Fernan Lake
Sediment and Phosphorus: Loading and Balance

Coeur d'Alene Lake Tributaries WAG Update
11/30/15

Dr. Mark Solomon, UI Idaho Water Resources Research Institute

University of Idaho

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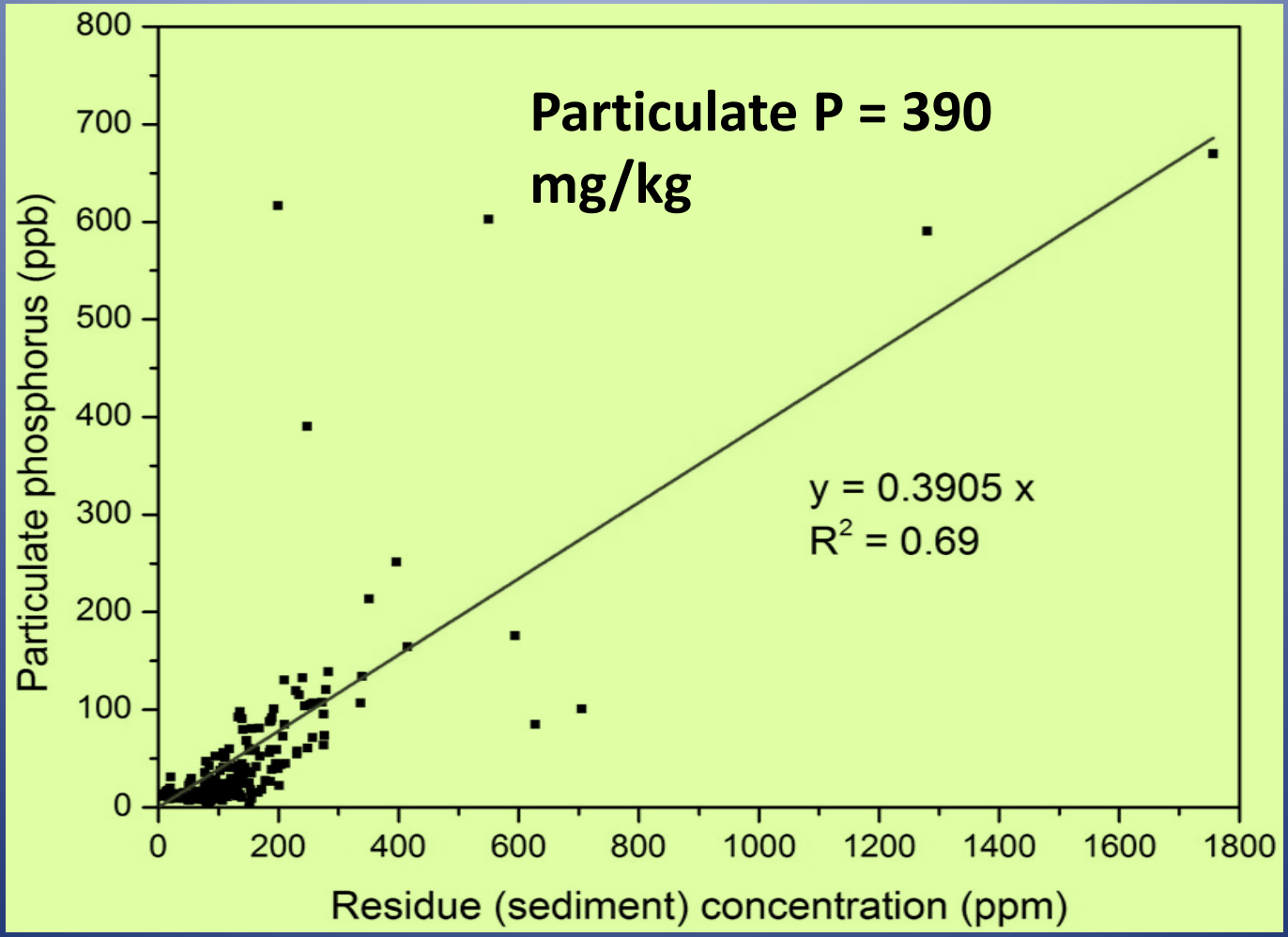
Studies to Report

- Phosphorus Loading: Wilhelm and LaCroix
- Phosphorus Sources: Brooks
- Sedimentation Rate: Yanites
- Water Quality and Property Value: Liao

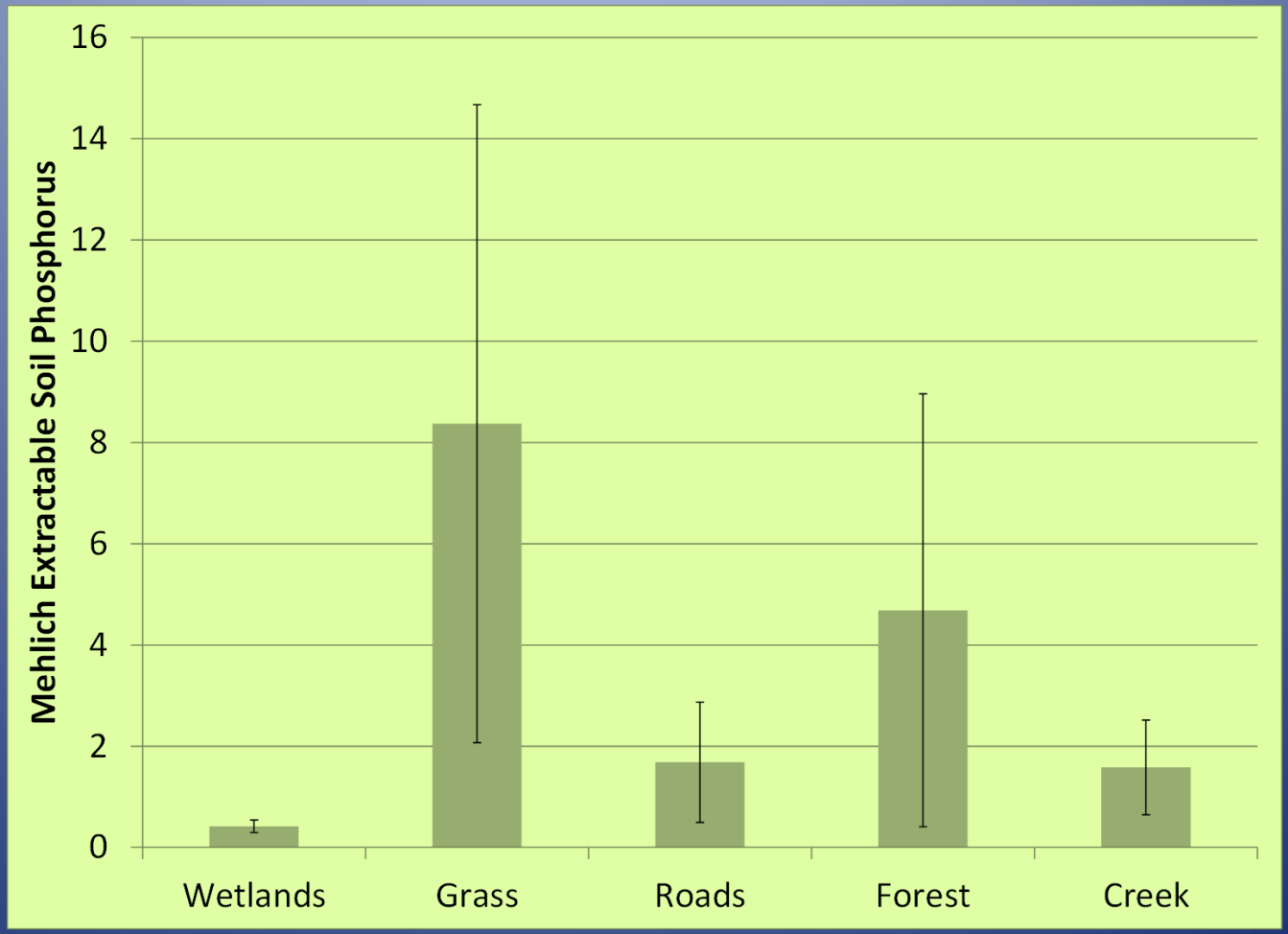
Sediment and Particulate P in Fernan Lake Watershed

