Peer Review Report
Trinity River Restoration Program
Preliminary Fiscal Year 2013 Science Workplan

October 2012

This page intentionally left blank

TABLE OF CONTENTS

LIST OF TABLES

This page intentionally left blank

1.0 INTRODUCTION

1.1 Peer Review Participants

Panel Members

Don Orth, Ph.D.
John Stella, Ph.D.
Peter Wilcock, Ph.D.

Atkins Facilitators

Tom St. Clair, Ph.D.
Rebecca Burns

1.2 Purpose of Peer Review

The Trinity River Restoration Program (TRRP or Program) requested an independent expert review and evaluation of its Fiscal Year 2013 (FY13) Preliminary Science Workplan (FY13 Workplan), a prioritized list of science and monitoring activities developed by the TRRP technical workgroups. The desired outcome of the review was a unified science workplan that would meet the Program's adaptive management needs. The Program's Scientific Advisory Board (SAB) will review the review panel's recommendations and advise the Trinity Management Council (TMC) about prioritization of FY13 activities.

1.3 Scope of Peer Review

The review panel, composed of a geomorphologist, fisheries biologist and riparian ecologist, was instructed to review and evaluate the FY13 Workplan and recommend revisions to the prioritization of the proposed activities. The review panel was asked to consider whether the suite of proposed activities address the TRRP programmatic goals and whether the prioritized activities would improve the Program's ability to adaptively manage its available management actions (goals and management actions are specified in the Record of Decision (ROD) [USDOI 2000]). The TRRP provided the panel with the following list of questions to consider in their review:

- Are there linkages between proposed projects (activities) that are being missed? Please identify and make recommendations on how to achieve those linkages.
- Are there duplications between projects (activities) that should be eliminated?
- Are there deficiencies in the overall program of work to achieve program objectives?
- Are there projects (activities), or subordinate tasks, that should be elevated or lowered in priority?
- Are there projects (activities), or subordinate tasks, that should be expanded or reduced in scope?
- What are the primary projects (activities) or tasks that are necessary to address the program objectives and what would be considered secondary component tasks or projects in achieving these objectives (either between projects or within projects)?
- Identify any inefficiency in projects (activities) or tasks when considered in context of a unified work plan and how they might be remedied.

The desired outcome of the review process was a peer review report that includes any recommended revisions to the prioritization of the activities, rationale for those revisions and overall comments and conclusions.

The panel was provided with the FY13 Workplan (i.e., a spreadsheet of 37 proposed science and monitoring activities arranged in priority order) along with extensive supporting information and background materials. Supporting information included proposal briefs, investigation plans and external review documentation for each proposed activity (when available). Background materials included the ROD (USDOI 2000), Trinity River Flow Evaluation Report (USFWS and Hoopa Valley Tribe 1999), Integrated Assessment Plan (IAP) (TRRP and ESSA Technologies Ltd. 2009) and a draft summary of "Big Questions" among others. Additionally, the panel was provided with recent evaluations of adult salmonid monitoring (Bradford and Hankin 2012) and habitat carrying capacity (Beechie et al. 2012), as well as a 2009 integrated habitat assessment (IHA) (Hoopa Valley Tribe et al. *in prep*) and a draft of portions of an integrated habitat assessment for water year (WY) 2011 (Hoopa Valley Tribe and McBain and Trush *in prep.*). Other reports and evaluations were provided; however, those listed above were relied upon most heavily by the panel during their review.

2.0 PEER REVIEW PROCESS

Atkins, North America, hereafter referred to as Atkins, was retained by the TRRP to select peer review panel members and facilitate the peer review process. The terms of the contract are set in the contractual document and include the following:

- Prepare panelist invitation letter and instructions for review by TRRP;
- Secure the panel;
- Distribute materials to panelists and coordinate the start of the review;
- Facilitate a web-based orientation meeting;
- Manage panelist queries during one-week review period;
- Facilitate production of panel report; and
- Incorporate SAB input.

2.1 Selection of Reviewers

Atkins was directed to select three reviewers with expertise in geomorphology, fisheries biology and riparian ecology. Collectively the panel was required to have expertise in physical processes of mountain rivers, riverine ecology, fish population/habitat interactions, riverine rehabilitation techniques, and adaptive management (with emphasis on adaptive management in association with restoration programs). All panel members were required to have a Ph.D. in their respective fields. Members of the peer review panel were to be selected in accordance with the general principles of the National Academy of Sciences Policy on Committee Composition and Balance and Conflict of Interest for Committees. To avoid real or perceived conflicts of interest, the TRRP specified that employees of TRRP partners (Bureau of Reclamation, U.S. Fish and Wildlife Service, Hoopa Valley Tribe, Yurok Tribe, Trinity County, the California Resources Agency [consisting of California's Department of Water Resources and the Department of Fish and Game], the U.S. Forest Service and

National Oceanic and Atmospheric Administration [NOAA] Fisheries) could not participate in this review.

