

# Visualization

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# Visual Simulations Overview

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- **Definition**
  - **Uses**
    - Geospatial- Land Use Planning
    - Project Planning & Design
    - Affects Analysis and Evaluation
  - **Types....examples...pros/cons**
    - *Traditional vs. Computer-Generated*
    - 2d Image Editing
    - 3d Spatial Rendering
-

# Visual Simulation.... What is it?

FEDERAL LAND MANAGEMENT AGENCIES:

***For This Class: The use of illustrations, photographs, and computer-generated images designed to communicate the visible changes to the environment as a result of management activities or decisions.***



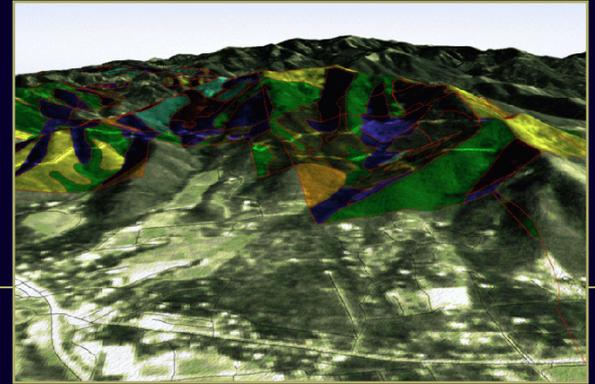
Before



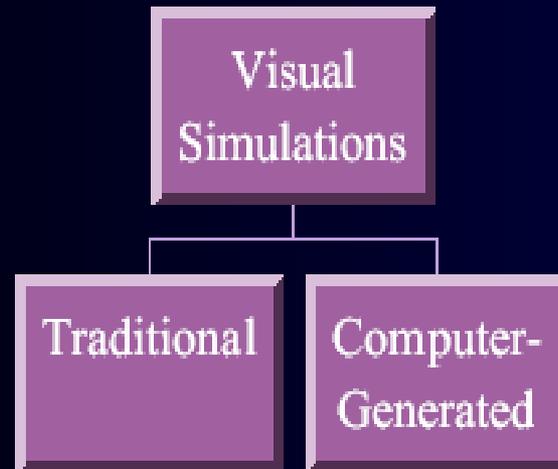
After

# What are the uses?

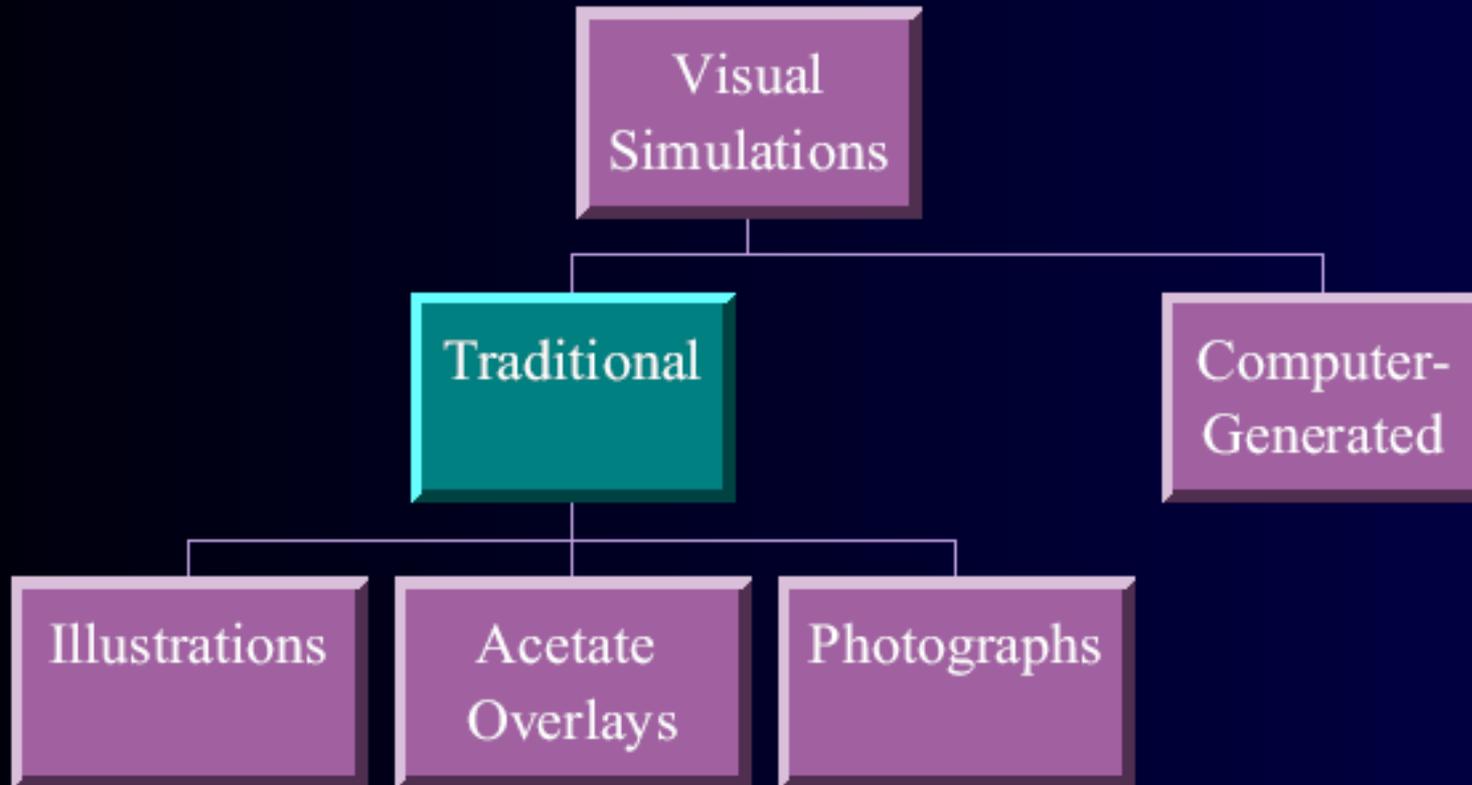
- Environmental consequences
  - Visual Resource Management (Contrast-ratings) See notebook
- Alternative studies / Project design
- Negotiations with project proponent
- Engage the public
- Internal communication
- Landscape level planning
  - Land Use Plan and Activity



# Types of Simulations

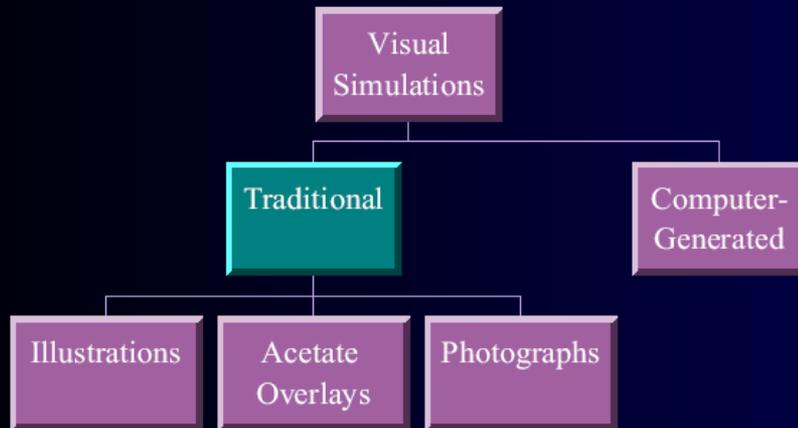


# Types of Simulations



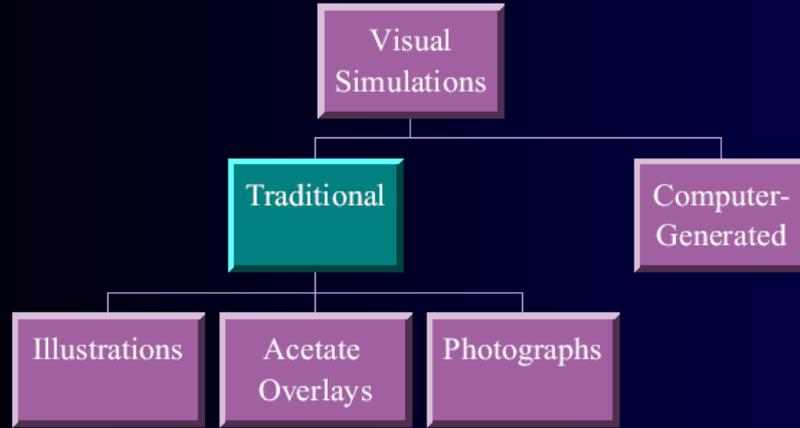
# Simulation Examples

- Traditional/ Photographs
- Similar activities
- Actual site photos



# Simulation Examples

## Traditional/ Photographs



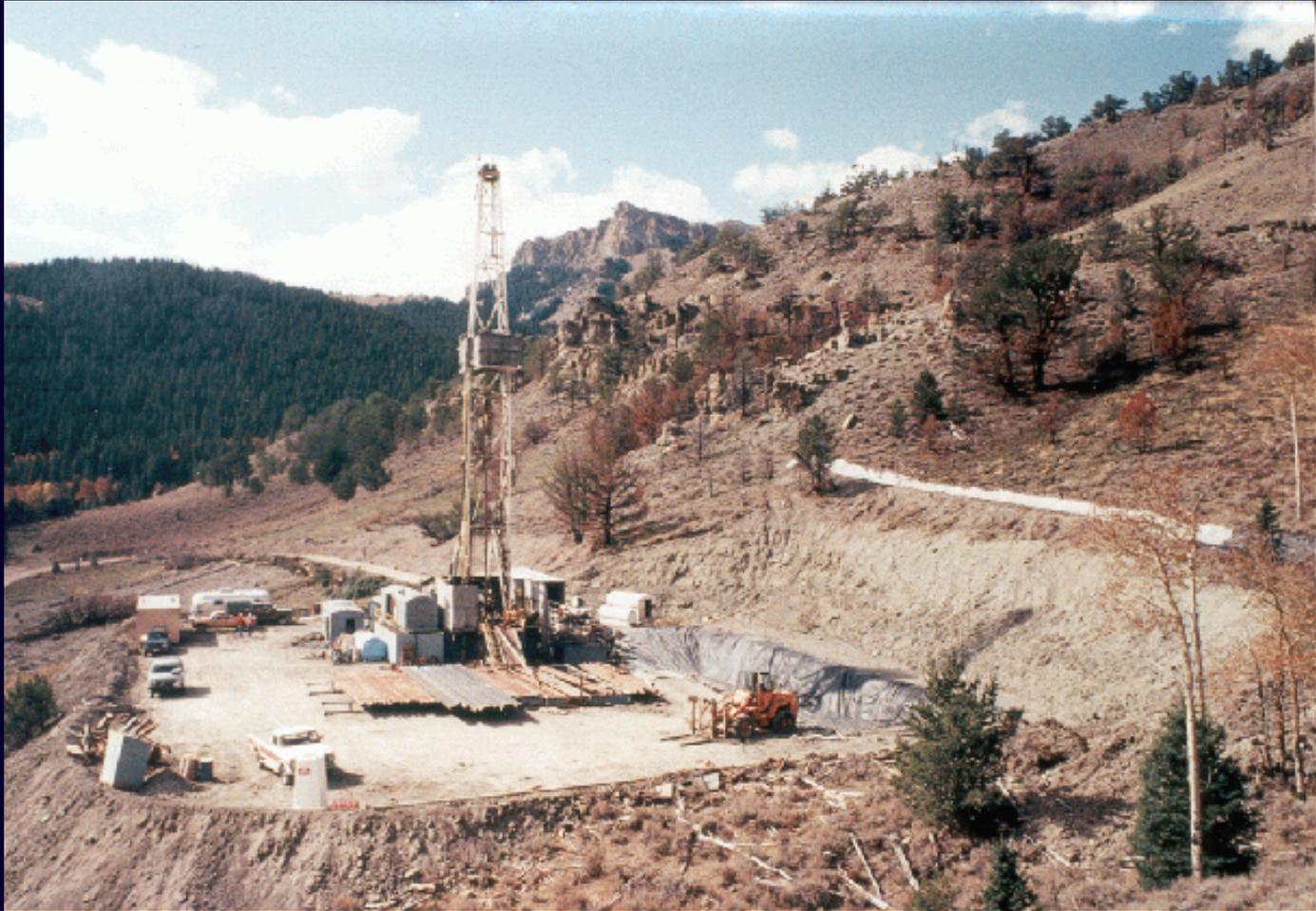
# Simulation Types

## Photographs- Changes over Time



# Simulation Types

## Photographs- Changes over Time



# Simulation Types

## Photographs- Changes over Time



# Simulation Types

## Photographs- Changes over Time



# Simulation Types

## Photographs- Changes over Time



# Traditional Simulations

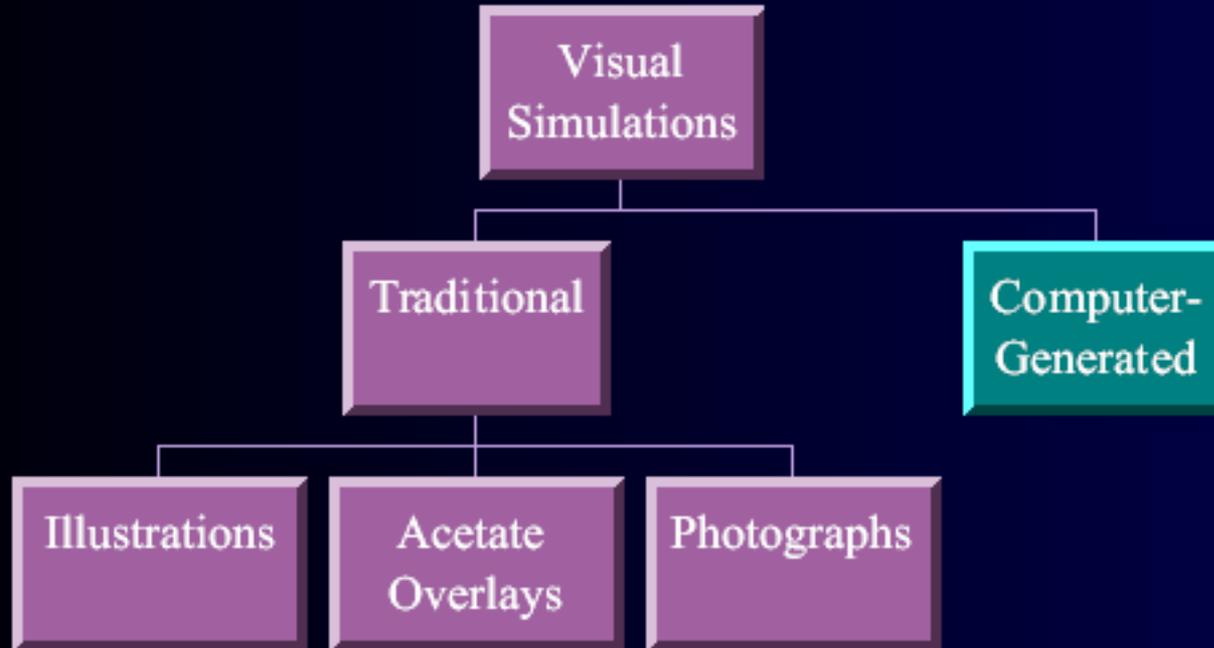
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## Using Photographs: Summary

- References proven successes
- Connects loop w/monitoring
- No graphic expertise necessary; IN-House
- May be best “bang for buck”
- Requires time commitment and follow-up

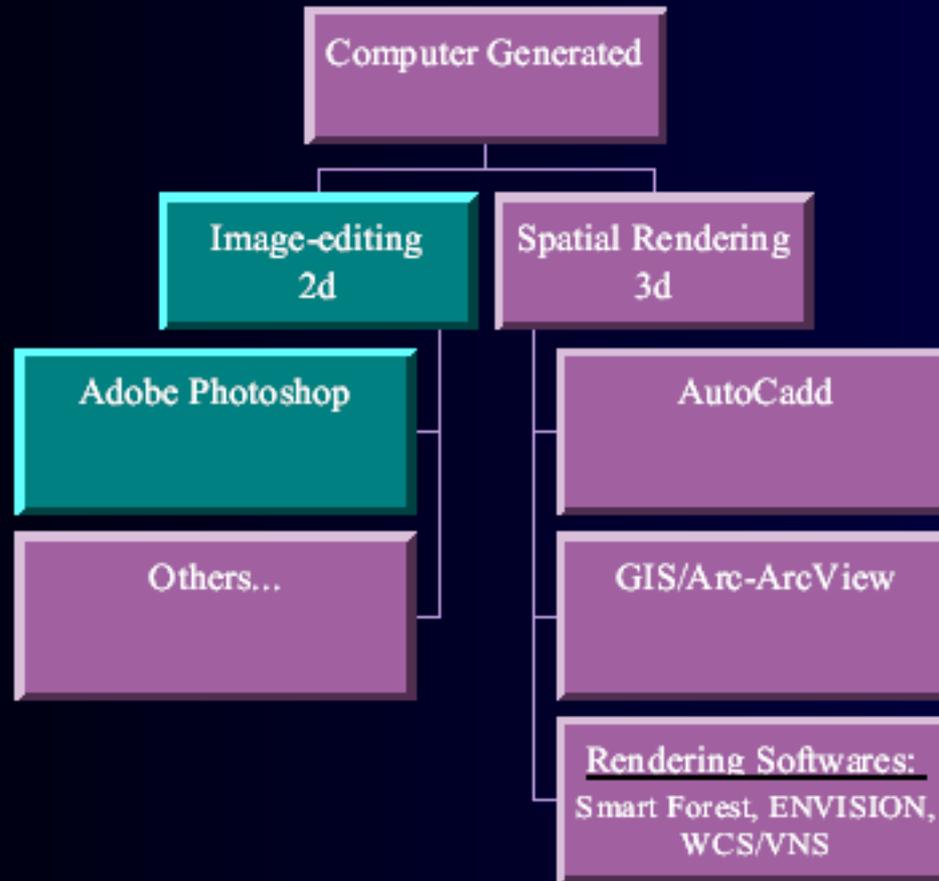
# Simulations

What are the types?



