

# Sediment Delivery Inventory and Monitoring

David J. Lewis  
Watershed Management Advisor



# Definitions

**Soil Erosion** – The detachment or removal of soil by wind, rain drop impact, or fluvial processes.

**Sediment Yield** – Quantity of sediment passing a particular point in a watershed per unit of time.

**Sediment Delivery** – Portion of transported sediment to a particular location or part of a landscape.









# Erosion Research and Monitoring



7. 9. 2000

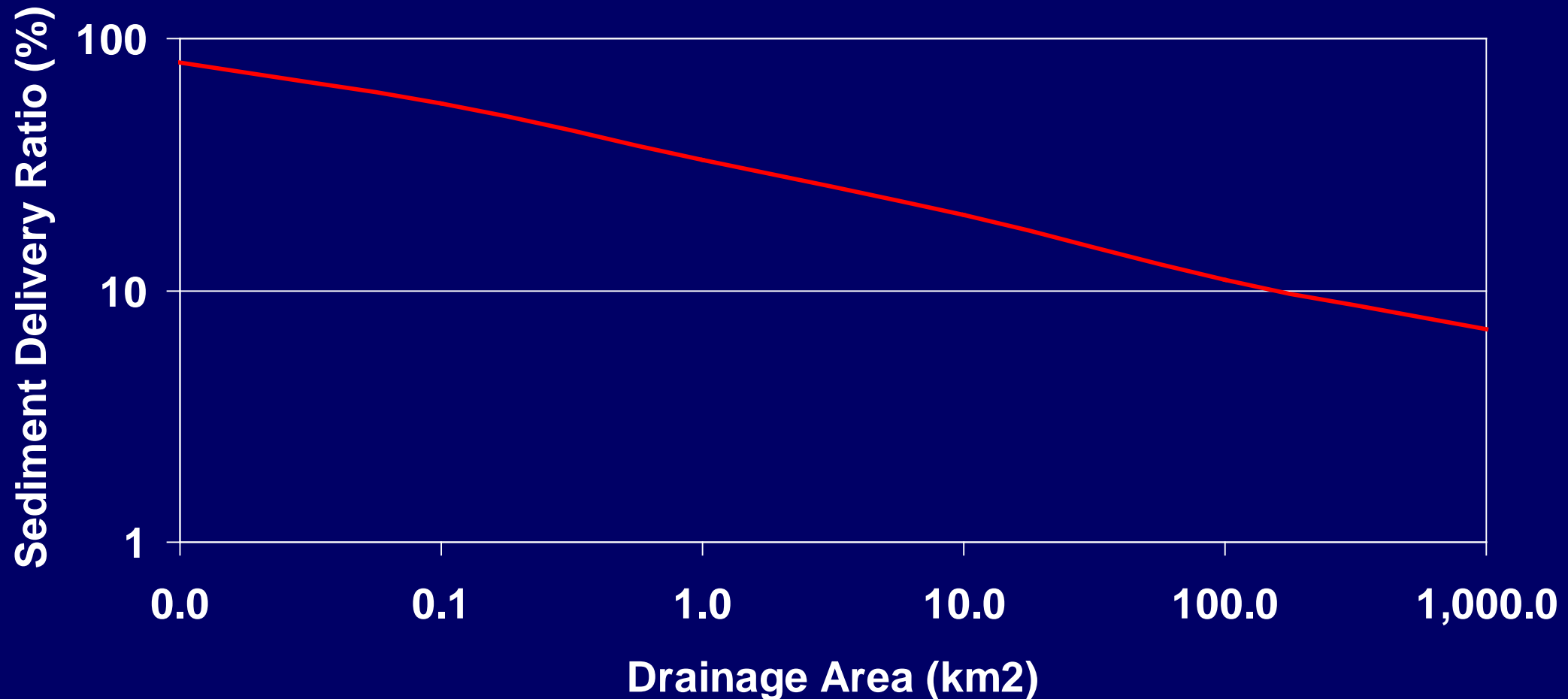


# Sediment Yield Research and Monitoring



$$\text{Sediment Delivery Ratio} = \frac{\text{Sediment Yield}}{\text{Soil Erosion Rate}}$$

