# Summary Presentation of the Sediment Lessons Learned Workshop

Presentation to TAMWG-December 9th 2015

# Workshop Agenda

| Time | Topic | Presenter |
|---|---|---|
| 9:30 | Introductions/Agenda Review/Goals and Objectives | Robin/Joe Polos |
| 9:45 | Intro to the sediment management program (TRFES/CSMP)<br>1. What was called for and why<br>2. Assumptions made in Appendix O TRFES<br>3. Studies that contributed to the recommendations in the Trinity Mainstem Record of Decision | Robert Franklin |
| 10:05 | Coarse Sediment Transport<br>1. (Observed sediment transport rates)<br>2. (Sediment budget update)<br>3. Lessons Learned | 1. Krause<br>2. Gaeuman<br>3. Moderator |
| 10:45 | System-wide Geomorphic Change<br>1. Pool Depth Changes<br>2. USGS geomorphic assessment (40 minutes)<br>3. Lessons learned | 1. Gaeuman<br>2. Jennifer Curtis<br>3. Moderator |
| 11:45 | Lunch | Everyone |
| 1:00 | Effects and Fate of Injected Gravel<br>1. Fate of Gravel Augmentations<br>2. Lowden Ranch<br>3. Habitat | 1. Gaeuman<br>2. Gaeuman<br>3. Kyle<br>4. Moderator |
| 2:00 | Fine sediment management efforts (Fine sediment reduction)<br>1. Examples of projects<br>2. Studies done<br>3. Lessons learned | Andreas Krause |
| 2:20 | Gravel Augmentation<br>1. Basis for WY 2015 Recommendation | 1. Gaeuman<br>2. Moderator |
| 2:55 | AUDIENCE FEEDBACK | Everyone |

