

Salmonid Habitat Restoration and Fish Passage Improvement in a Urban Stream

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Introduction

- ◆ 1,450 lineal feet of San Pedro Creek was reconstructed to improve fish passage and restore the channel bed to its historic profile in the fall of 2005
- ◆ The performance and evolution of this channel for the initial 3 months after construction is presented

Project Sponsors

- ◆ City of Pacifica
- ◆ Coastal Conservancy
- ◆ California Department of Fish and Game
- ◆ US Fish and Wildlife Foundation
- ◆ Water Resources Control Board
- ◆ CA Department of Water Resources
- ◆ American Rivers/NOAA

San Pedro Creek Watershed Facts

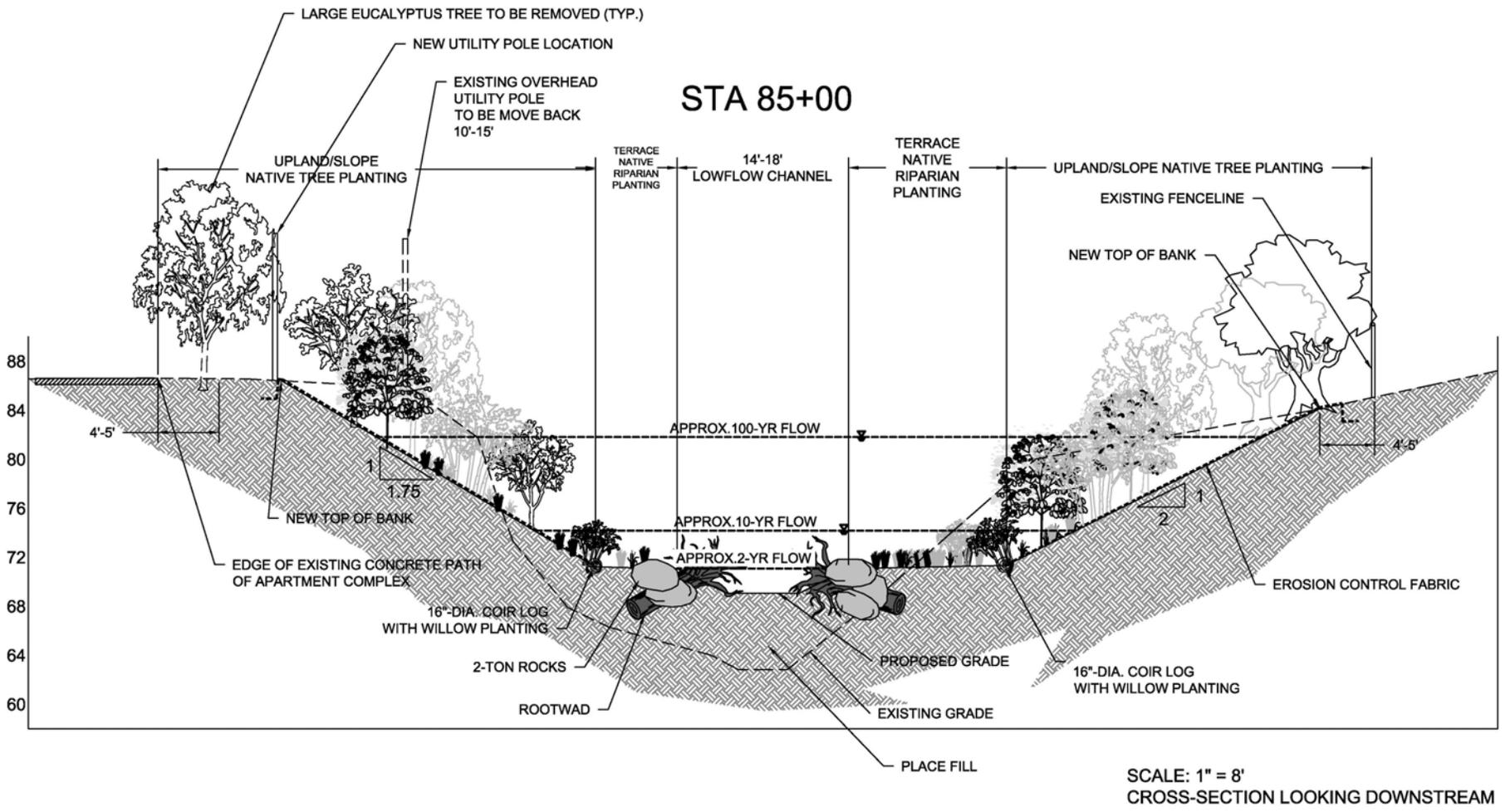
- ◆ Watershed size 5,250 acres or 8.2 sq.mi.
- ◆ Hydrology
 - Bankfull flow \pm 350 cfs
 - 10- & 100-year; 1,400 cfs and 3,000 cfs
- ◆ Existing conditions of the channel
 - Entrenched, degrading, eroding banks, exotic vegetation, adjacent high density residential land use
- ◆ Channel gradient
 - Sand & gravel bed 0.6% to 1% bed slope