# Relationship of Sediment Delivery Ratio and Drainage Basin Area



Walling, D.E. 1983



# Sediment Delivery Problem

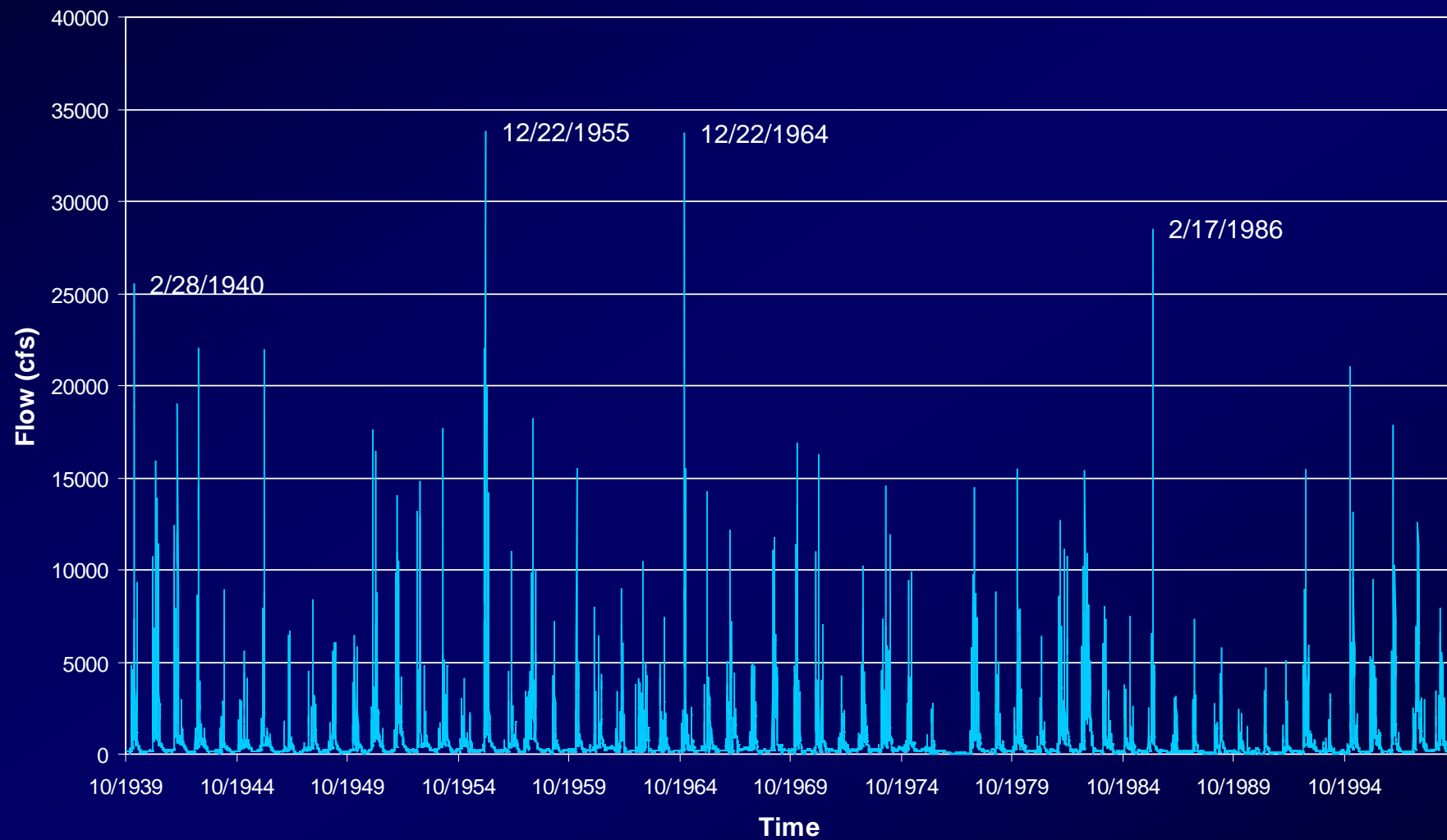
“The **linking** of on-site **rates of erosion** and soil loss within a drainage basin **to the sediment yield** at the basin outlet, and improved knowledge and representation of the associated processes of sediment delivery, represent a **major research need** within the field of erosion and sedimentation and also an important scale problem in drainage basin studies.”

