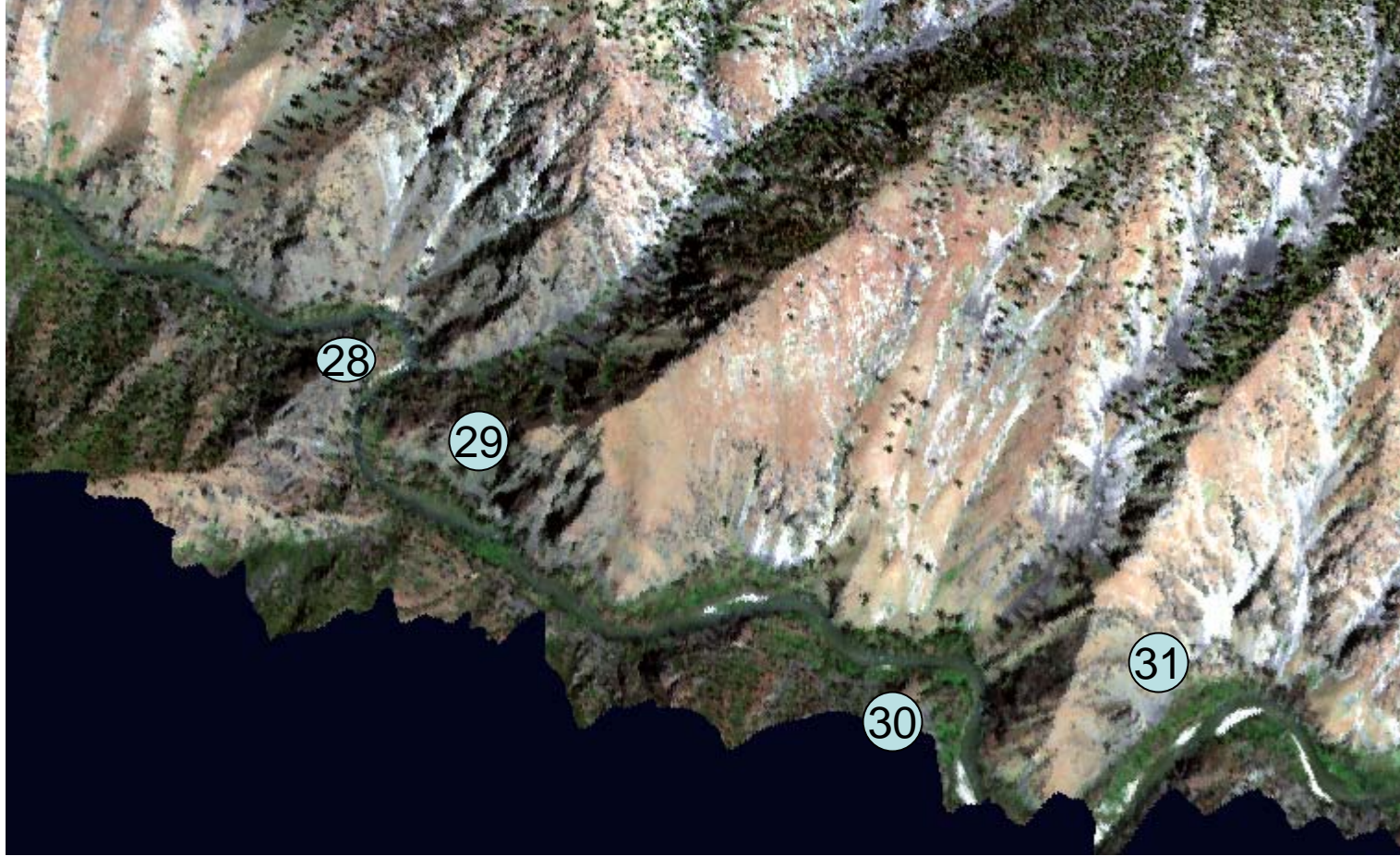
- DeVlieg Foundation 
- Janet DeVlieg Pope 
- Jim and Holly Akenson 
- Jeremy Shive, ISU
- Taylor Ranch interns and employees: Corey Shake, Mackenzie Shardlow, Hati Mvundura
- Dr. Jeff Braatne (UI academic mentor of project) 



