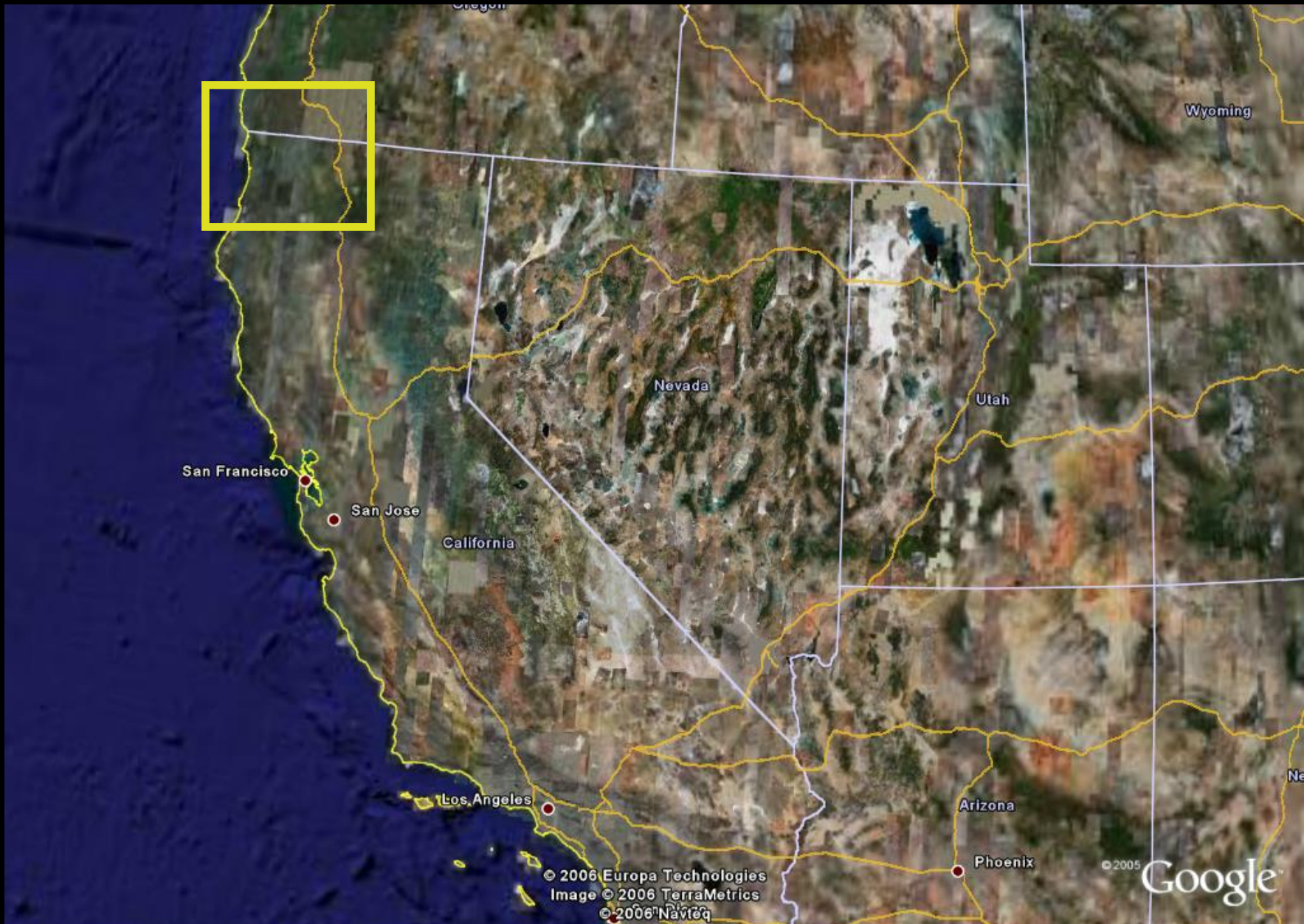


Linkages between sediment supply, streambed fine sediment, and benthic macroinvertebrates in the Klamath National Forest: implications for tolerance values

Matt Cover, Christine May, Bill Dietrich, Vincent Resh
mcover@nature.berkeley.edu
University of California, Berkeley