Walling, 1983





## Daily Discharge in the Russian River Near Hopland from 10/01/1939 to 09/30/1999







**Present Sediment Yield Rates for California**  
(SCS, 1974)

DO NOT USE FOR DESIGN PURPOSES

Sediment Yield Class Rate (ac-ft/sq mi-yr)

Yellow	> 3.0	Light Green	0.2 to 0.5
Orange	1.0 to 3.0	Dark Green	0.1 to 0.2
Brown	0.5 to 1.0	Black	< 0.1

Grid is in 1 degree increments

50-50 = % sheet & rill erosion  
- % channel & gully erosion

^ 0.51 = characteristic meas. avg.  
suspended sed. yield rates  
(ac-ft/sq mi-yr)

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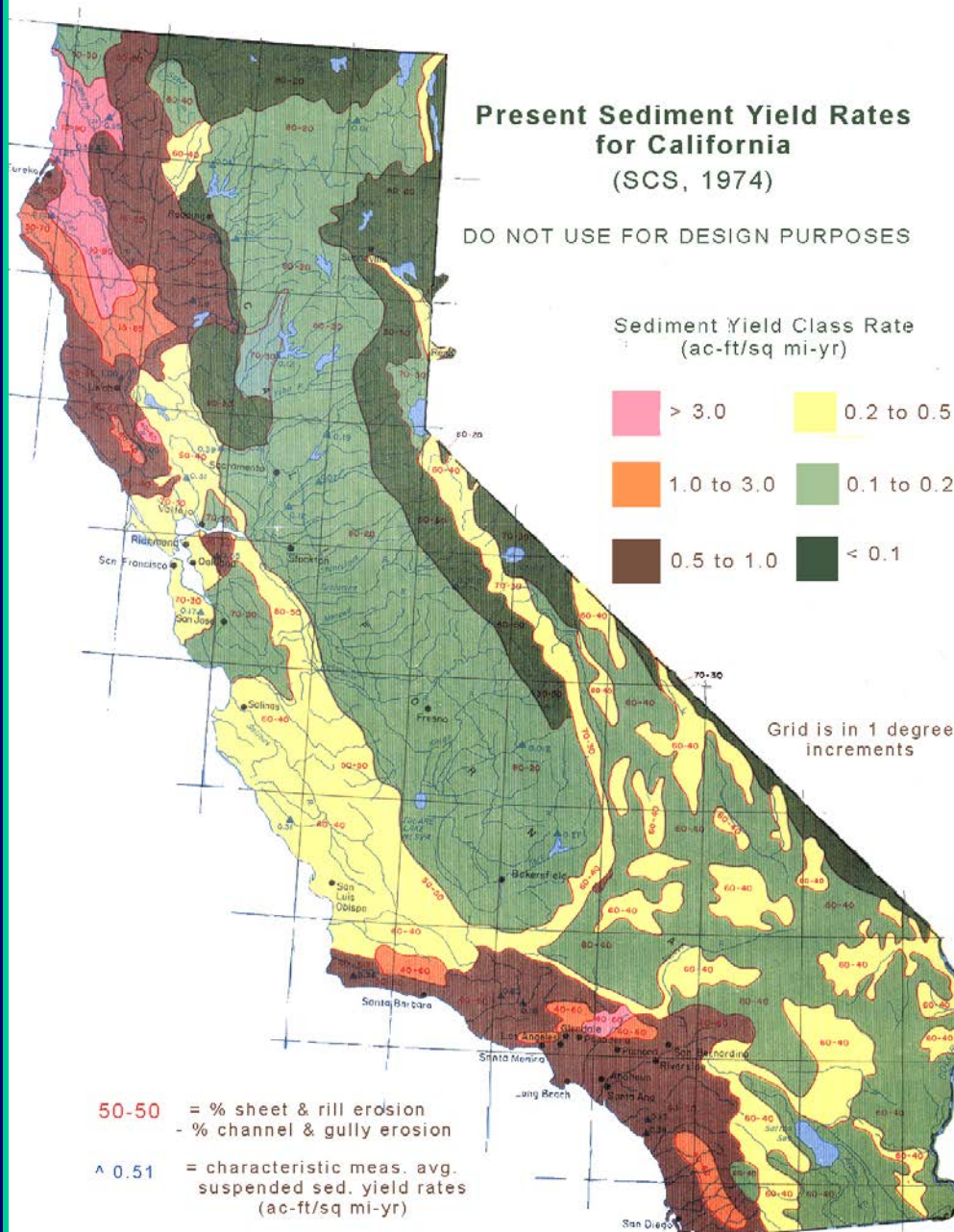
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5 20 '97



# Garcia River TMDL Requirements

“First, landowners are required to inventory the sediment delivery sites on their property.”

