

*Delineating Geomorphic Landscape
Units to assess sediment supply in
the San Diego River Watershed*

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Watershed Analysis/Mapping

- Watershed Characteristics and Processes
- Current Land Use and Stream Conditions
- Past Actions/Legacy Effects
- Proposed Future Actions/Changes in Land Use

Watershed Hydromodification Management

- Opportunities/Constraints
- Management Objectives
- Framework for Determining Site Control Requirements
- Valuation Method for Mitigation

New Development Site Analysis

Other Entities or Programs

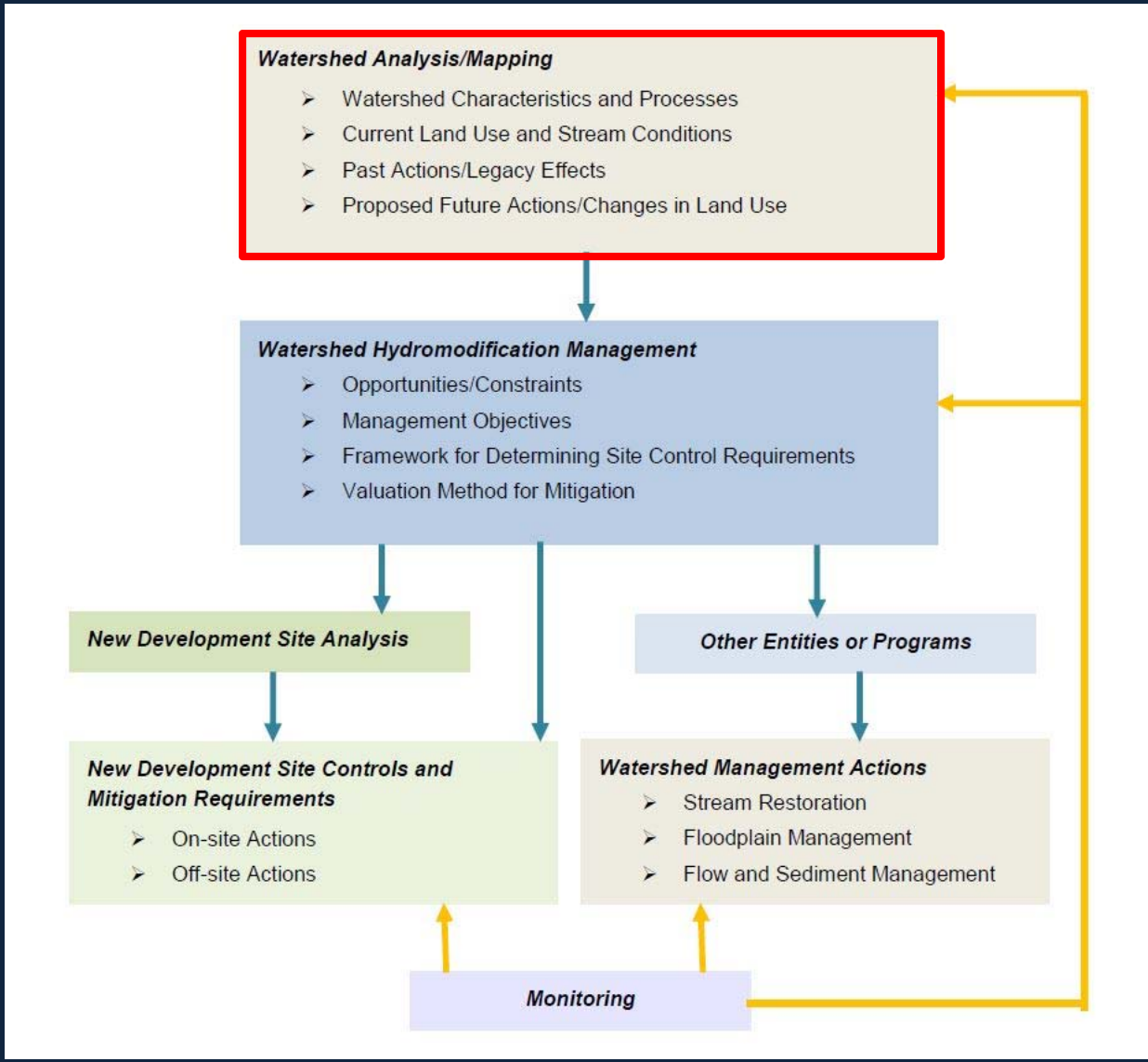
New Development Site Controls and Mitigation Requirements

- On-site Actions
- Off-site Actions

Watershed Management Actions

- Stream Restoration
- Floodplain Management
- Flow and Sediment Management

Monitoring



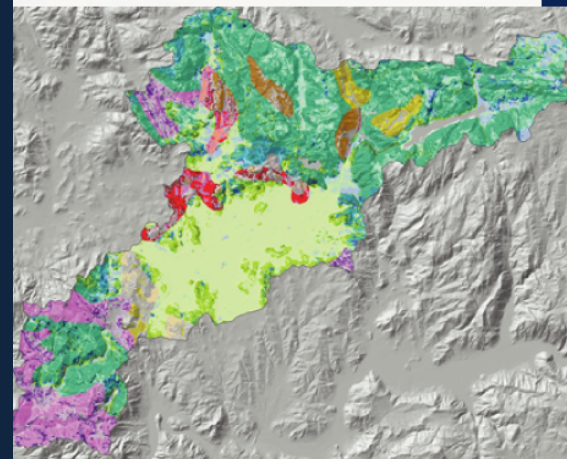
Objectives

- Review of Original Geomorphic Landscape Units (GLUs) Approach
- Revised GLUs Approach
 - San Diego River Watershed
- Limitations

Original Approach to GLUs

- Classification of Slope, Geology and Land Cover
- Planning tool to predict effects of hydromodification based on sediment changes due to landscape alteration
- Rapid assessment technique that could inform management decisions

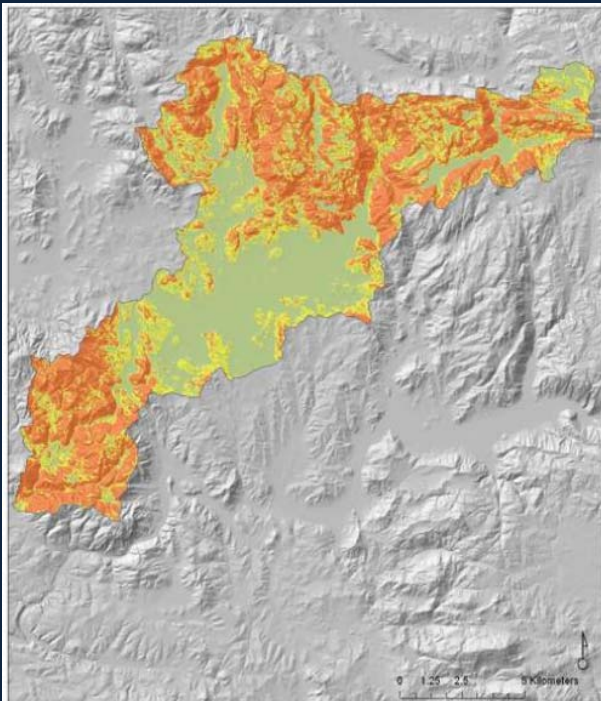
HYDROMODIFICATION SCREENING TOOLS:
GIS-BASED CATCHMENT ANALYSES
OF POTENTIAL CHANGES IN
RUNOFF AND SEDIMENT DISCHARGE



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Scott R. Dusterhoff
Eric D. Stein
Brian P. Bledsoe*

Southern California Coastal Water Research Project
Technical Report 605 - March 2010