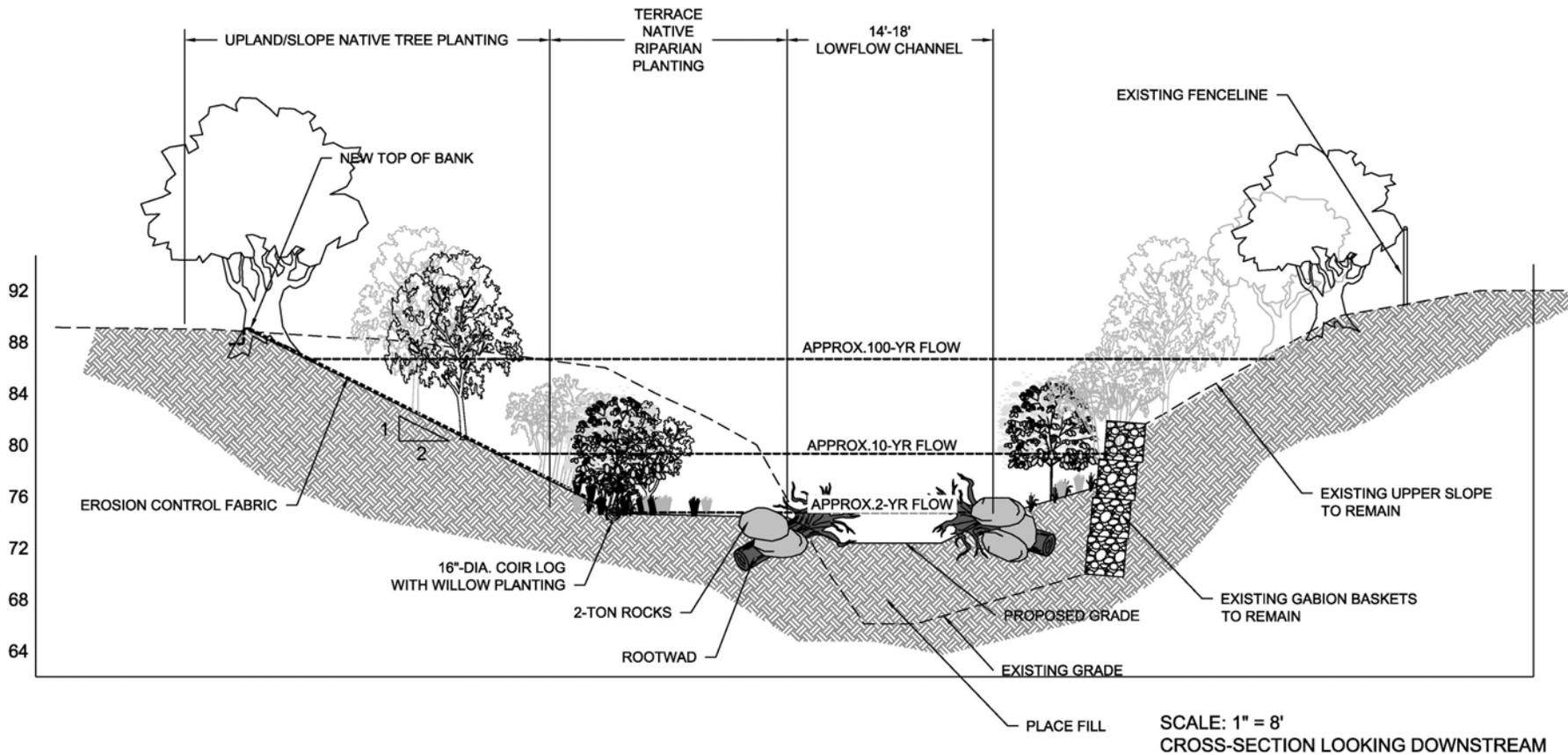
Project Concept

- ◆ Place fill in the channel; eliminate culvert perching; Project Length = 1,300 feet
- ◆ Install 19 grade control structures to minimize degradation and maintain grade
- ◆ Re-establish 1.3% to 4.5% grade between controls
- ◆ Provide extensive roughness elements
 - Large woody debris
 - Boulder clusters
 - Augment bed material
- ◆ Replant 13,000 trees and shrubs