“Landowners are then directed to reduce the controllable volume of sediment at the inventoried sediment delivery sites”

A photograph of a green pickup truck parked in a grassy field. In the foreground, there is a large pile of dirt and a white pipe. The background shows a grassy hill under a cloudy sky.

# Source Sites

- Deliverable
- Management Induced
- Responsive to mitigation
- > 10 yards<sup>3</sup>





## Unstable Areas

- $> 10 \text{ yards}^3$
- Fails other criteria

# Sediment Delivery Inventory and Monitoring

- Developed in collaboration with agricultural landowners, RWQCB, NRCS, and UCCE
  - Ease of use
  - Compliance with water quality regulations
  - Integration with UCCE Rangeland Watershed Program
  - Incorporation of NRCS terminology

<http://danrcs.ucdavis.edu/pdf/8014.pdf>



Sediment Delivery Inventory and Monitoring Worksheet

Site #: \_\_\_\_\_ Location Description: \_\_\_\_\_

Site Selection Criteria ("y" or "n")

- ☐ Deliverable to surface watercourse?
- ☐ Reasonably responsive to mitigation?
- ☐ Management induced?
- ☐ Greater than volume threshold (VT = \_\_\_\_\_)?

Sediment Volume (yards<sup>3</sup>)

- Eroded volume: H= \_\_\_\_\_ L= \_\_\_\_\_ W= \_\_\_\_\_

Potential volume: H= \_\_\_\_\_ L= \_\_\_\_\_ W= \_\_\_\_\_
- Volume (H X L X W)= \_\_\_\_\_

Volume (H X L X W)= \_\_\_\_\_
- ☐ 0-30%☐ 30-60%☐ 60-90%☐ 90-100%

Unstable Areas (sediment delivery sites not meeting source site criteria)

- ☐ Photopoint monitoring
- ☐ No monitoring

Category (check only one)

- ☐ Road
- ☐ Riparian
- ☐ Hillslope/uplands

Process (check only one)

- ☐ Streambank cutting
- ☐ Sheet erosion
- ☐ Rill
- ☐ Gully
- ☐ Mass wasting

Influence (check all that apply)

- ☐ Road drainage design
- ☐ Road fill failure
- ☐ Grazing
- ☐ Off-property road sediment
- ☐ Upstream sediment
- ☐ Culvert design
- ☐ Road cut failure
- ☐ Livestock trail
- ☐ Stream channelization
- ☐ Historical
- ☐ Diversion potential
- ☐ Crop agriculture
- ☐ Concentration area
- ☐ Dams and spillways
- ☐ Natural

Potential Control Measure (check all that apply)

- ☐ Road improvement
- ☐ Grade stabilization
- ☐ Grazing management
- ☐ Landslide treatment
- ☐ Surface treatment
- ☐ Streambank protection
- ☐ Monitoring only

Prioritization (points provided below, see Table 1 in user guide for further detail)

Description

Points

Assistance needed: \_\_\_\_\_

Estimated time: \_\_\_\_\_

Estimated cost (\$): \_\_\_\_\_

Potential volume: (copy from Sediment Volume section above) \_\_\_\_\_

% Deliverable: (copy from Sediment Volume section above) \_\_\_\_\_

Total Priority Score = \_\_\_\_\_

Total Project Cost =\$ \_\_\_\_\_

Date Completed = \_\_\_\_\_

Assistance Needed	Pts.	Time	Pts.	Costs	Pts.	Potential Volume	Pts.	% Deliverable	Pts.
Technical & Permits	1	> Week	1	> \$10,000	1	10-100 yd <sup>3</sup>	2	0-30%	2
Some	2	One Week	2	\$1,000-10,000	2	100-500 yd <sup>3</sup>	4	30-60%	4
Minimal	3	One Day	3	\$100-1,000	3	500-1,000 yd <sup>3</sup>	6	60-90%	6
None	4	< Day	4	<\$100	4	>1,000 yd <sup>3</sup>	8	90-100%	8

Sediment Delivery Inventory and Monitoring Worksheet

Site #: \_\_\_\_\_ Location Description: \_\_\_\_\_

Site Selection Criteria ("y" or "n")

- ☐ Deliverable to surface watercourse?
- ☐ Reasonably responsive to management?
- ☐ Management induced?
- ☐ Greater than volume of sediment source?