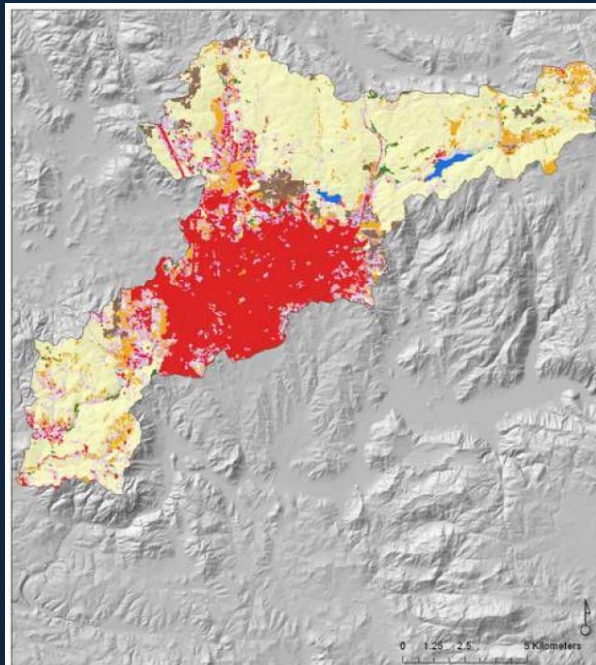
Escondido Creek Watershed



Slope Classes

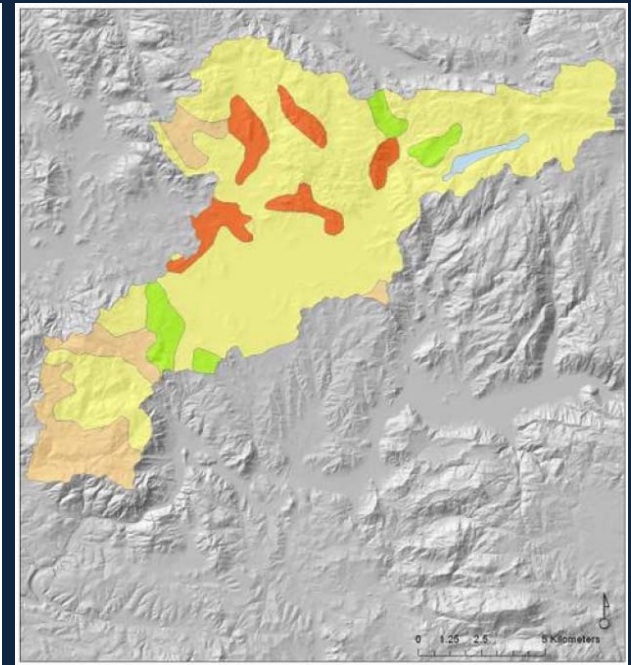
- 0 - 10%
- 11 - 20%
- >20%

Source: USGS 10m DEM



Landcover Class

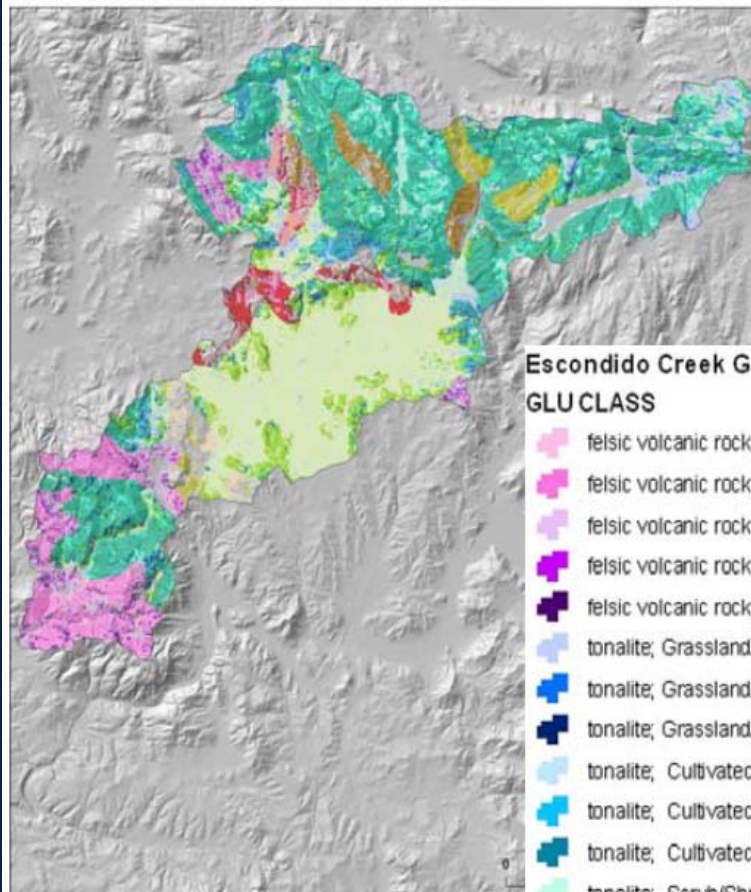
- | | |
|---|--|
| ■ Barren Land | ■ Scrub/Shrub |
| ■ Cultivated Crops | ■ Forest |
| ■ Developed | ■ Grassland/herbaceous/pasture |
| ■ Developed, Open Space | ■ Wetland |
| ■ Open water | |



Geology Type (Age, Rocktype 1, Rocktype 2)

- Holocene, water,
- Late Jurassic to Early Cretaceous, felsic volcanic rock, intermediate volcanic rock
- Middle Jurassic to Late Cretaceous, tonalite, quartz diorite
- Paleozoic(?) to Late Jurassic, argillite, graywacke
- Triassic to Cretaceous, gabbro, diorite

Escondido Creek Watershed



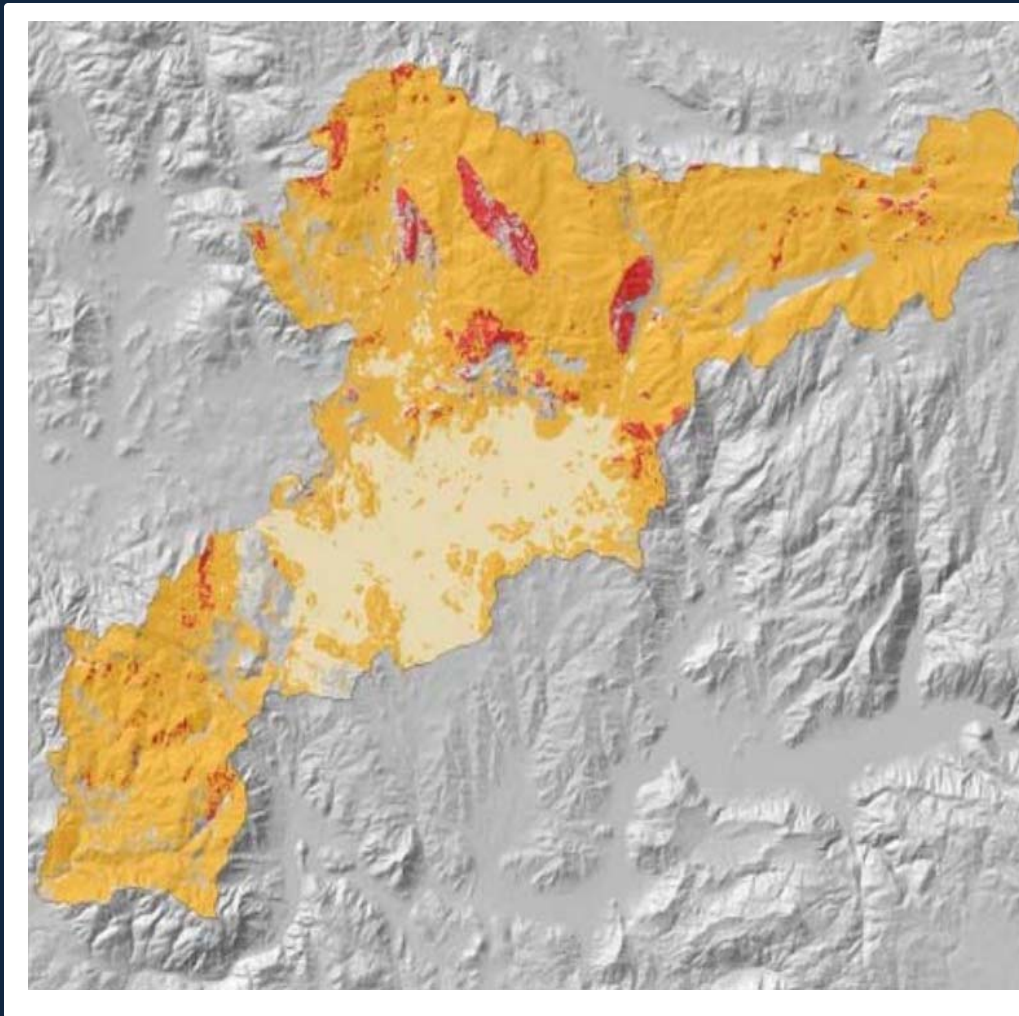
Escondido Creek GLU

GLU CLASS

- | | | | |
|--|---|--|--|
| | felsic volcanic rock; Scrub/Shrub; 11 - 20% | | tonalite; Scrub/Shrub; >20% |
| | felsic volcanic rock; Scrub/Shrub; >20% | | tonalite; Developed, Open Space; 0 - 10% |
| | felsic volcanic rock; Developed, Open Space; 0 - 10% | | tonalite; Developed, Open Space; 11 - 20% |
| | felsic volcanic rock; Developed, Open Space; 11 - 20% | | tonalite; Developed, Open Space; >20% |
| | felsic volcanic rock; Developed, Open Space; >20% | | tonalite; Developed; 0 - 10% |
| | tonalite; Grassland/herbaceous/pasture; 0 - 10% | | tonalite; Developed; 11 - 20% |
| | tonalite; Grassland/herbaceous/pasture; 11 - 20% | | tonalite; Developed; >20% |
| | tonalite; Grassland/herbaceous/pasture; >20% | | gabbro; Scrub/Shrub; 11 - 20% |
| | tonalite; Cultivated Crops; 0 - 10% | | gabbro; Scrub/Shrub; >20% |
| | tonalite; Cultivated Crops; 11 - 20% | | gabbro; Developed; 0 - 10% |
| | tonalite; Cultivated Crops; >20% | | argillite; Grassland/herbaceous/pasture; 0 - 10% |
| | tonalite; Scrub/Shrub; 0 - 10% | | argillite; Scrub/Shrub; >20% |
| | tonalite; Scrub/Shrub; 11 - 20% | | argillite; Developed, Open Space; 0 - 10% |
| | | | argillite; Developed; 0 - 10% |
| | | | argillite; Developed; 11 - 20% |

