2 Year Proposal For South R. Sediment Research

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Goals

1. Test previously proposed conceptual model of fine-grained (f-g) sediment budget
2. Quantify volume of (f-g) sediment in storage "reservoirs" and rates of transfer between reservoirs
3. Determine annual and decadal rates of f-g sediment movement from Waynesboro to Port Republic using 1+ dimensional numerical model

Why Develop a Model?

- A tool for exploring how sediment storage “elements” and transport processes interact to control spatial and temporal patterns of f-g sediment movement
- Cannot do this without including dynamics of erosion and deposition, thus, a model is required, not just a simple budget approach.

Personnel

- Jim Pizzuto
- PhD student
- MS or undergrad for field assistance, assistance with mapping, etc.

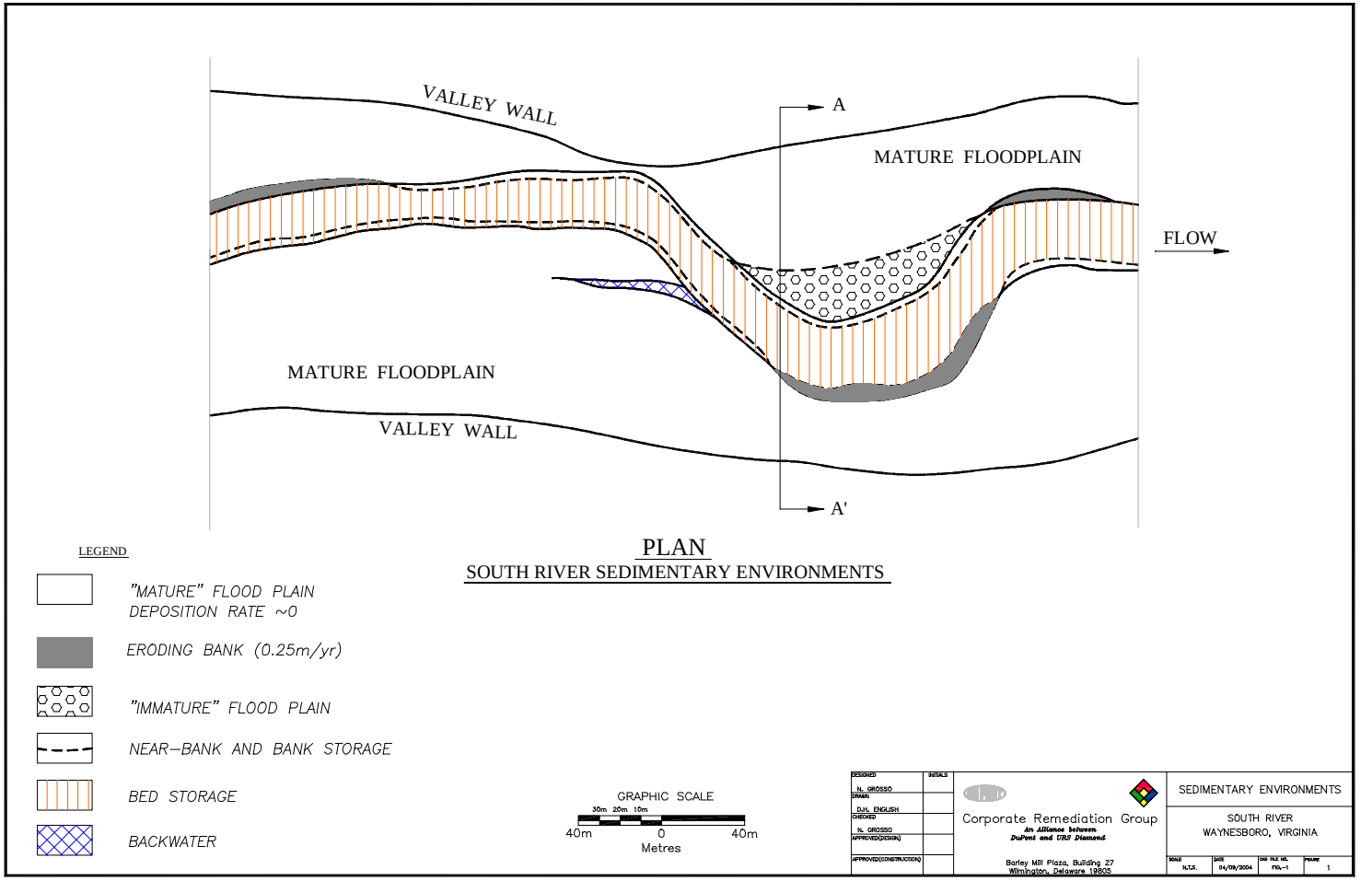
Study Area

- S. River and floodplain from Waynesboro to Port Republic

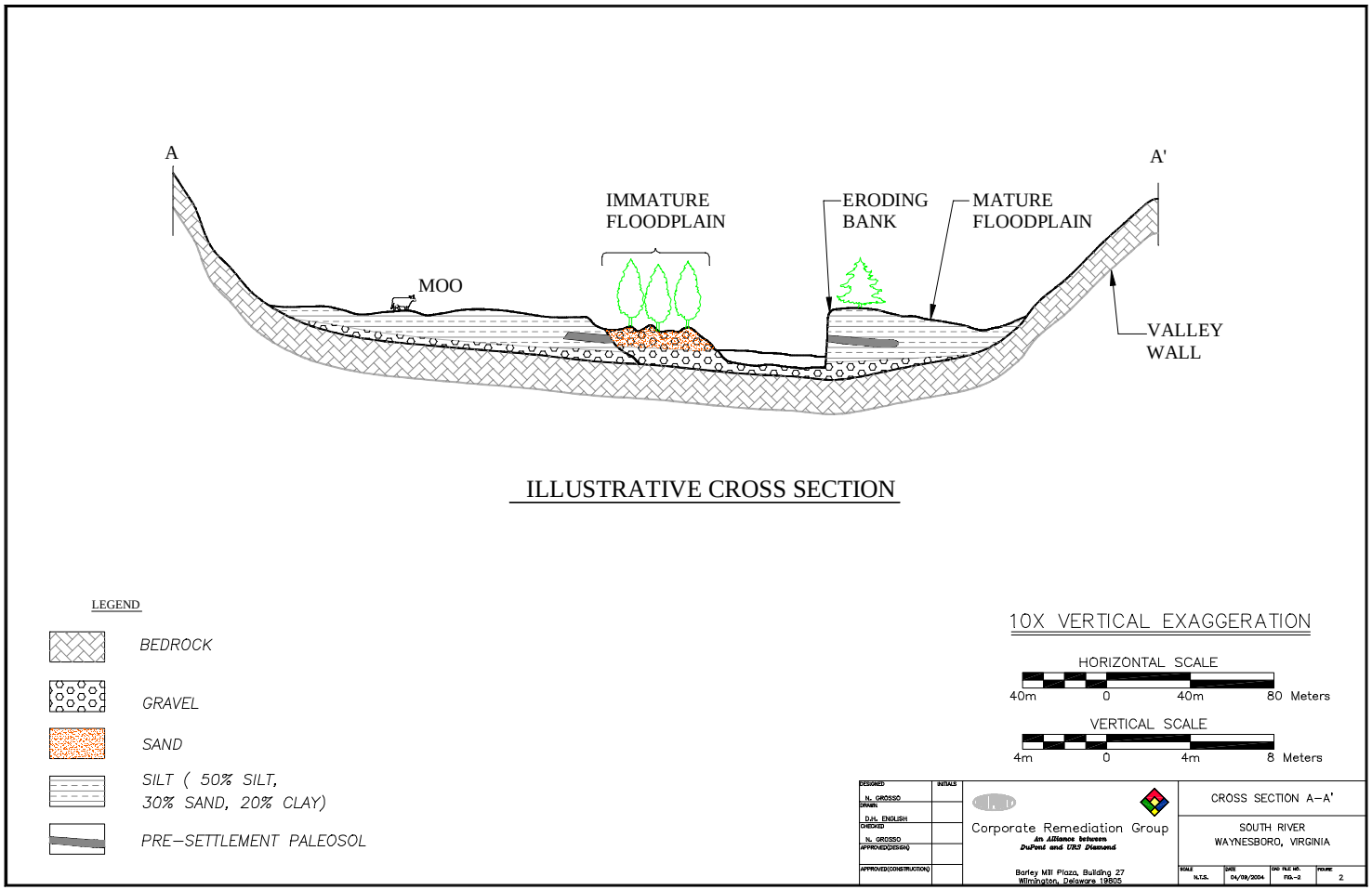
Proposed Starting Date

- Sept. 1, 2004 or January 1, 2005