# Introduction-Robert Franklin

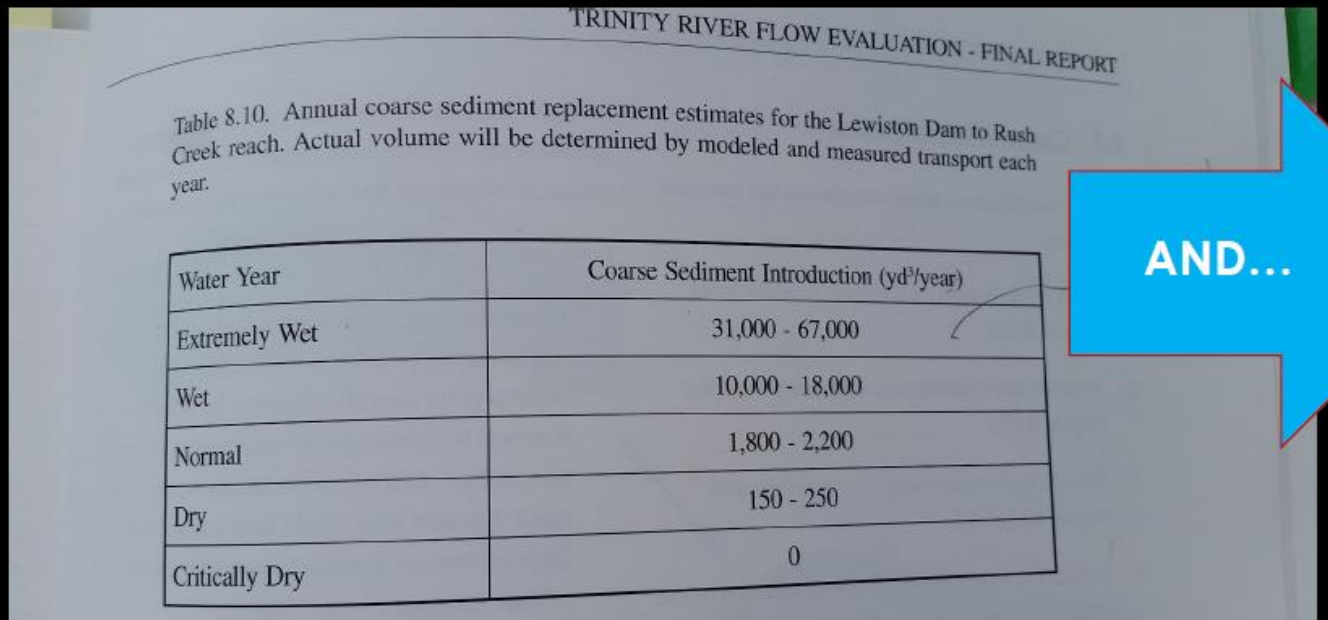
## TRFES COARSE SEDIMENT STRATEGY

- Both a short-term and a long-term strategy for coarse sediment introductions.
  - The short-term strategy rapidly (over a few years) replenishes coarse sediment storage in the reach at multiple sites in a manner scaled to flow regime.
  - The long-term strategy maintains storage by periodically introducing coarse sediment at a rate equal to transport.

# Introduction-Robert Franklin

**TRFES Coarse Sediment Recommendations:**

- (1) immediate placement of more than 16,000 cubic yards of properly graded coarse sediment ( 5 / 16 to 5 inches) between Lewiston Dam and Rush Creek to restore the spawning gravel deficit caused by the elimination of upstream coarse sediment supply by the TRD;
- (2) annual supplementation of coarse sediment to balance the coarse sediment supply along the Lewiston Dam to Rush Creek segment;



TRINITY RIVER FLOW EVALUATION - FINAL REPORT

Table 8.10. Annual coarse sediment replacement estimates for the Lewiston Dam to Rush Creek reach. Actual volume will be determined by modeled and measured transport each year.

| Water Year | Coarse Sediment Introduction ($yd^3$/year) |
|---|---|
| Extremely Wet | 31,000 - 67,000 |
| Wet | 10,000 - 18,000 |
| Normal | 1,800 - 2,200 |
| Dry | 150 - 250 |
| Critically Dry | 0 |