Source: SWS 2008

Escondido Creek Watershed



Relative Sediment Production Rates

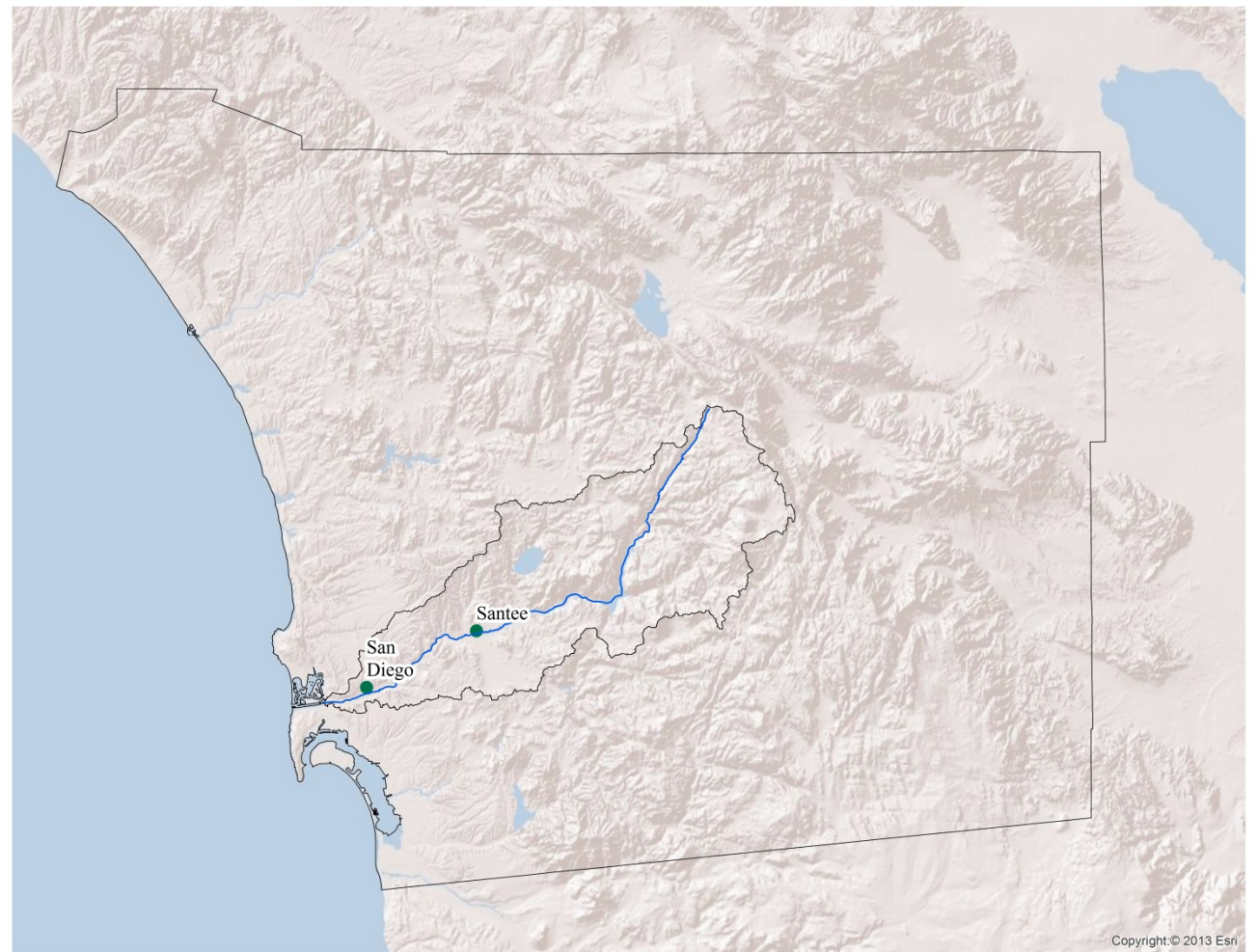
- Low
- Medium
- High

Revised GLUs Approach

- Datasets:
 1. USGS 30 Meter elevation to derive slope
 2. CGS 1977 Jennings Geology
 3. SanGIS Current Land Use and Planned Land Use

