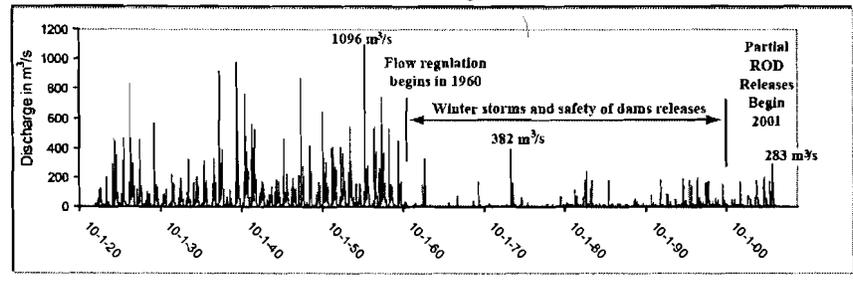


# Gravel Augmentation

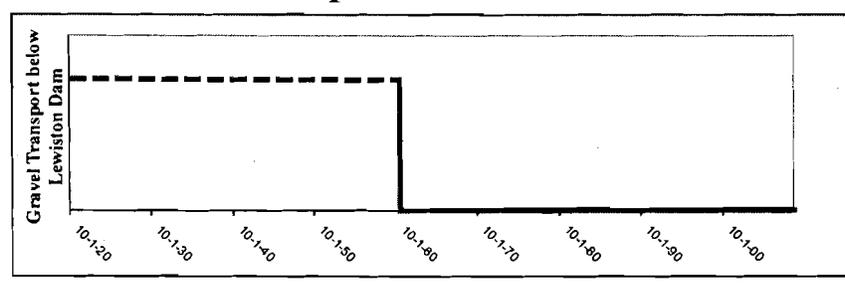


## Current Specifications and Plans

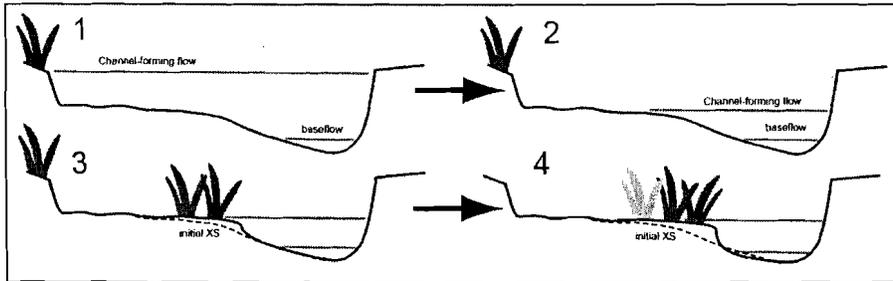
### Daily Mean Flow, Trinity River at Lewiston