AND…

# Introduction-Robert Franklin

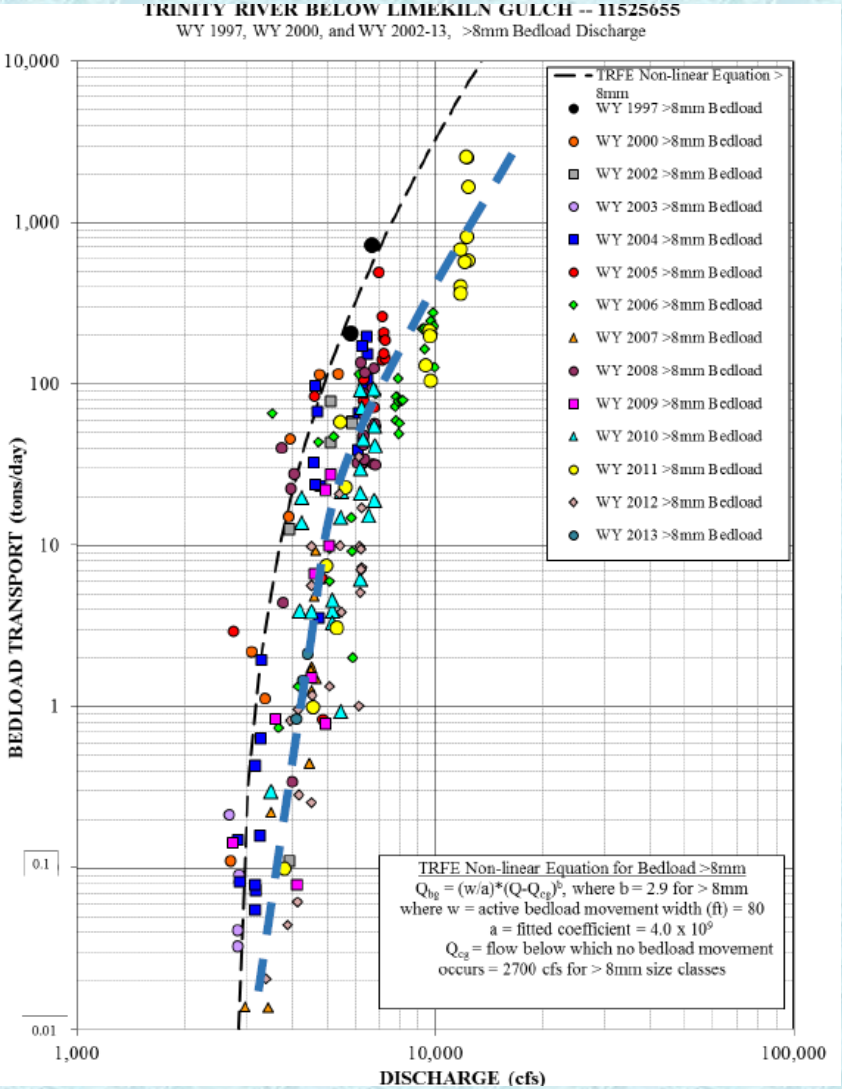
## ATTRIBUTE #4 BALANCED SEDIMENT BUDGETS

- **Desired Physical Responses:**
- Maintain physical complexity by sustaining alternate bar morphology.
- Reduce storage of fine sediment in riparian berms.
- D84 tracer rocks should negotiate alternate bar sequences; i.e., larger particles from upstream riffles should not accumulate in downstream pools.
- Encourage slight degradation of bed elevation at tributary deltas.
- Increase pool depths.

# Observed Mainstem Sediment Transport Rates-Andreas Krause

## 1997 Rating Curve at Limekiln Gulch

(Coarse Sediment Bedload >8mm)



# Observed Mainstem Sediment Transport Rates-Andreas Krause

## Lessons Learned

- Observed transport (bedload >8mm) since 2002 is an order of magnitude less than predicted by 1997 rating curves, especially at higher flows

Explanations for Lower Transport Rates Have Yet To Be Investigated

# Observed Mainstem Sediment Transport Rates-Andreas Krause

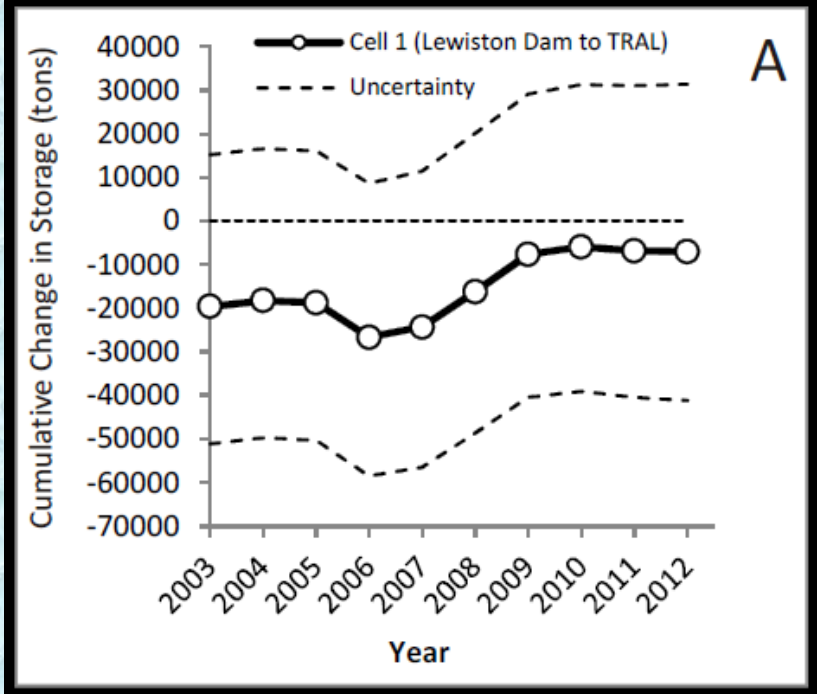
## Management Implications

- Sediment transport rate affects
  - Channel dynamics, planform, and associated habitat
  - Rate of change
- Management Implications
  - Reduced gravel augmentation needed to balance coarse sediment budget
  - Implications for the broader flow and gravel augmentation regime needed to meet fundamental restoration goals have yet to be fully considered