Sediment Volume (yards³)

Eroded volume: H= \_\_\_\_\_ L= \_\_\_\_\_ W= \_\_\_\_\_

\_\_\_\_\_ W= \_\_\_\_\_

% ☐ 60-90

(see site criteria)

lands

☐ Rill ☐ G

- ☐ Grazing
- ☐ Livestock trail
- ☐ Concentration area

☐ Grazing management

☐ Monitoring

for guide for further

ion above)

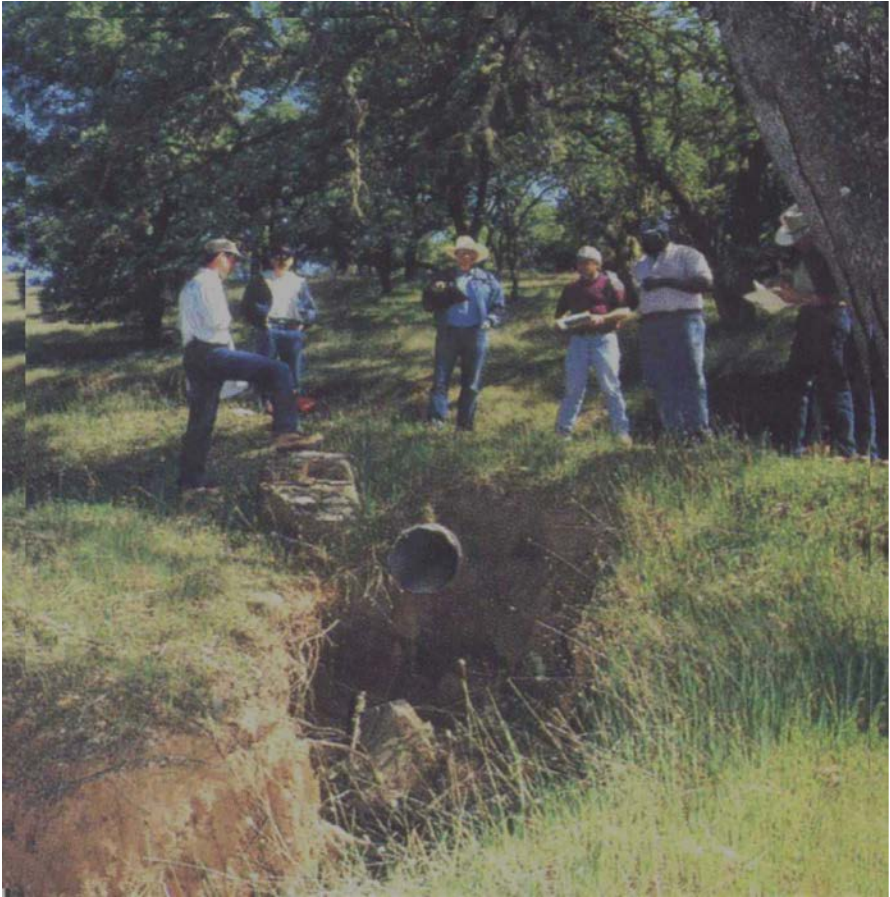
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					Pts.	Potential Volume	Pts.	% Deliverable	Pts.
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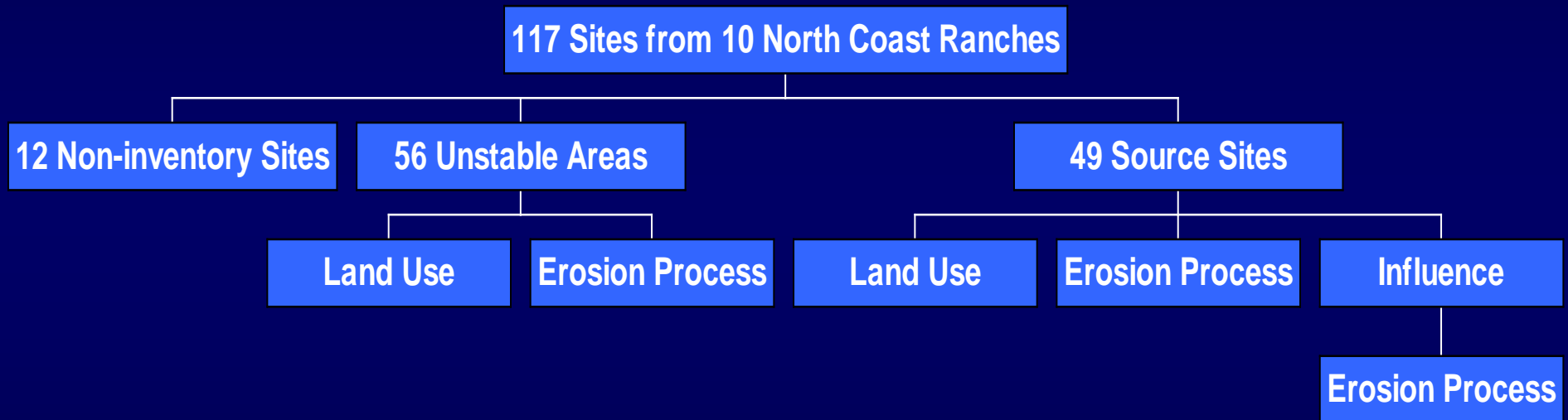