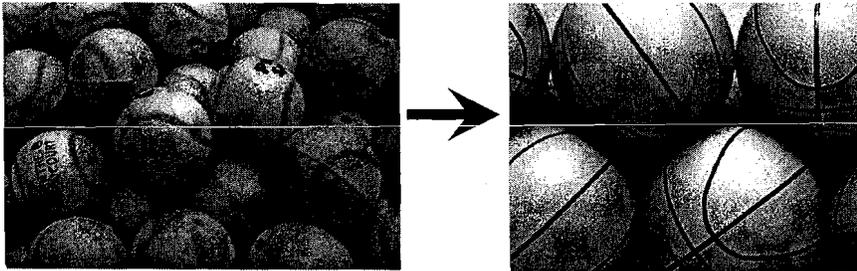
### Gravel Transport at Lewiston Dam



## Channel Narrowing and Habitat Deterioration



## Lack of gravel supply leads to +Ds





## **“Restore Fluvial Processes”**

**Increase sediment storage (TRFE)**

**Increase coarse sediment transport  
rates (SAB)**

**Decrease surface particle sizes  
(governs the transport rate)**

## Coarse Sediment Management Plan

**Broad-scale planning document, finalized in April, 2007.**

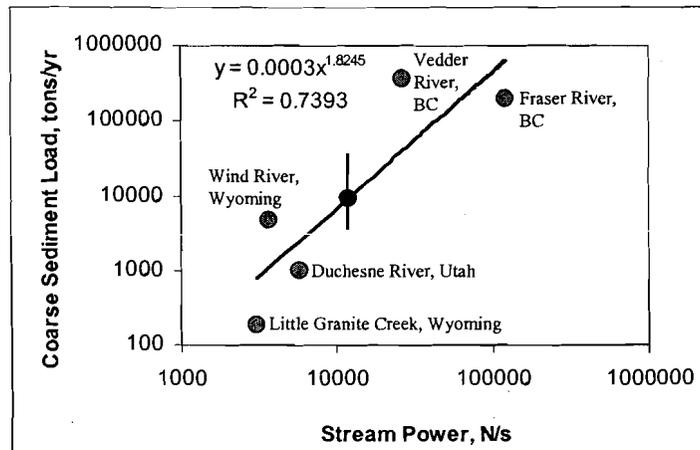
**Describes potential placement methods.**

**Identifies placement locations and associated volumes that can be placed.**

**Inventories potential coarse sediment sources (tailings piles).**

### *Transport Criterion 1*

#### **Empirical (sort of) Estimate**



**Annual gravel load, best guess: ~9,000 tons**  
**Range: 3,000 – 30,000 tons**

*Transport Criterion 2*

**Parker Dimensionless Hydraulic Geometry**

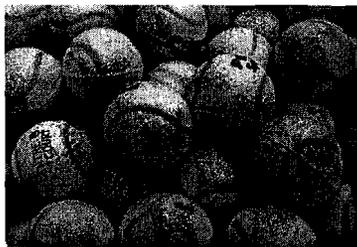
$$\tilde{Q} = \frac{Q}{(gD_{s50})^{0.5} D_{s50}^2} \quad Q^* = \frac{Qs}{(gD_{s50})^{0.5} D_{s50}^2}$$

$$S = 1370 Q^{*1.062} \tilde{Q}^{-1.062}$$

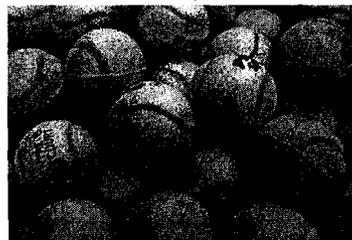
$$Q^* = \frac{S^{0.9416} \tilde{Q}}{7855}$$

**Annual bedload ~ 17,000 tons**  
**How much is gravel?**  
**7,000 – 12,000 tons?**

**Lack of gravel supply leads to +Ds**



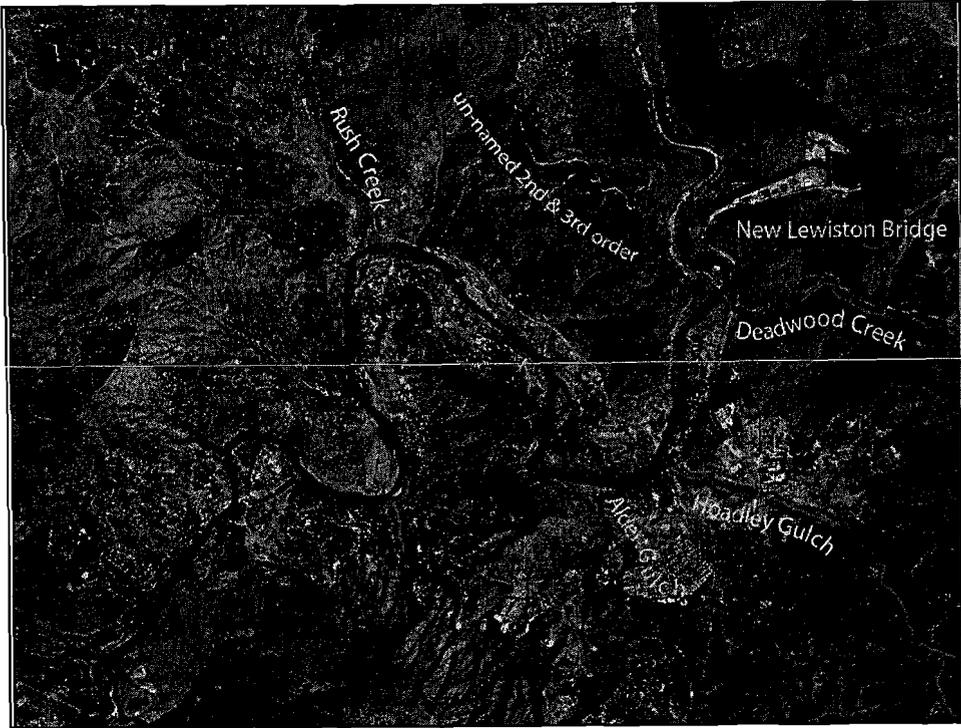
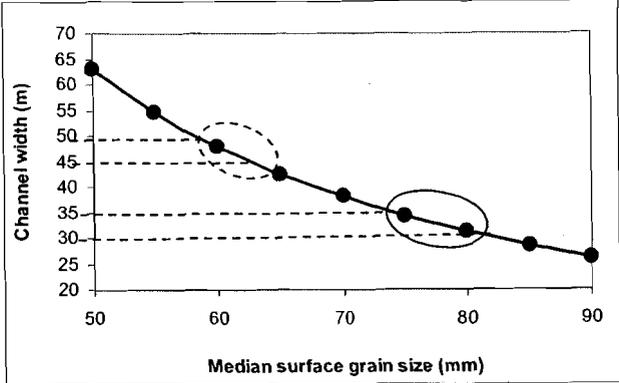
**Restore gravel supply to  
restore or maintain  
a mobile bed surface**