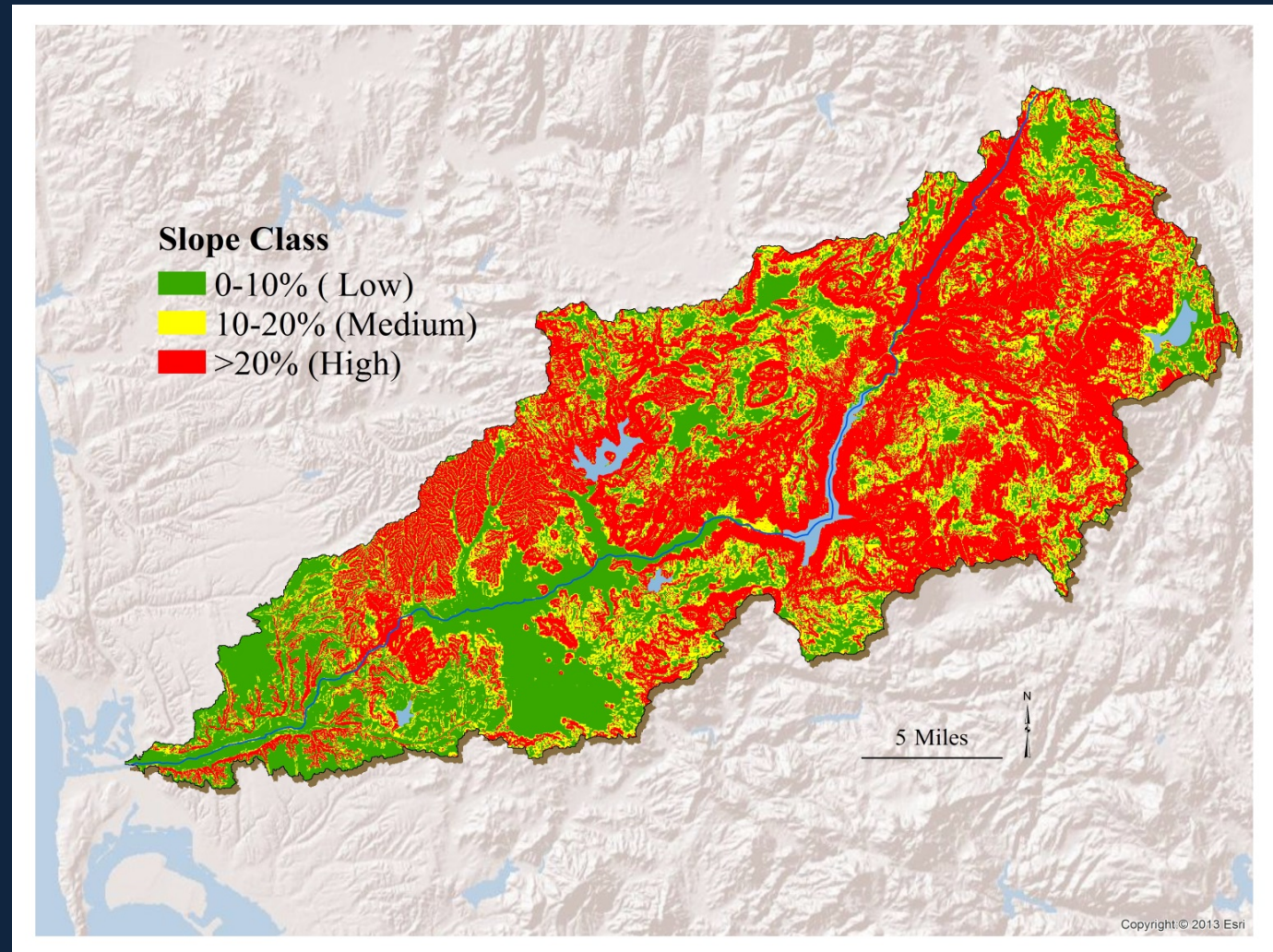
San Diego River Watershed

- 433 Sq. Mile
- Second Largest
- Highest Population



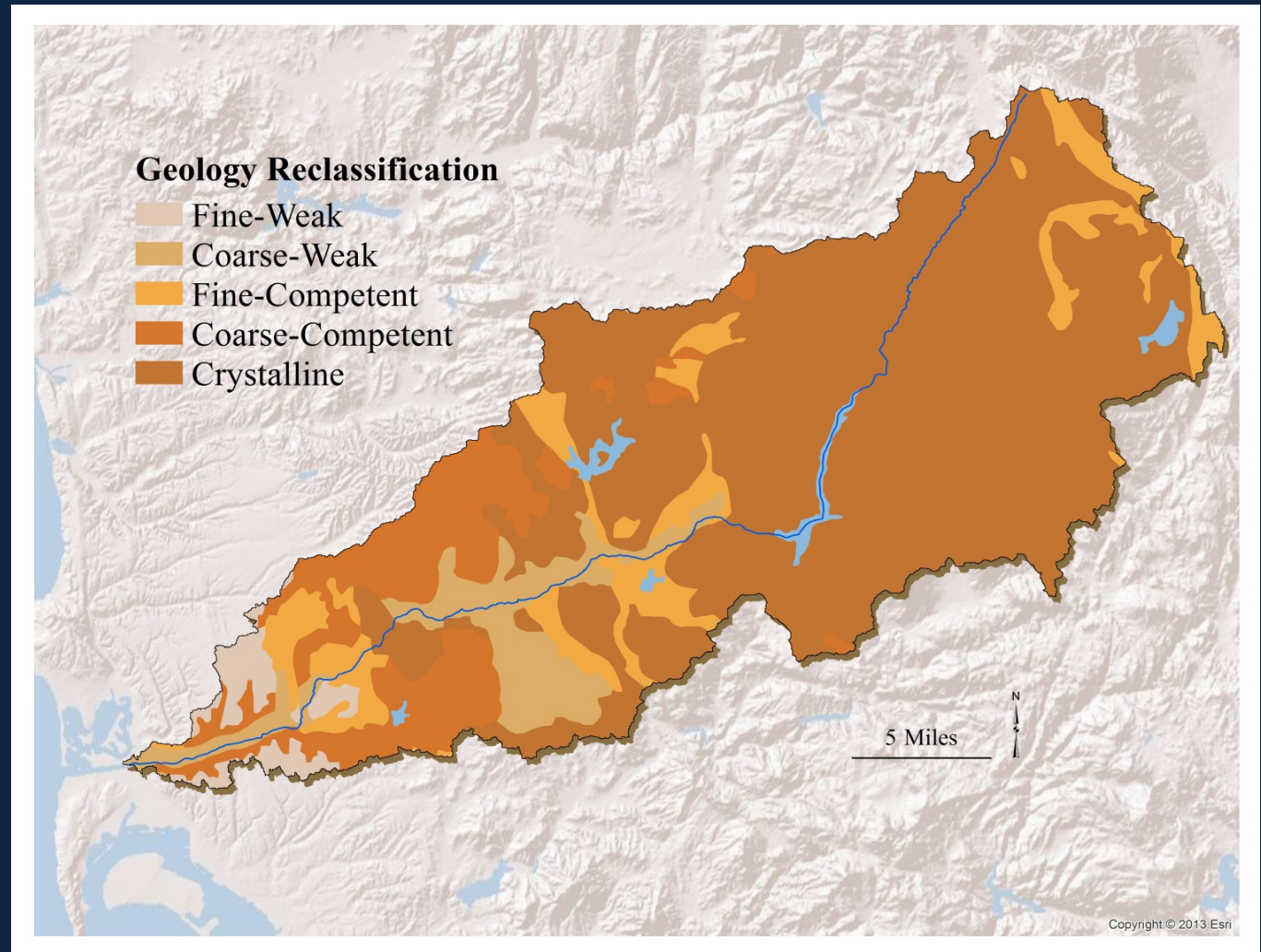
Slope Classification

- 30 Meter Resolution
- Slope stability



Geology Reclassification

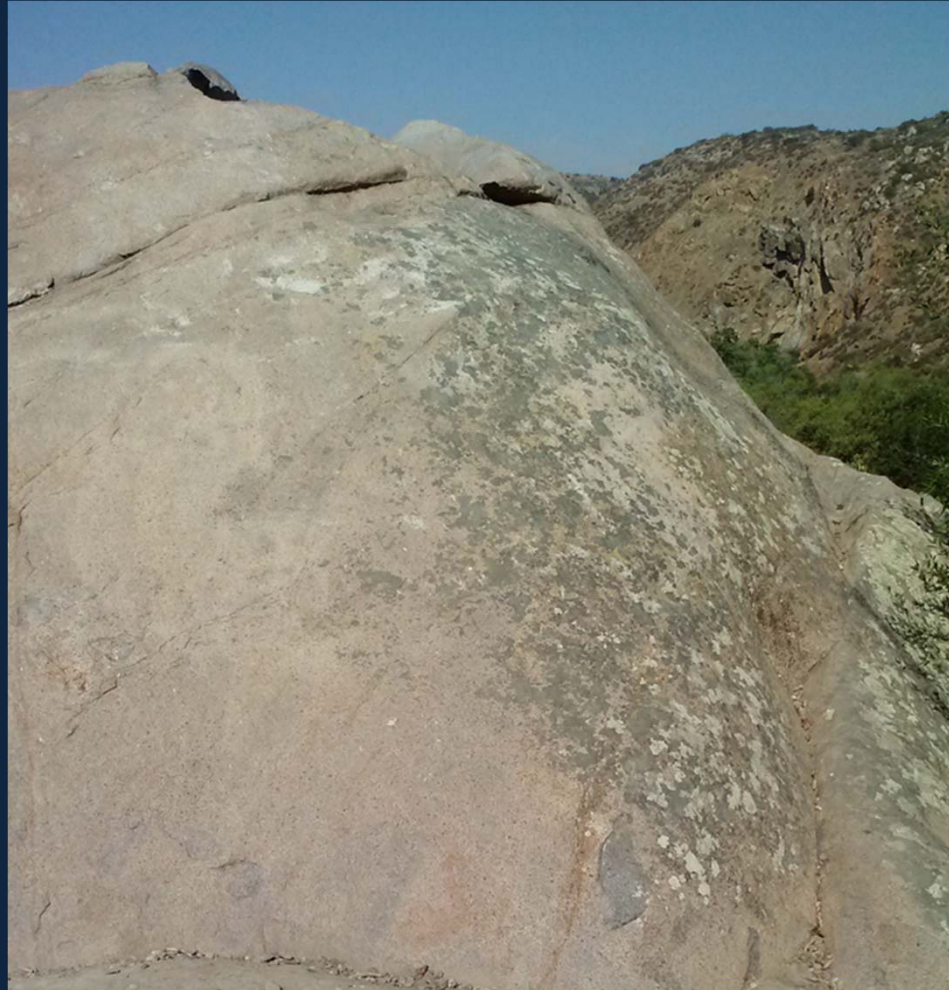
- CGS
- 68 Original
- Grouped by geologic characteristic