Width to depth ratios increase from channel reconfiguration

STA 86+75











Design Philosophy

- ◆ If heterogeneous gradients and **larger** scale features are established, then **smaller** scale features will evolve in a self-sustaining manner in locations that would be difficult to predict and where construction would be difficult.
- ◆ **Larger Scale** = large boulders, rootwads, and grade control structures
- ◆ **Smaller Scale** = gravel bars, pools, and riffles

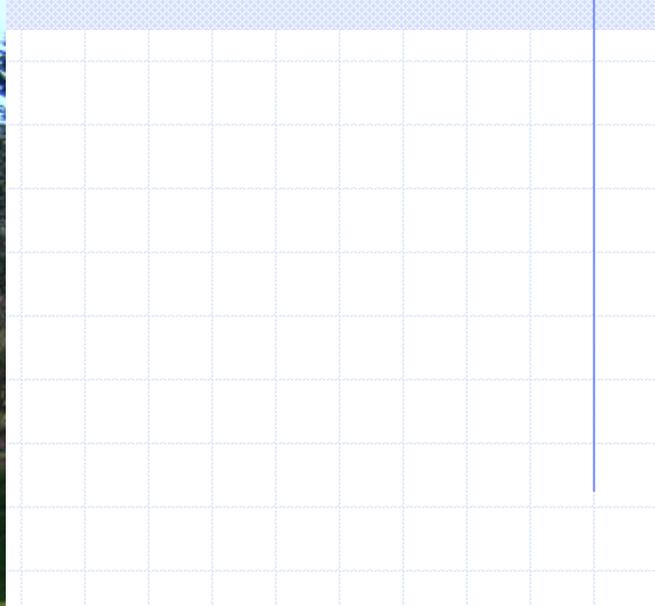
Channel Bed Construction

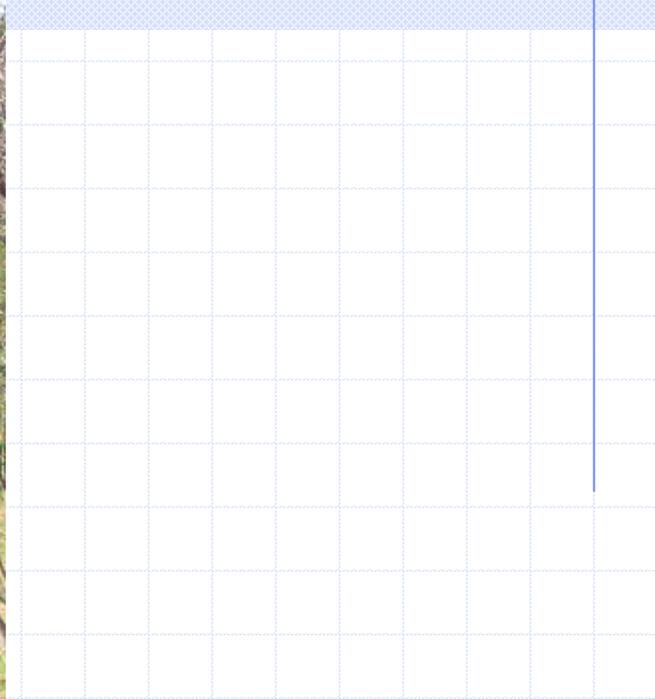
- ◆ Channel grade control to hold bed elevation
- ◆ Seeding the bed with large material only
- ◆ Constructing intermediate rock weirs using 50lb to 150lb rock
- ◆ Placement of woody debris to create scour