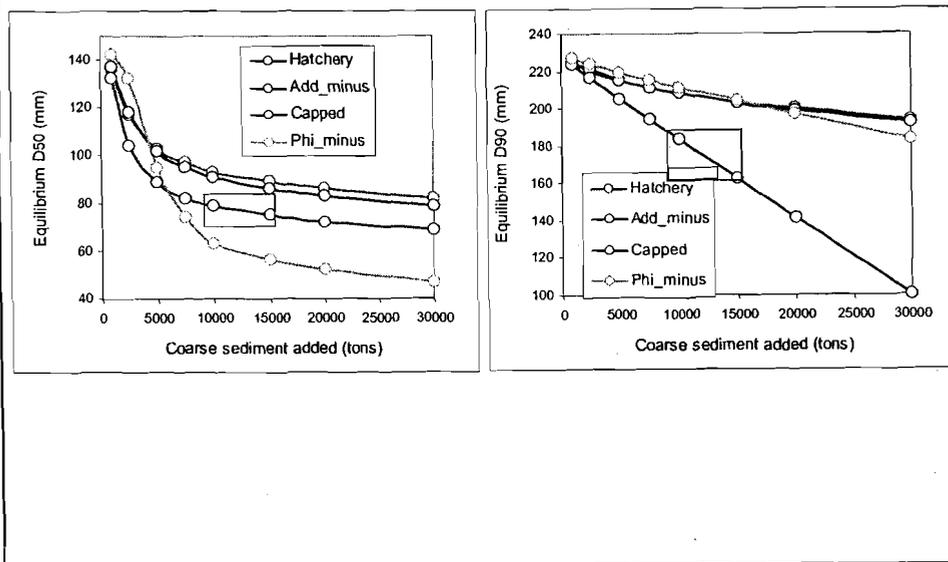
**Surface Grain Size Criterion**  
**dimensionless hydraulic geometry again...**

$$B^* = 3090000 Q^{*1.296} \tilde{Q}^{-0.296} \quad B^* = \frac{B}{D_{s50}}$$

$$Q^* = \frac{B^{*0.7716} \tilde{Q}^{0.2284}}{101785}$$



## *iSURF* Output



### Recommended Volume/Gradation

- Coarse sediment additions below Lewiston Dam should average 10,000 – 15,000 tons/yr.
- Eliminating the coarsest fractions (material caught on a 4" sieve) is effective for reducing surface grain sizes.
- 1"-minus material provides fisheries (as opposed to geomorphic) benefits. Inclusion of 3/8"-1/2" material has been suggested (CSMP).

## Augmentations: When and Where?

*Short-term: Get gravel in the river NOW  
at multiple injections points  
-- dispersion takes time.*

*Long-term: Maintain target transport  
rates and surface grain sizes  
into the future.*