Review – Geomorphic Elements in Plan

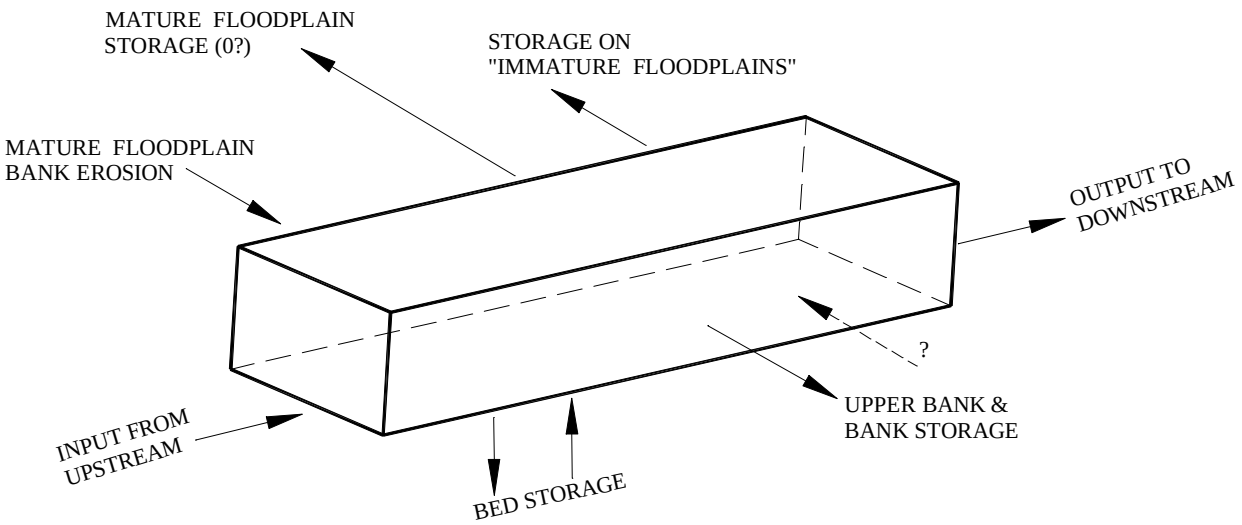


Review – Geomorphic Elements in Cross-section



Review – Sediment Budget

ANNUAL WATER COLUMN SEDIMENT BUDGET FOR SILT AND CLAY



DESIGNED N. GROSSO	INITIALS	Corporate Remediation Group *An Alliance between DuPont and URS Diamond* Barley Mill Plaza, Building 27 Wilmington, Delaware 19805	WATER COLUMN SEDIMENT FOR SILT & CLAY SOUTH RIVER WAYNESBORO, VIRGINIA
DRAWN D.H. ENGLISH			
CHECKED N. GROSSO			
APPROVED(DESIGN)			
APPROVED(CONSTRUCTION)			