Pointer lat 38.235525° lon -116.981202° elev 5941 ft

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Streaming 100%

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Eye alt 947.52 mi

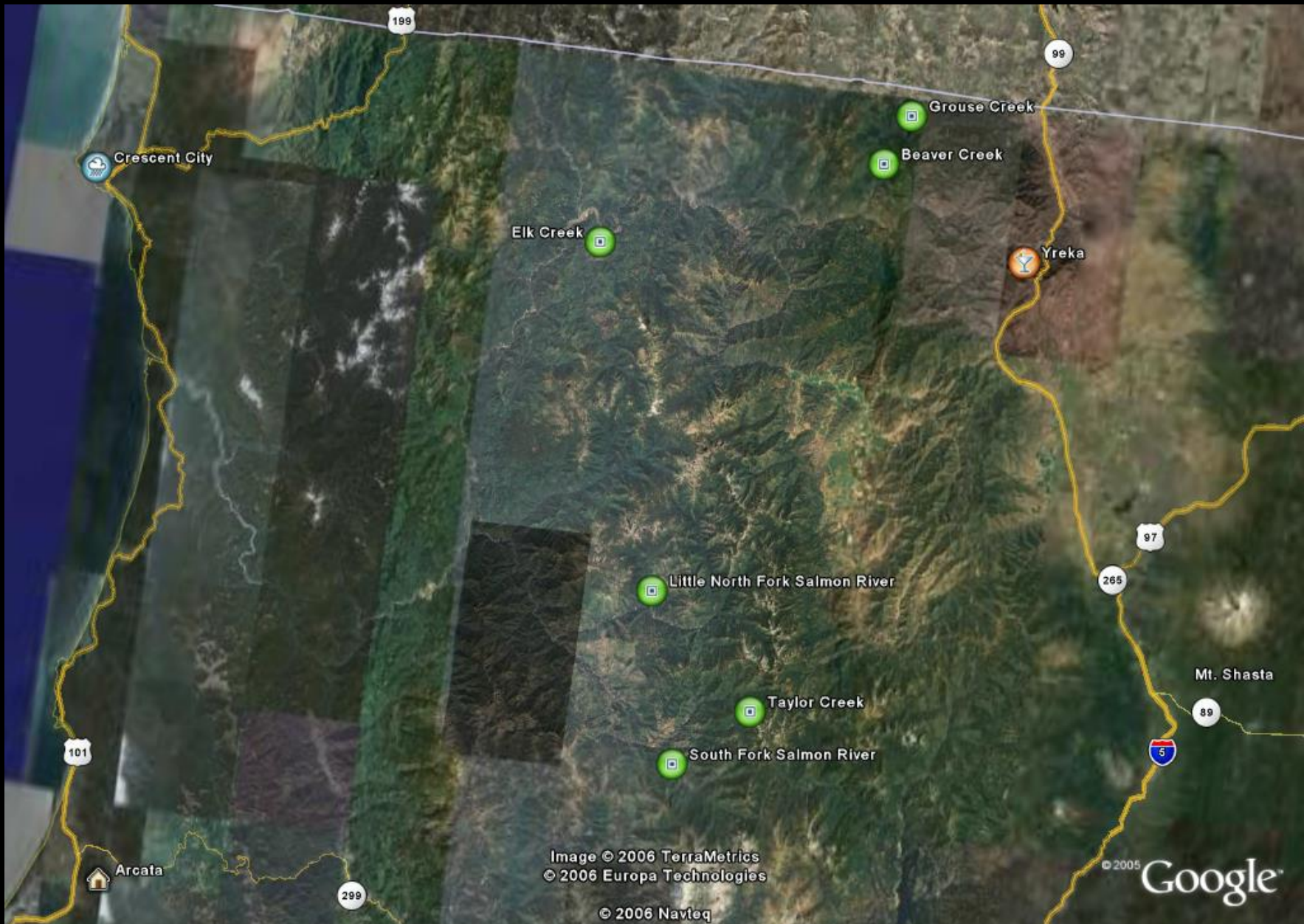


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Pointer lat 41.481650° lon -123.192397° elev 4580 ft