# Simulations

## What are the types?



# Image Editing

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## Photoshop Basics

- Process:
  - INPUT: (Photographs, Scan, Digital...)
  - EDIT: (Software)
  - OUTPUT: (Print, video, etc.)
  
- System Requirements...
  
- Considerations:
  - Source Imagery
  - Editing Guides- G.I.S.
  - Ultimate Application

# 2d: Photoshop Basics



# 2d: Photoshop Basics



# 2d: Photoshop Basics



# 2d: Photoshop Basics



# 2d: Photoshop Examples



Existing Situation



Expanded Pipeline

# 2d: Photoshop Examples



Existing Situation



Buried Pipeline

# 2d: Photoshop Examples



# 2d: Photoshop Examples



# 2d: Photoshop Examples



Existing Situation

# 2d: Photoshop Examples



Simulation: Short-term

# 2d: Photoshop Examples



Simulation: Long-term

## 2d: Photoshop Examples

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## 2d: Photoshop Examples

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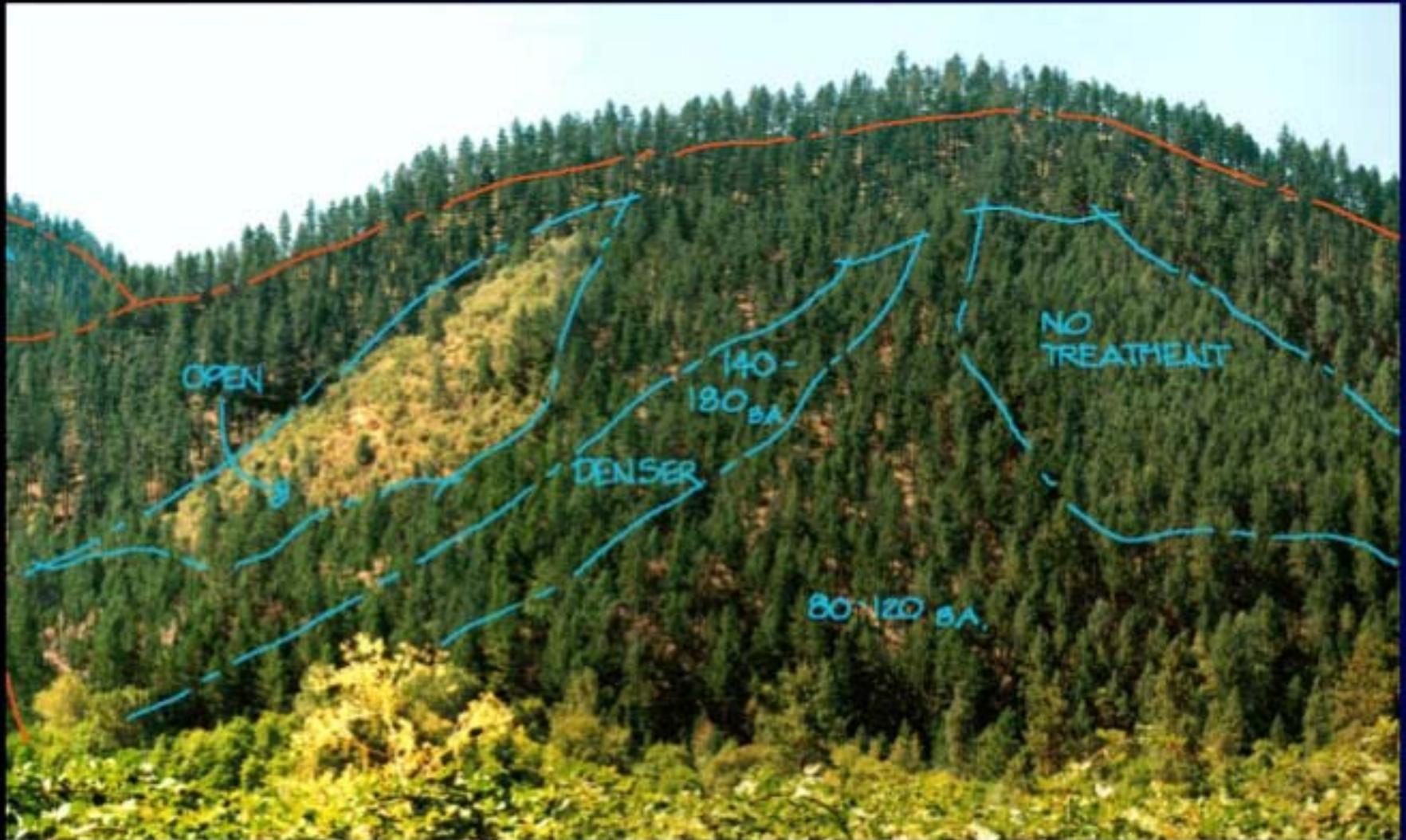


## 2d: Photoshop Examples

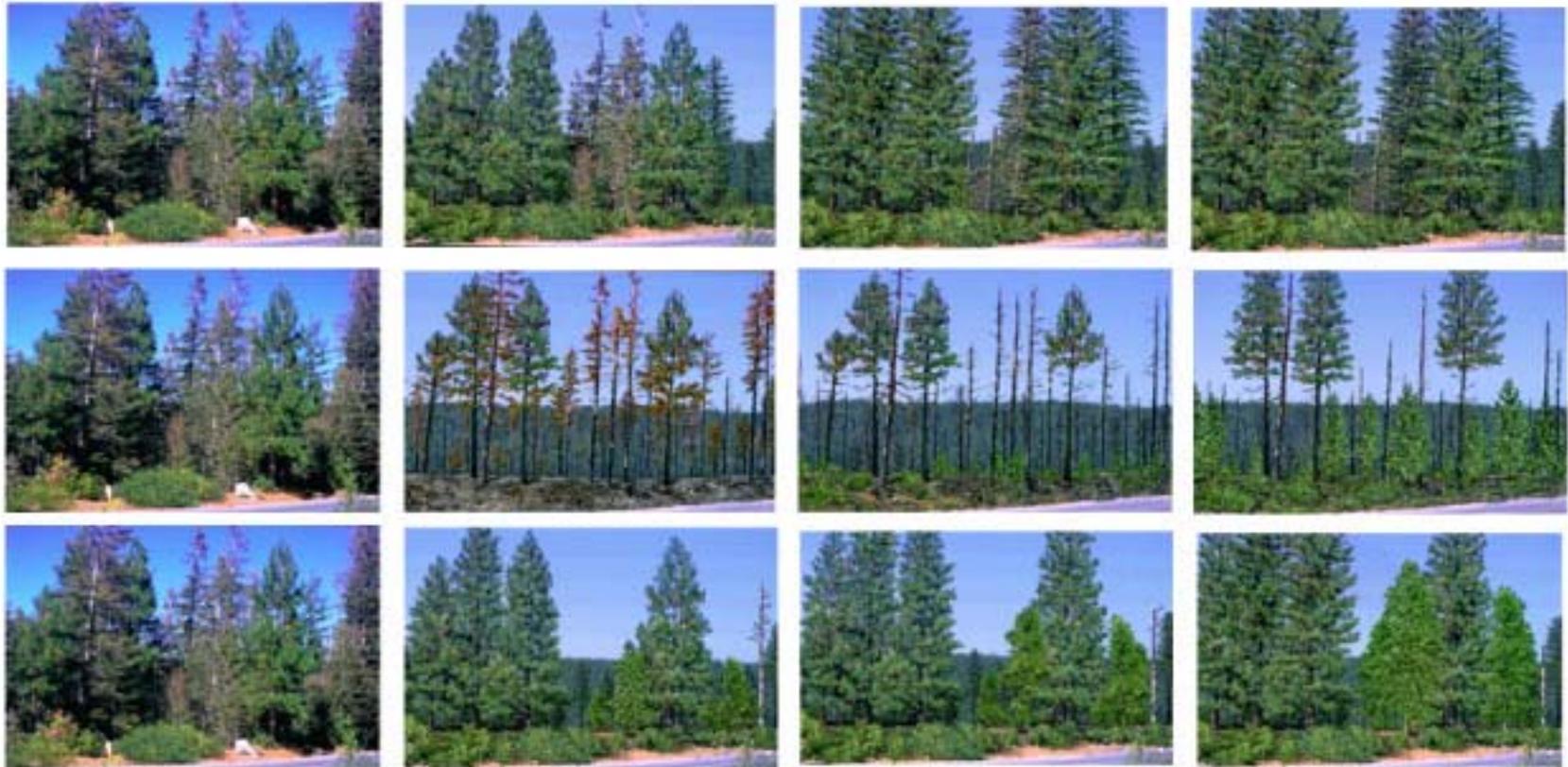
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## 2d: Photoshop Examples



## 2d: Photoshop Examples



# Image Editing

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## 2d: Photoshop Summary

- Most realistic visualization
- Artistically-generated
- Can use G.I.S. to guide
- Public skepticism
- Labor Intensive
- 2-dimensional- static

# Spatial Rendering

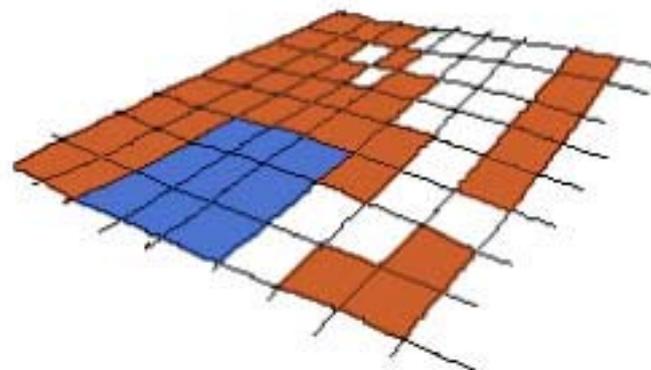
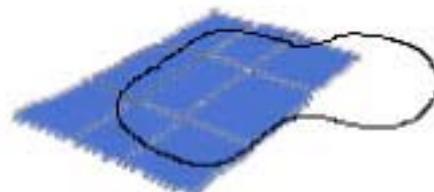
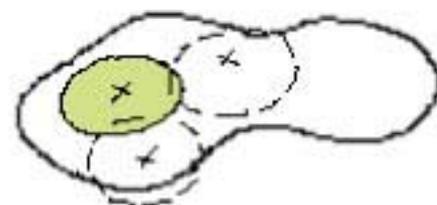
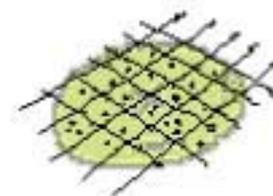
## Spatial Data Scales