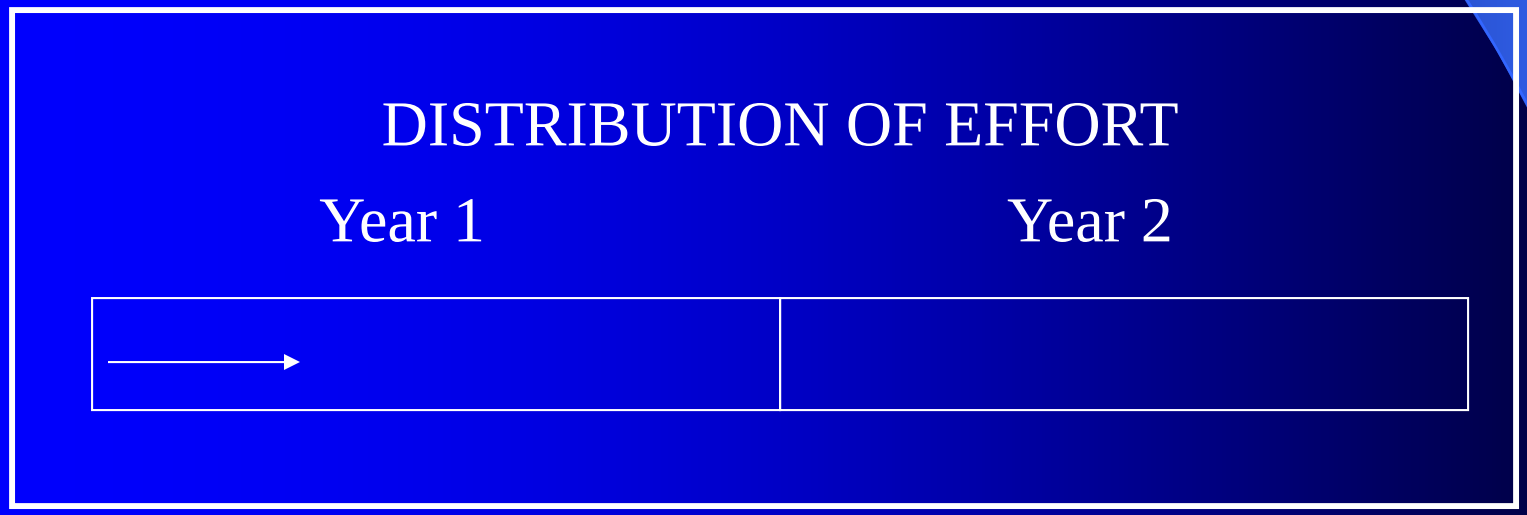
SCALE	DATE	CAD FILE NO.	FIGURE
N.T.S.	04/08/2004	FIG.-3	3

List of Tasks

- Map geomorphic elements in the valley
- Obtain basic geomorphic data for the study area (cross-sections, slope, bed material grain size, longitudinal profile)
- Quantify rates of bank erosion
- Quantify rates of floodplain sedimentation
- Develop understanding of exchange of fine-grained sediment with channel perimeter (bed, banks, and “near-bank”), and develop quantitative tools to “model” these
- Improve estimates of supply of sediment into reach from upstream
- Model development and implementation