Dr. Erin Brooks and Dr. Anurag Srivastava, UI Dept. of Biological Engineering



Where is the P in the sediment coming from?

51 sample sites



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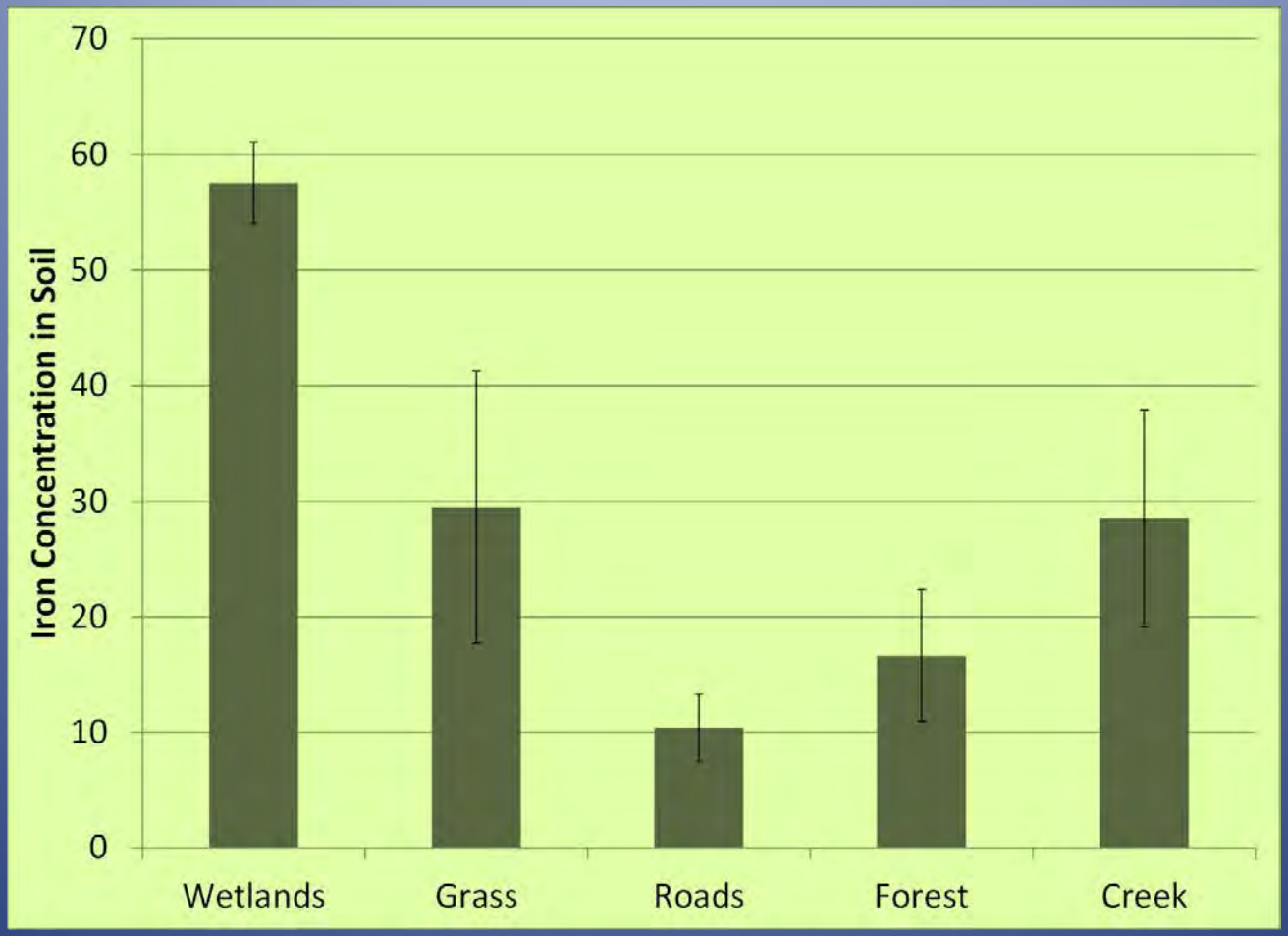
Iron in the soil