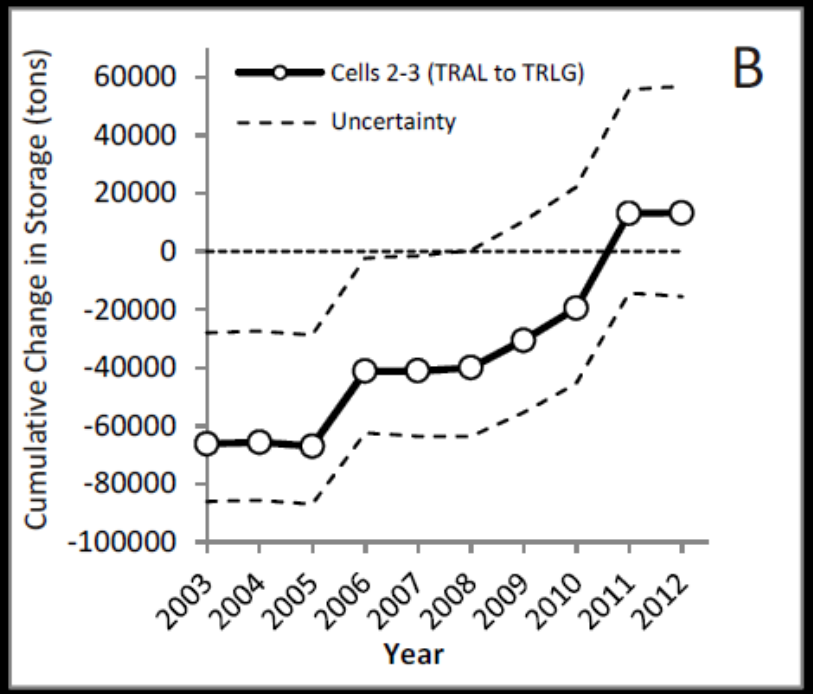
# Sediment Budget Update-Dave Gaeuman

## Recharge Storage: 2012 Budget

### Cell 1: Less than 1.5 miles from dam



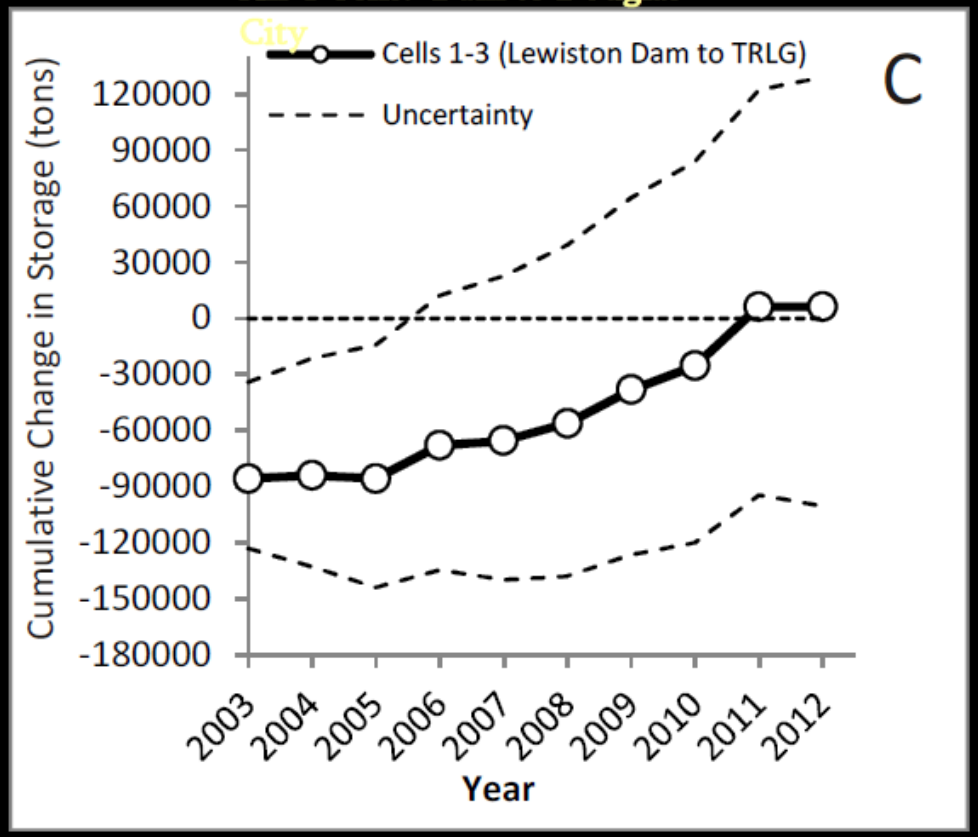

### Cells 2 and 3: Above Indian Creek




Gaeuman, D. 2013. *2012 sediment budget update, Trinity River, Lewiston Dam to Douglas City, California*. Trinity River Restoration Program, Weaverville, CA, TRRP Technical Report TR-TRRP-2013-2, http://odp.trrp.net/Data/Documents/Details.aspx?document=2156