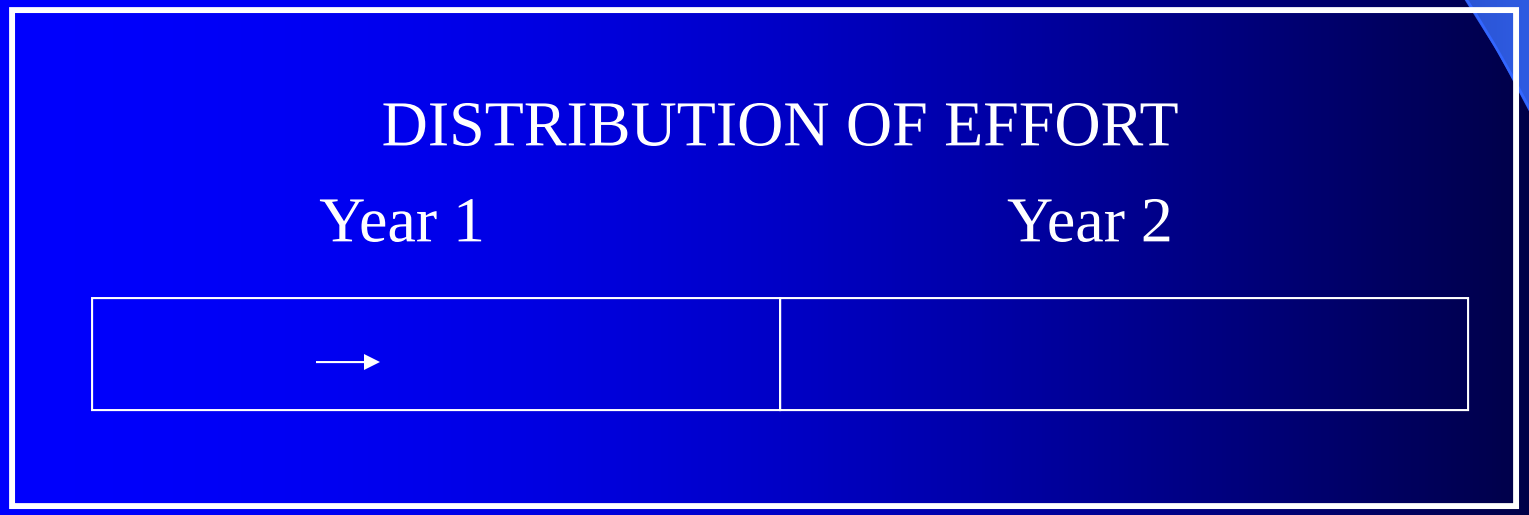
Map Geomorphic Elements

- Current and historic (1950s, 1937)
- Field mapping, aerial photos, maps.



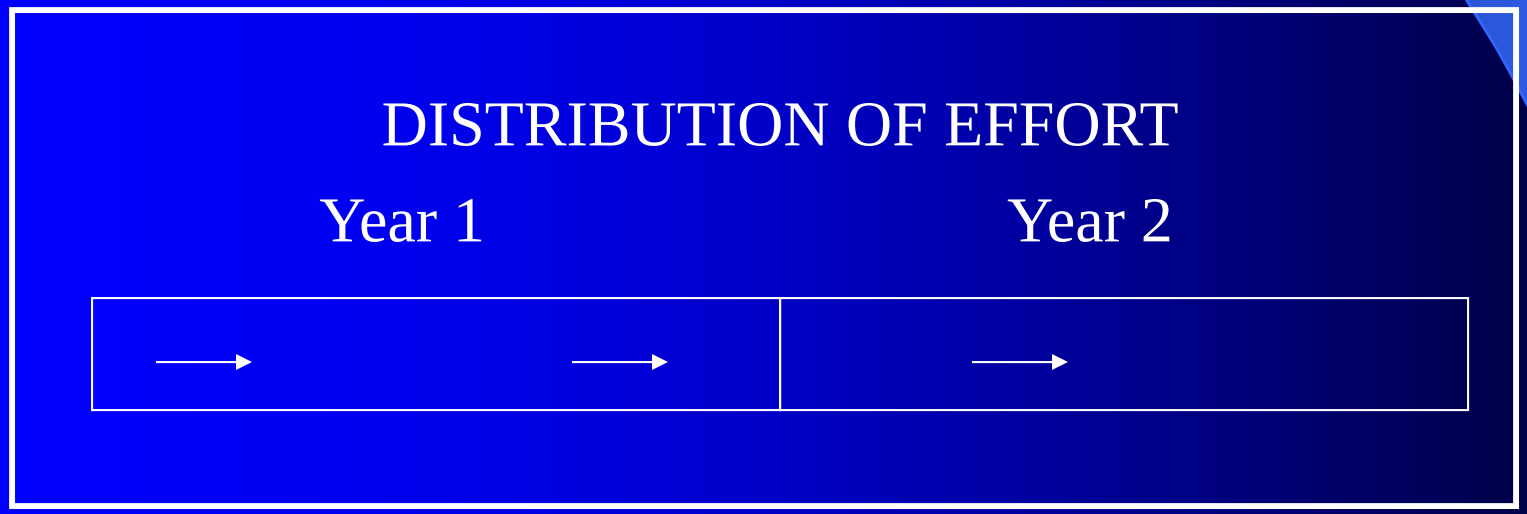
Obtain Basic Geomorphic Data

- Field mapping (2 weeks)