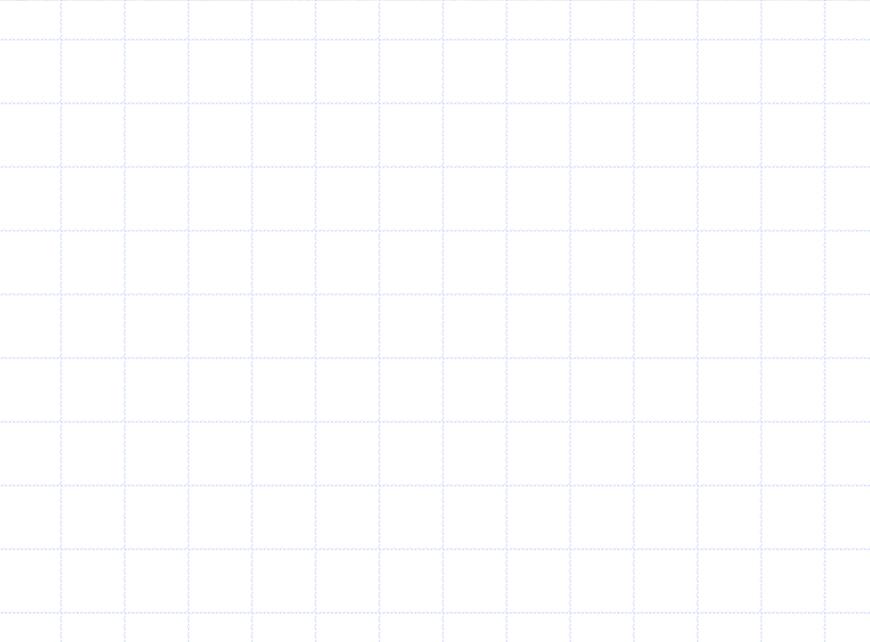
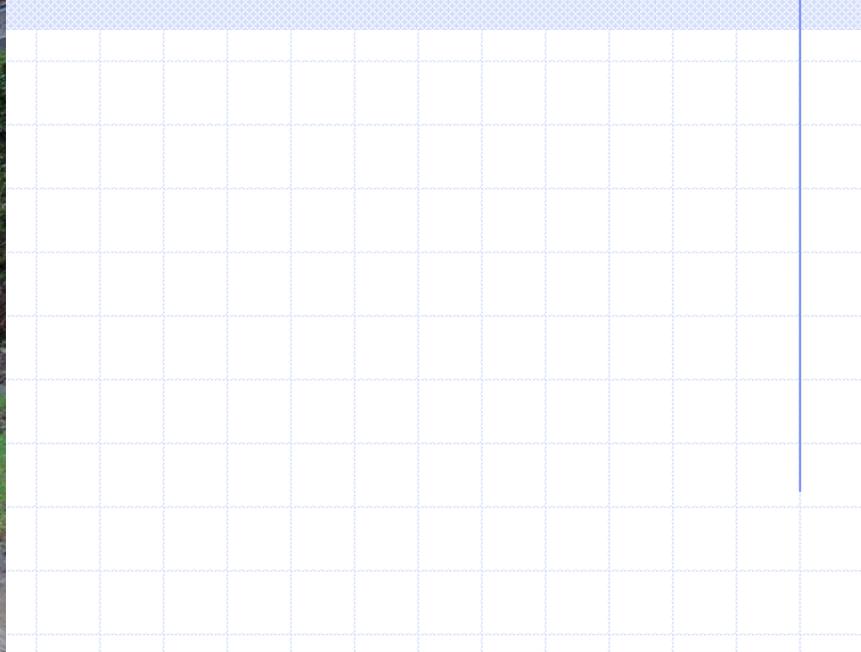




Winter Storms

◆ Two back-to-back storms

- Dec 26-27, 2005; Peak flow = 400-500 cfs
- Dec 31, '05 - Jan 1, '06 = 950 to 1,200 cfs