Iron strongly binds phosphorus

Observations

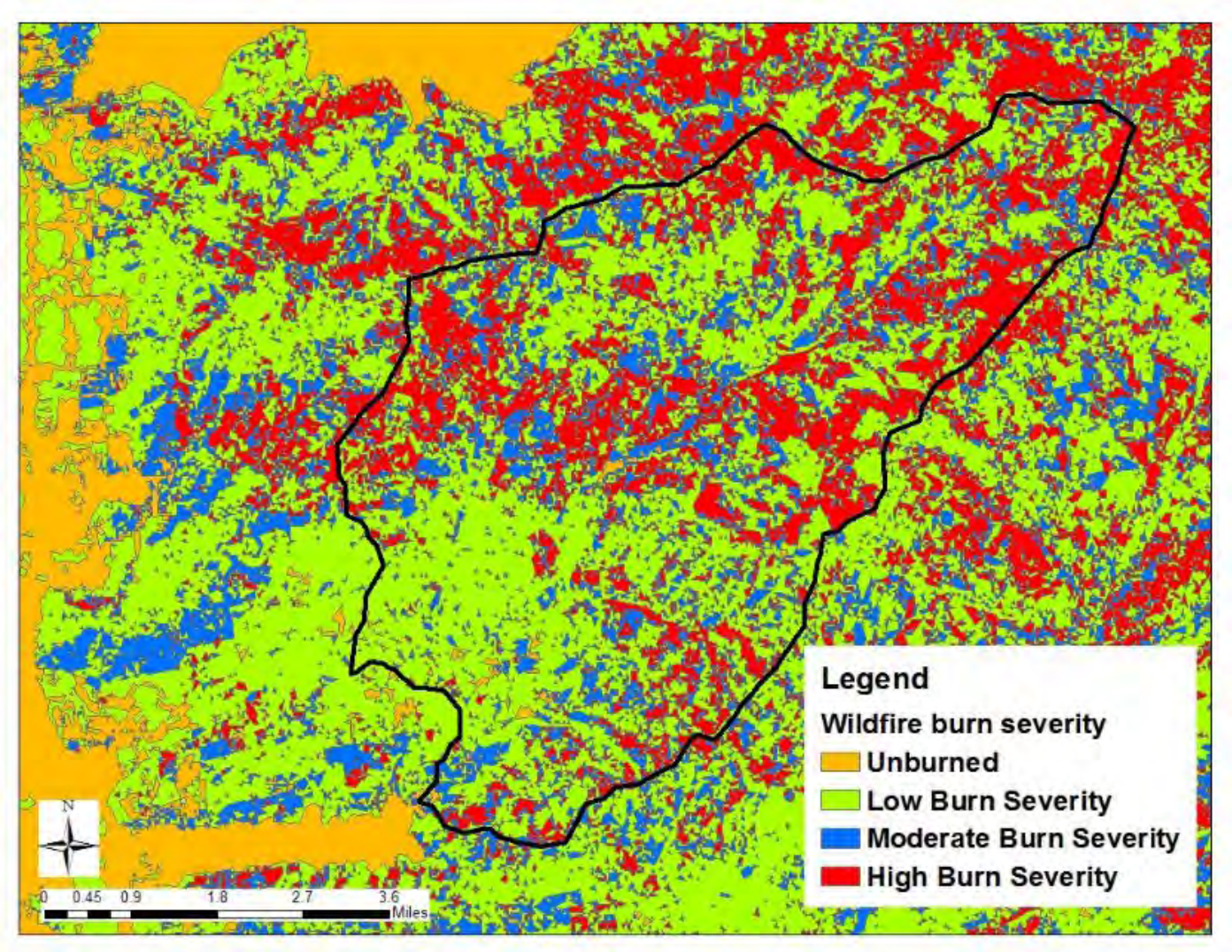
- Grass areas have the highest extractable P
- Wetlands have the lowest extractable P
- Wetlands have the highest iron concentrations
- There is high variability

Forested Watershed Sediment Contribution

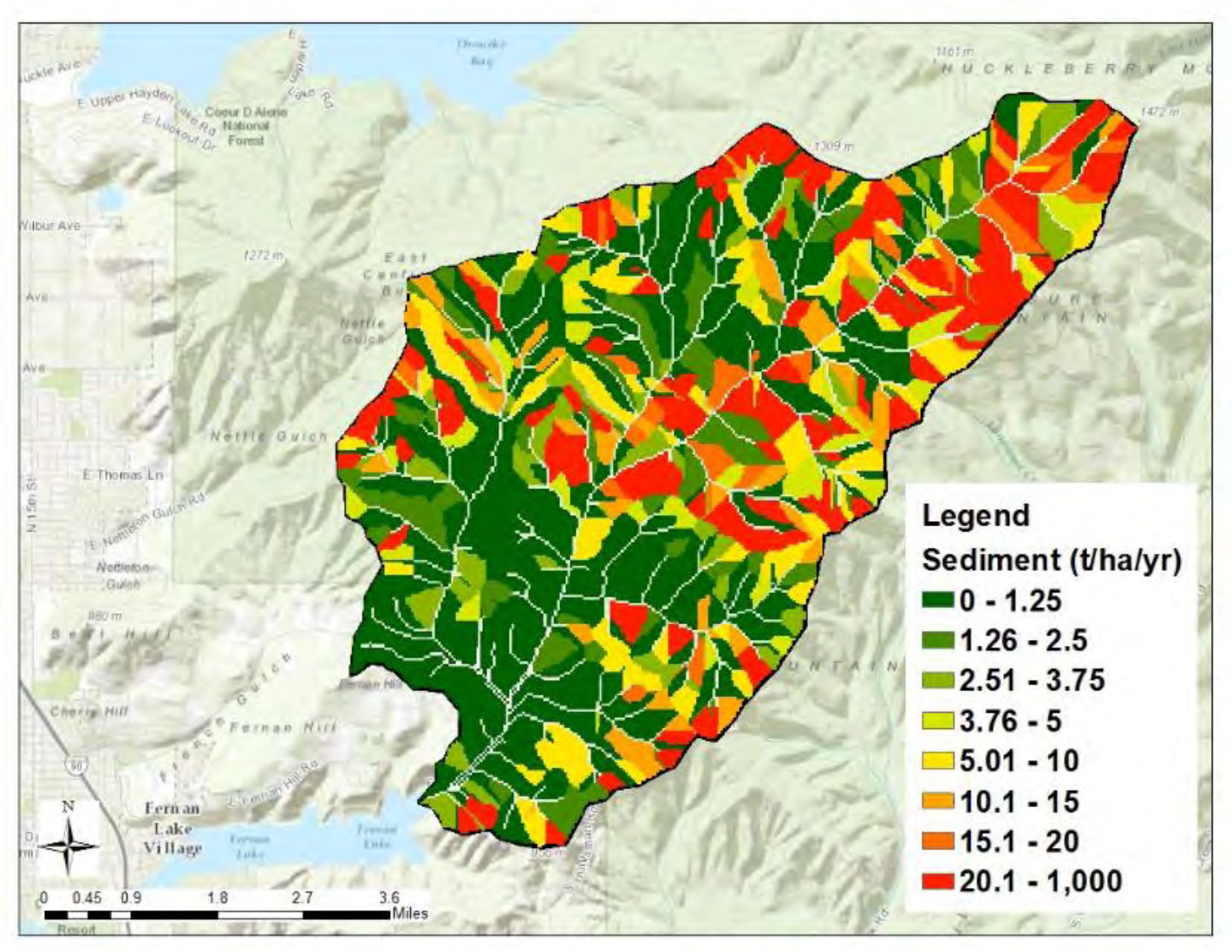
Scenarios

- Undisturbed forests
- Wildfires
- Thinning/prescribed burns
- Harvest
- Roads
- Future climate