Individual Tree Data

Plot Level Data

Stand Level Data

Remote Sensing Data



# Primary Building Blocks of WCS

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## Topography



## Spatial Data



## Foliage Images

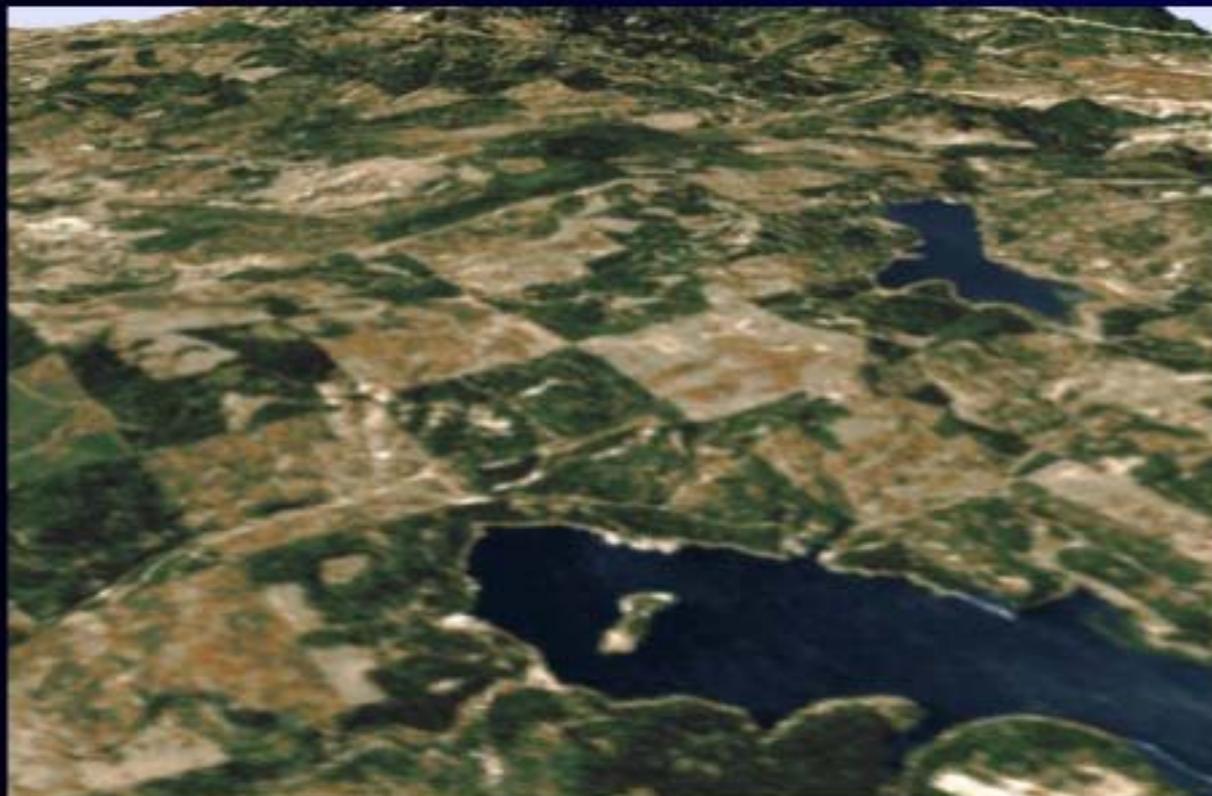


# Spatial Rendering

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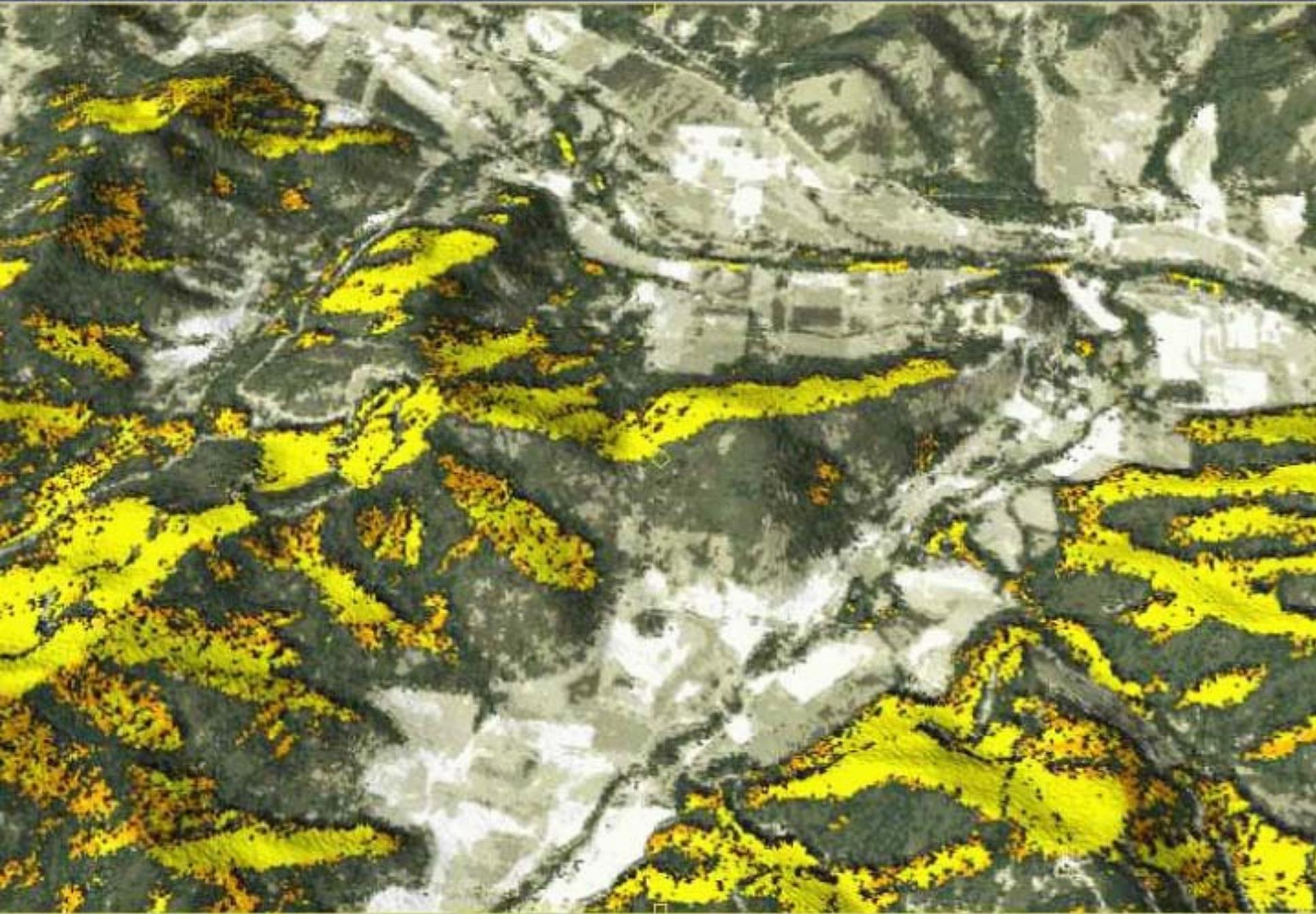
## Remote Sensing Data

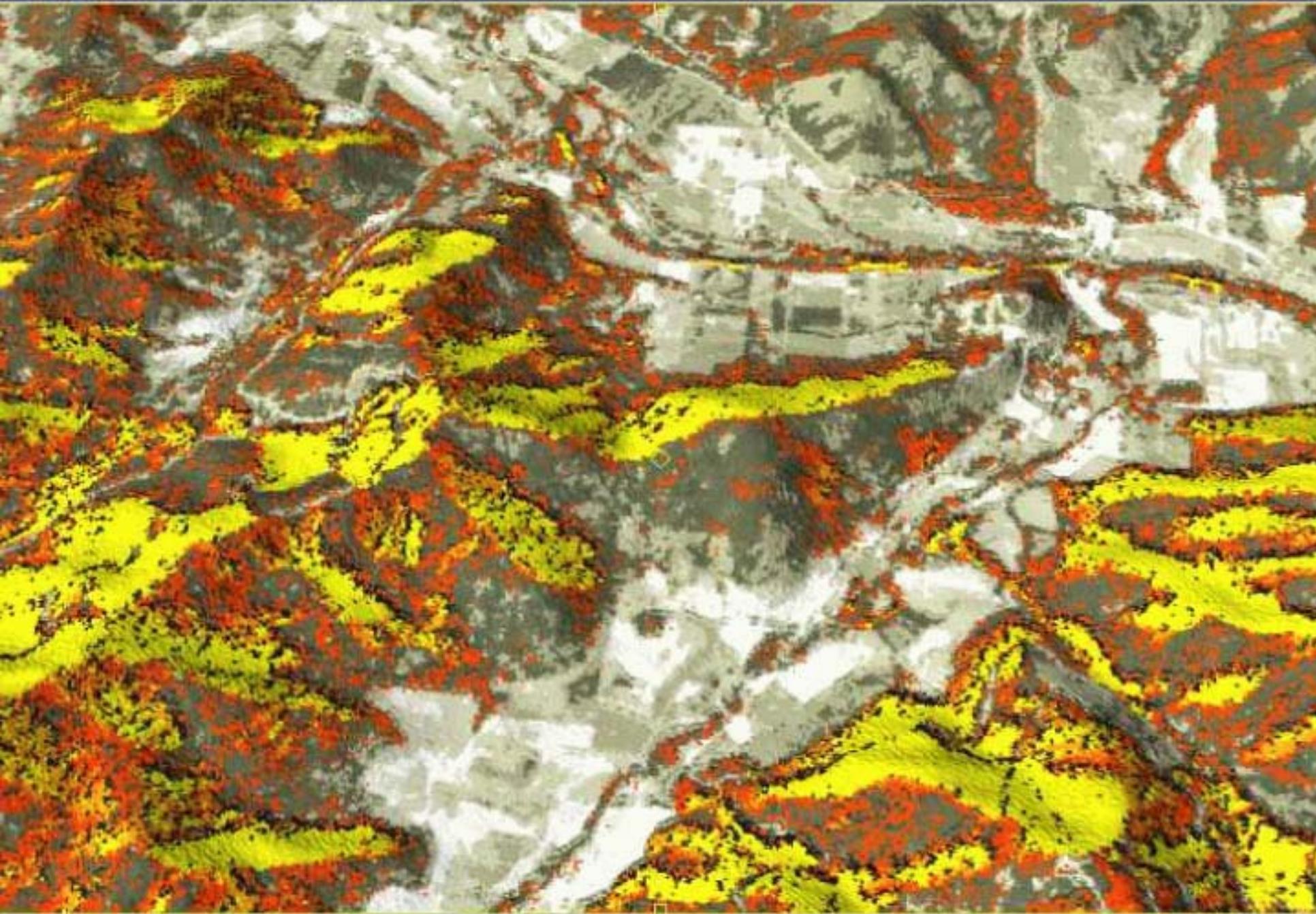
- Satellite
- Digital Orthoquads
- Aerial Photographs

