Lessons Learned from California Urban Stream Restoration Projects



Northwest Stream Restoration Design Symposium

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BACKGROUND

PROJECT

National River Restoration Science Synthesis (NRRSS)

PHASES

I. Comprehensive database of river restoration projects (*complete*)

II. Survey-based database of restoration practices (*complete*)

III. Post-project appraisals – California only (*in progress*)

BACKGROUND

DEFINITION OF POST-PROJECT APPRAISAL (PPA)

Evaluation of the effectiveness of restoration projects based on systematic data collection.

PPA INQUIRIES

Was it built as designed?

Did it achieve its objectives?

Should steps be taken to address unanticipated effects?

How can we improve future restoration design?

(Downs & Kondolf 2002; Skinner 1999 adapted from Sadler 1998)

METHODS

PROJECT DOCUMENT COLLECTION

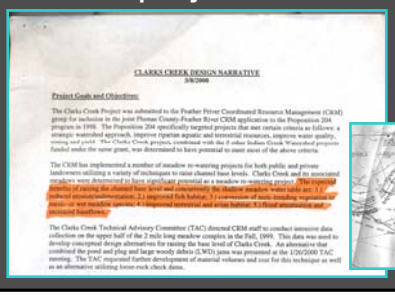
I. Success criteria

II. Baseline surveys

III. Design rationale

IV. Design drawings

V. Post-project monitoring surveys


CLARKS CREEK DESIGN NARRATIVE
3/8/2000

Project Goals and Objectives:

The Clarks Creek Project was submitted to the Feather River Coordinated Resource Management (CRM) group for inclusion in the joint Plumas County-Feather River CRM application to the Proposition 204 program in 1998. The Proposition 204 specifically targeted projects that met certain criteria as follows: a strategic watershed approach, improve riparian aquatic and terrestrial resources, improve water quality, raising and perch. The Clarks Creek project, combined with the 3 other Indian Creek Watershed projects funded under the same grant, was determined to have potential to meet most of the above criteria.

The CRM has implemented a number of meadow re-watering projects for both public and private landowners utilizing a variety of techniques to raise channel base levels. Clarks Creek and its associated meadows were determined to have significant potential as a meadow re-watering project. The potential benefits of raising the channel base level and concurrently the shallow meadow water table are: 1) reduced erosion/sedimentation, 2.) improved fish habitat, 3.) conversion of xeric-trending vegetation to mesic- or wet meadow species, 4.) improved terrestrial and avian habitat, 5.) flood attenuation and increased baseflows.

The Clarks Creek Technical Advisory Committee (TAC) directed CRM staff to conduct intensive data collection on the upper half of the 2 mile long meadow complex in the Fall, 1999. This data was used to develop conceptual design alternatives for raising the base level of Clarks Creek. An alternative that combined the pond and plug and large woody debris (LWD) jams was presented at the 1/26/2000 TAC meeting. The TAC requested further development of material volumes and cost for this technique as well as an alternative utilizing loose-rock check dams.

STUDY AREA

PPAs (2005-2007)

Total PPAs: 40

Urban PPAs: 22

STUDY AREA

STUDY RATIONALE

WHY RESTORE & APPRAISE URBAN STREAMS?

I. 75% of population lives in cities

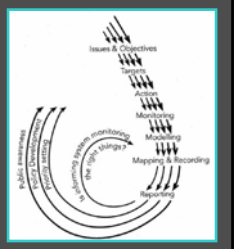
II. Habitat for potentially diverse and productive biota

III. Water and materials conveyance

IV. Air purification

V. Adaptive management feedback





(United Nations Population Division 1997; Walsh et al. 2005; Paul and Meyer 2001; McPherson et al 1997)