Quantify rates of bank erosion

- Short term: field surveys, bank erosion "pins" (2 weeks first year, 1 week 2nd year)
- Long term: mapping

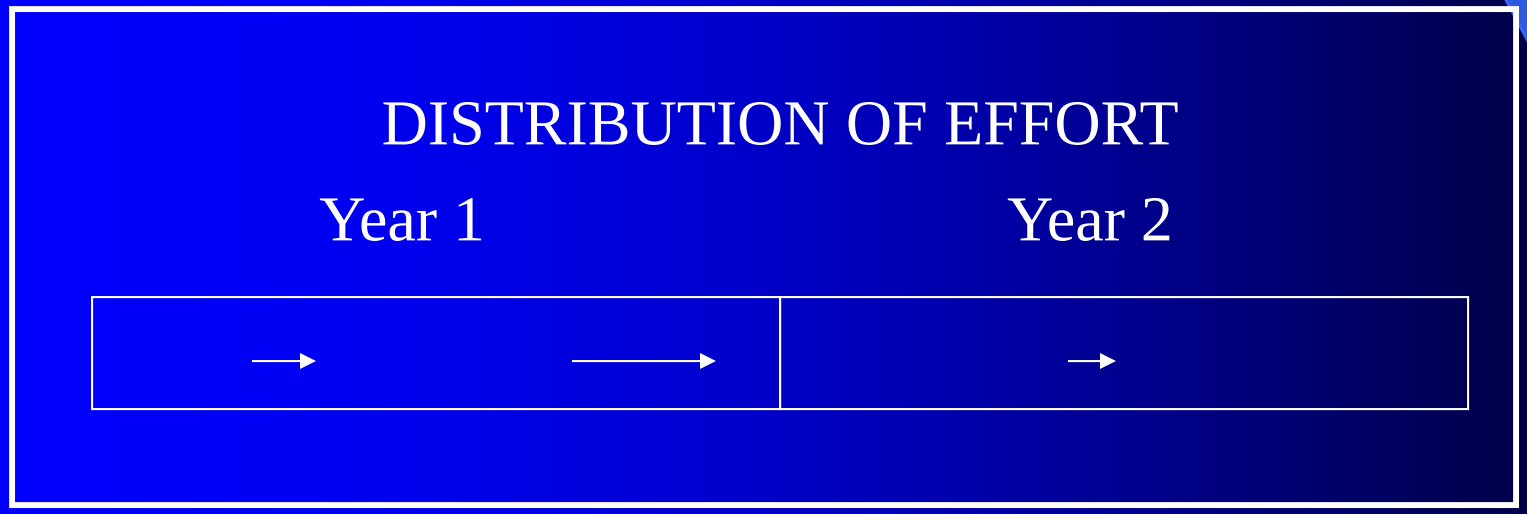


Quantify rates of floodplain sedimentation

- Local test: see if current rates low on “mature floodplains”
- Also determine sedimentation on “immature” floodplains where current rates are likely higher.
- Backwater environments?