Wildfire Severity



Post-Wildfire Sediment Yield



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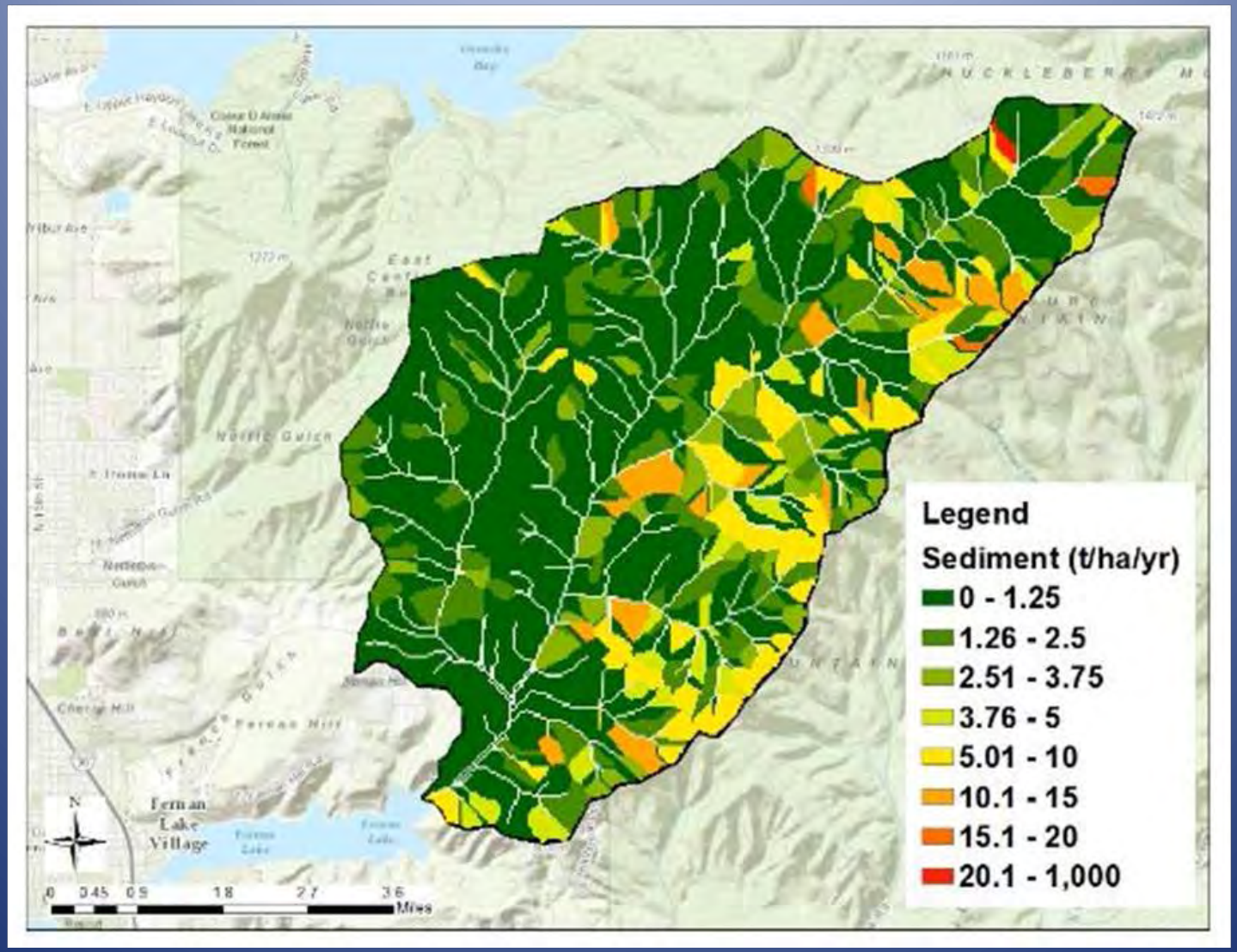
Prescribed-burn Sediment



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Virtual Fernan

Long-term controls on sediment delivery to Fernan Lake

Cody Parker and Dr. Brian Yanites
UI Department of Geological Sciences

University of Idaho

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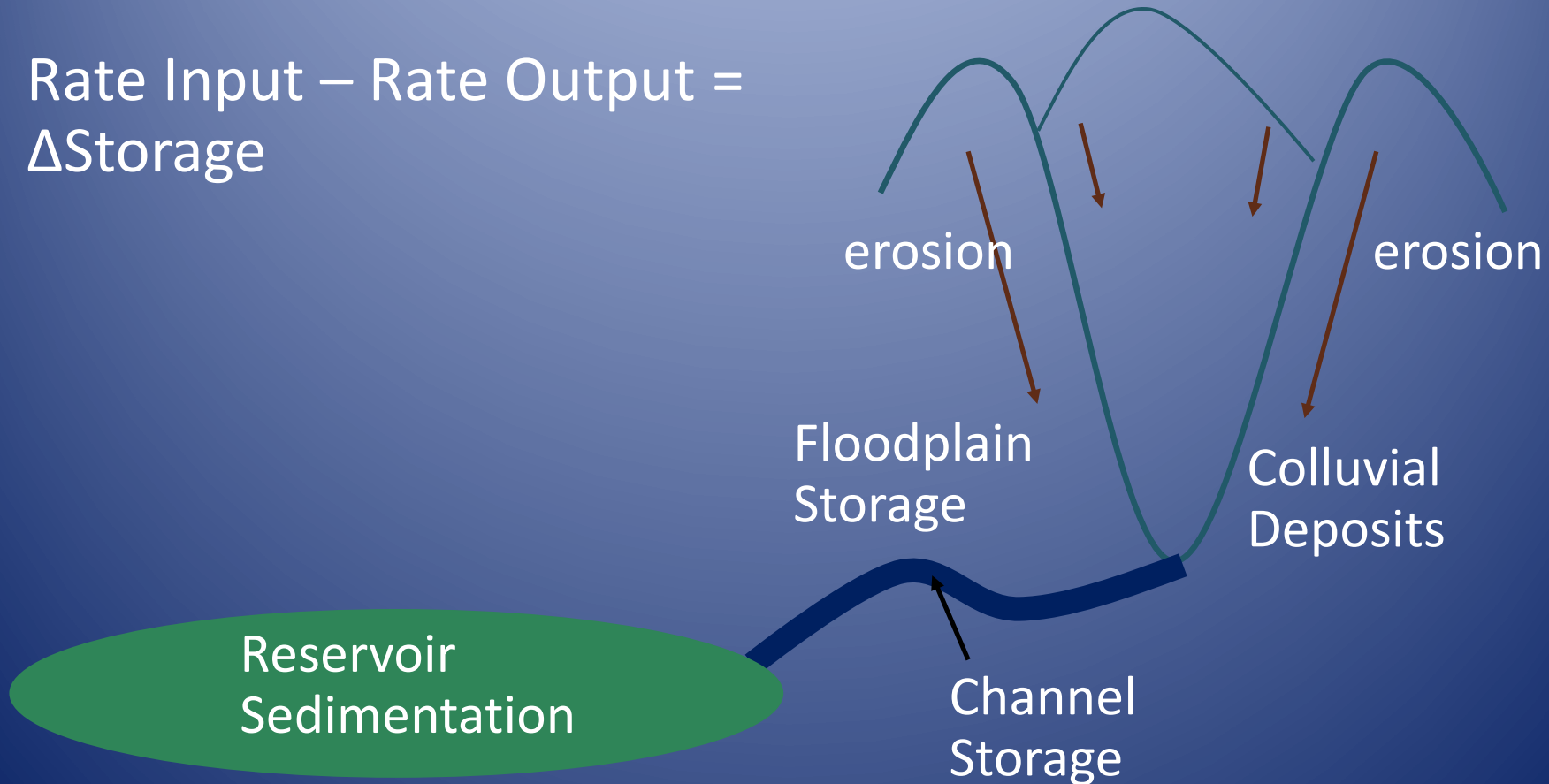
Objective: Quantify sediment budget and its variability