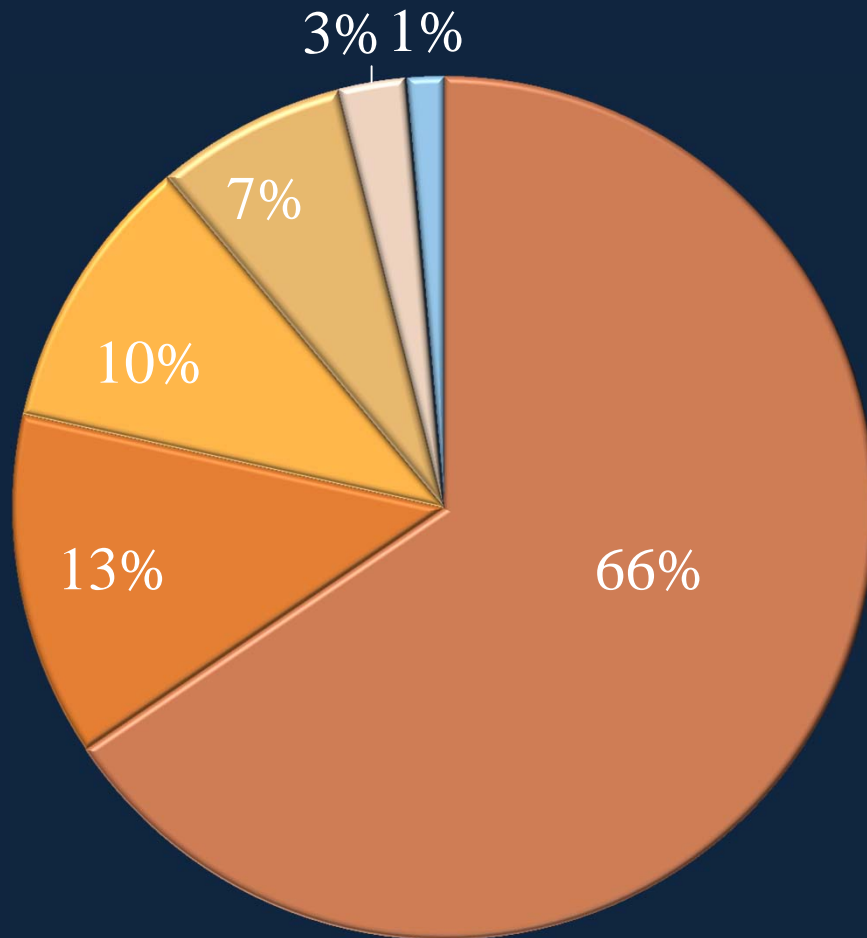
Coarse-Competent Classification



Crystalline Classification



Geology Reclassification

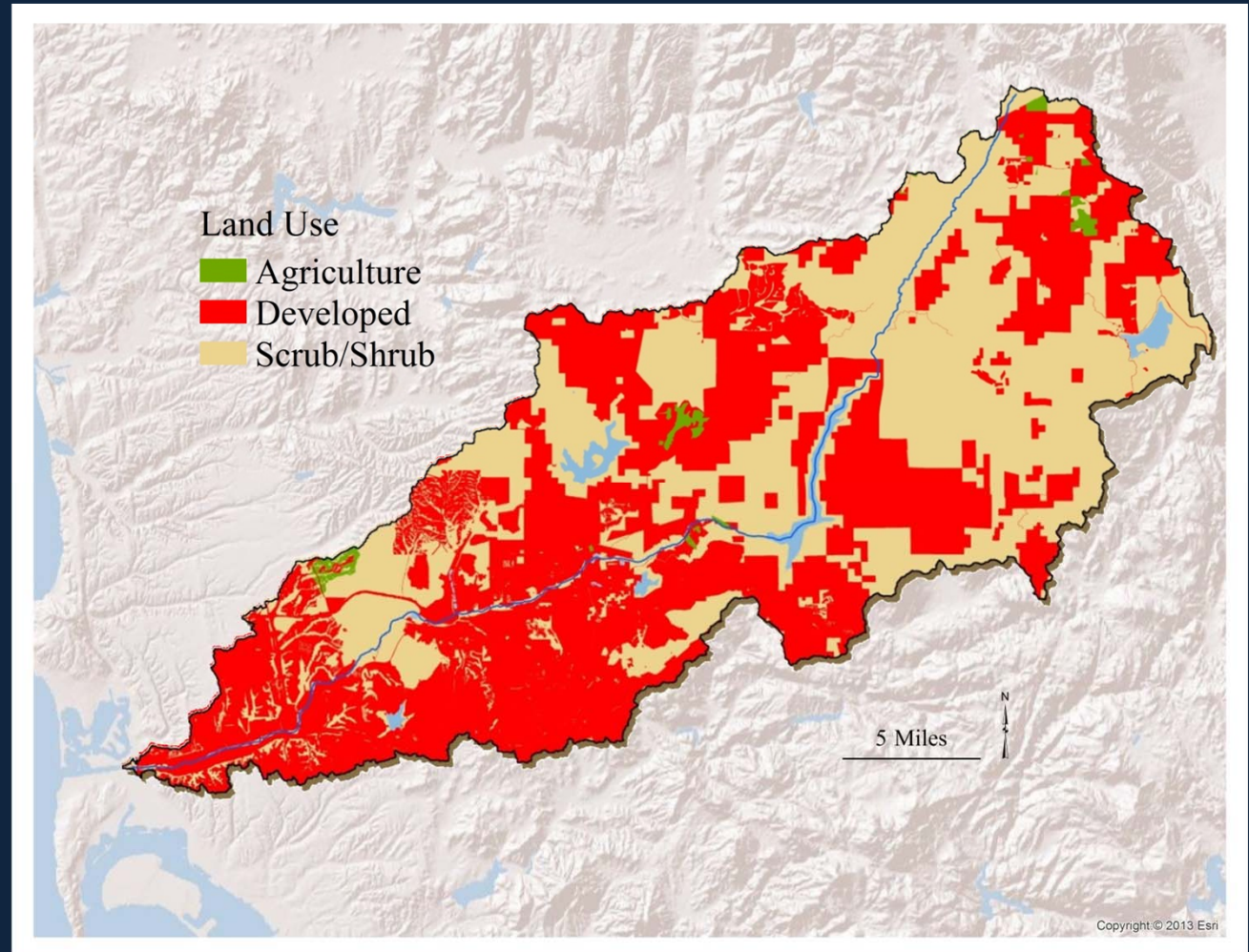


Geology Reclassification



Land Use Classification

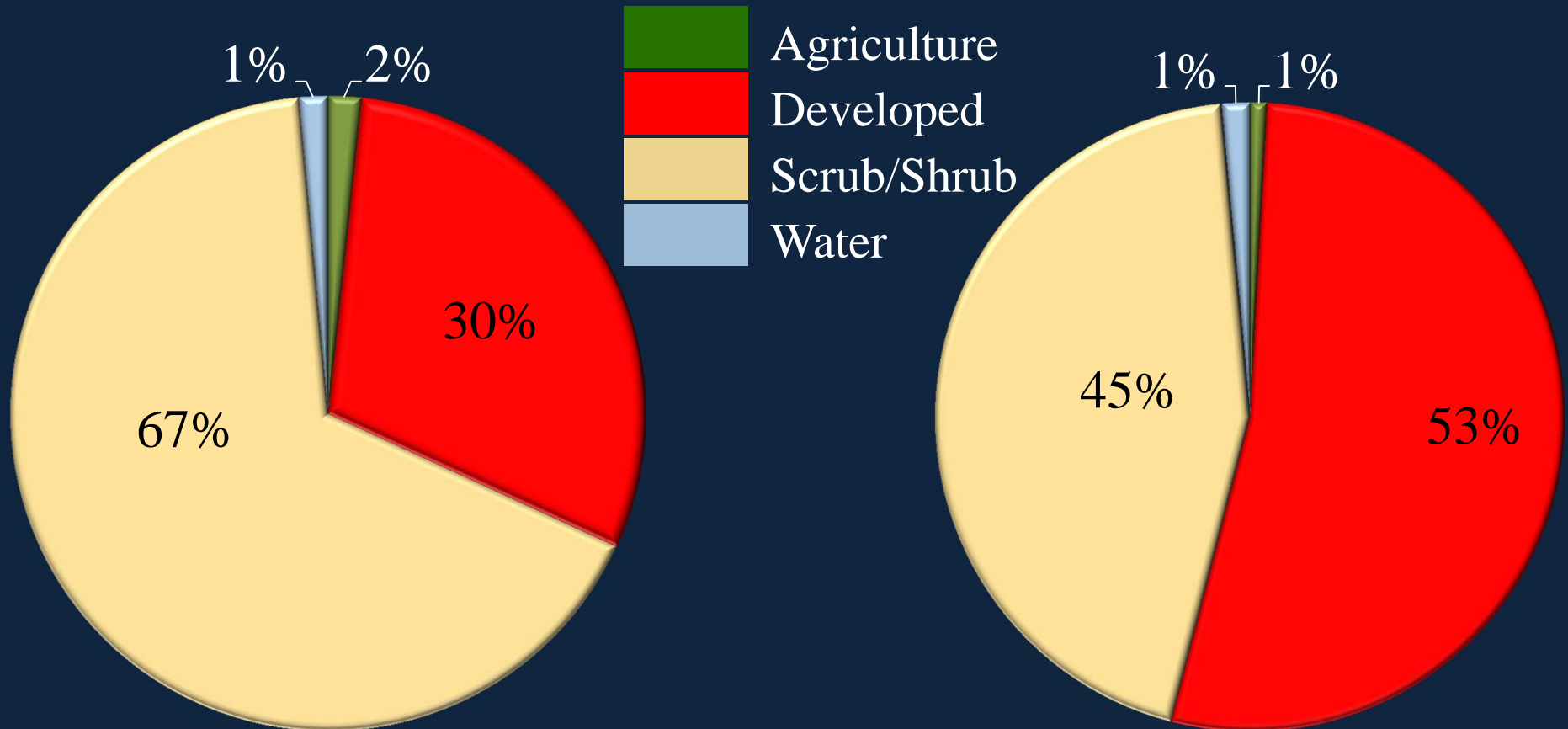
- General & Community Plans
- 90 Original
- 3 Reclassified