# Method Use

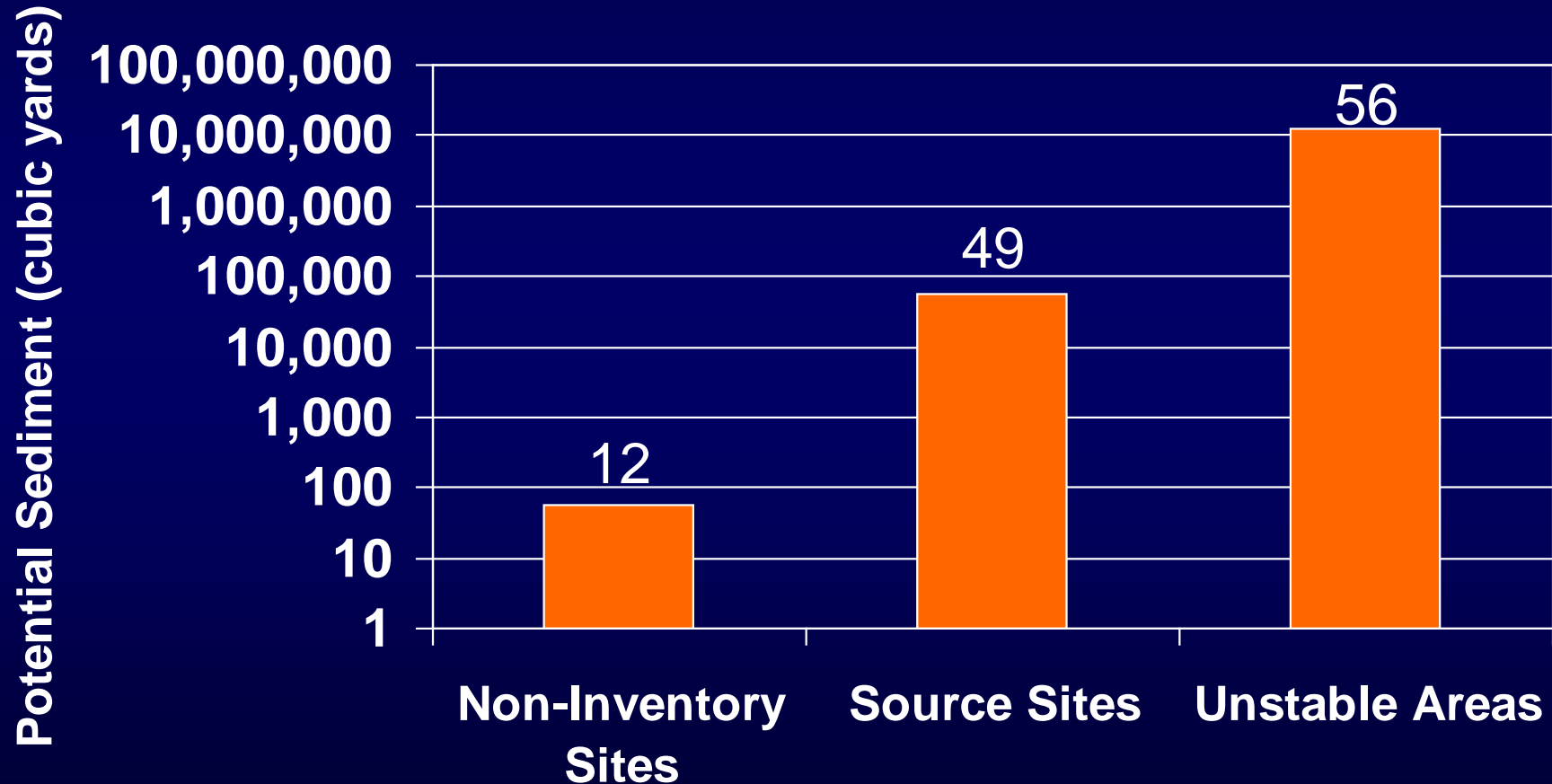
- Compliant with TMDL requirements
- Over 250 North Coast landowners trained
- Component in ranch water quality plans
- Conduct North Coast sediment source survey