Streaming 100%

Eye alt 99.90 mi

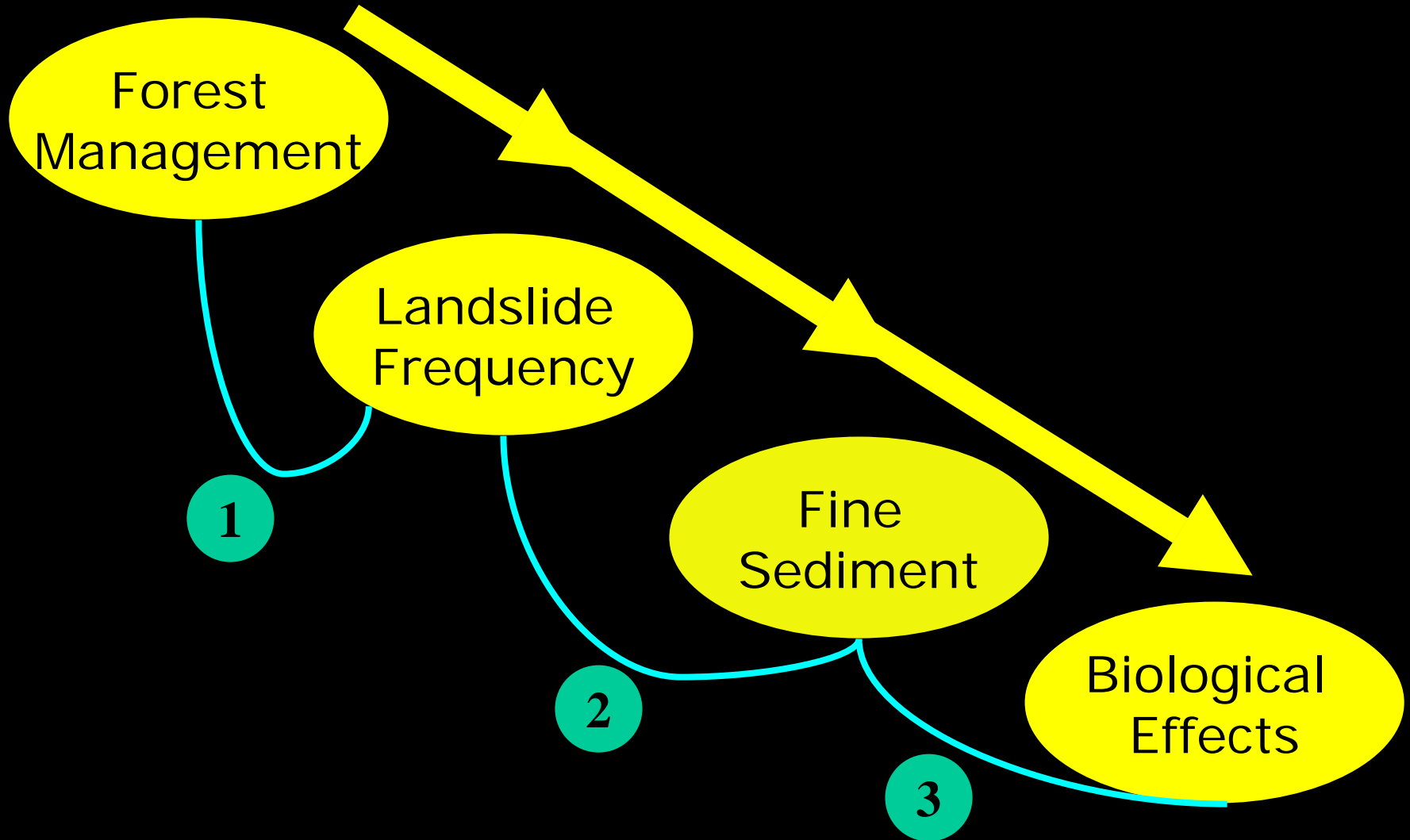








Cumulative Watershed Effects



Objectives

1. Quantify empirical **linkages** between sediment supply, streambed conditions, and benthic invertebrates
2. Identify invertebrate metrics or taxa that could serve as **bioindicators** of fine sediment and sediment supply.

Study Sites

- 6 Streams
 - 3 “high” sediment supply
 - 3 “low sediment supply”
- >50% granitic bedrock
- 2-4% slope
- 5-20 m wide
- 25-150 sq. km
- Anadromous fish