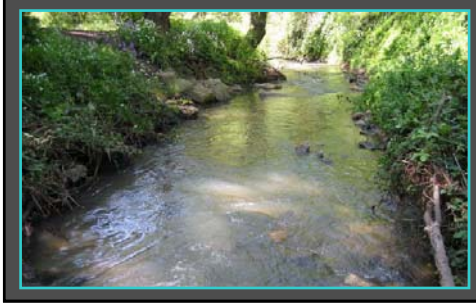
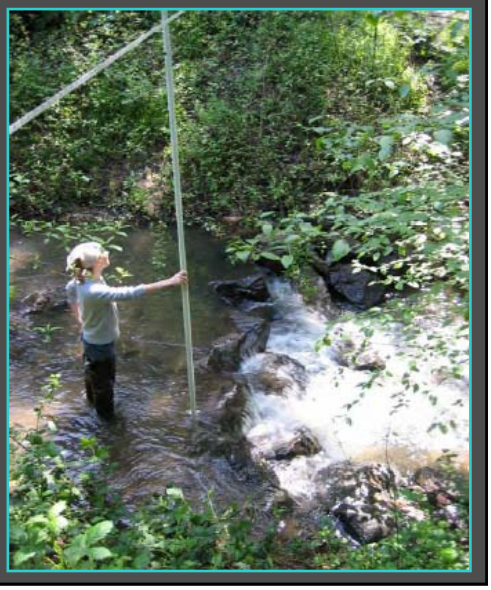
SCOPE OF PROJECTS

SIZE OF PROJECT REACHES

- 61 – 343 meters
- Median = 213 meters
- Mean = 220 meters

PROJECT COMPLETION

- 1995 – 2006

DOCUMENTATION AVAILABLE

I. Success criteria?	0	No	Review project docs & interview stakeholders
		Yes	
II. Pre-project surveys?	2	No	Reconstruct conditions with maps, aerials, etc.
		Yes	
III. Design rationale stated?	4	No	Reconstruct construction of goals by interviews & doc review
		Yes	
IV. Design drawings?	10	No	Reconstruct design features by interviews & doc review
		Yes	
V. As-built drawings?	1	No	Reconstruct by ground photos, site evidence, comparison to design
		Yes	
VI. Reproducible monitoring?	2	No	Evaluate value of new monitoring program to evaluate performance

FIELD SURVEY PARAMETERS

I. Interviews with project managers, designers, etc. (10)

II. Cross-section and long profile surveys (10)

III. Photo documentation (10)

IV. Facies/feature maps (9)

V. Vegetation cover/composition (5)

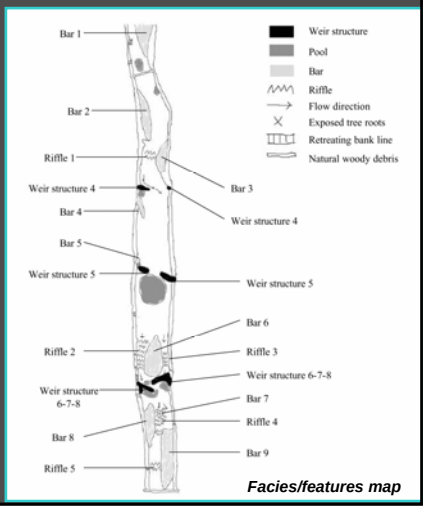
VI. Hydrologic analysis (3)