Due to the tight timeframe for this peer review (in order to influence programmatic decision making for FY13), Atkins began by contacting members of the SAB for panel member recommendations. Emails were sent to prospective candidates with an invitation letter that detailed the purpose of the review, duties of the panel, review process and schedule. Atkins confirmed the following individuals for the panel (see Appendix A for CVs):

- Fisheries Biology: Dr. Don Orth, Virginia Tech University
- Riparian Ecology: Dr. John Stella, State University of New York College of Environmental Science and Forestry
- Geomorphology: Dr. Peter Wilcock, Johns Hopkins University

2.2 Document Review and Report Development

Upon selection, reviewers were provided with the workplan and all supporting information in both hard and electronic forms. Background information was provided as links and electronic files. Atkins held two teleconferences (August 31 and September 7, 2012) with the panel and TRRP management staff to describe the purpose and desired outcomes of the review and answer any clarifying questions from the panel. The reviewers conducted their independent desk reviews between September 10 and 14, 2012. On September 17, 2012, Atkins convened a webinar and teleconference with the panel to discuss and document their individual and collective review comments and begin preparation of this summary report. Panel members prepared the General Comments and Overall Conclusions and Discipline-specific Comments, while Atkins prepared the Introduction, Peer Review Process and Response to Review Questions (summarized from the teleconference). The compiled draft report was distributed to the panel for review and revisions were incorporated. Another teleconference was held on September 20, 2012 to review comments on the draft report prior to submittal to the SAB for review.

The report was submitted to the SAB for review on September 21, 2012 and all comments were received from the SAB by October 1, 2012. SAB members submitted their comments individually to Atkins, who then summarized them in a memorandum and attached the individual comments (without attribution). The memorandum was distributed to the SAB for review and approval. Simultaneously, TRRP staff reviewed the draft report for accuracy and provided clarifying comments and corrections. All comments received from the SAB and TRRP were distributed to the panel for consideration and revisions were made to the report to correct inaccuracies and clarify recommendations.

3.0 RESULTS

3.1 General Comments and Overall Conclusions

The panel's review of the workplan was made difficult by unevenness in the quality and detail of the individual proposals. Many did not contain sufficient information to understand the scope and location of the work. Although the task of the panel was not to provide a specific review of each

individual proposal, the lack of information made it difficult to make the linkages needed to evaluate how the proposed monitoring and research activities contribute to the Program's adaptive management needs. The panel recognizes that the proposal solicitation process is new and that the Program is in the process of making the workplan development process more accountable, transparent, and integrated; however, the current proposal system is not yet sufficient. Future reviews would be aided by providing a single overview of the proposed research plan that integrates monitoring results to date and applies these results to two questions:

a) Are monitoring activities demonstrating that management actions are working (achieving Program objectives)?
b) What changes in management actions are being considered?

A synthesis demonstrating how the proposed workplan is developed in response to existing monitoring and these basic adaptive management questions would allow for a better focused review.

More fundamentally, the panel found that it was unable to identify sufficient effort directed to core activities of an effective adaptive management program: the analysis and interpretation of monitoring observations applied to Program questions and hypotheses in a way that can lead to revision of management actions. A consistent theme that emerged in the discipline-specific comments below (Section 3.2) is that the linkage among monitoring, analysis, interpretation, and revised management is not apparent. With some exceptions, it *appears* that there is sufficient information being collected to achieve this task and that many of the monitoring programs are appropriately focused. There is not sufficient indication that this information has been, or will be used to improve management decisions. In this sense, the panel strongly agrees with the recommendation of Bradford and Hankin (2012, p. 21) that "program integration or synthesis be elevated to be a significant component of the adult assessment program." The panel suggests taking this recommendation further by expanding its scope to all program objectives and by emphasizing that more effort is needed to focus the synthesis on testing program hypotheses, answering questions, and *using this information to revise program actions in a truly adaptive framework*.

In making these observations about apparent weaknesses in synthesis, interpretation, and feedback to management, the panel is reluctant to recommend specific actions that might simply add to the current list of reporting obligations of TRRP partners and contractors. For example, requirements to add an integration component to individual activities, or to implement additional synthesis workshops, are not, on their own, likely to provide the actual synthesis, learning, and reframing of management actions that are needed to conduct effective adaptive management. A broader reprioritization should be considered such that the Program is structured around consistent, integrated synthesis and analysis that links cause and effect, action and response, within a broader system context. This activity -- which is at the core of adaptive environmental assessment and management -- appears to be currently accomplished via outside reviews (e.g., peer reviews of individual monitoring activities) and the SAB. It is important to ask whether this is the most effective approach.

The panel suggests that the task of *performing* the synthesis and feedback should be built into TRRP in a more integral way. Specifically, the panel suggests that this integration be conducted by permanent program staff, in collaboration with program stakeholders and contractors, rather than by

individuals employed as outside reviewers, contractors, and advisors who are temporarily associated with the program. This essential task should be performed in a way that promotes continuity, context, and focus. Intellectual direction by a designated senior scientist should be considered as a means to develop and maintain a robust connection between monitoring and management. Outside reviews should *review* the synthesis and management choices. The SAB should *advise* on the work that is performed. If the core work is performed by temporary program participants (e.g., contractors, reviewers, or advisors), it is harder to envision how a coherent, focused, forward-stepping framework could be built. Rather, it is likely that the program could become overwhelmed by ever-accreting lists of priorities, unsynthesized observations, and excessive focus on the management process, without developing a focused, management experiment able to revise actions in response to monitoring observations.