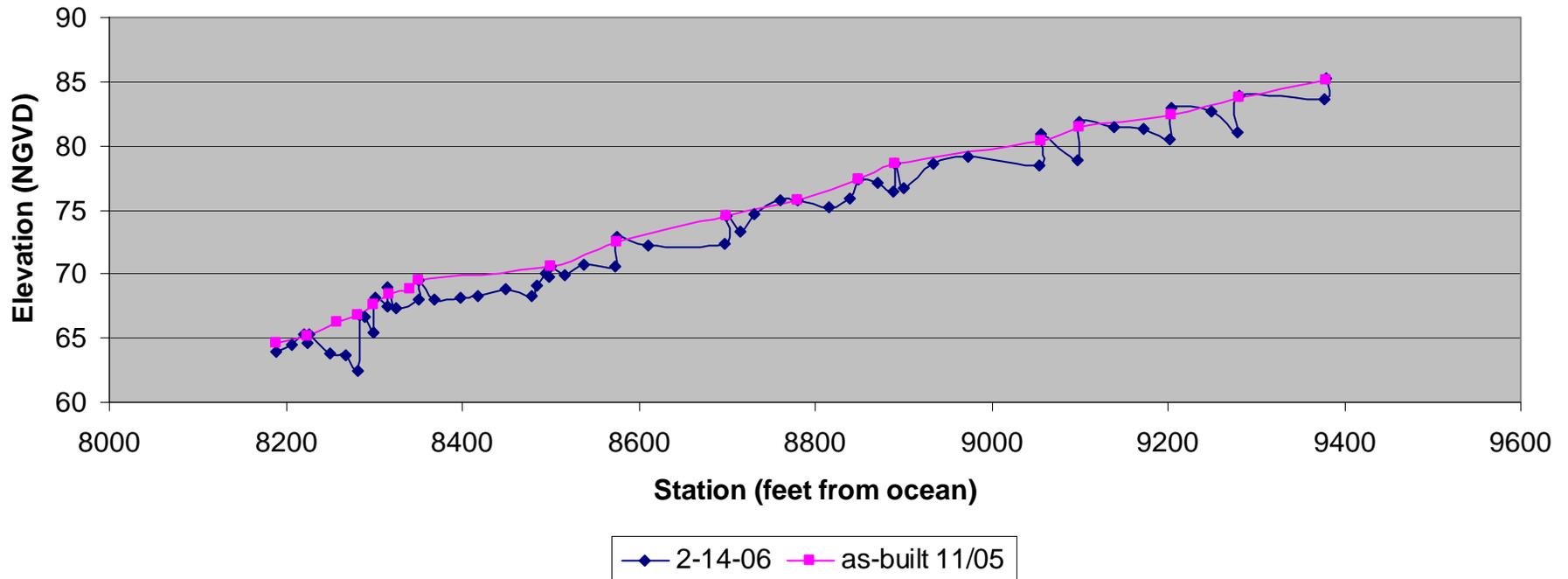




Project Evolution

- ◆ Channel profile evolution
- ◆ Post New Year's profiles
 - Slope equilibrium
- ◆ Placement and effect of woody debris structures
- ◆ Development of riffles from intermediate weirs