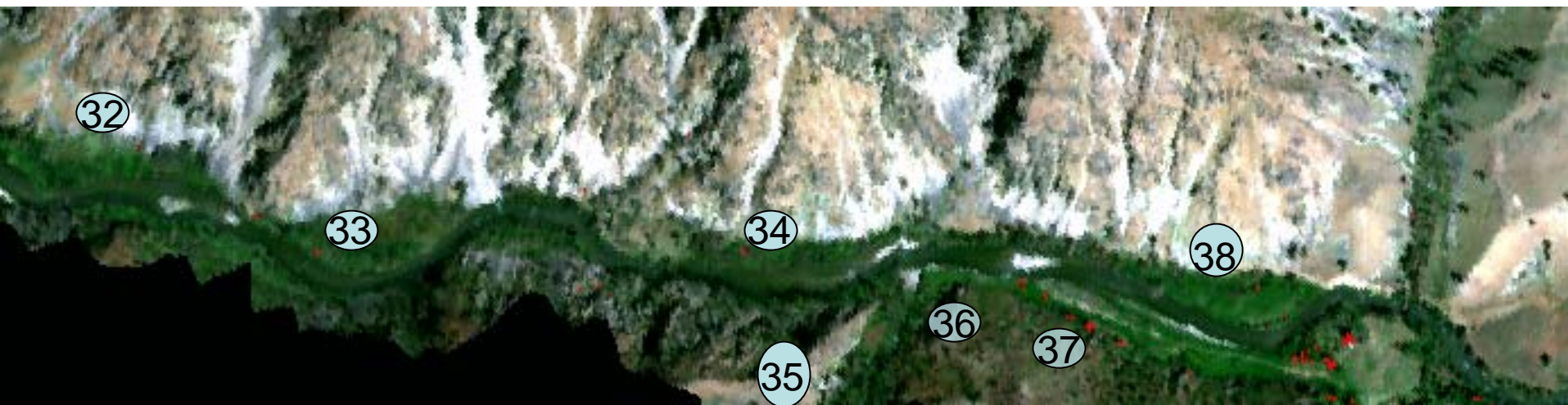


Cabin Creek Cottonwood Distribution

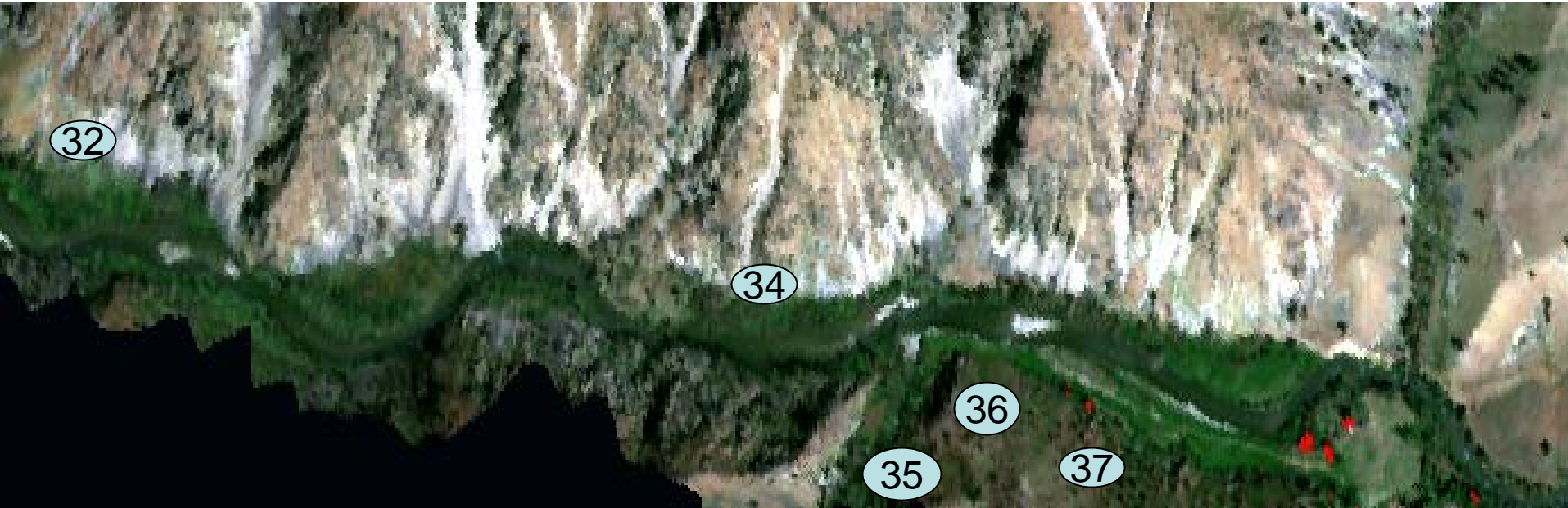
Below
Cabin to
Taylor
map



Taylor
and up



New Airstrip and Big Riparian Map
Without weird pixels and hyp sites



Taylor Ranch Cottonwood Distribution



Cougar Creek Hyperspectral Cottonwood Distribution