Methods

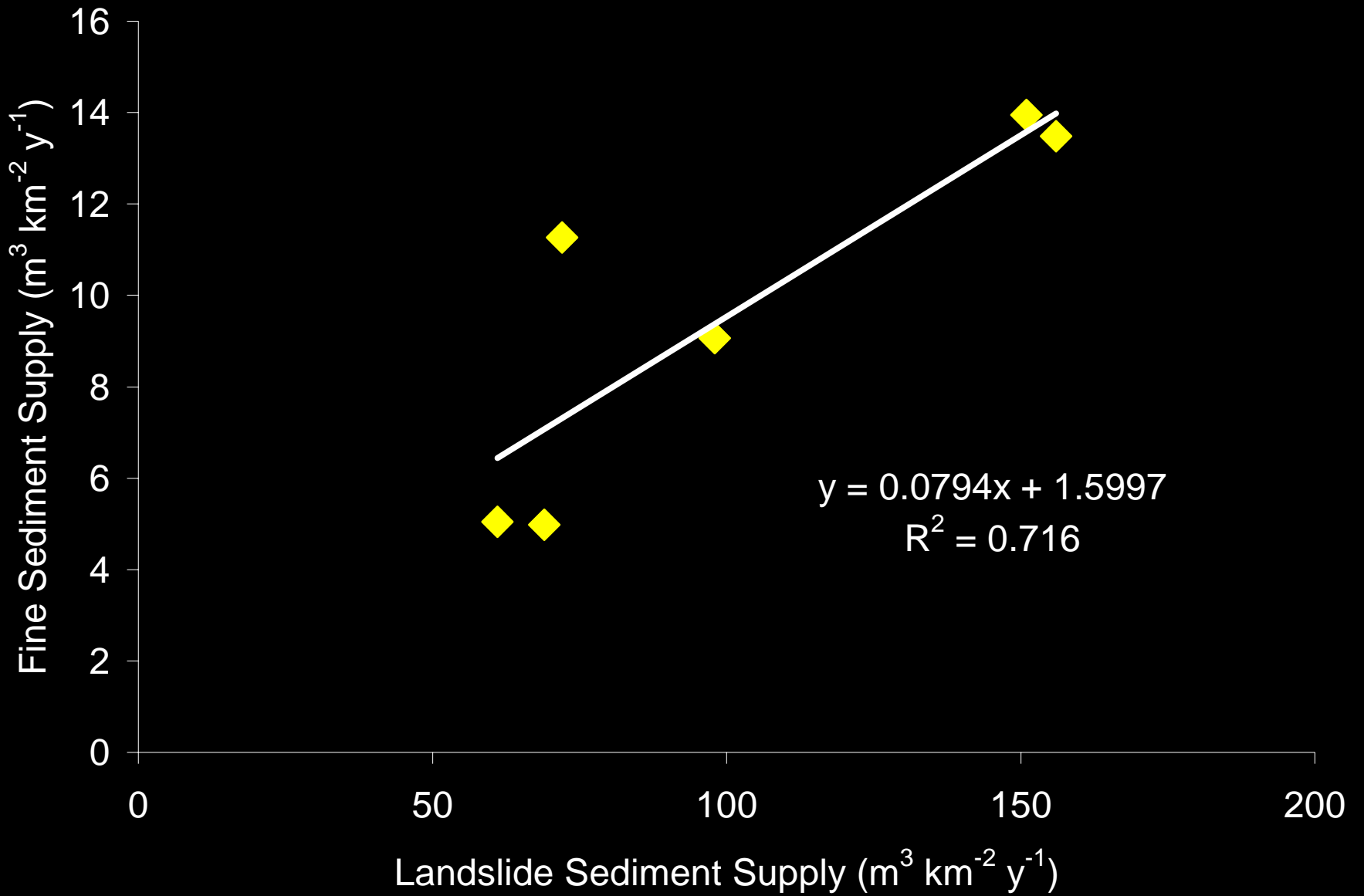
- Sediment supply models
 - Landslides: stratified by geomorphic terrains
 - Fine sediment: calibrated USLE
- Streambed fine sediment
 - V^* : pool filling