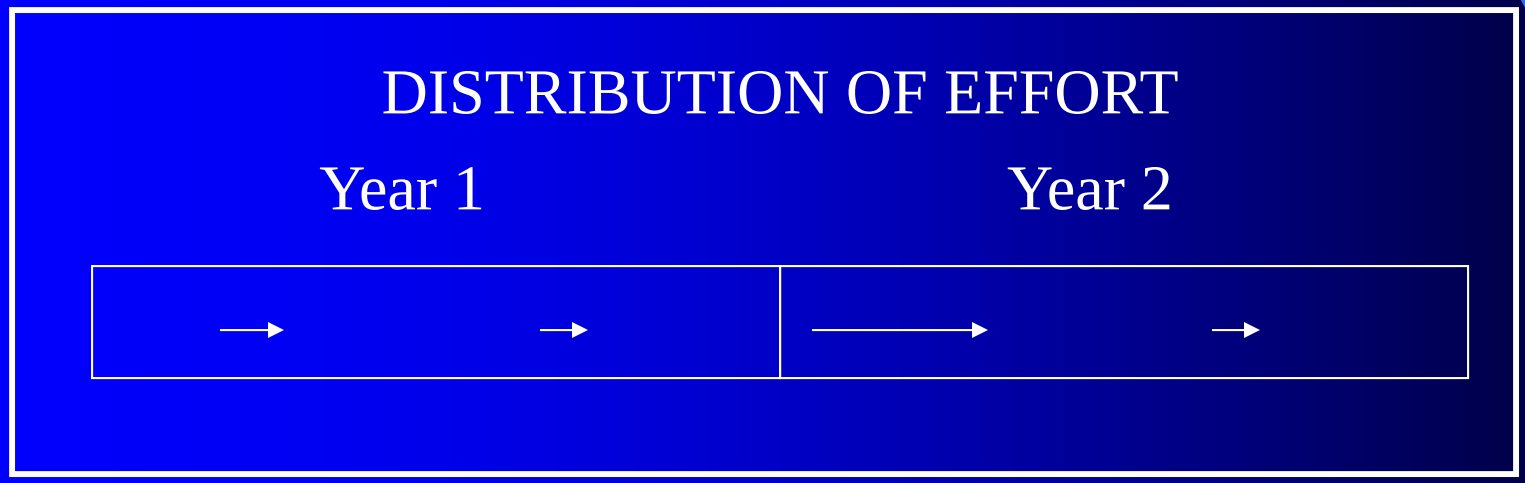
Quantify rates of floodplain sedimentation -Methods

- Accumulation over tree roots (decadal)
- “Marker horizons” or plates (event based)
- Radionuclides (lead-210)(lit review needed) (decadal)



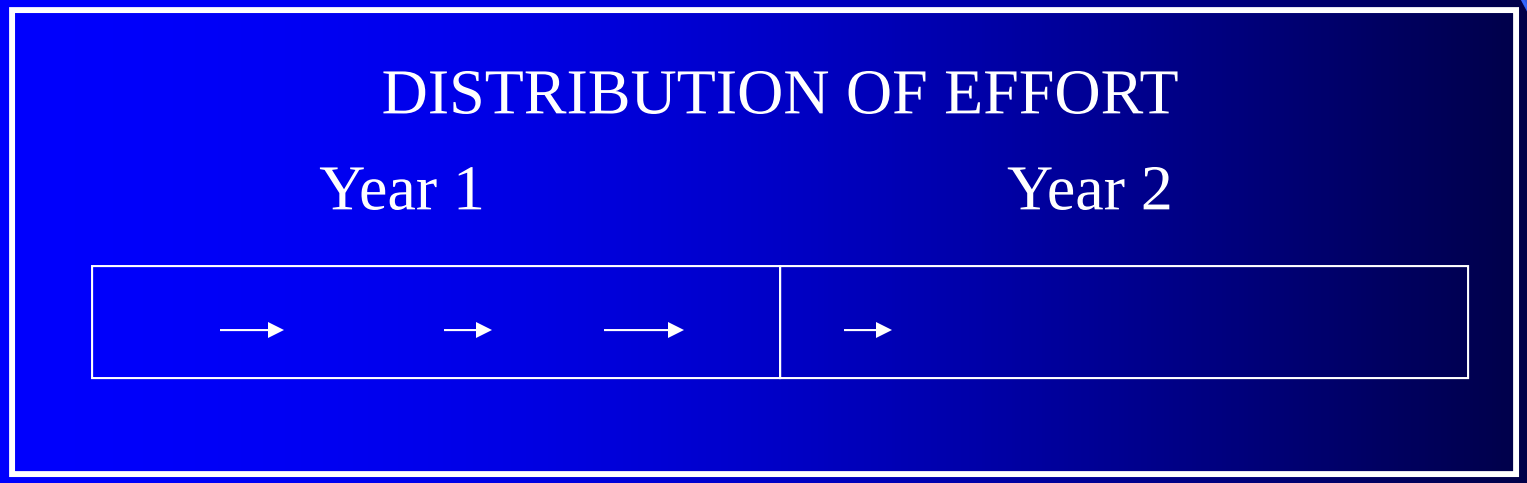
Fine-Grained Sediment in Channel Perimeter (Bed, etc)