San Pedro Creek Long Profile



Pre- vs. Post-Project Conditions

Previous Conditions

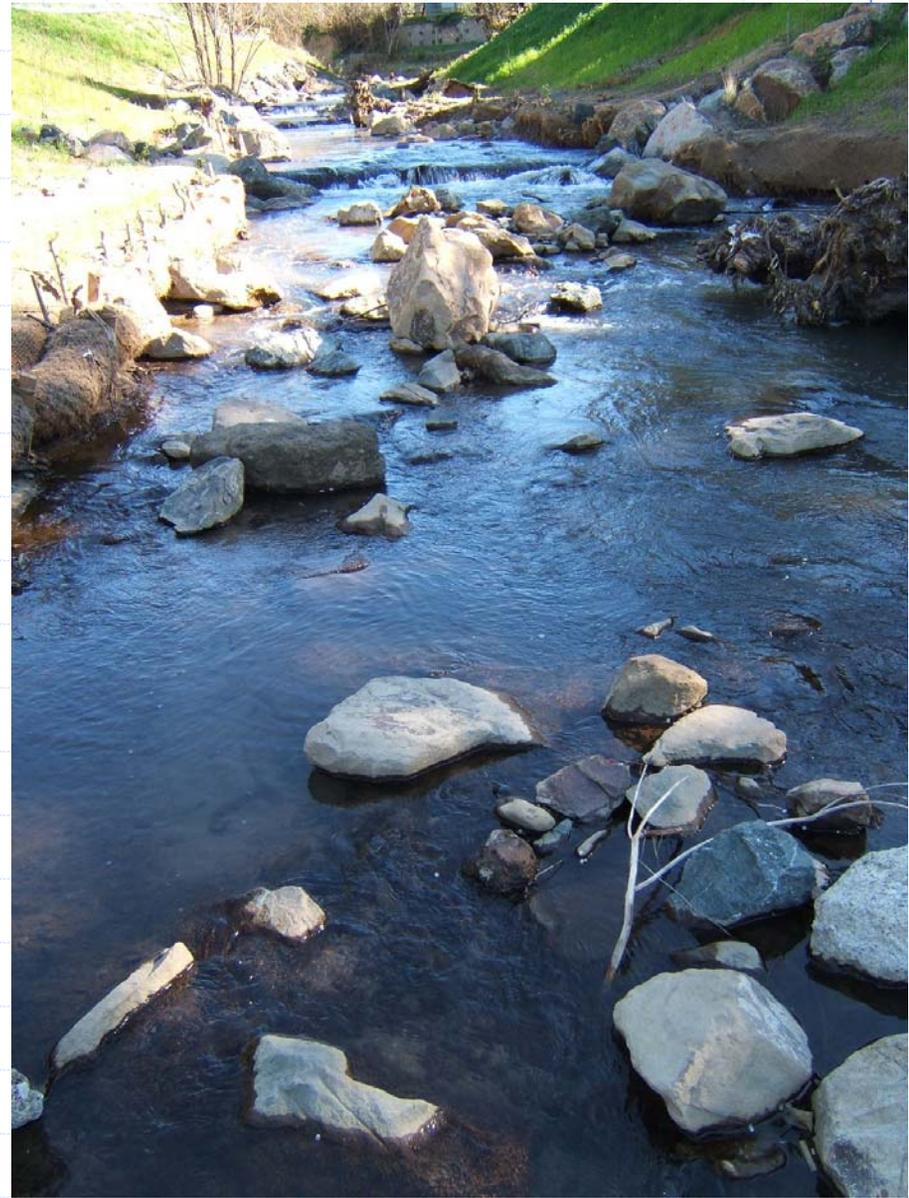
- ◆ Bankfull width = 22'
- ◆ 15 pools
- ◆ 6,123 cu.ft. of pools
- ◆ Max depth 2 to 3 feet
- ◆ Average inner terrace height 5 to 6 feet
- ◆ 10 LWD complexes

(Collins, SBEI, 2001)

Post-project Conditions

- ◆ Bankfull width 20'-25'
- ◆ 20 pools
- ◆ Est. 7,915 cu. ft.
- ◆ Max depth 4 feet, average 1.6 feet
- ◆ Average inner terrace height 2 to 3 feet
- ◆ 20+ LWD complexes