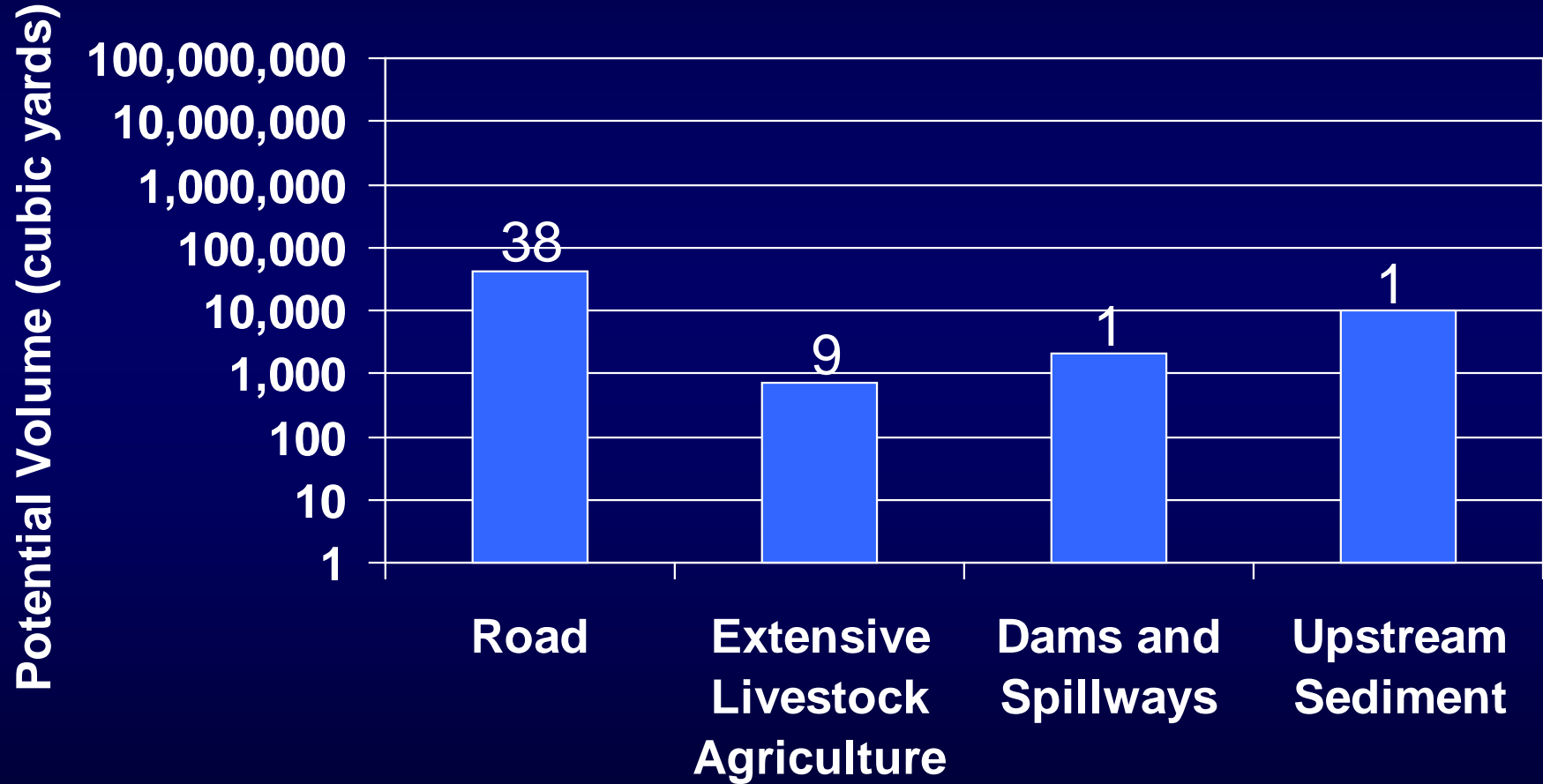
# Site Characterization Results



# Sediment Volume by Inventory Designation

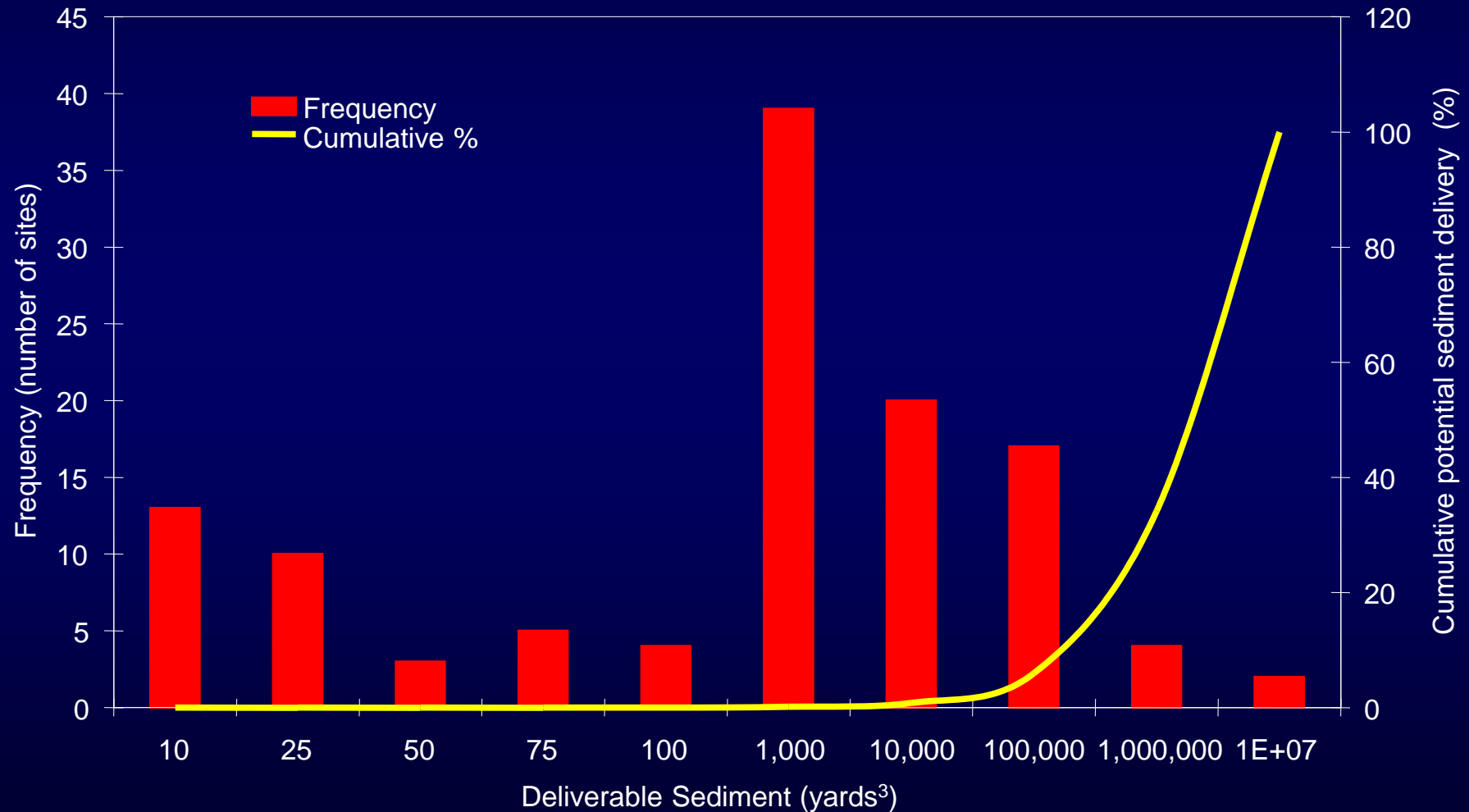


# Sediment Volume by Influence for Source Sites





# Potential Volume for Source Sites



- Total potential sediment from Unstable Areas is  $10^3$  greater than Source Sites





- Majority of Unstable Area sediment is associated with upland or riparian lands and mass wasting or streambank cutting





- Majority of Source Site sediment is associated with roads and gully erosion