- Map storage in channel bed, near banks during first year
- Develop methods to look at residence times during first year (literature review, testing, etc.)
- Implement during 2nd year

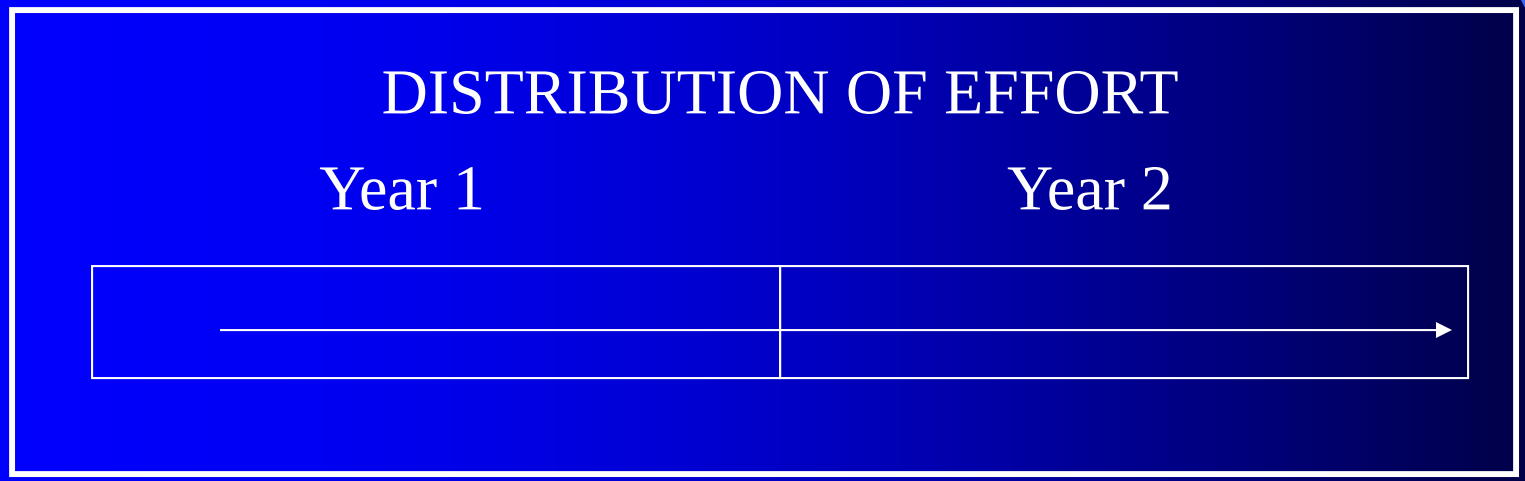


Supply of sediment from upstream

- Review existing regional data
- Review new analytical tools
- Try to establish useful “predictor” using above
- Should test with field measurements in the study area



Model development, testing, calibration, implementation



Important Supporting Data (hopefully available or to be obtained by others)

- Hg concentrations in floodplain and channel perimeter (Hg useful as sediment “tracer”)
- Hydrologic data (temporal and spatial distribution of river discharges)
- Estimates of hydraulic parameters (resistance to flow, etc.)
- Sediment concentration measurements somewhere in study area