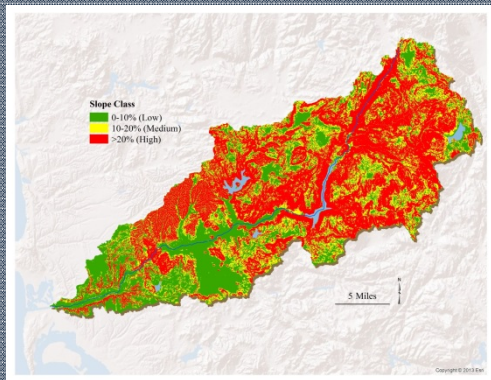


Land Use Classification

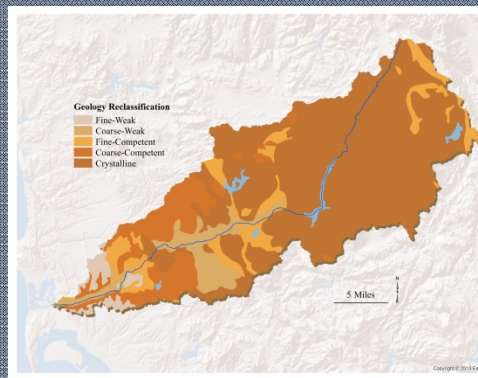
Current 2012 Land Use

Planned 2050 Land Use

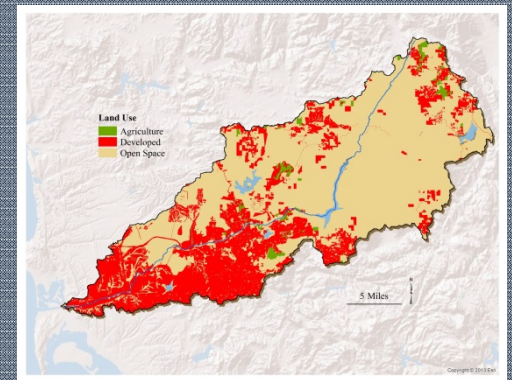




Slope



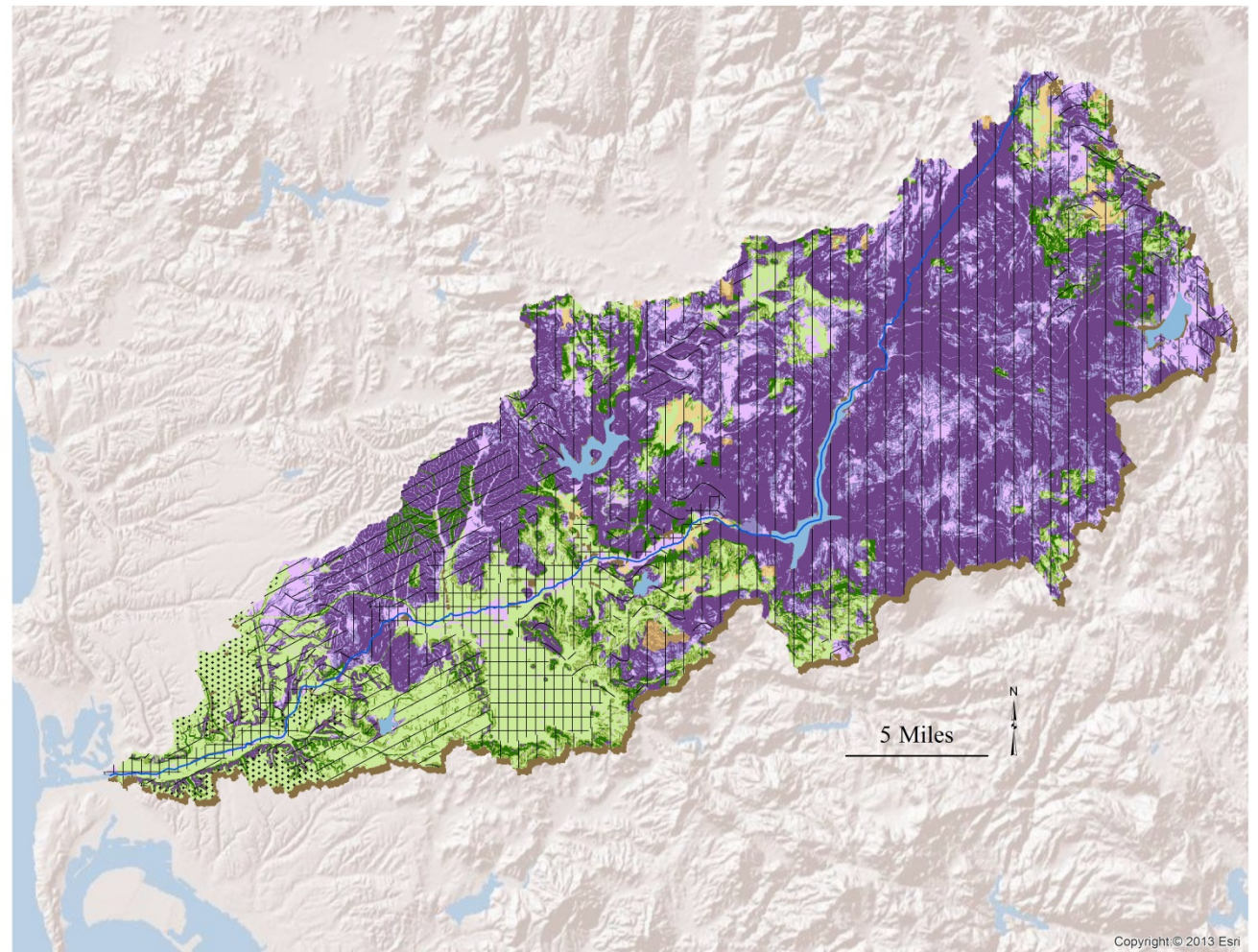
Geology



Land Use

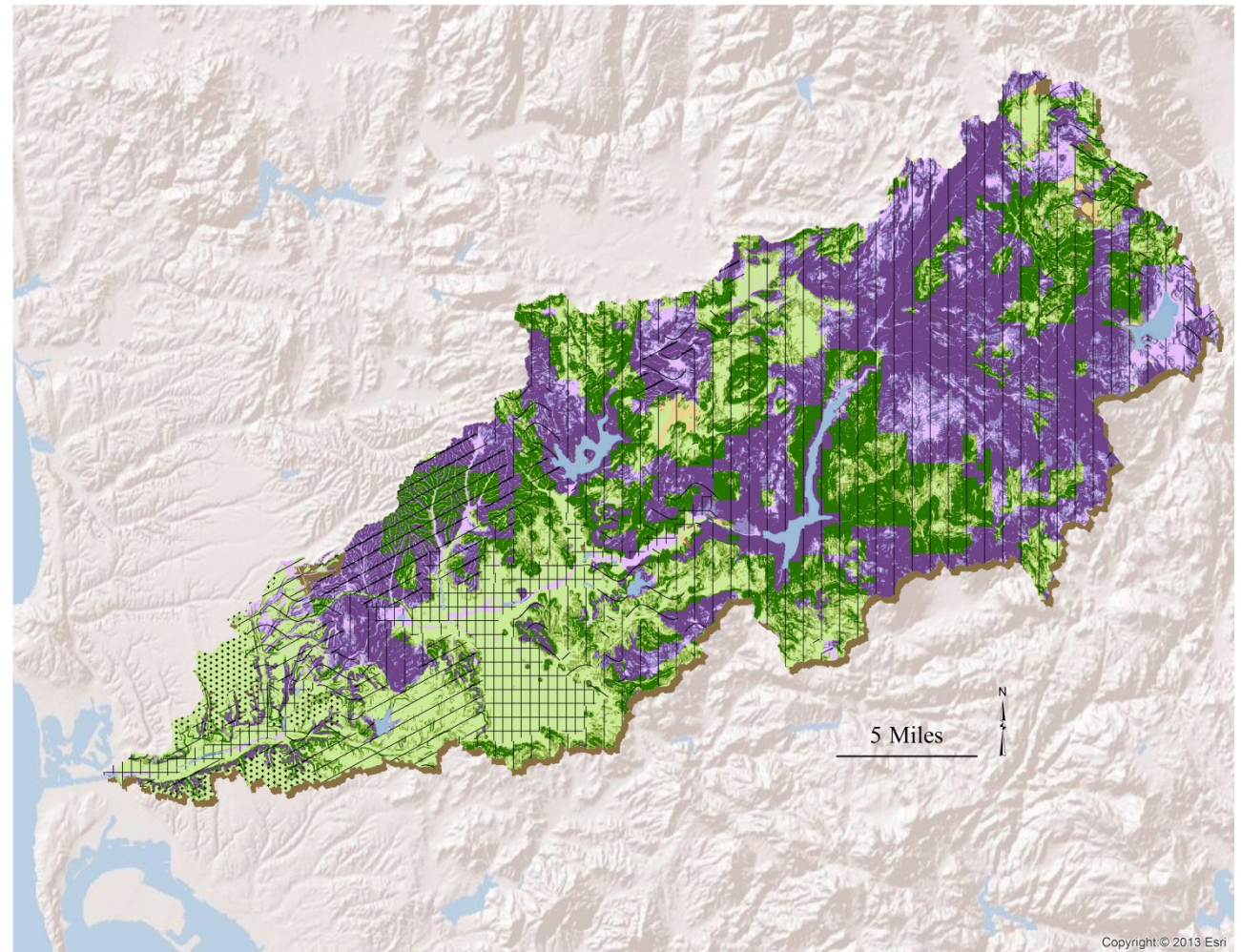
Unique Landscape Units – Current Land Use

- Coarse-Competent; Developed; Low
- Coarse-Competent; Developed; Medium
- Coarse-Competent; Developed; High
- Coarse-Competent; Scrub/Shrub; Low
- Coarse-Competent; Scrub/Shrub; Medium
- Coarse-Competent; Scrub/Shrub; High
- Coarse-Weak; Agriculture; Low
- Coarse-Weak; Agriculture; Medium
- Coarse-Weak; Agriculture; High
- Coarse-Weak; Developed; Low
- Coarse-Weak; Developed; Medium
- Coarse-Weak; Developed; High
- Coarse-Weak; Scrub/Shrub; Low
- Coarse-Weak; Scrub/Shrub; Medium
- Coarse-Weak; Scrub/Shrub; High
- Crystalline; Agriculture; Low
- Crystalline; Agriculture; Medium
- Crystalline; Agriculture; High
- Crystalline; Developed; Low
- Crystalline; Developed; Medium
- Crystalline; Developed; High
- Crystalline; Scrub/Shrub; Low
- Crystalline; Scrub/Shrub; Medium
- Crystalline; Scrub/Shrub; High
- Fine-Competent; Agriculture; Low
- Fine-Competent; Agriculture; Medium
- Fine-Competent; Agriculture; High
- Fine-Competent; Developed; Low
- Fine-Competent; Developed; Medium