# Sediment Budget Update-Dave Gaeuman

## Recharge Storage: 2012 Budget




Gaeuman, D. 2013. *2012 sediment budget update, Trinity River, Lewiston Dam to Douglas City, California*. Trinity River Restoration Program, Weaverville, CA, TRRP Technical Report TR-TRRP-2013-2, http://odp.trrp.net/Data/Documents/Details.aspx?document=2156

# Sediment Budget Update-Dave Gaeuman

## Lessons Learned

Initial Assumption:

An increase in coarse sediment storage is needed to overcome a dam-induced coarse sediment deficit upstream from Rush Creek or Indian Creek.

Findings:

Coarse sediment storage levels upstream from Indian Creek may be similar to pre-dam levels. The existing budget cells are too large to identify reaches where local gravel deficits limit processes that create habitat.

Management Implications:

Focus coarse sediment management on long-term objectives rather than storage increases.

# Pool Depth Changes- Dave Gaeuman

## Lessons Learned

Popular Assumption:

Pools are filling with gravel throughout the Trinity River, and this is the result of gravel augmentation.

Findings:

Only a few pools have filled significantly and many pools have deepened. Where substantial fill has occurred, it is often related to terrace lowering rather than gravel augmentation.

Management Implications:

Modify rehabilitation designs to maintain mainstem confinement in the vicinity of valuable holding habitats.

# USGS Geomorphic Assessment-Jenny Curtis

The active-channel area expanded as a result of bank erosion and channel rehabilitation.

The highest rates of change in the areal extents of channel and riparian features were observed during the pre-2001 period, which was longer and relatively wetter than the 2001-2011 period.

# Fate of Gravel Augmentations-Dave Gaeuman

## Lessons Learned

Initial Assumption:

Augmented gravel affects pools and other habitats far downstream from where it is introduced. Gravel propagates downstream in a consistent manner akin to a conveyor belt.

Findings:

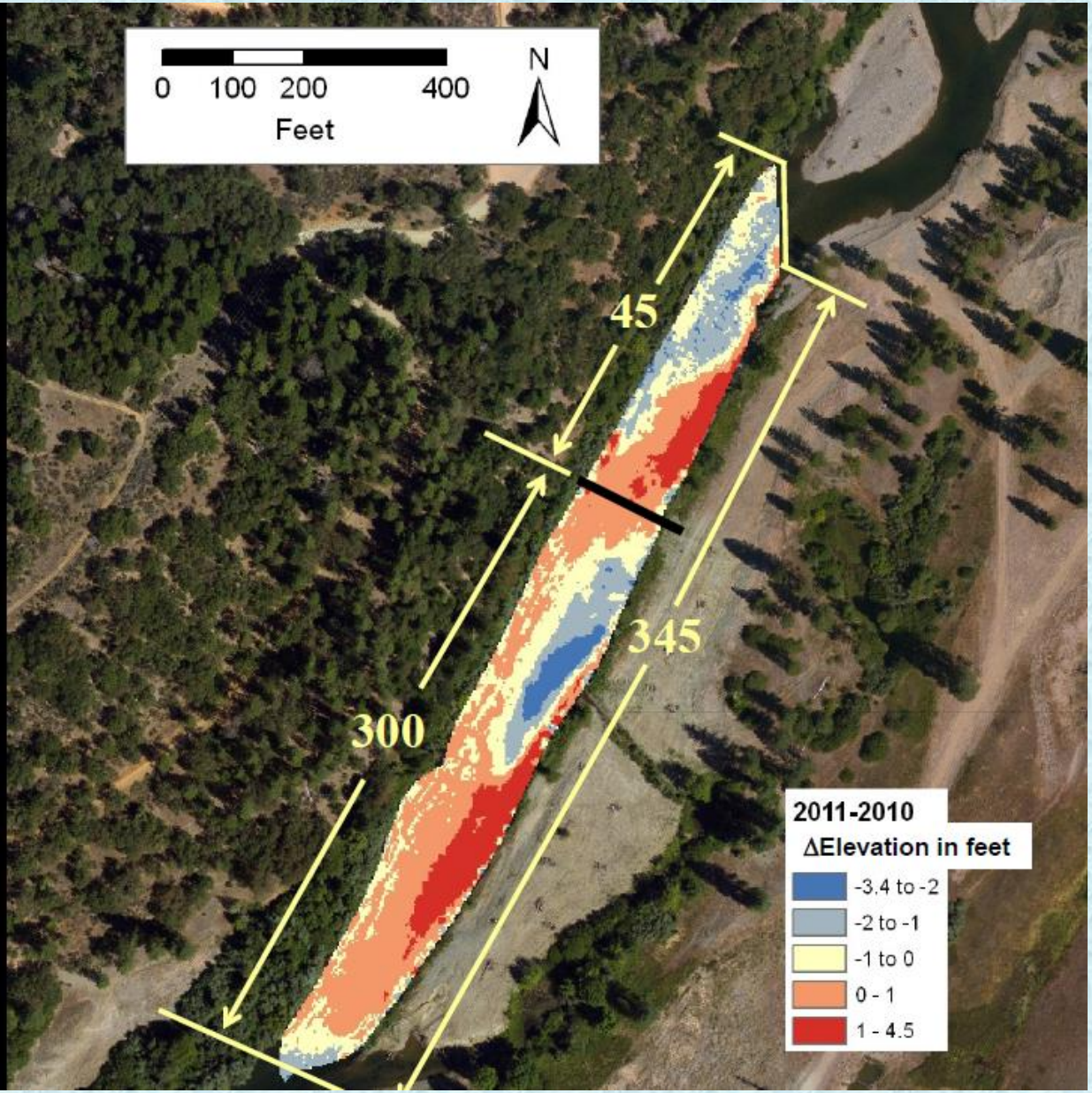
A large proportion of augmented gravel remains relatively close to where it was introduced. Downstream transport is irregular and mediated by sinks where gravel can stall for extended periods of time.

Management Implications:

Augmentations are best implemented close to the areas they are intended to affect. Channel modifications that greatly reduce stream power can create artificial gravel sinks.

# Lowden Ranch-Dave Gaeuman

**ACTUAL**
change in bed material storage (yd), 2010-2011



# Lowden Ranch-Dave Gaeuman

## Summary

Dynamic bar construction works:

- Height of the target bar increased by about 2 feet.
- Increased mainstem rearing habitat at baseflow
- Bed relief throughout response reach increased by 25-30%.
- A new alternate bar sequence was created.

Increases in bed complexity are the result of scour as well as deposition.

Fluvially-deposited bars are functionally superior to mechanically placed bars.

- Increased temperature modulation
- More POM retention
- Larger hydraulic gradients

# Habitat-Kyle De Juilio

## Lessons Learned

- Changes in sediment supply caused a shift in spawning habitat preference for Chinook
- Gravel placement has had minimal impacts on rearing habitat in the low flow channel
- Low flow augmentation in many cases has not persisted unless reinforced with hard points or oversized material
- Gravel placement or recruitment can alter the flow to habitat relationship
- Habitat gains due to gravel may only occur at specific flows

# Fine Sediment-Andreas Krause

## Lessons Learned

- Fine sediment less of an issue than it once was
  - Pervasive surficial sand deposits gone
- Major Accomplishment
  - needs to be better quantified

# Fine Sediment-Andreas Krause

## Have Fine Sediment Management Objectives been Met?

- Reduce tributary fine sediment supply
  - Lack of data except in Grass Valley Creek
- Reduce mainstem fine sediment storage
  - Unclear if objective met
    - Disparate information → conclusions premature
    - Unquantified target

# Fine Sediment-Andreas Krause

## Recommendations

- Synthesize data
  - Mainstem and tributary fine sediment
- Refine objective
  - ID biological lower limit
  - set quantitative target
- Identify how progress towards target will be assessed
- Consider management implications
  - River different than during TRFE studies
  - How affect management actions recommendations