 - Riffle surface
 - Subsurface gravel permeability (egg survival)
- Stream biota
 - Benthic invertebrates (4 riffles)

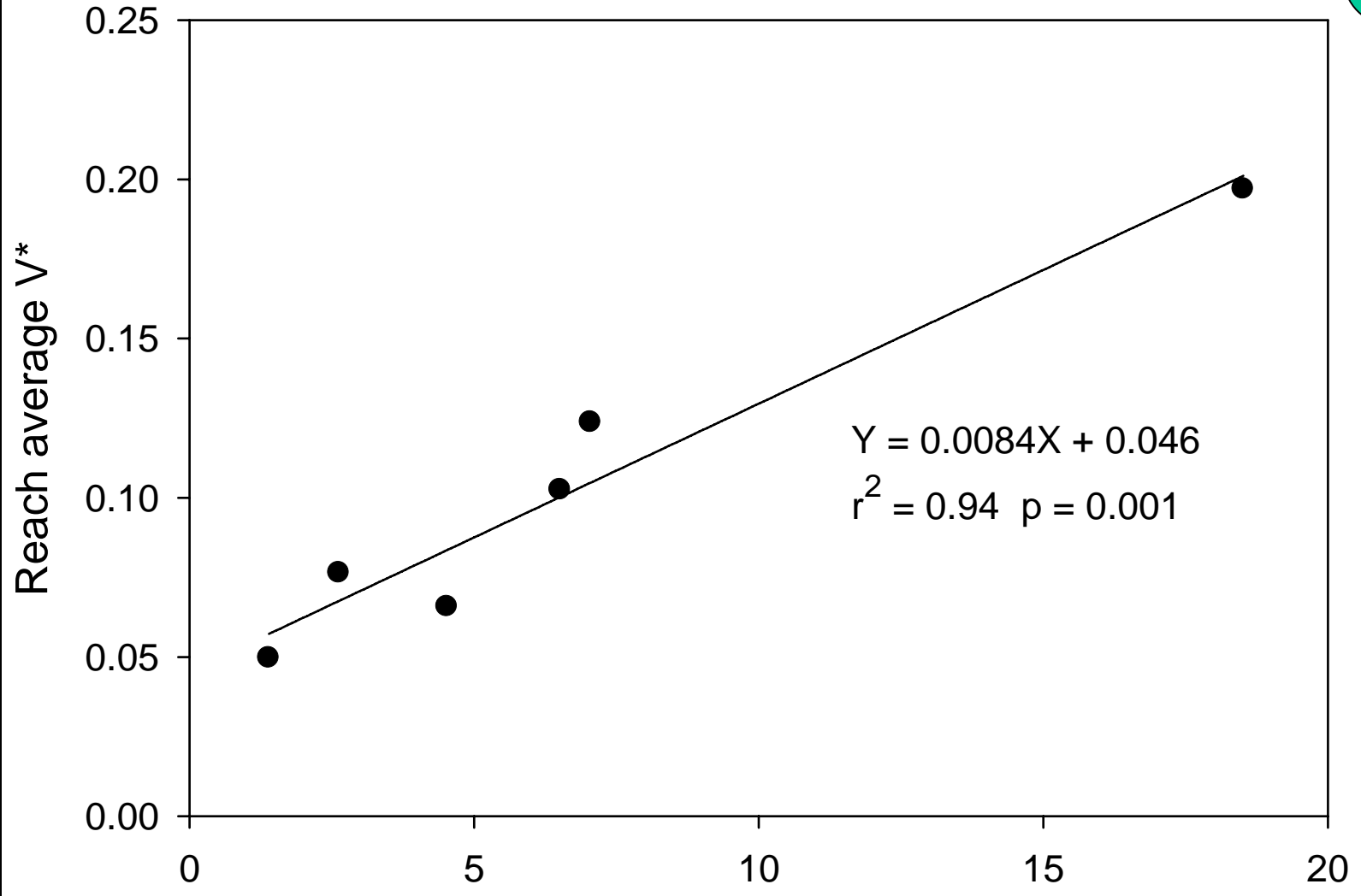
1 Effects of forest management on sediment supply