- Fine-Competent; Developed; High
- Fine-Competent; Scrub/Shrub; Low
- Fine-Competent; Scrub/Shrub; Medium
- Fine-Competent; Scrub/Shrub; High
- Fine-Weak; Developed; Low
- Fine-Weak; Developed; Medium
- Fine-Weak; Developed; High
- Fine-Weak; Scrub/Shrub; High

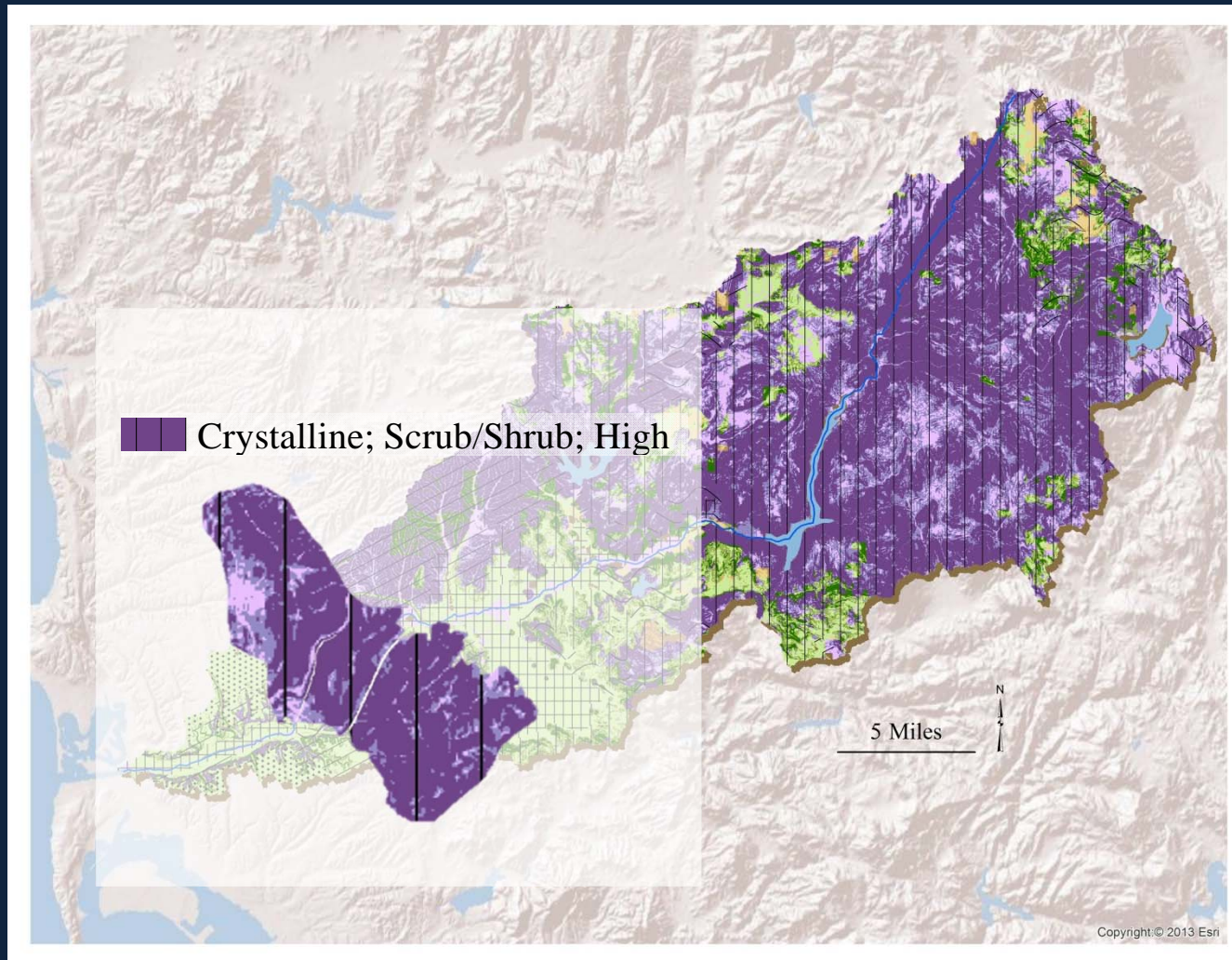


Unique Landscape Units – Planned Land Use

- Coarse-Competent; Developed; Low
- Coarse-Competent; Developed; Medium
- Coarse-Competent; Developed; High
- Coarse-Competent; Scrub/Shrub; Low
- Coarse-Competent; Scrub/Shrub; Medium
- Coarse-Competent; Scrub/Shrub; High
- Coarse-Weak; Developed; Low
- Coarse-Weak; Developed; Medium
- Coarse-Weak; Developed; High
- Coarse-Weak; Scrub/Shrub; Low
- Coarse-Weak; Scrub/Shrub; Medium
- Coarse-Weak; Scrub/Shrub; High
- Crystalline; Agriculture; Low
- Crystalline; Developed; Low
- Crystalline; Developed; Medium
- Crystalline; Developed; High
- Crystalline; Scrub/Shrub; Low
- Crystalline; Scrub/Shrub; Medium
- Crystalline; Scrub/Shrub; High
- Fine-Competent; Developed; Low
- Fine-Competent; Developed; Medium
- Fine-Competent; Developed; High
- Fine-Competent; Scrub/Shrub; Low
- Fine-Competent; Scrub/Shrub; Medium
- Fine-Competent; Scrub/Shrub; High
- Fine-Weak; Developed; Low
- Fine-Weak; Developed; Medium
- Fine-Weak; Developed; High
- Fine-Weak; Scrub/Shrub; High