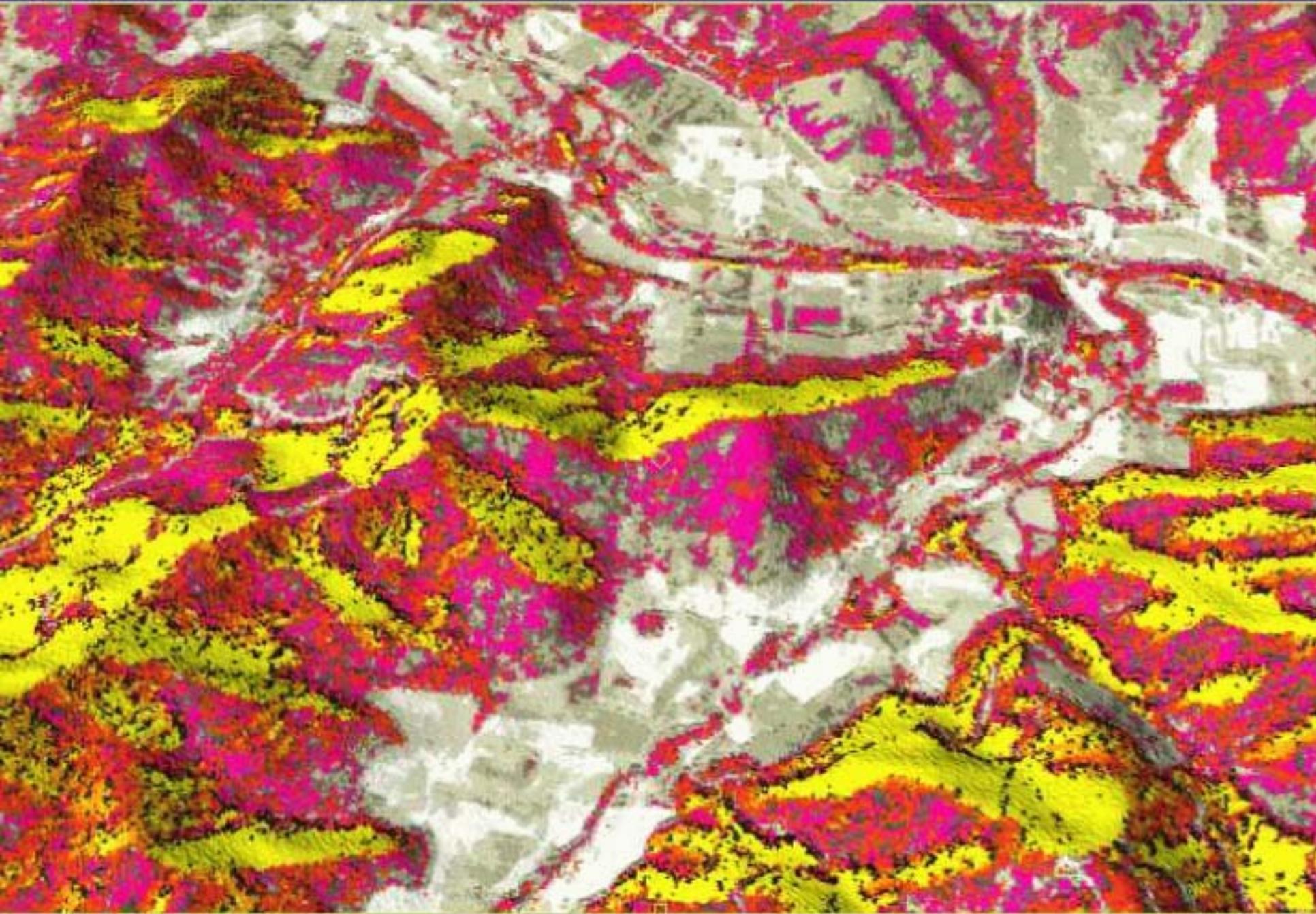


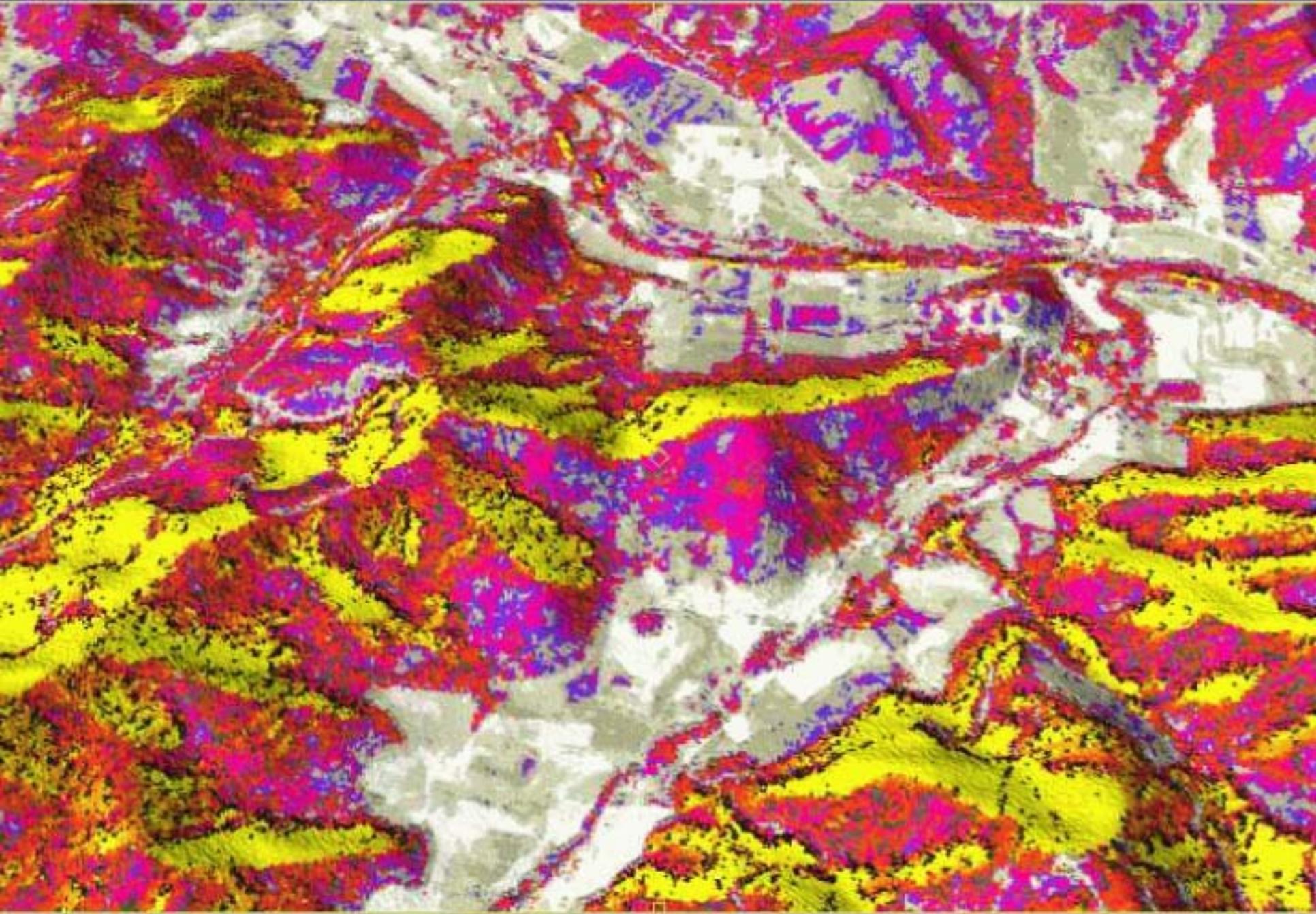


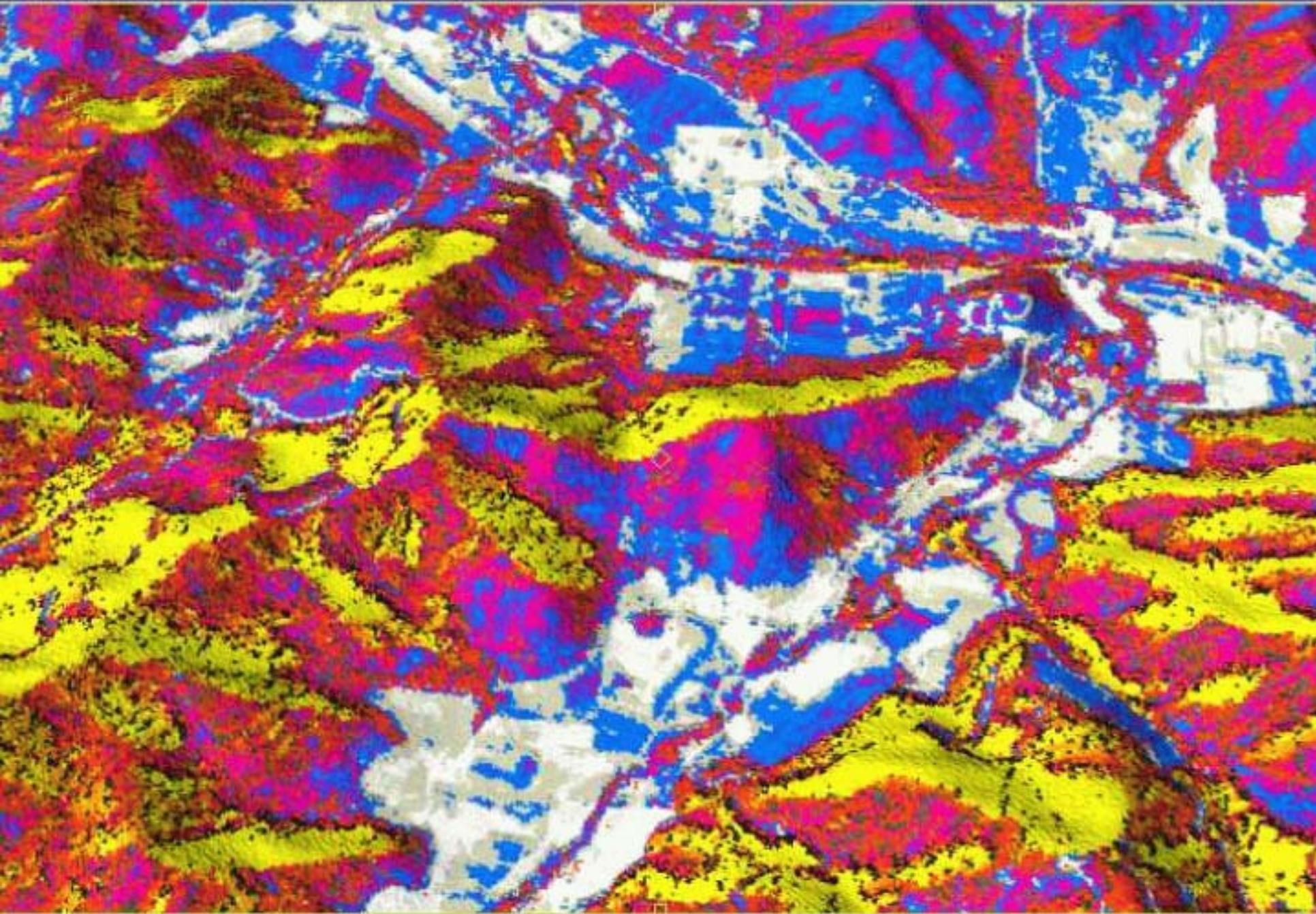
















WODIP Data draped in perspective



Foliage Images according to WODIP



## Realistic Foliage Rendering



Photographic Panorama



World Construction Set Rendering



Aerial Photograph



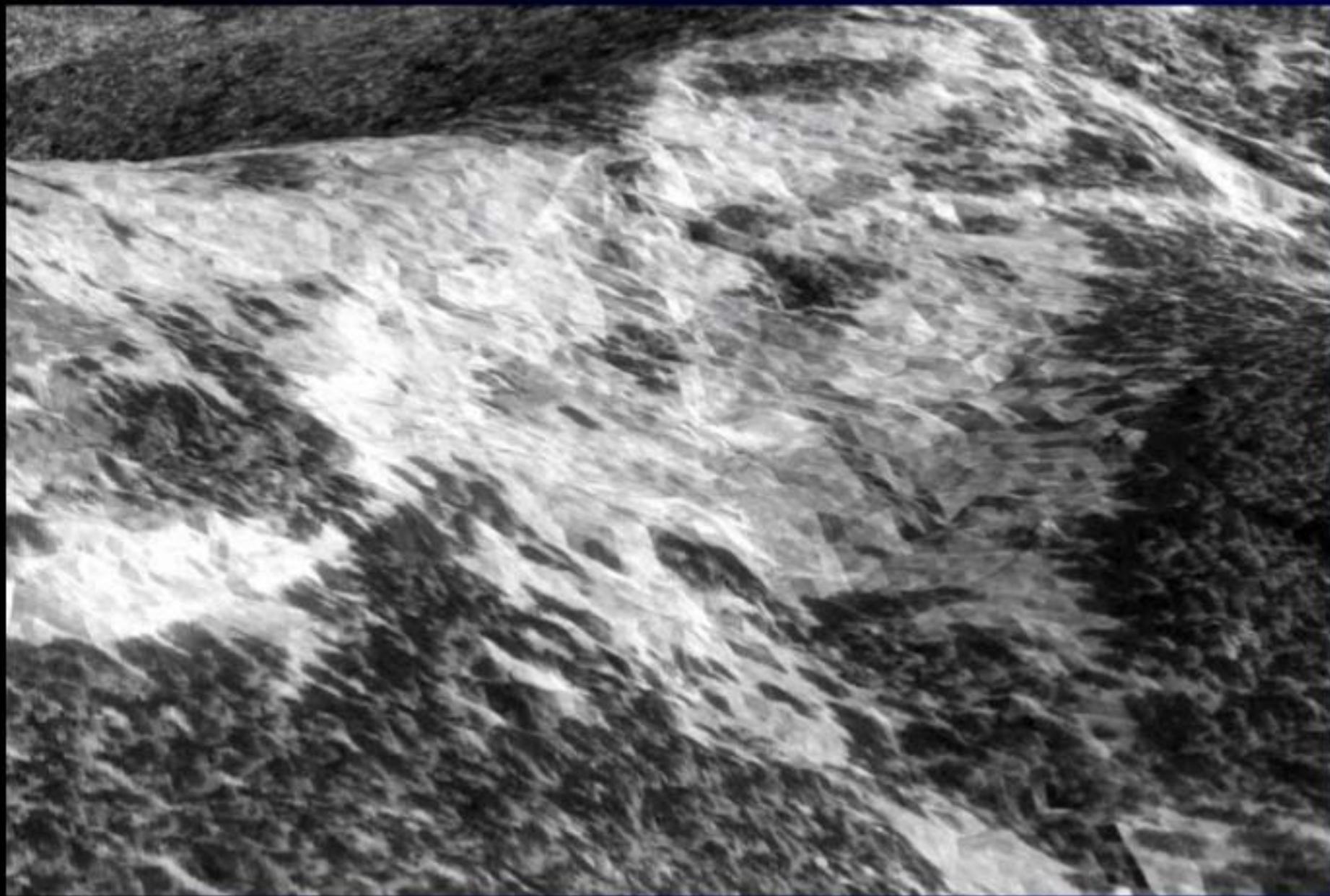
Rendering based on WODIP data

# Digital Orthoquads



Zoomed View:

Orthoquad draped over DEM



# Digital Orthoquads:

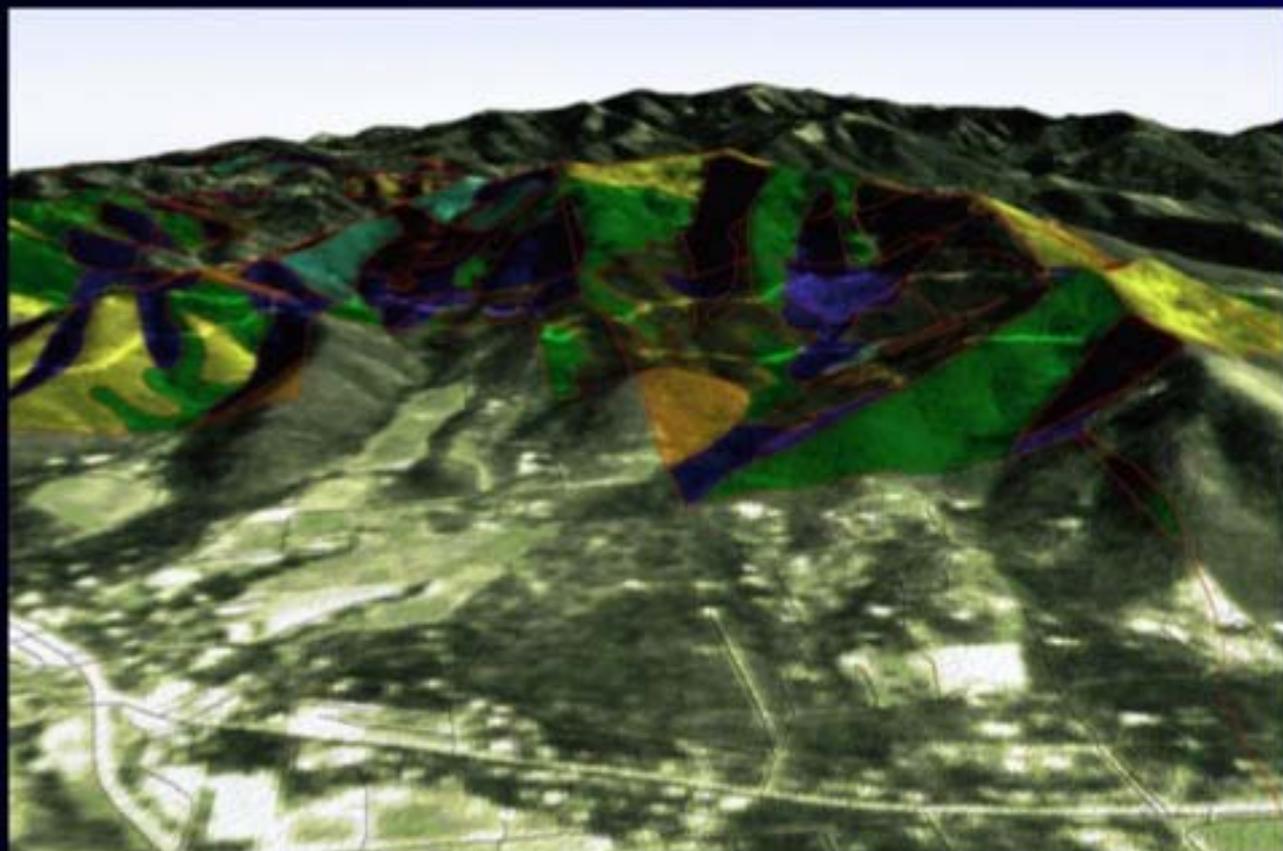
Foliage Images driven by DOQ colormap



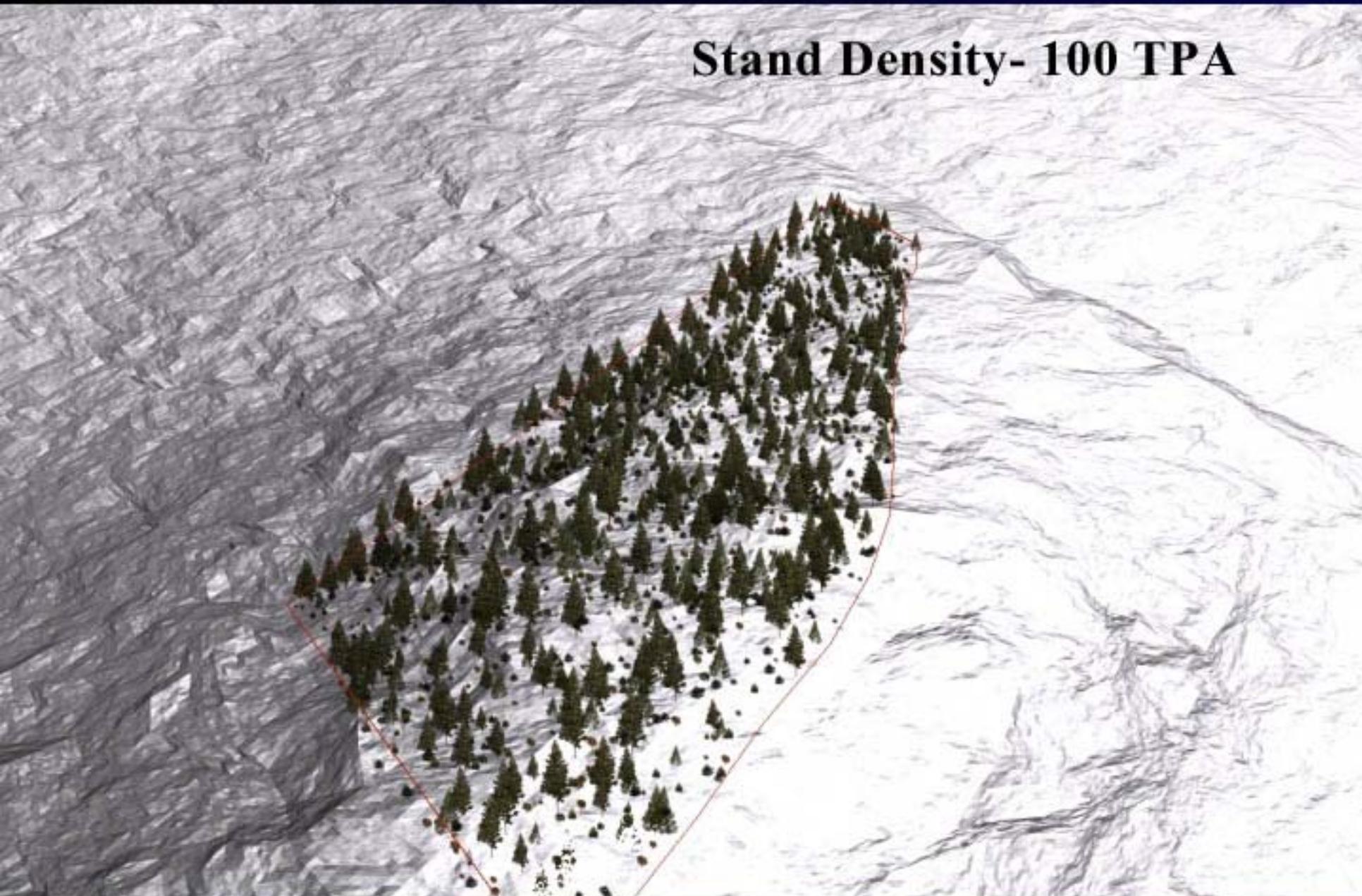
# Spatial Rendering

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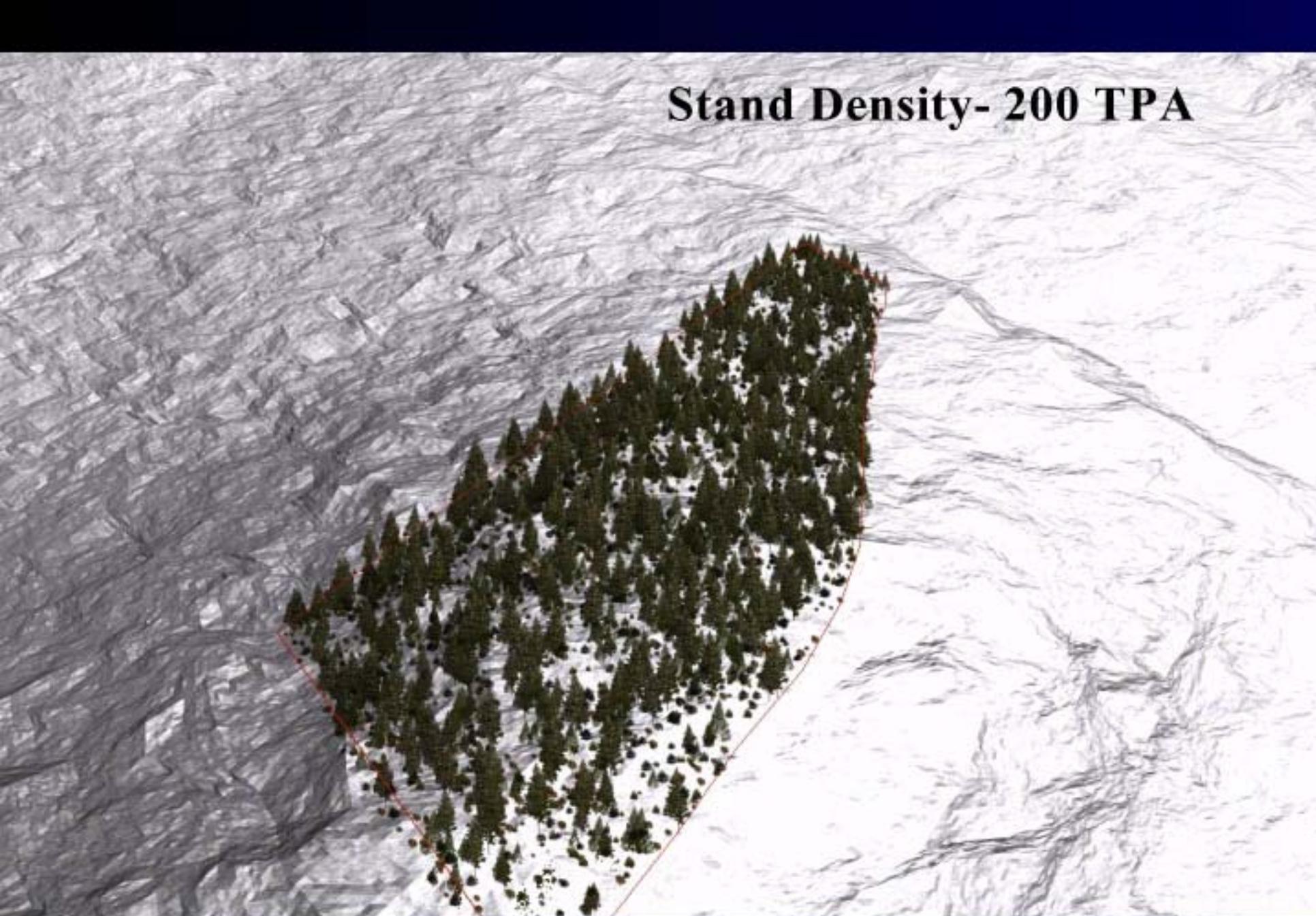
## Stand Level Data