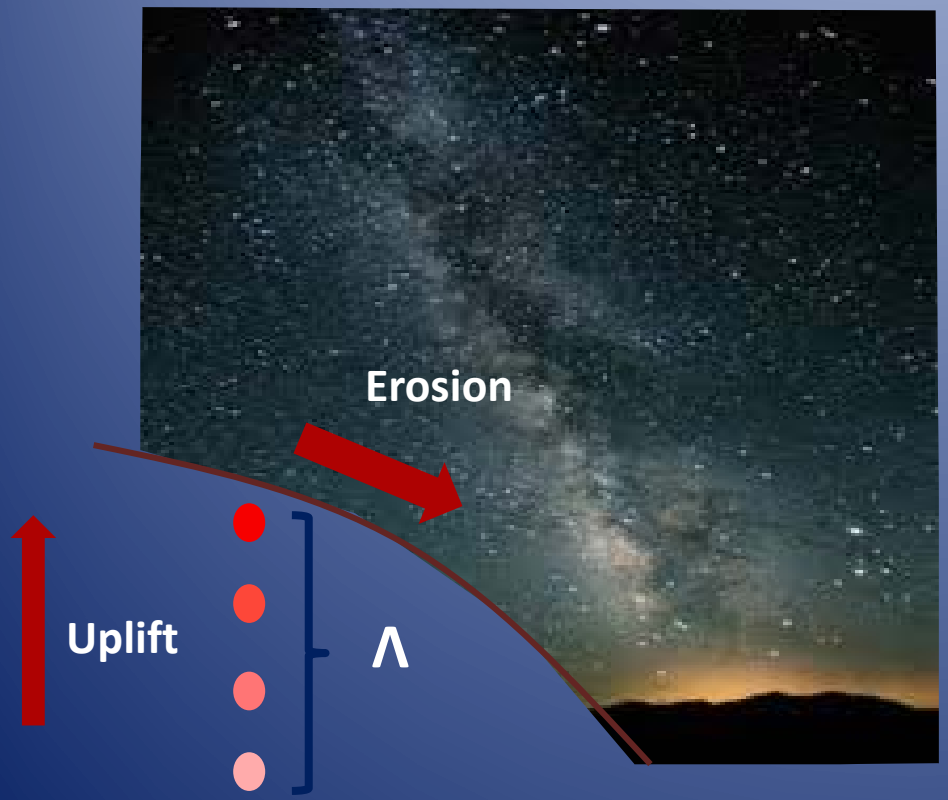
Rate Input – Rate Output = ΔStorage



Study Goals

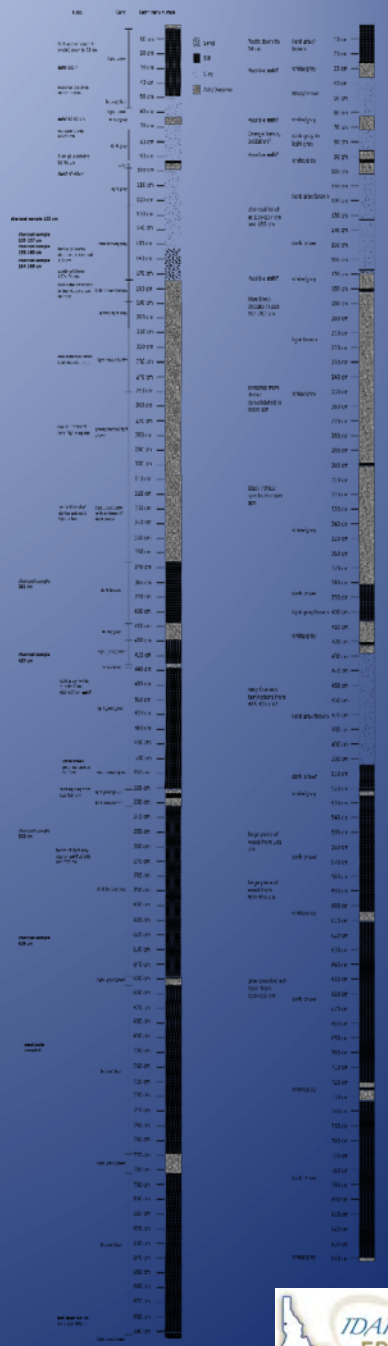
- Determine long-term variability of sediment yield
- Determine 10,000 year average landscape erosion rate
- Characterize potential sediment yield
- Does sediment yield vary with climate?
- Has land use significantly affected delivery of sediment?