Unique Landscape Units – Current Land Use



Crystalline; Scrub/Shrub; High

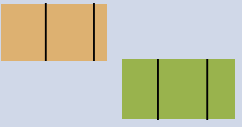







Crystalline; Scrub/Shrub; Low

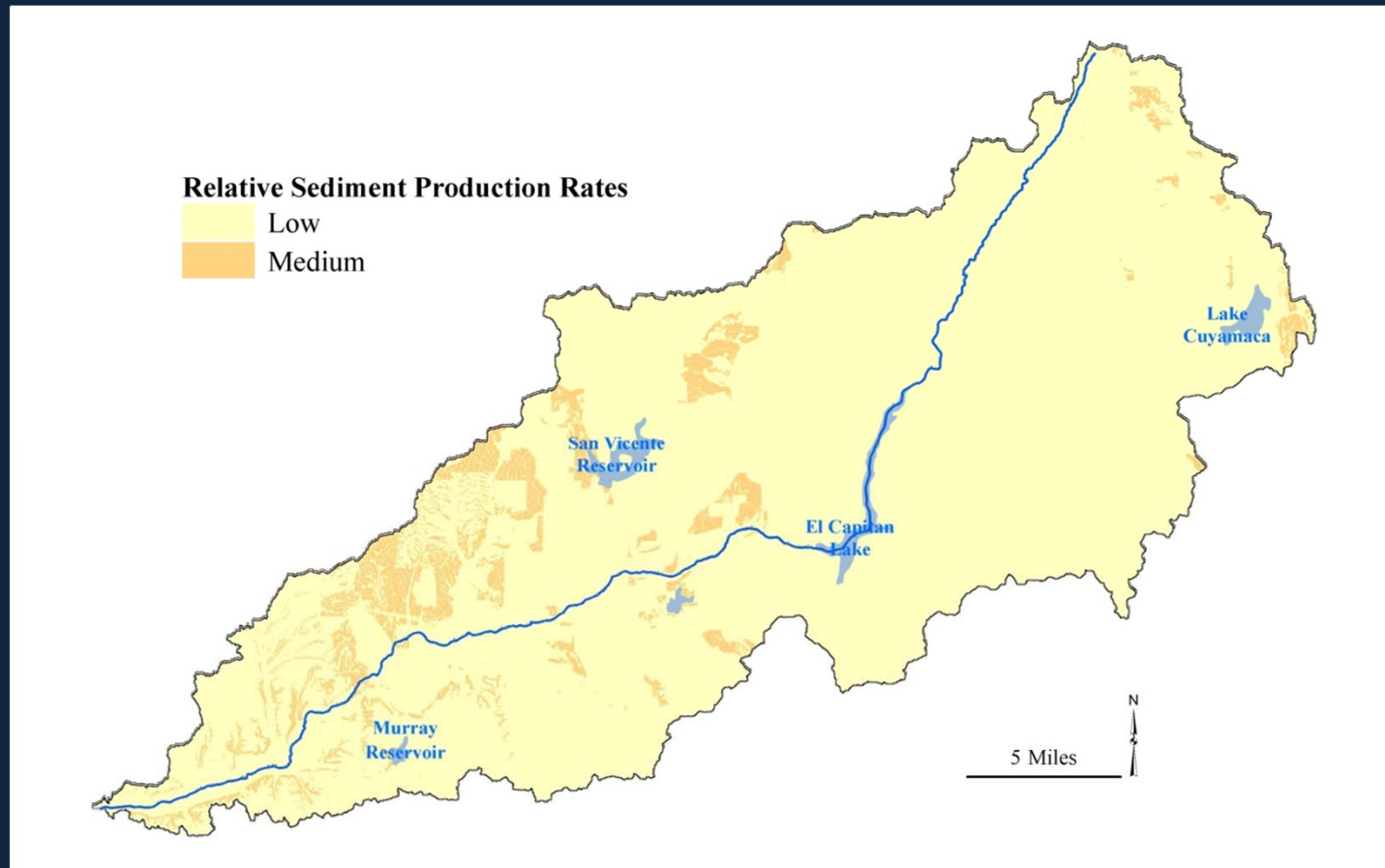


Coarse-Competent; Scrub/Shrub; High



Legend	Geology	Slope	Current 2012 Land Use	Relative Sediment Production	Potential 2050 Land Use	Difference in Percent
	Crystalline	Medium	Agriculture	Low	Developed	-6.6
	Crystalline	Medium	Scrub/Shrub	Low	Scrub/Shrub	-8.1
	Crystalline	High	Scrub/Shrub	Low	Scrub/Shrub	-3.1
	Coarse-Competent	Low	Scrub/Shrub	Low	Scrub/Shrub	-0.7
	Coarse-Competent	High	Scrub/Shrub	Medium	Developed	-1.2
	Coarse-Competent	Medium	Scrub/Shrub	Medium	Scrub/Shrub	-0.2



2050

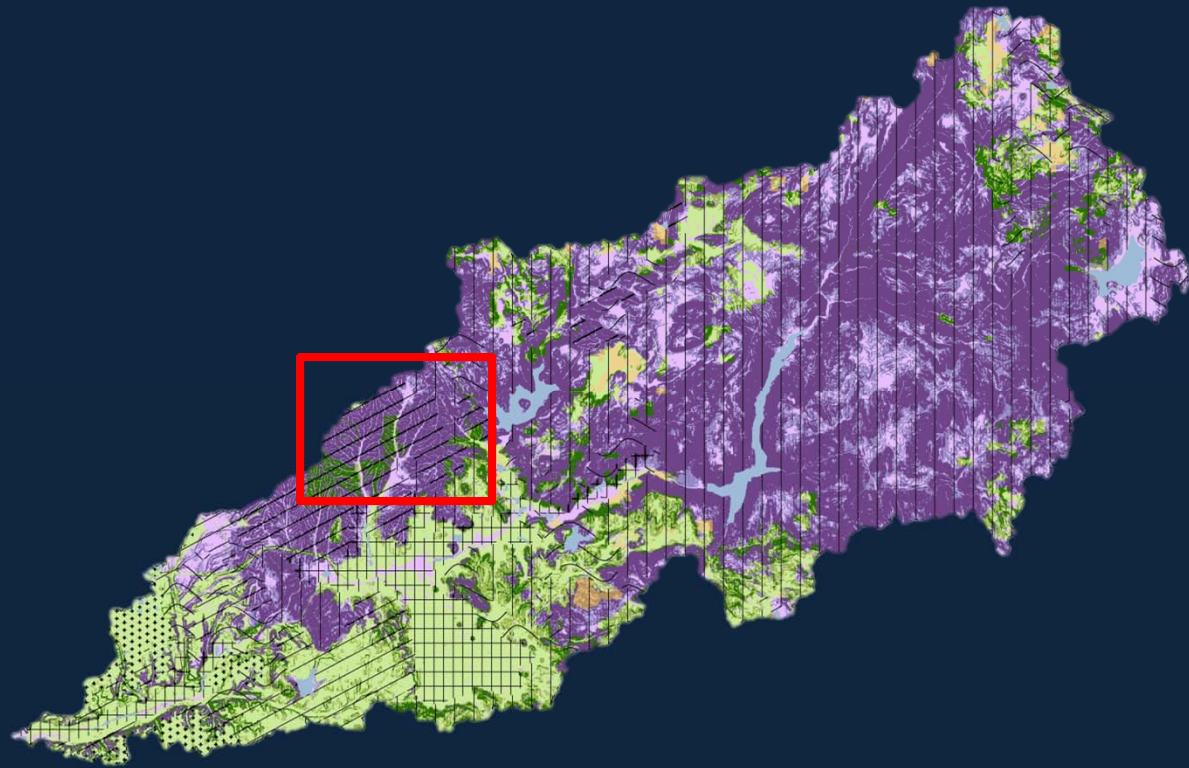


A predicted reduction in sediment could be used to identify areas of hydromodification

Relative Sediment Production



		Coarse-Competent	High	Scrub/Shrub	Medium	Developed
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Limitations

- Defined by the coarsest dataset – Jennings Geology
- Reclassification of Categories
- Assessment of relative sediment production rates

Summary

- Goal was to identify unique landscape units that could be used in a rapid assessment of the watershed
- 3 indicators of potential sediment production
- Predicted reduction in sediment could be used to identify areas of hydromodification and assist decision makers
- Dataset and Classification limitations

Questions?

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