VII. Stakeholder surveys (3)

VIII. Interpretation of aerials and historic maps (2)

IX. Topographic survey (1)

X. Substrate analysis (1)

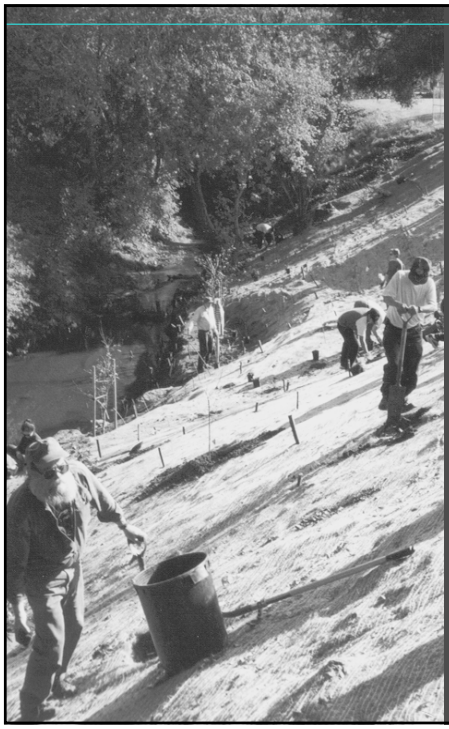


Facies/features map

DESIGN TRENDS

RESTORATION OBJECTIVES	# reporting*
Bank stabilization	9
Channel reconfiguration	8
Stormwater management	7
Aesthetics, recreation, education	6
Water quality management	6
Riparian management	5
In-stream habitat improvement	5
Floodplain reconnection	4
Dam removal/retrofit	0
Fish passage	0
In-stream species management	0
Land acquisition	0

** Multiple responses allowed*



IMPLEMENTATION TRENDS

ACTIVITIES (COMMON)*

- Bank/channel reshaping (10)
- Revegetation (9)
- Grading - plan form (9)
- Grading banks (9)
- Grading floodplain (7)
- Boulders (5)
- Meander creation (5)
- Wiers (5)

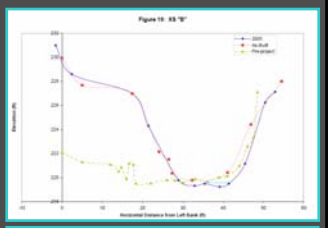
** Multiple responses allowed*

PERFORMANCE TRENDS

POSITIVE OUTCOMES
- Successful vegetation establishment
- Stable channel geometry
- More complex channel features
- Increase of site use and/or stewardship

NEGLIGIBLE OR ADVERSE OUTCOMES
- Banks not as stable as desired
- Limited access or poor project reception
- Upstream/downstream constraints

INDIRECT OUTCOMES
- Grade control from US/DS culverts
- Shopping carts acting as boulders and/or LWD
- Demonstration project

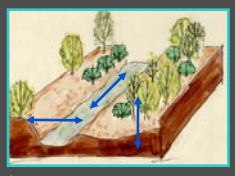


LESSONS LEARNED

- Projects did not have quantitative objectives
- Lack of documentation and monitoring data restricts evaluation opportunities
- Projects had incompatible project objectives
- Projects did not set objectives in context of altered watershed

IMPLICATIONS

- Is a PPA ever “complete?”
- Who is charged with maintenance of project?
- More research needed on channel geometry and flow regime for urban streams (Brown 2000)
- If you build it, will they come? (Palmer et al. 1997, Bond & Lake 2003)
- Restoration projects should be linked to nearby intact reaches (Palmer et al 1997, Brierley and Fryirs 2000, Morley and Karr 2002, Findlay et al. 2006)
- Consider watershed context for restoration planning
- Include stakeholders in the restoration process
- Deal with uncertainty through adaptive management



Natural ◄ ► Urban

QUESTIONS?

Select the NRRSS Record to View/Print:
Records listed in NUMERICAL order (by NRRSS Number) for California

NRRSS - Project Number	Name
30	Alhambra Creek Restoration
31	Adelante High School Dry Creek Restoration Project
69	Morro Bay National Estuary Riparian Restoration
70	San Antonio Creek Riparian Restoration
71	Norton Creek Wildlife Area Riparian Restoration
96	Muwekma Ohlone Sanctuary Habitat Restoration and Environmental Education
97	Salvador Community Awareness Restoration and Stewardship

SUBMIT **View/Print NRRSS Record**

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"Every increment is significant. Any restored habitat will provide a focal point for a few individuals or a few taxa that would not otherwise be present in the system." — Iannuzzi and Ludwig 2005

"The success of any attempt to improve the ecological condition of streams in urban areas will largely depend on human attitudes and behaviors within the catchments." — Booth 2005

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