(de la Fuente and Elder 2003)

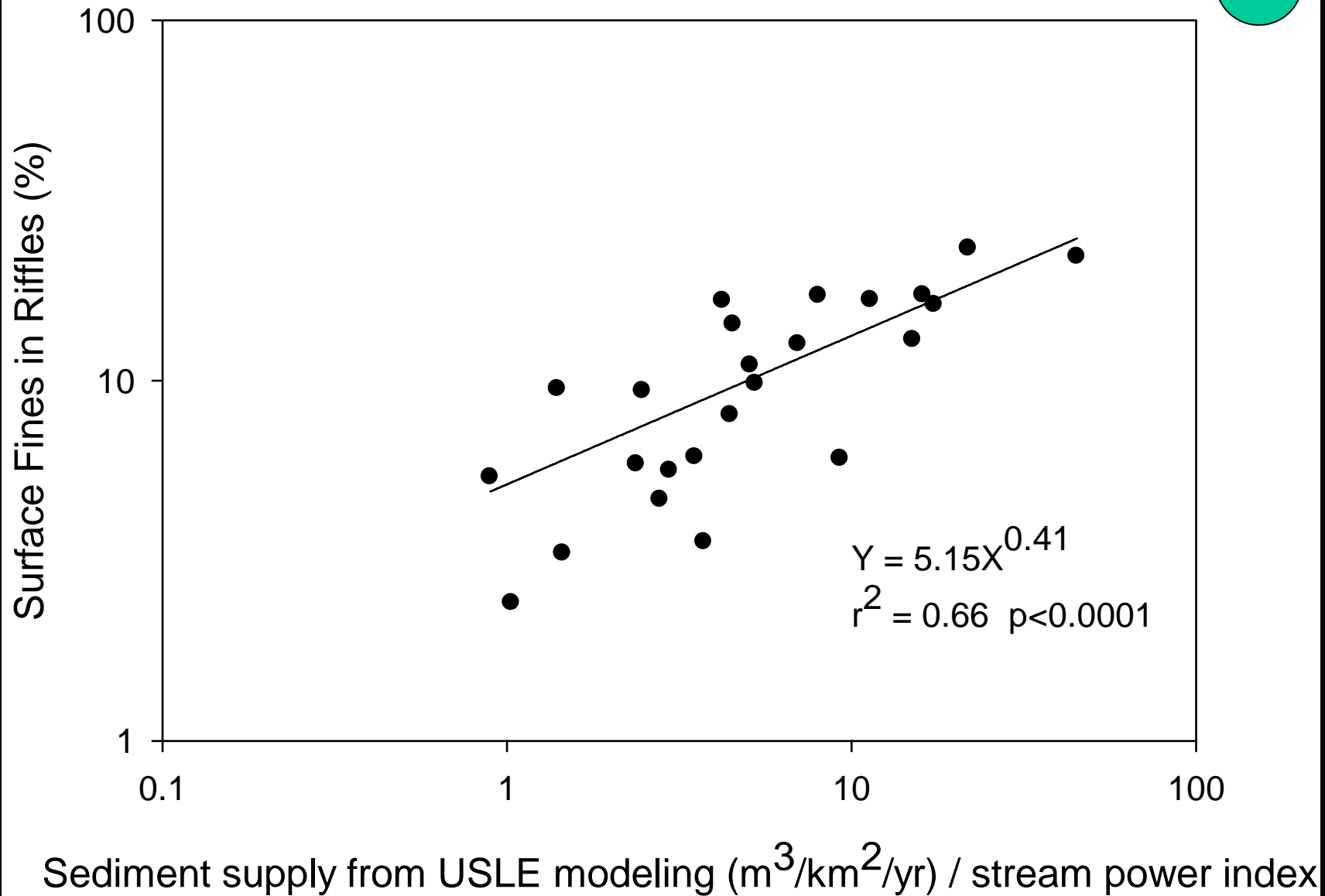
Compared to undisturbed land, sediment supply from landslides was:

- 4.5x greater in harvested areas
- 63x greater on roads



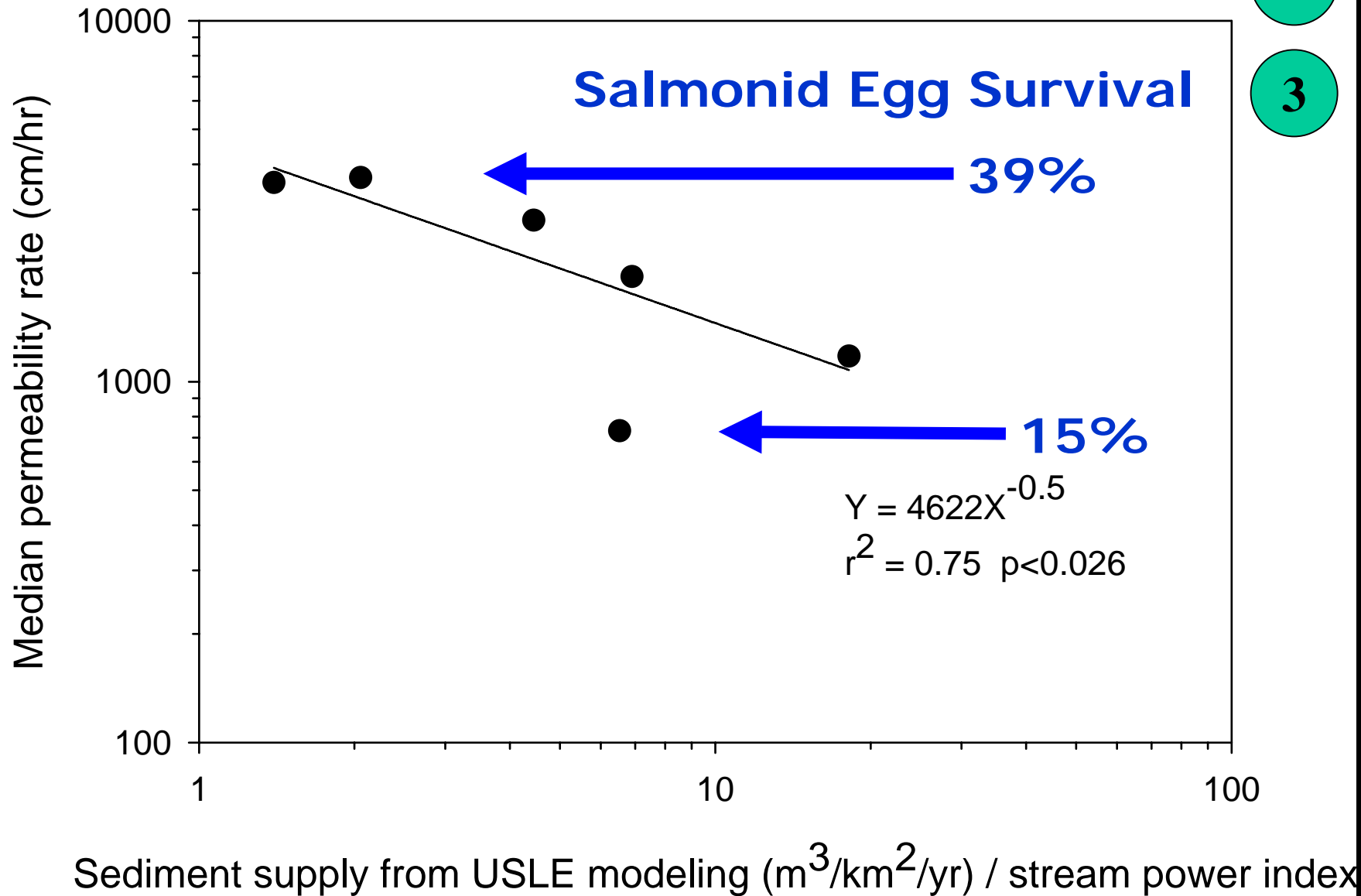


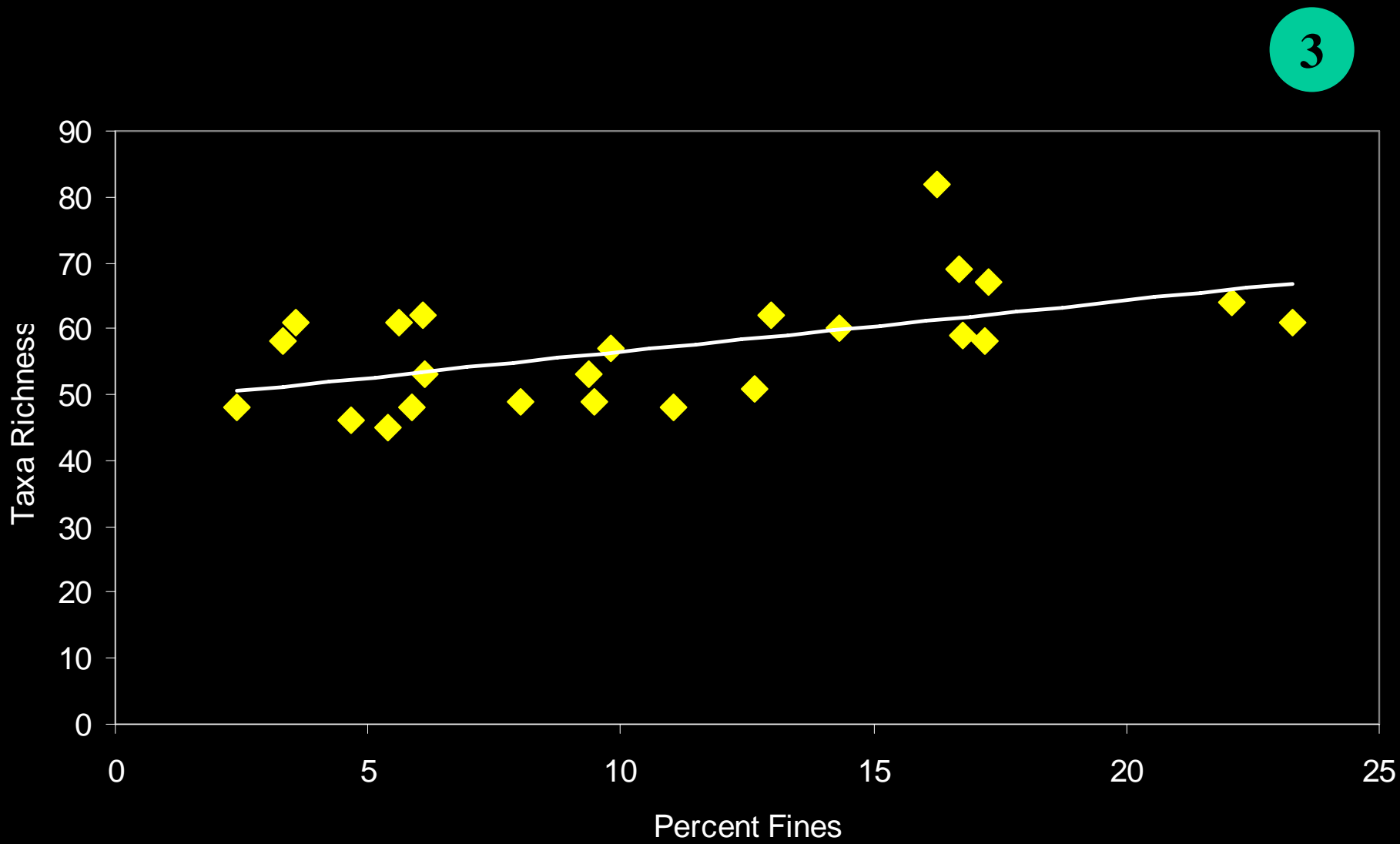
Sediment supply from USLE modeling (m³/km²/yr) / stream power index