Landscape Erosion Rate

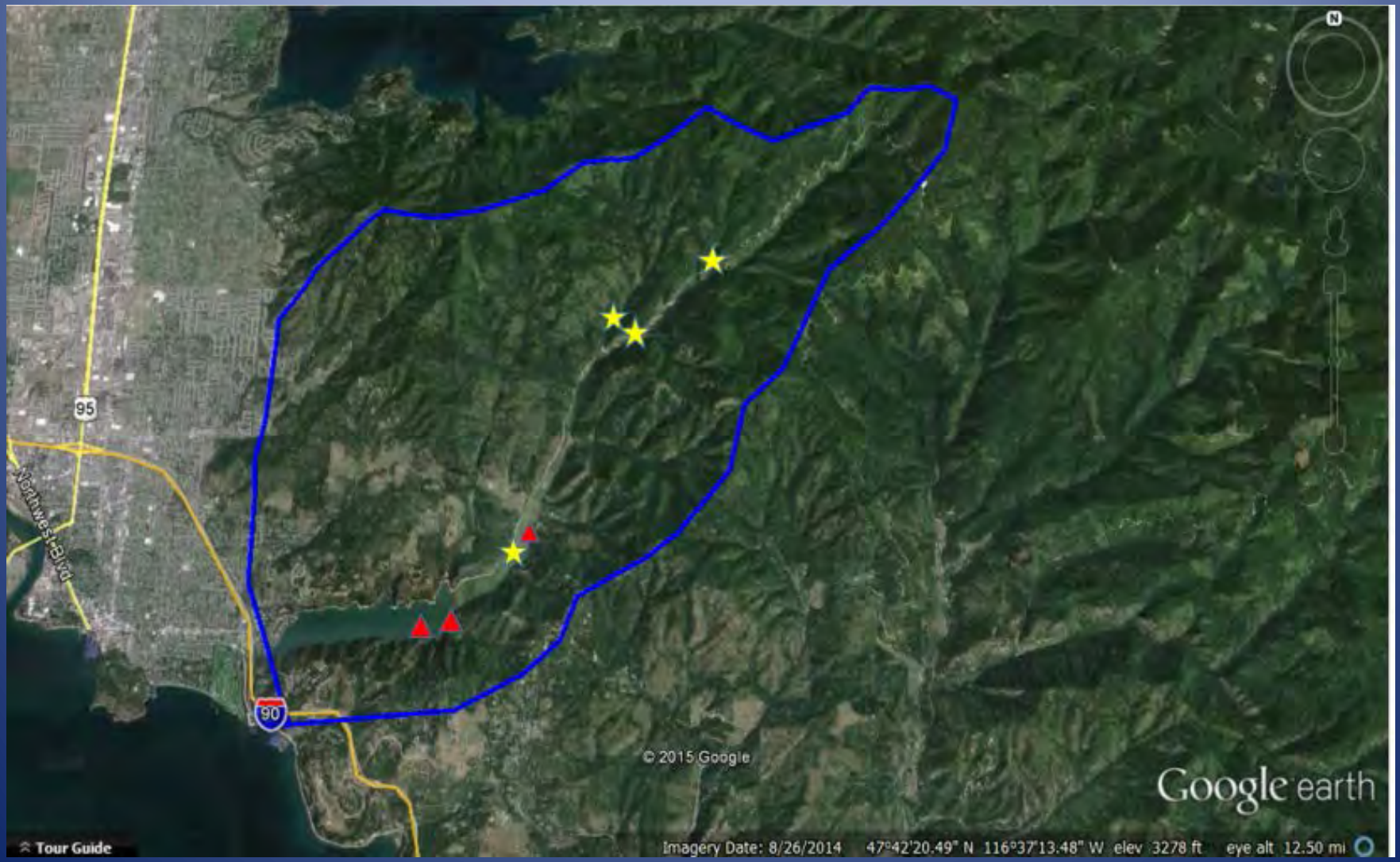


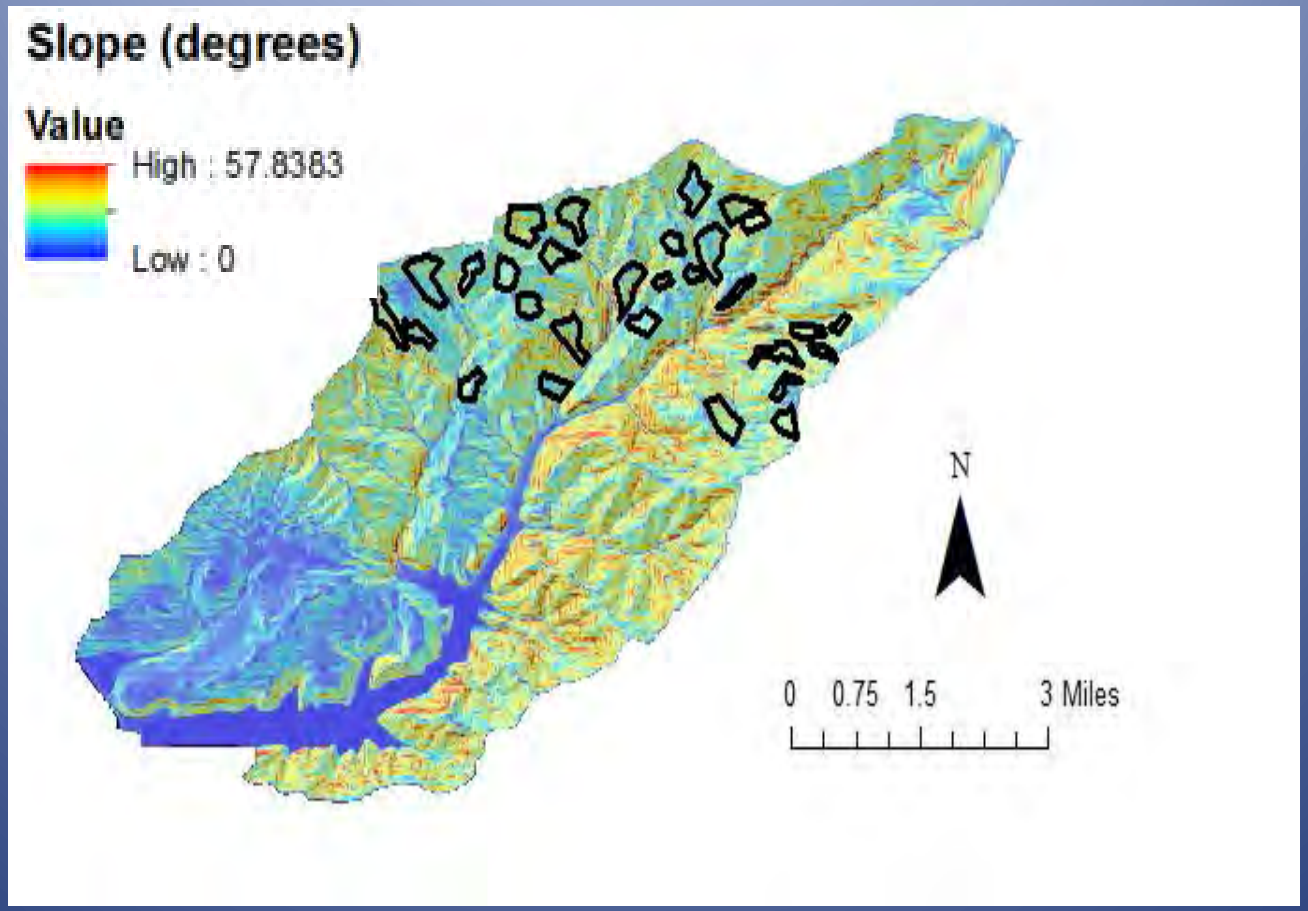
$$E = \frac{P_0 \Lambda}{N}$$

Sediment Deposition



Core Retrieval Sites