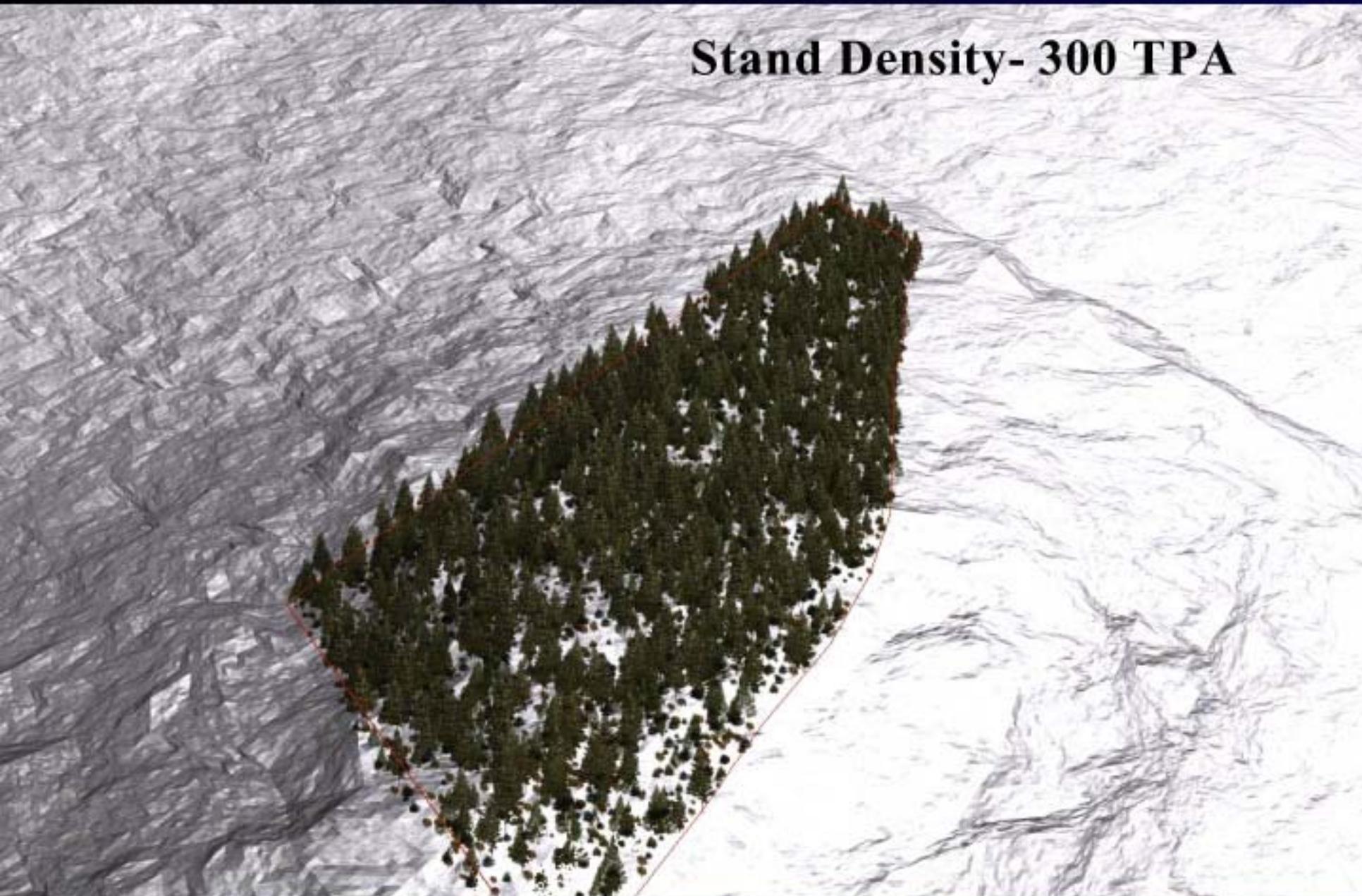
# Stand Density- 100 TPA



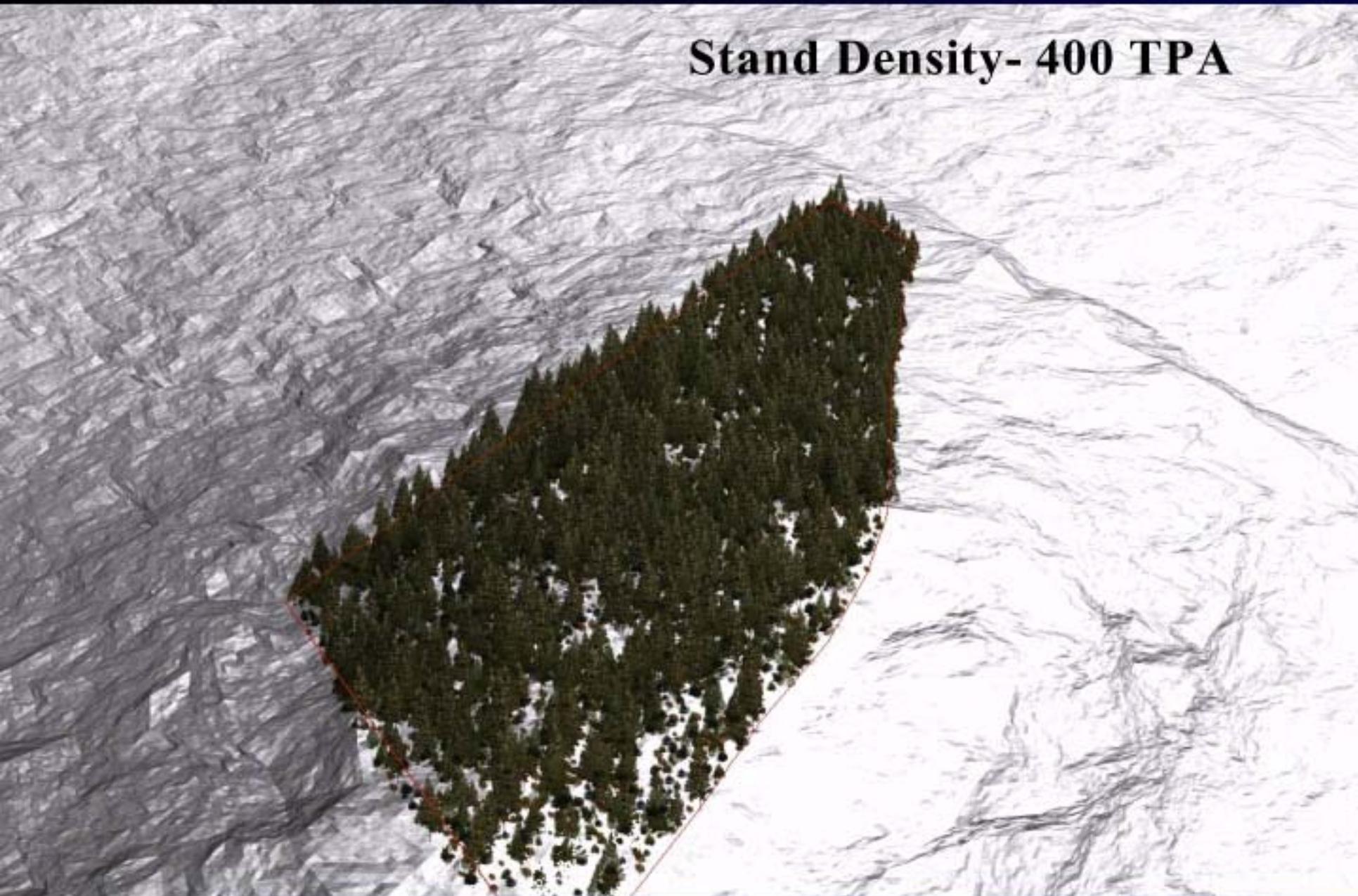
# Stand Density- 200 TPA



**Stand Density- 300 TPA**

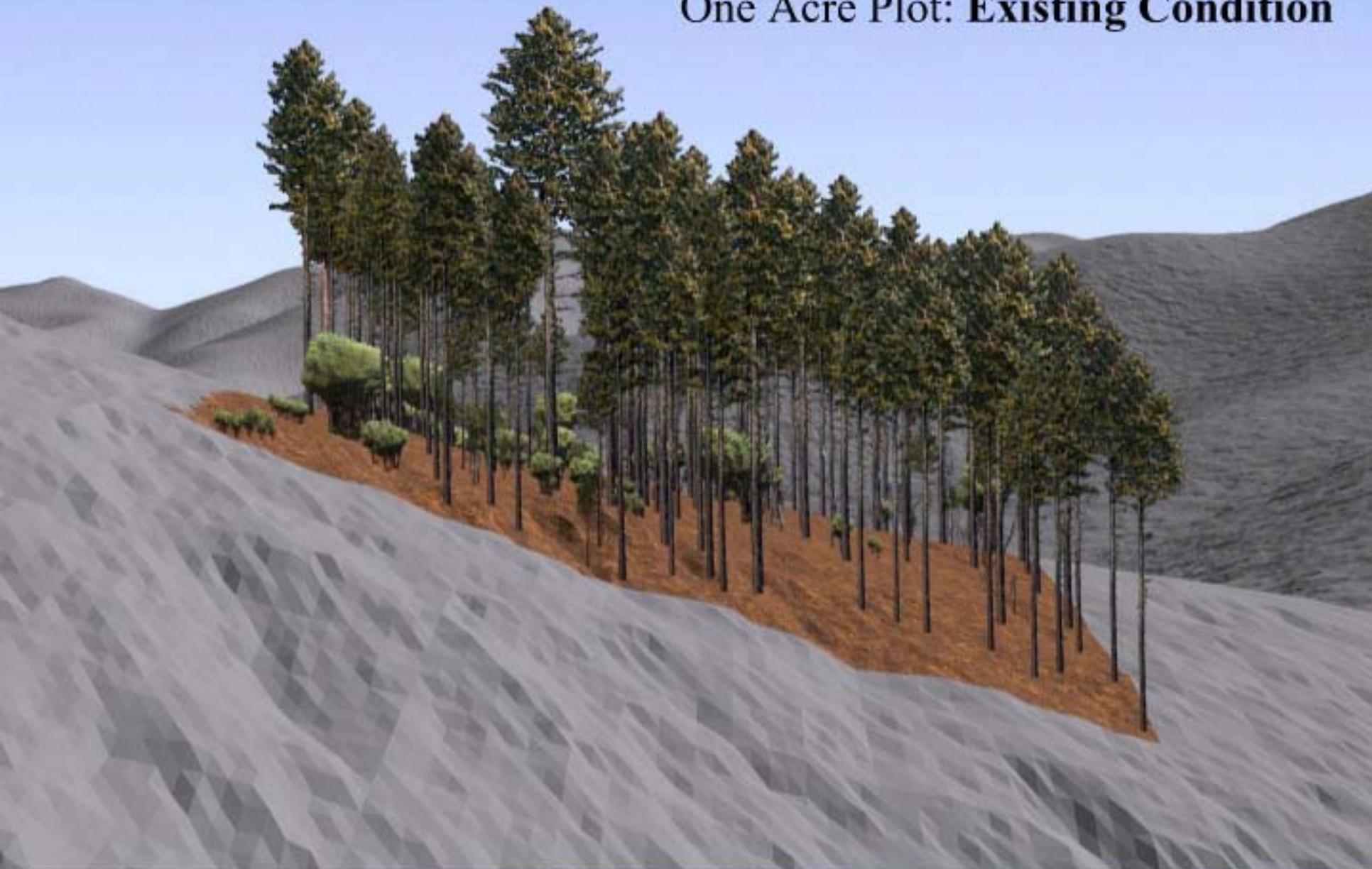


**Stand Density- 400 TPA**

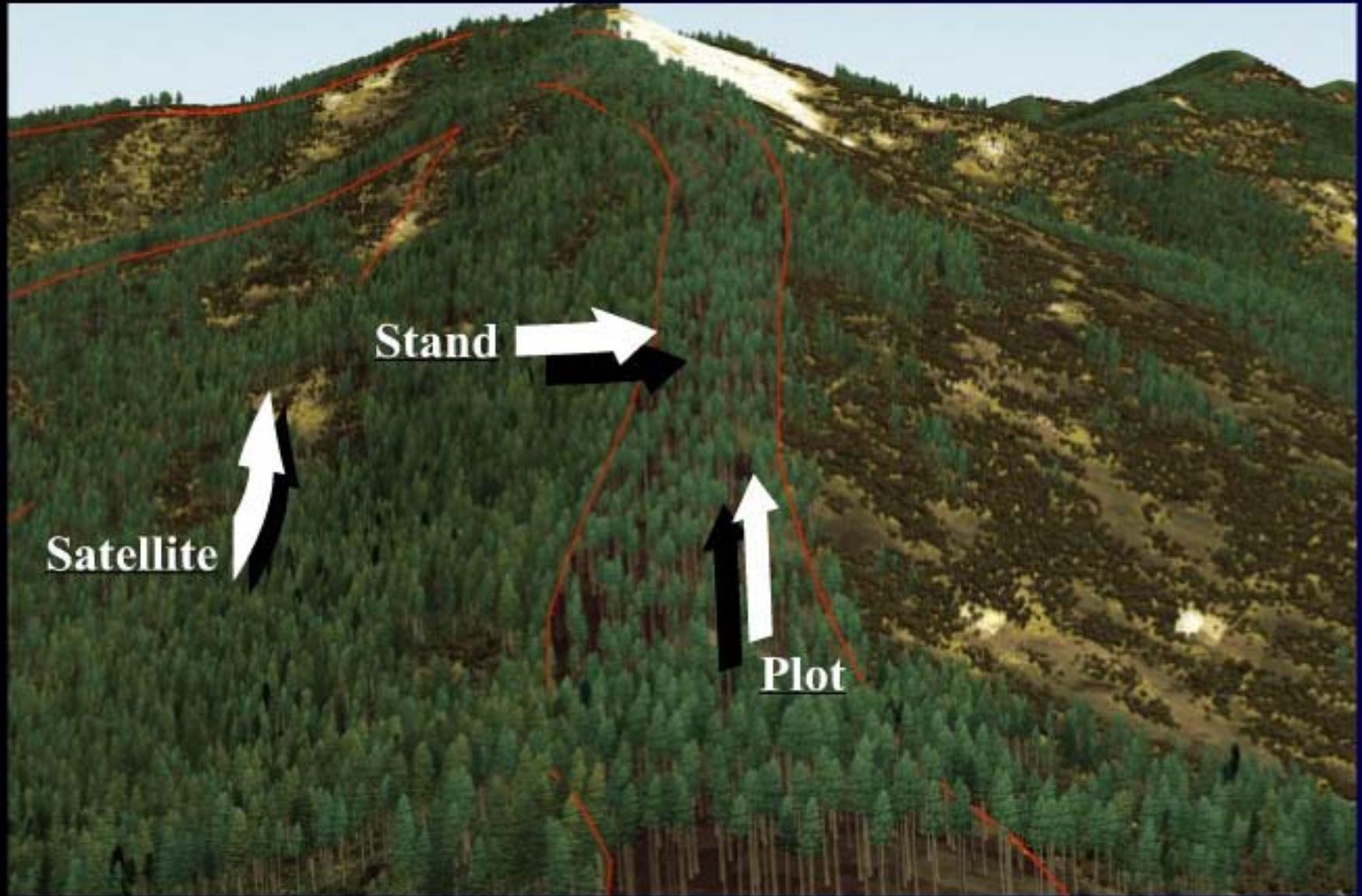




## One Acre Plot: **Existing Condition**



# Spatial Data Scales Combined



# Spatial Rendering

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## Rendering Effects



# Roads



# Roads

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# Roads

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# Fire



# Seasonal Changes

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Mid-Summer's View

# Seasonal Changes

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Thawing Snow Scene

# Seasonal Changes

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Winter Frost and Snow

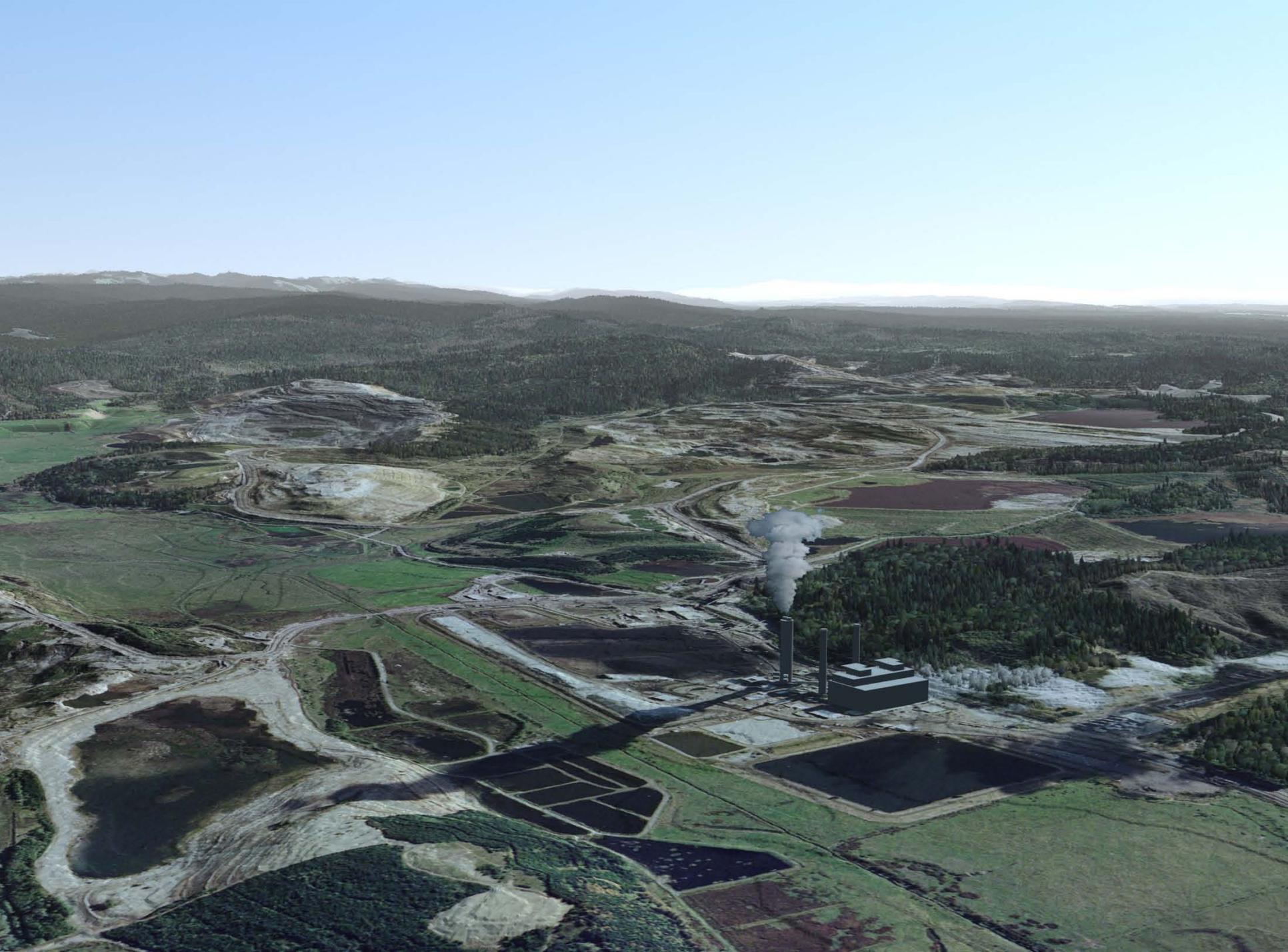
# Other Examples



## Other Examples



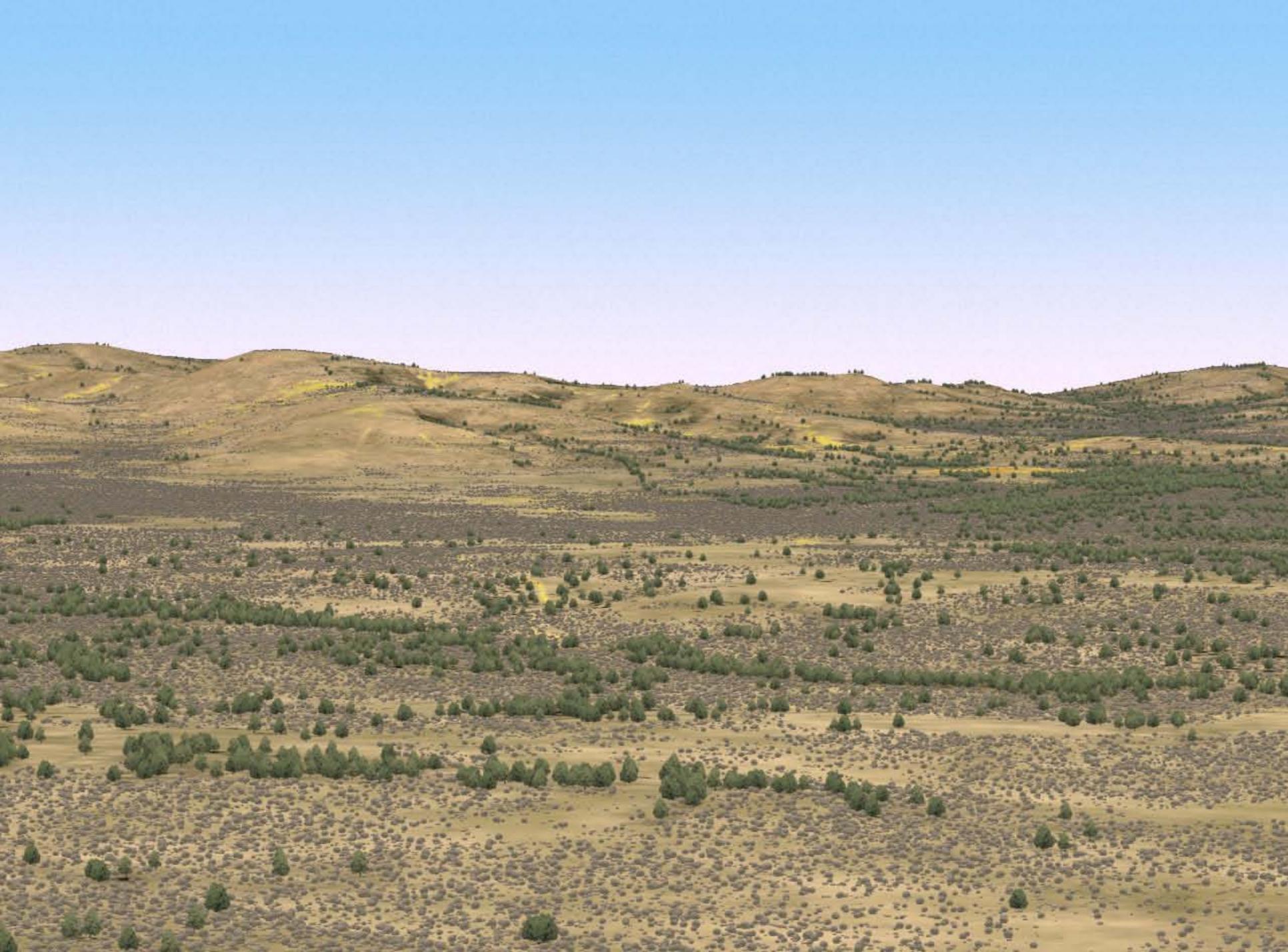




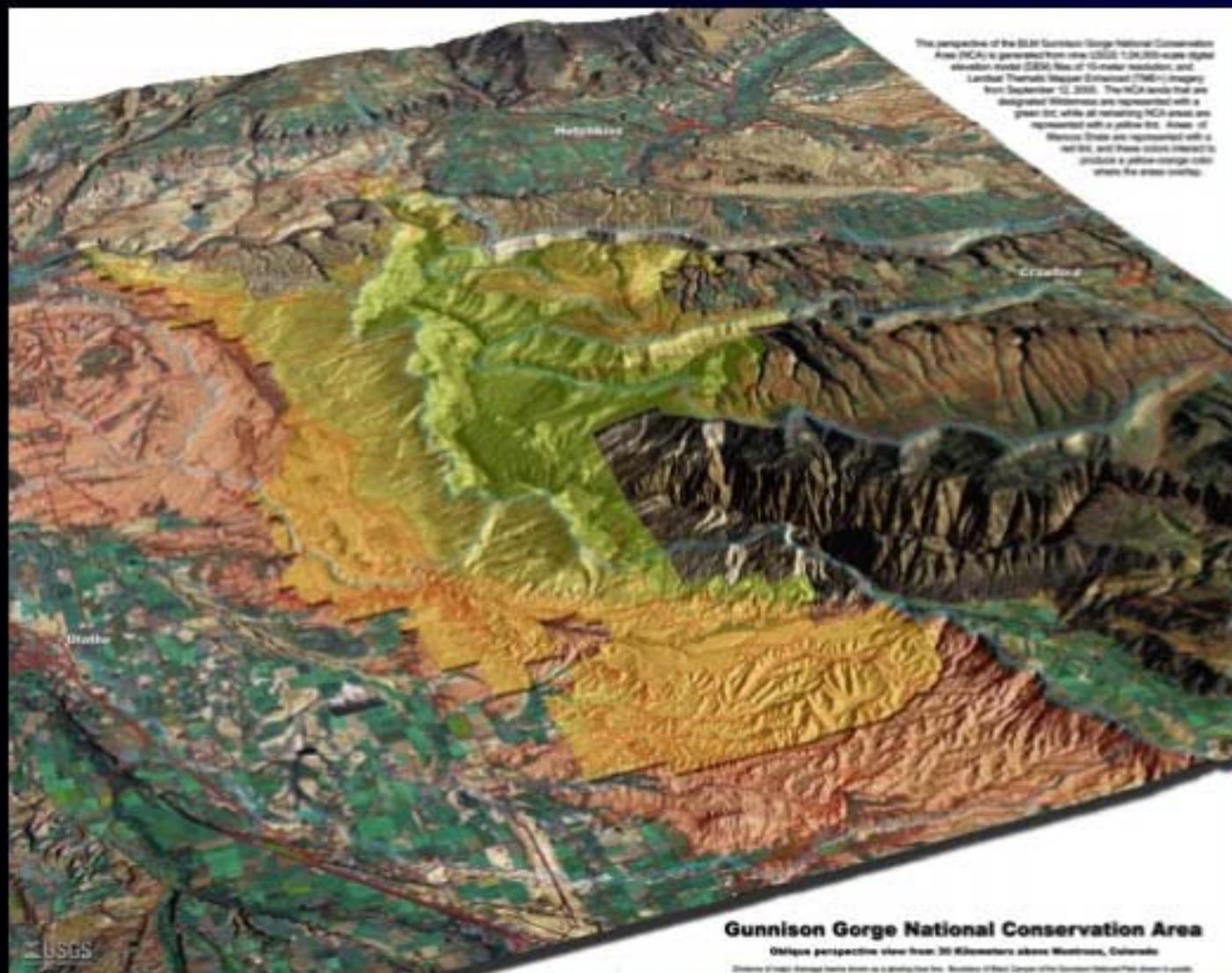