2

3

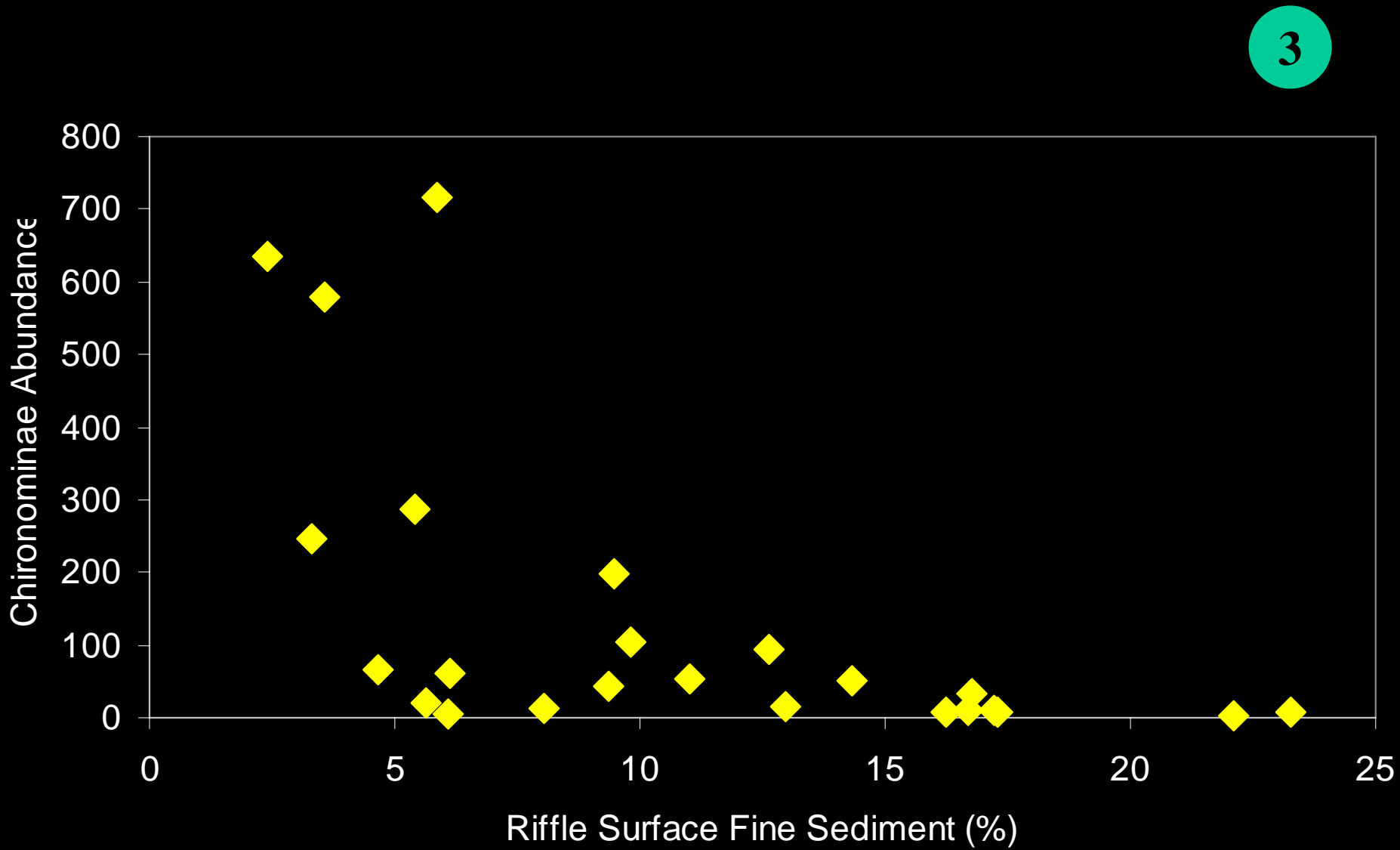




Fine Sediment

Metrics and Taxa (Predicted Response to Fine Sediment)	Simple Linear Regression		Partial Correlation	
	r_{12}	Sig. Prob.	$r_{12.345678}$	Sig. Prob.
Taxa Richness (-)	0.50	0.012	0.18	0.49
Total Abundance (-)	-0.29	0.18	-0.28	0.26
EPT Richness (-)	0.46	0.023	0.07	0.80
EPT Abundance (-)	-0.18	0.39	-0.08	0.78
% Burrowing (+)	-0.32	0.13	0.40	0.097
% Vulnerable (-)	0.23	0.27	0.30	0.23
Chironominae/Chironomidae (-)*	-0.53	0.0082	-0.81	<0.001
Orthocladiinae/Chironomidae (+)*	0.50	0.014	0.79	<0.001

* Angradi 1999



	Response	Size (mm)	Availability Score*
Chironominae (Angradi 1999)	-	2-8	70.5
<i>Epeorus</i> (Relyea 2000)	-	7-18	63.6
<i>Cinygmula</i>	-	7-18	63.6
<i>Arctopsyche</i> (Relyea 2000)	-	10-28	51.6
Oligochaeta	+	2-20	10.0
<i>Attenella delantala</i>	+	5-9	22.5
<i>Zapada columbiana</i> (Relyea 2000)	+	5-10	52.6

*Radar 1997

Conclusions

Increased sediment supply is associated with:

- Increased fine sediment
- Decreased subsurface permeability

Conclusions

- No relationship between fine sediment and benthic macroinvertebrate metrics
- A few taxa show potential for being useful bioindicators of fine sediment

Possibilities

- Need tolerance values for all taxa?
- Individual cobble sampling

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