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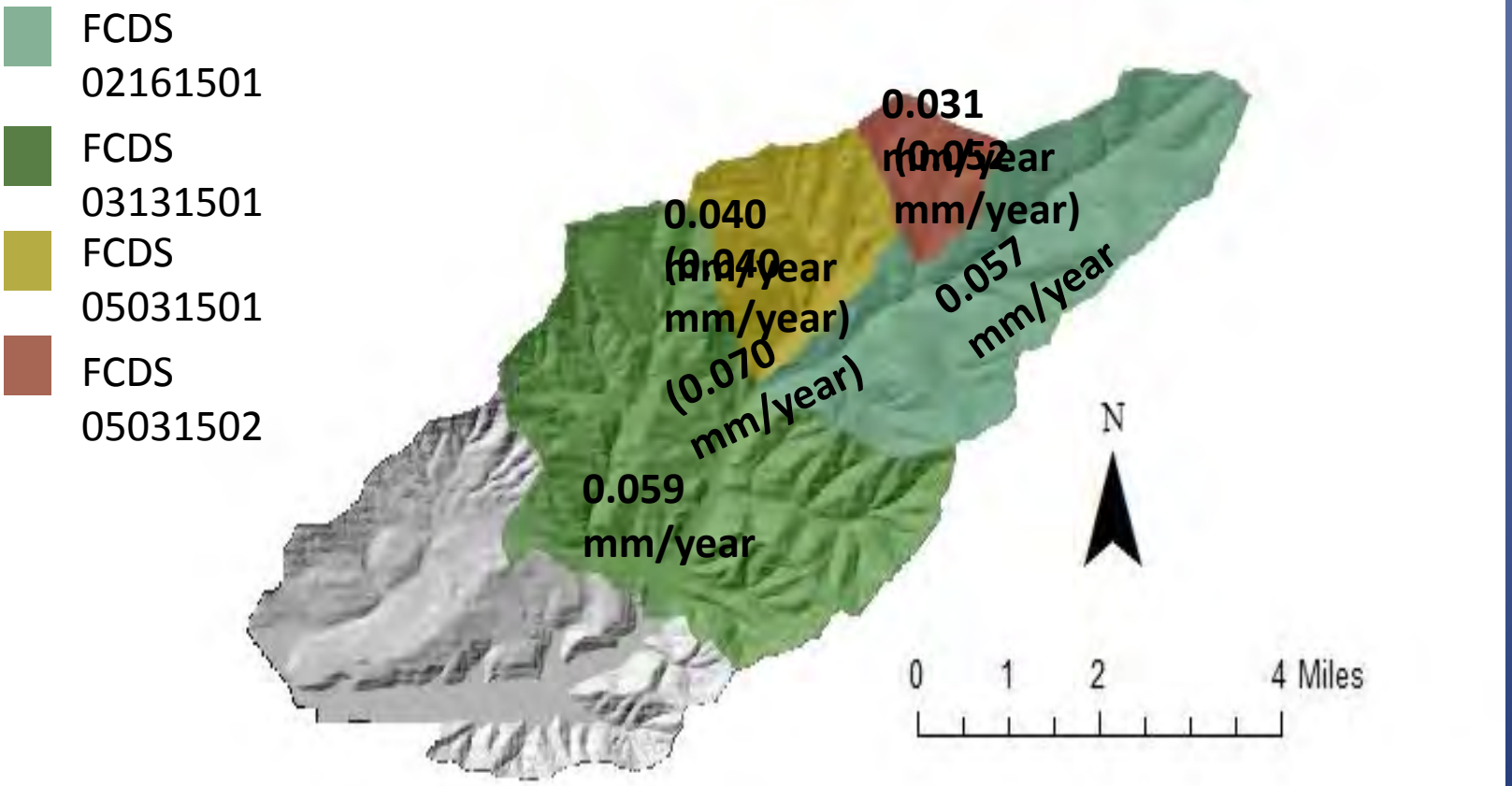
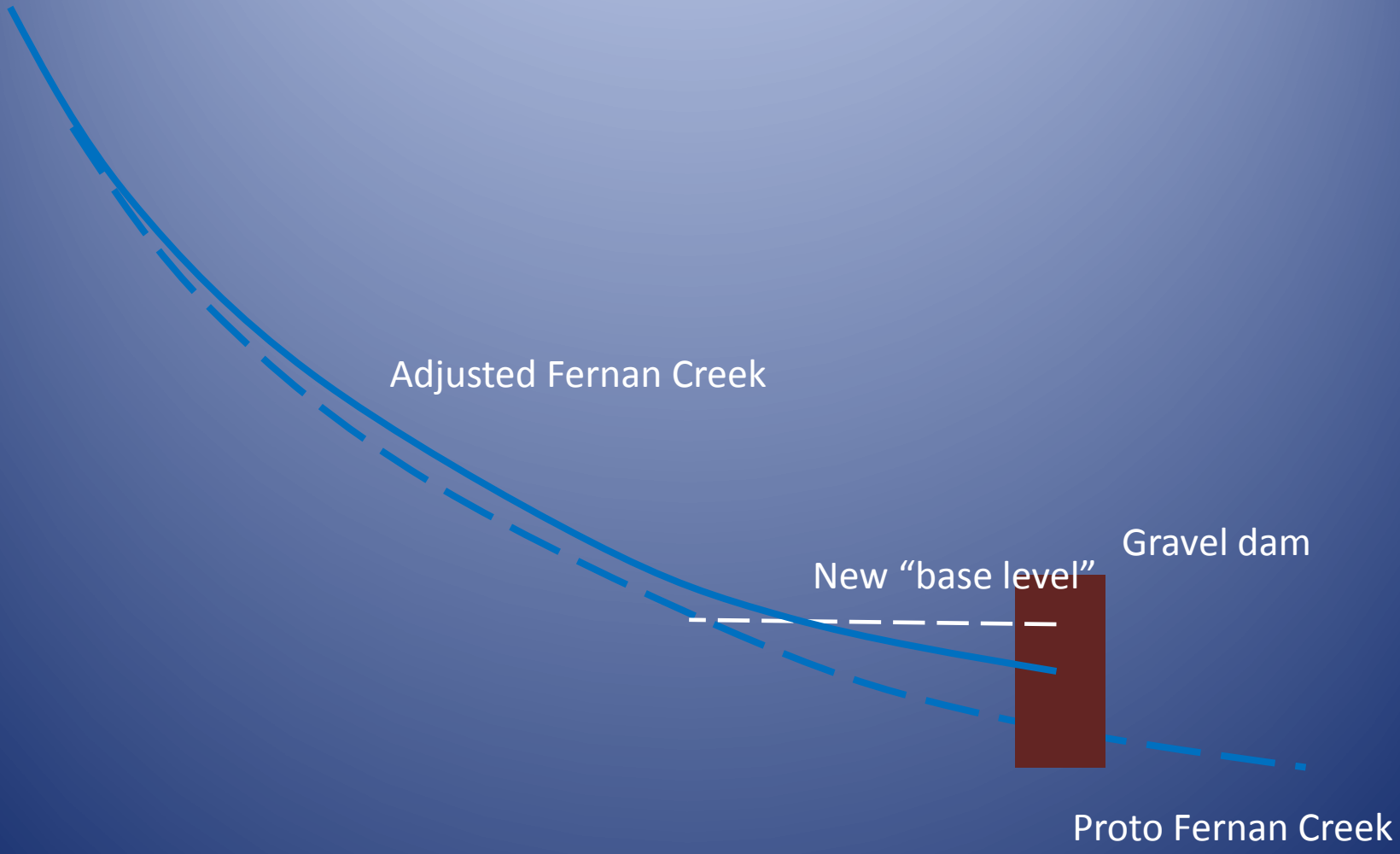
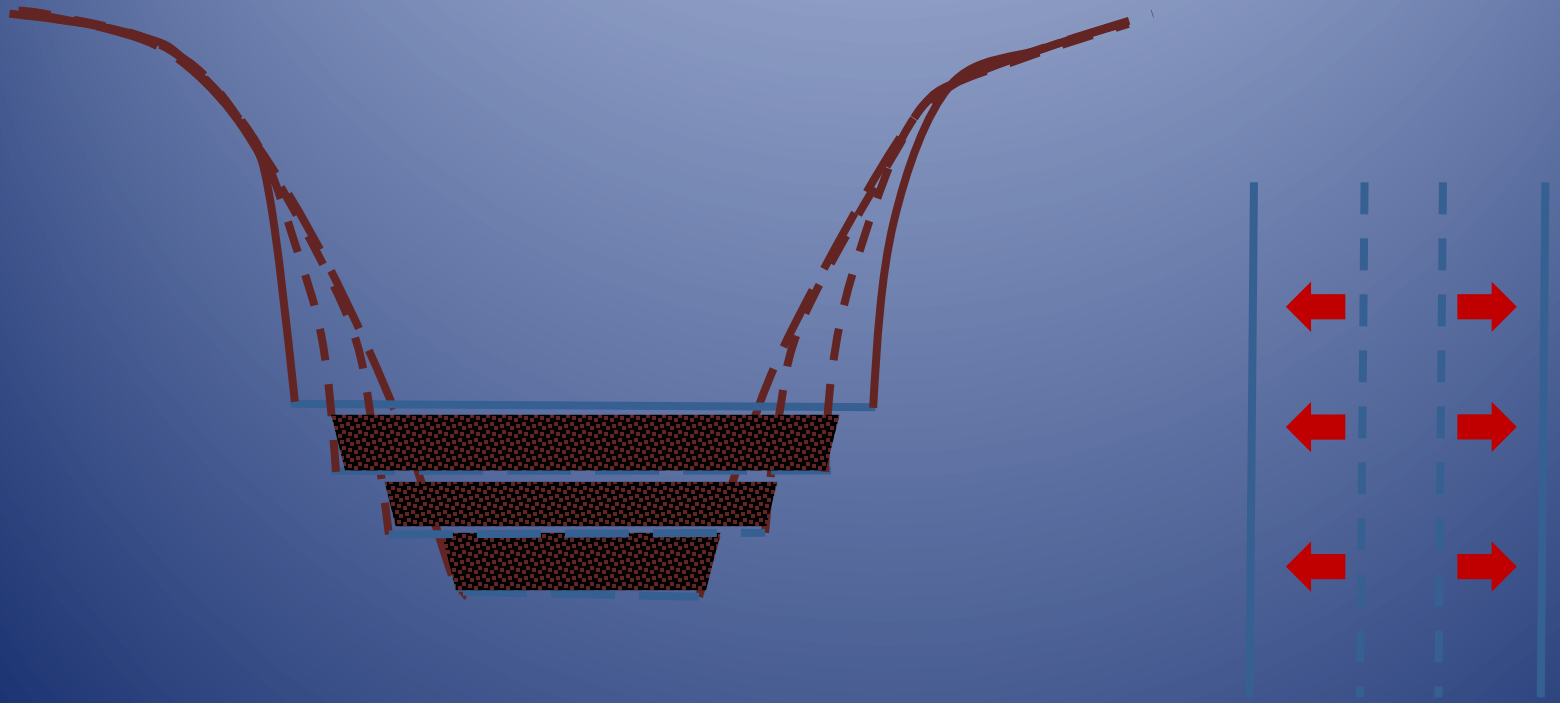