## Other Examples

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# Other Examples

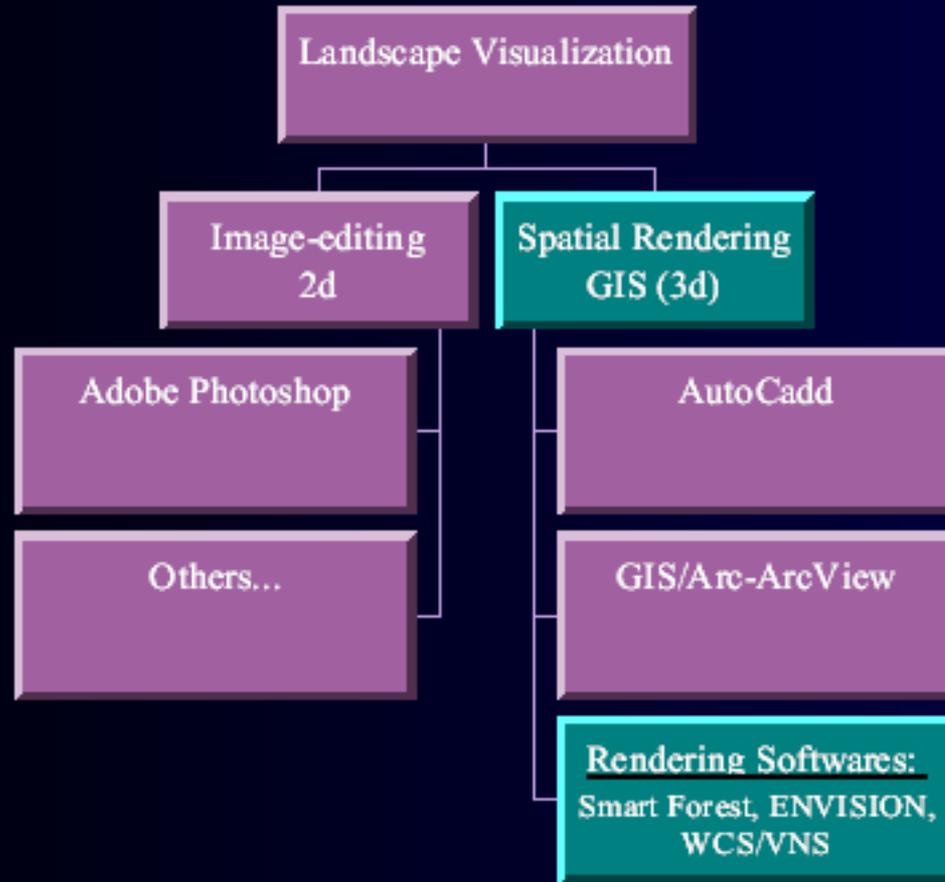






# Simulations

## What are the types?





# Integrated Software Design & Analysis



# Integrated Software Design & Analysis

## Prima Wild Turkey Project Site Key Observation Point #1



Photo of existing project site from KOP #1



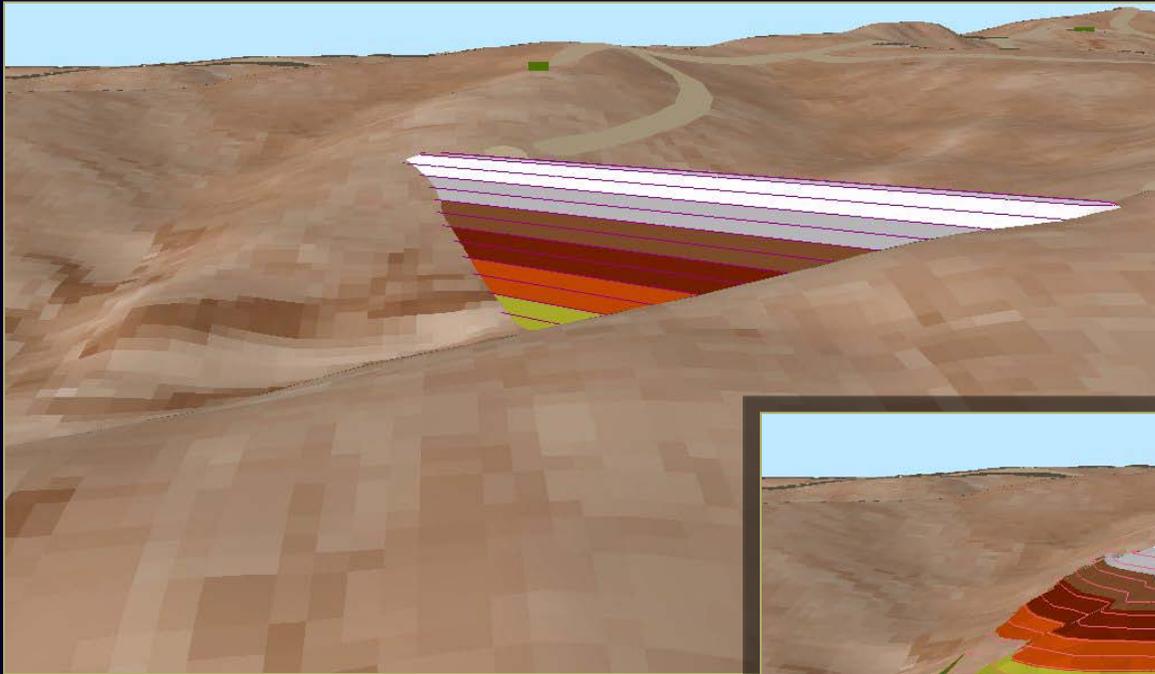
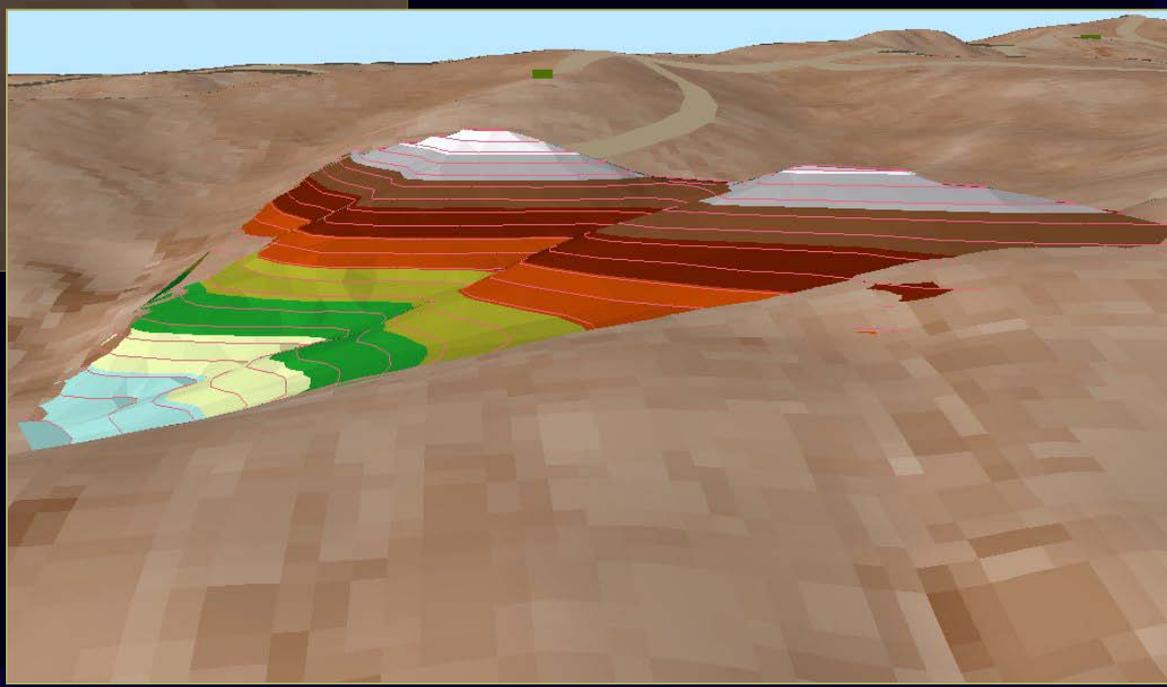
### **Compare model to field photo**

Computer model of proposed reservoir 31-19 from KOP #1

# Integrated Software Design & Analysis

Proposed

Alternative



# Integrated Software Design & Analysis



**Existing Conditions**

**KOP-4 Eastbound  
Res 31-20  
Fed 20-31**



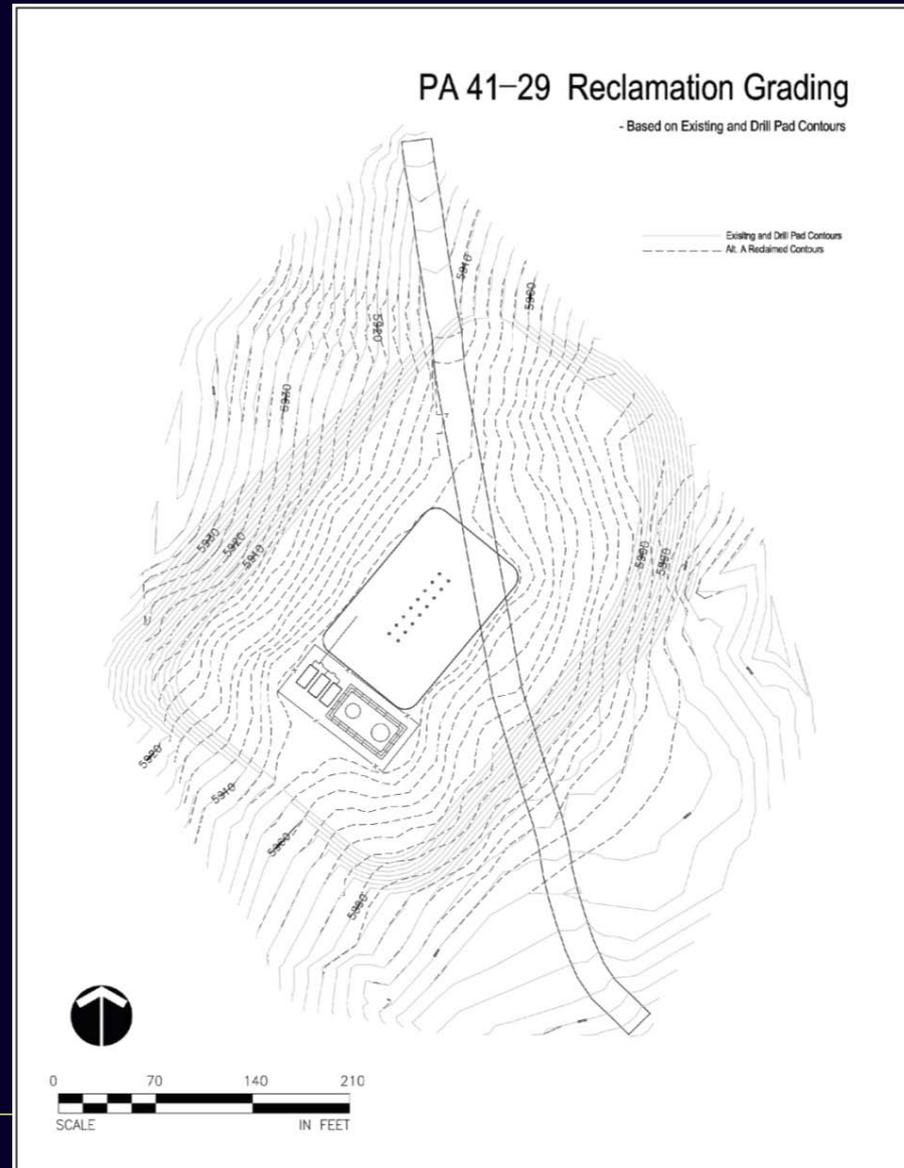
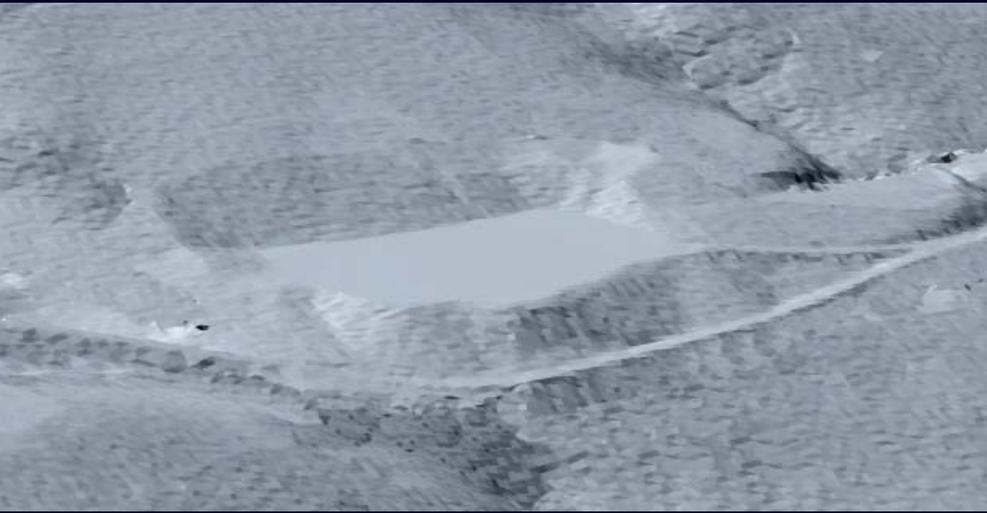
**Facilities without Mitigation**



**Facilities with Mitigation**

**Mitigation Strategies: VMP-1A, VMP-1B, VMP-3A, VMP-4D, VMP-5A.**

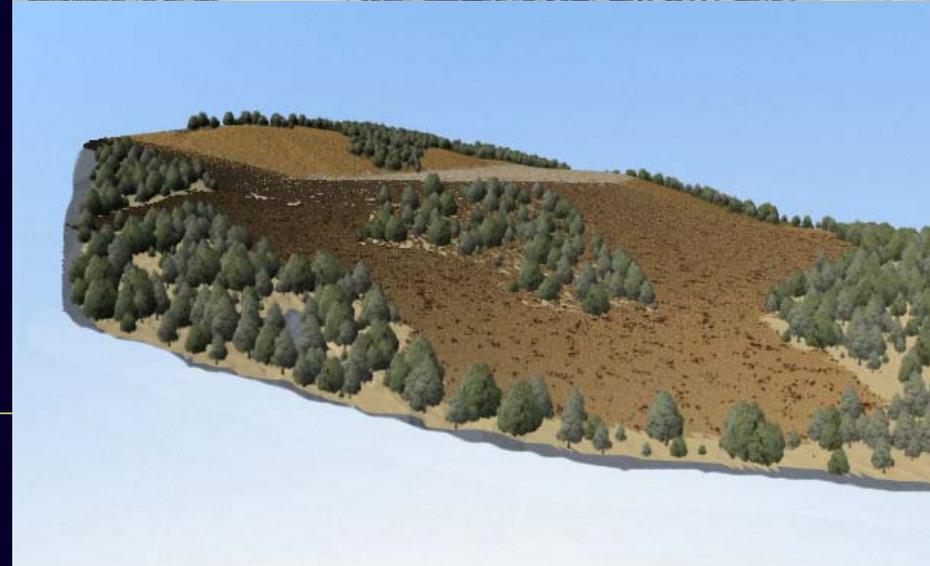
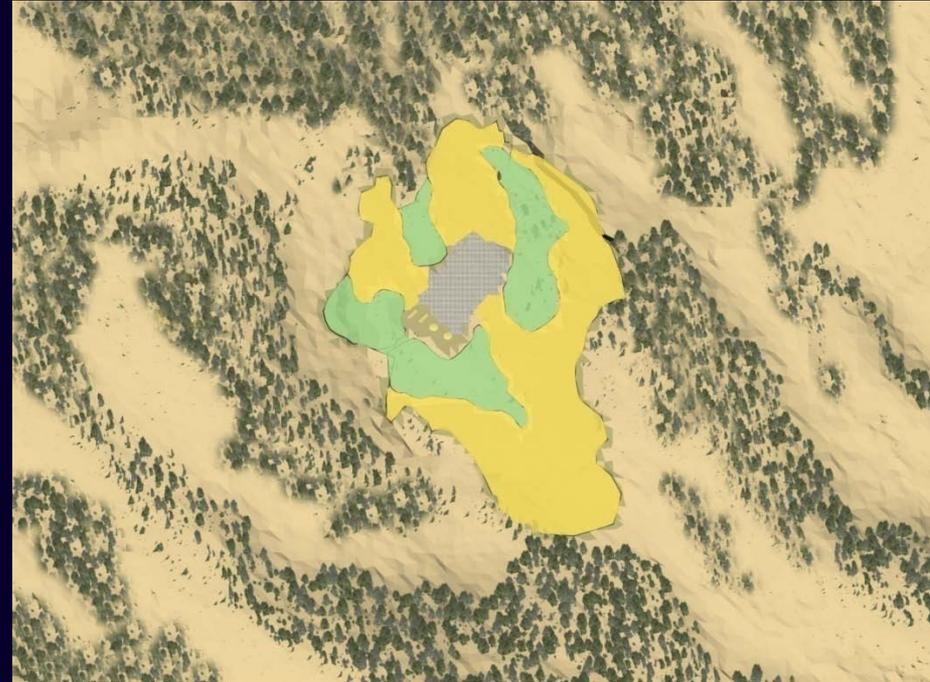
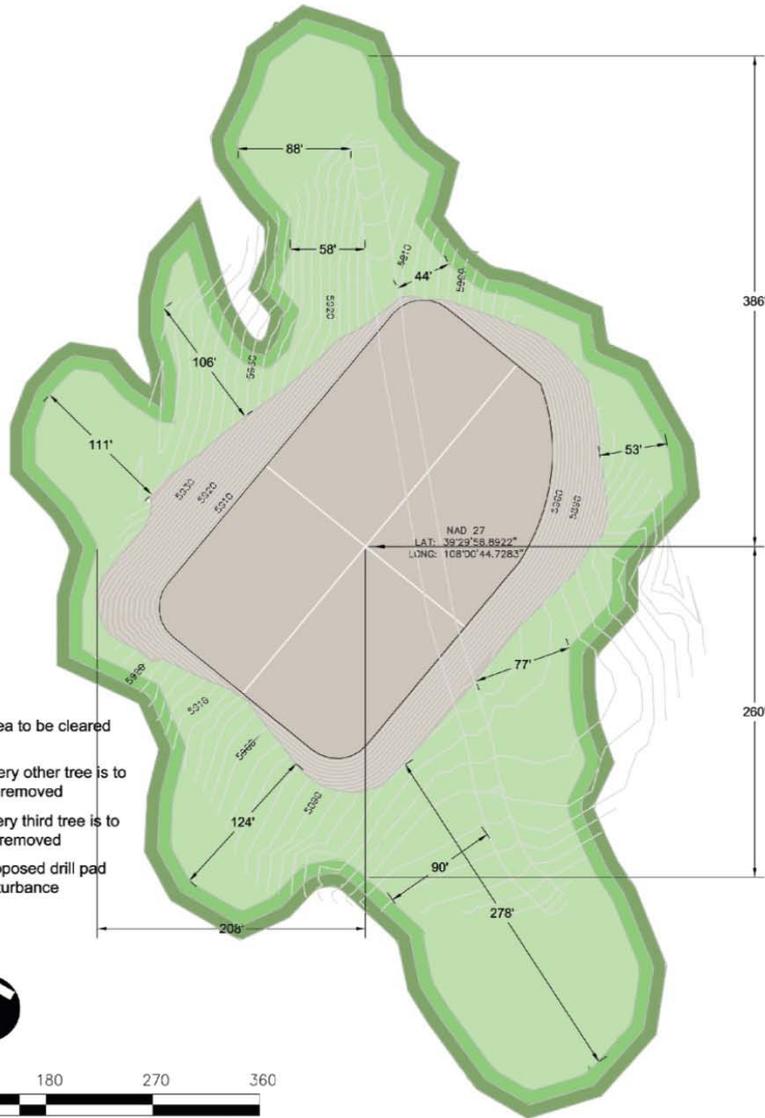
# Integrated Software Design & Analysis