Sediment Transport

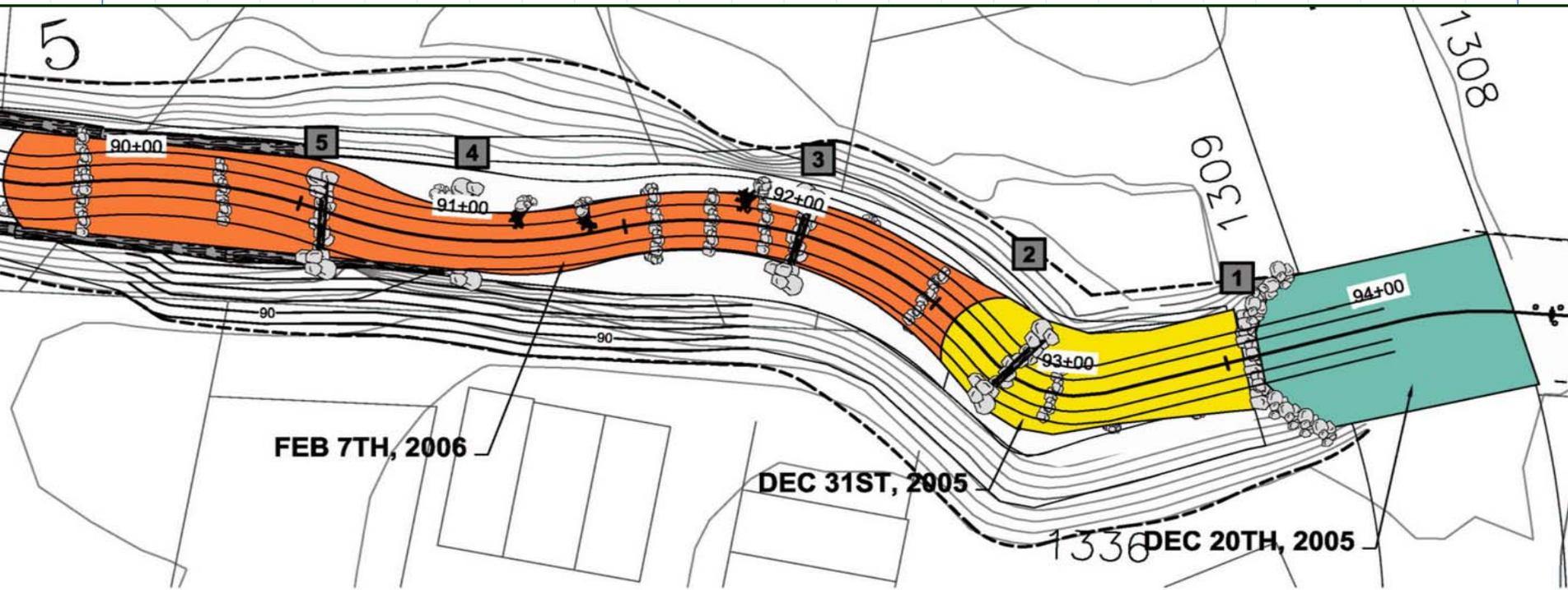
◆ Initial grade/sediment transport

- Clay balls and clasts

◆ Gravel recruitment

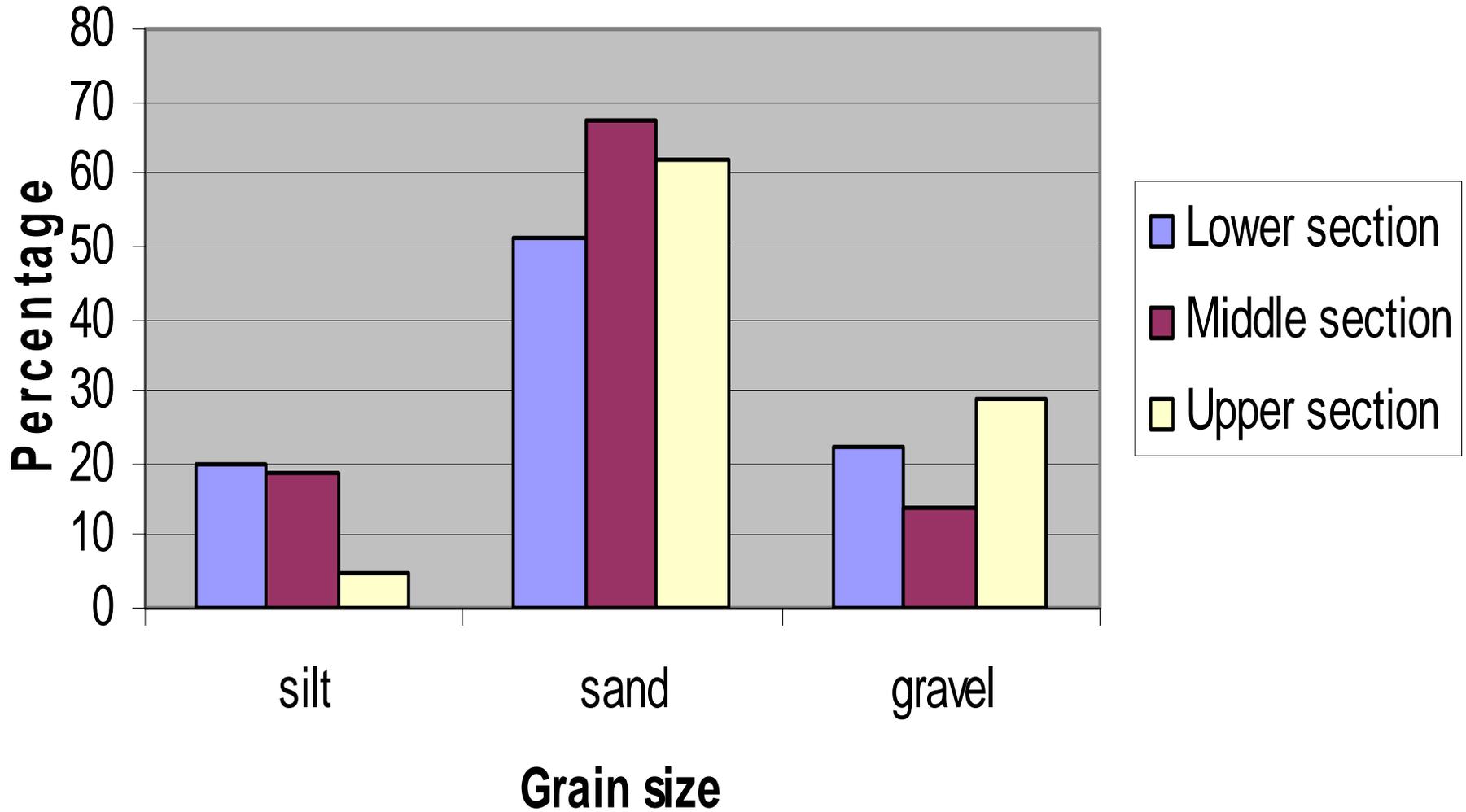
- Bedload was sampled four times longitudinally from January through early February
- Progression of upstream gravel plume monitored over time