FCDS 02161501
FCDS 03131501
FCDS 05031501
FCDS 05031502
0.031 (0.052 mm/year)
0.040 (0.040 mm/year)
0.057 mm/year
0.070 mm/year)
0.059 mm/year
N
0 1 2 4 Miles

Fernan Creek Long Profile



Valley Cross-Section



Hedonic Modeling of Water Quality and Property Value

Dr. Felix Liao, UI Dept. of Geography

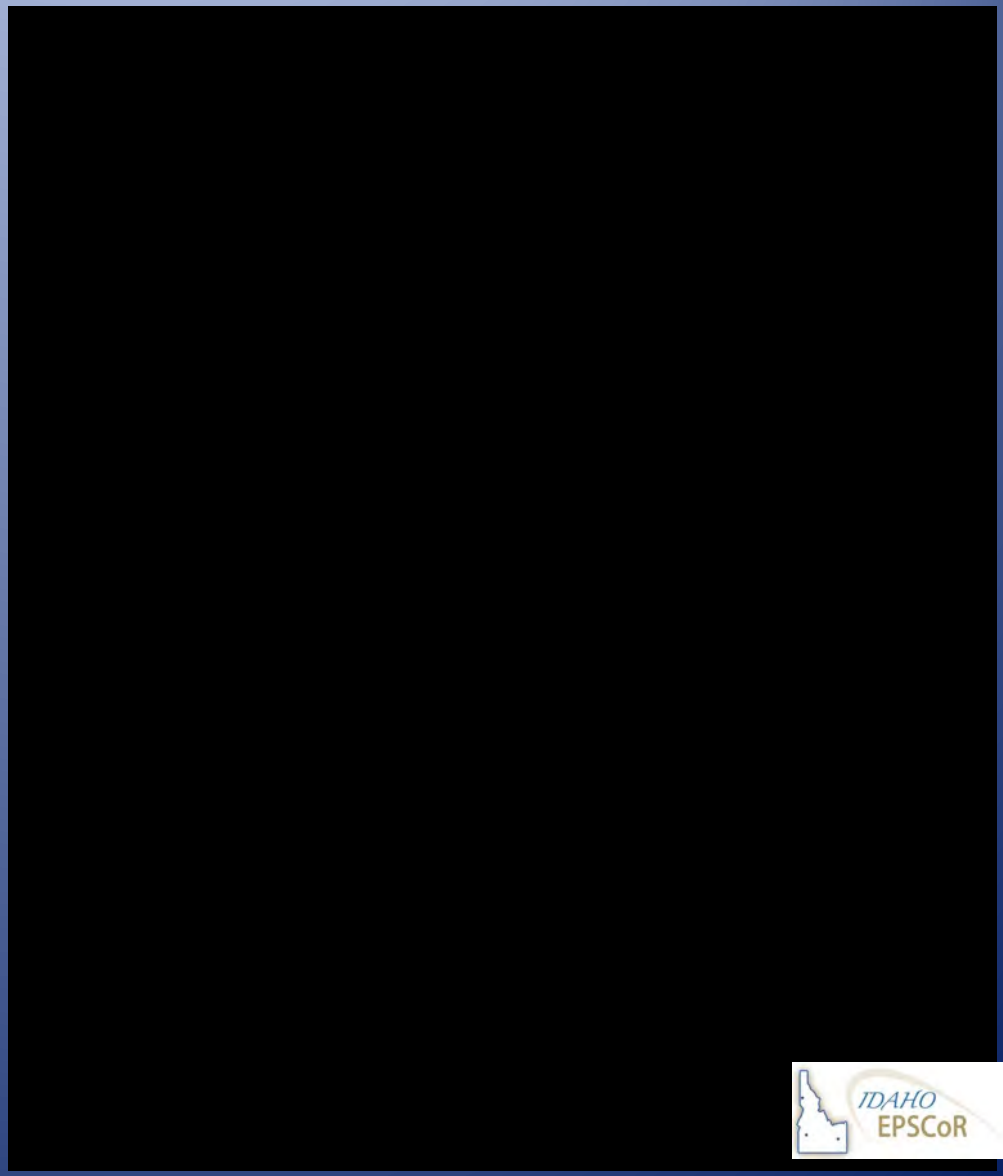
- Hedonic modeling is a method of estimating economic value of amenities/benefits that directly affect market prices

- Two indicators of water quality used
  - Water clarity (Secchi depth)
  - Presence/absence of milfoil

Water Quality and Property Value

614 sales of single family lakefront property homes from 2010-2014

Mean property value $509,962



Water quality matters to property value

Water quality attribute	% change at mean property values	Marginal implicit price (in 2010 constant dollars)
Secchi depth (1 meter increase)		
4 meters->5 meters	5.97%	$27,096
5 meters->6 meters	4.32%	$22,033
6 meters-> 7 meters	3.64%	$18,568
7 meters->8 meters	3.15%	$16,406
8 meters-> 9 meters	2.77%	$14,127
Invasive species		
Milfoil (presence->no presence)	12.67%	$64,444

Mark Solomon:
msolomon@uidaho.edu

Frank Wilhelm:
fwilhelm@uidaho.edu

Erin Brooks:
ebrooks@uidaho.edu

Brian Yanites:
byanites@uidaho.edu

Felix Liao
hliao@uidaho.edu