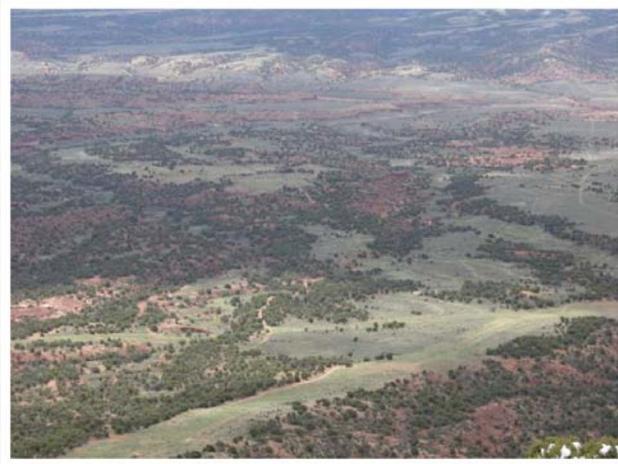
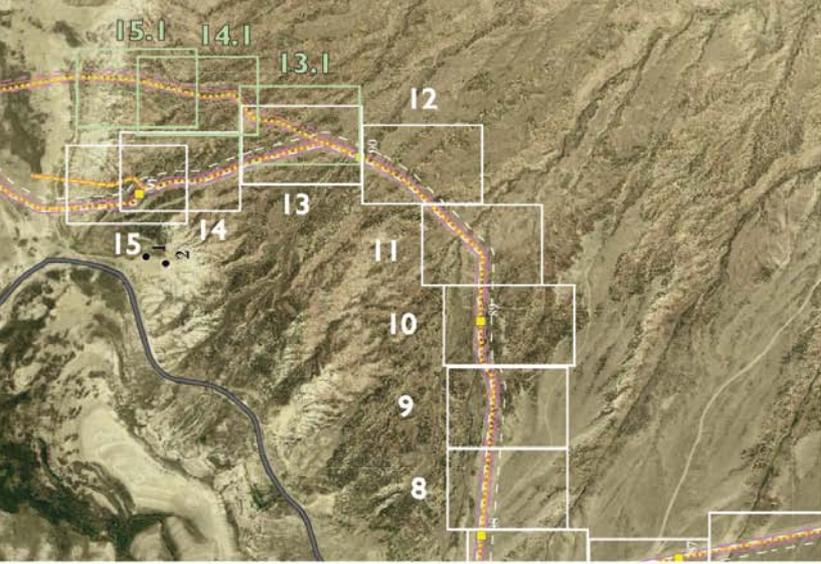


# Integrated Software Design & Analysis

## PA 41-29 Thinning and Feathering Area

- Based on location of proposed Drill Pad





View of current site characteristics

**Preservation of Existing Vegetation**

Islands of existing vegetation shall be preserved in the pipeline right-of-way. These islands shall have organic forms and mimic the appearance of naturally occurring vegetation islands. The general location of flagged vegetation to be preserved is indicated by a green dot.

Portions of the project area contain steep slopes. Depending on work space available and safety requirements, preservation areas may need to shift.

In addition, preserved vegetation may not be within 35 feet of the pipeline trench.

Thin and feather the edges of preserved vegetation islands to mimic the edge texture of the surrounding natural environment.



Existing islands of vegetation to emulate in visual mitigation



To achieve a natural-looking edge, remove every other tree or shrub adjacent to the edge of construction disturbance, transitioning to the removal of every third tree or shrub while moving outward from the edge of disturbance.

Heavy equipment such as a hydro-ax may be used when conditions allow; hand-clearing with chain saws may be required in some areas.

Trees and shrubs to be removed during thinning and feathering may be used for transplanting (see page 11).

Use of thinning and feathering will be limited on steep side slopes due to field conditions.



View of current site characteristics



Natural edge pattern of pinyon/juniper stands to emulate in visual mitigation



Natural pattern of sage meadow edges to emulate in visual mitigation



# Bridge Project



# Bridge Project



# Bridge Project



# Bridge Project



# Bridge Project



# Bridge Project



# Bridge Project

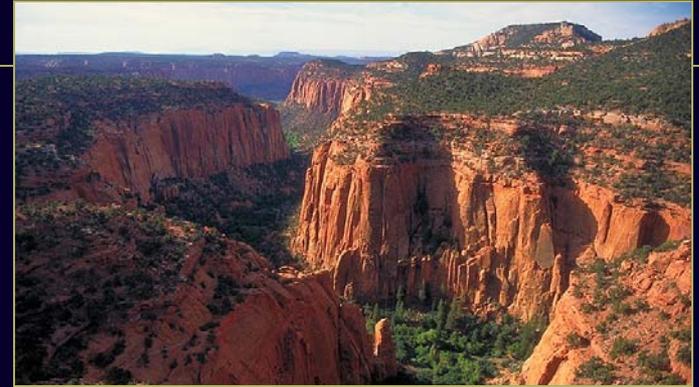


# Bridge Project



# Summary

- Use in combination
- Contract vs. In-house
- Spatial Relationships
- Disclose environmental consequences ...VRM
- Graphically illustrate land use allocations/ decisions
- Establish dialogue
- Better informed decisions
- Build credibility

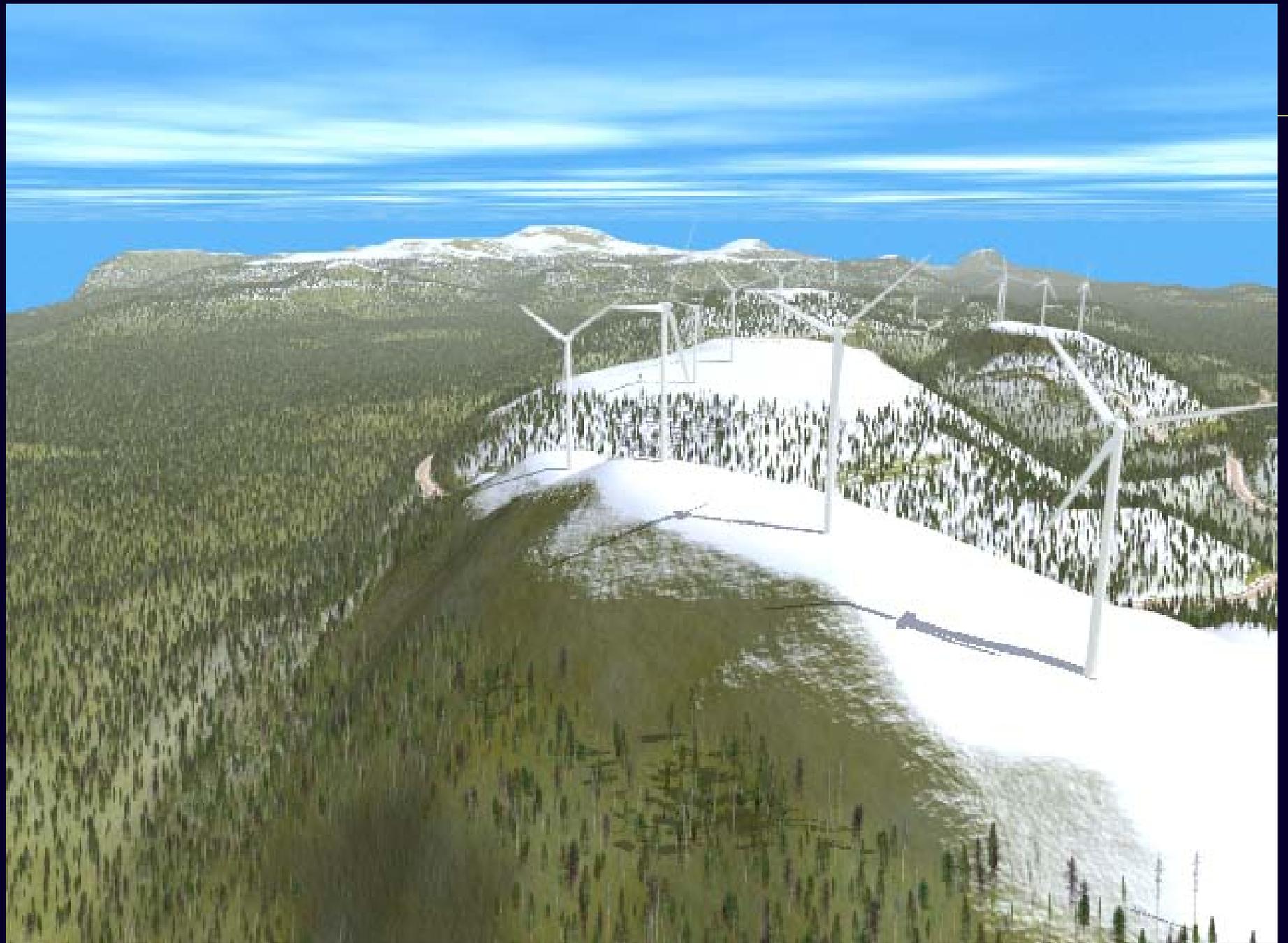


# More Examples...

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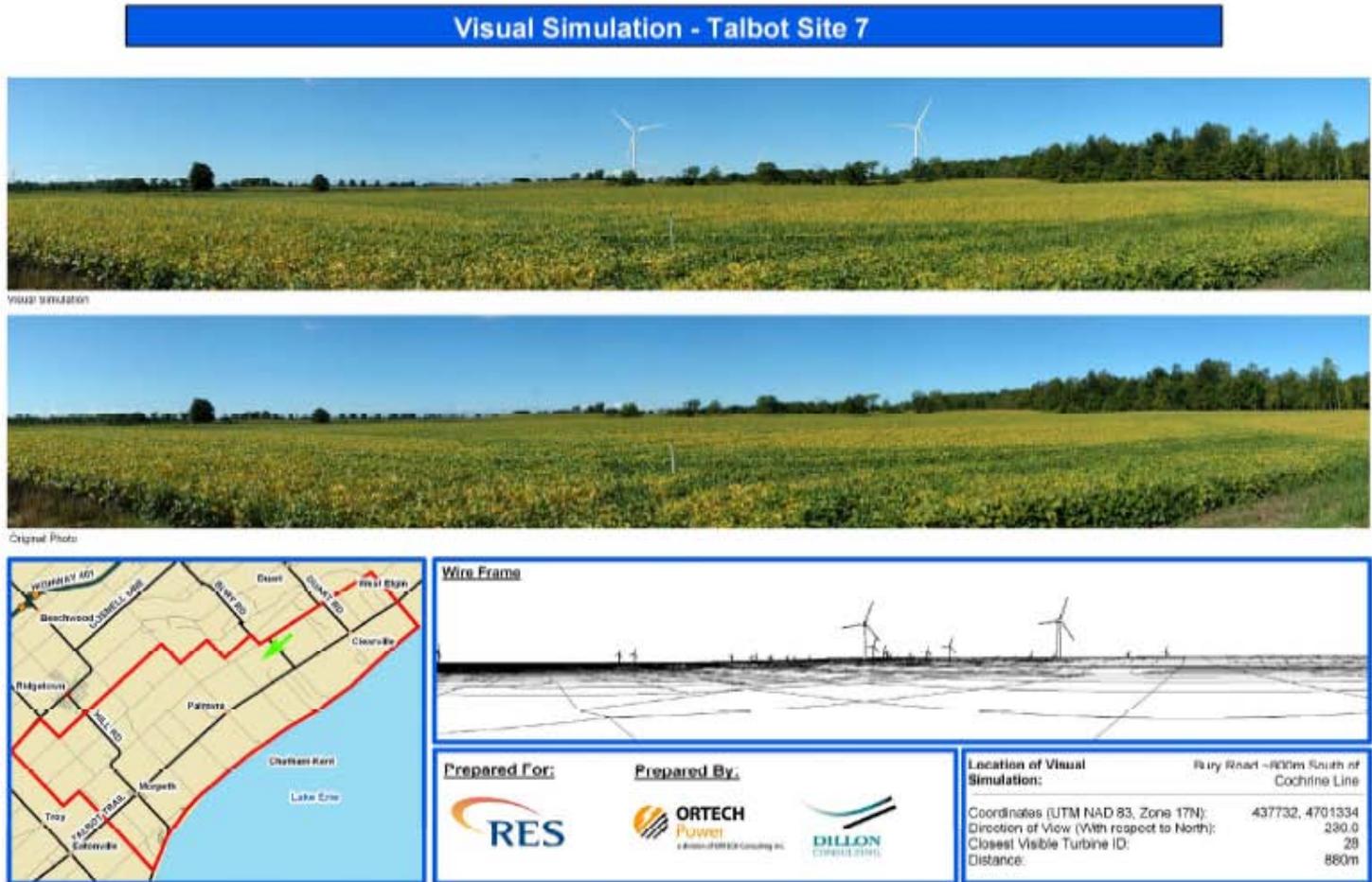
Existing condition.



Proposed solar development.



Figure 11: Site 7 Visual Simulation



# Video

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