Gravel Front Movement

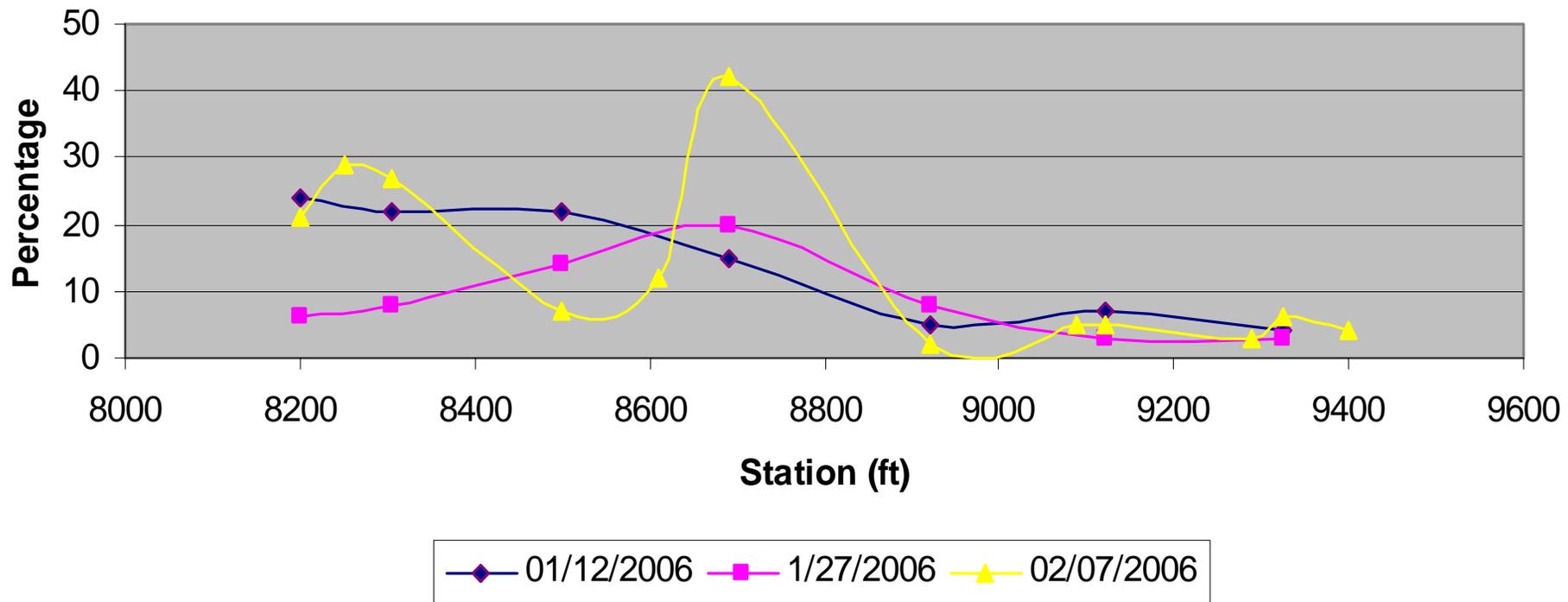




Average Contents by Reach



Silt percentage



First Impressions

◆ Log grade control

- Worked but likely near maximum creek size for technique

◆ Bed seeding large material only

- Allows fine material evacuation
- Allows for scour and rapid pool development

◆ 2 to 3 seasons to establish complete gravel and sand substrate

Conclusions

- ◆ Project concept appears to have met the initial goals of the project
- ◆ Multiple objectives of erosion control, habitat enhancement, and fish passage were attained
- ◆ Gravel recruitment is occurring from downstream to upstream, becoming coarser with time