The SAB is currently engaged in an exceptional, one-time integrated review of TRRP Phase I. This review is clearly needed at this point and the Program is fortunate that that SAB has undertaken this important activity. In the future, the Program would benefit from this type of assessment being performed on a rolling basis, by permanent staff, such that linkages between management hypotheses, project performance, and adaptive response are more actively maintained.

3.2 Discipline-specific Comments

3.2.1 Sediment and Geomorphology

The components of the annual work plan support the objectives of the IAP, in particular:

- Objective 1: Create and maintain spatially complex channel morphology

The Trinity River restoration actions, as defined by the ROD, include changes in flow, additions of gravel, and local channel and bank rehabilitation actions. Once the proposed slate of local rehabilitation actions are complete, a key hypothesis to consider is whether dam releases and ongoing gravel injections would maintain the system in a desirable state. This implies that sufficient gravel would move through the system to maintain desired habitat features, with an emphasis on dynamic topographic and hydraulic diversity. Of particular importance is an understanding of the distance, continuity, and style of gravel transport downstream of injection points. Can a continuous gravel system be developed or is the system segmented by locations that would continue to store sediment for decades? Would existing pools persist or new pools develop as a new dynamic transport system develops? The existing conceptual model supporting coarse sediment management (McBain and Trush 2003) is sufficient to initiate the adaptive management process, but a long-term operational plan must be built on more specific, testable estimates of how gravel moves through the system. The FY13 Workplan contains proposed activities (e.g. 13-12, *Gravel Implementation Monitoring;* 13-17, *Geomorphic monitoring and assessment of bed scour and mobility*; 13-18, *Geomorphic response to high flow duration*; 13-26, *Gravel implementation tracer experiment*) that provide field observations and parts of the analysis needed to build a revised conceptual model. Development of such a model should have higher priority, because it is needed to focus and evaluate monitoring actions and, more importantly, to provide the analytical structure required to link management actions (gravel augmentation, dam releases) to the desired geomorphic behavior of the river channel. On-going monitoring of sediment transport rates at the four mainstem stations (13-16, *Sediment monitoring*) provides the essential time series needed to track integrated river channel

response to management actions, but the linkage between these continuing observations and local channel response providing desired habitat must be more explicitly defined and tested.

3.2.2 Salmonid Recovery

The components of the annual workplan support the objectives of the IAP, in particular:

- Objective 2: Increase/improve habitats for freshwater life stages of anadromous fish to the extent necessary to meet or exceed production goals
- Objective 3: Restore and maintain natural production of anadromous fish populations, and
- Objective 4: Restore and sustain natural production of anadromous fish populations downstream of Lewiston Dam to pre-dam levels, to facilitate dependent tribal, commercial, and sport fisheries' full participation in the benefits of restoration via enhanced harvest opportunities.

The workplan includes activities that will address a number of key hypotheses critical to the success of the TRRP. In particular, the fundamental question addressed seems to be: Will the channel rehabilitation, gravel augmentation, and variable flow releases increase natural production of juvenile salmonids and outmigrant smolts? While substantial resources are devoted to the analysis of the quantification of habitats created via rehabilitation (Activity 13-4), the most compelling evidence should arise from the measures of size of the naturally produced runs (Activity 13-5) and resultant outmigrant smolts (Activity 13-6). It is essential that protocols be developed and tested to accurately measure the natural production of anadromous salmonids. Sufficient data exist from the long history of monitoring the harvest and escapement, that a model of anadromous salmonid population dynamics could be developed and incorporated in the Adaptive Environment Assessment and Management framework (p. 15 IAP; TRRP and ESSA Technologies Ltd. 2009). This overarching goal appears to have been overshadowed by the numerous sub-objectives.

3.2.3 Riparian Ecosystem Dynamics and Wildlife Habitat

The riparian and wildlife components of the FY13 Workplan support objectives of the IAP, particularly:

- Objective 5: Establish and maintain riparian vegetation that supports fish and wildlife, and
- Objective 6: Rehabilitate and protect wildlife habitats.

The specific workplan activities that support these objectives include 13-13, *Map and quantify riparian vegetation,* 13-14, *Riparian and riverine bird monitoring,* 13-20, *Monitor abundance and distribution of Foothill Yellow-Legged Frog (FYLF) egg masses,* 13-22, *Monitor distribution and abundance of Western Pond Turtle (WPT),* and 13-29, *Model how WY13 streamflow actions will affect riparian hardwood regeneration*. In light of the primary objective of the ROD and TRRP to enhance fish populations, it appears appropriate that all of these activities are of lower priority than those with direct linkages to fish populations and limiting habitat. The one exception is Activity 13-13, which is necessary for understanding (1) the linkages between fine sediment dynamics, vegetation encroachment, and riparian berm accretion, and (2) regeneration of riparian hardwood species large enough to eventually provide large woody debris (LWD) to the aquatic system (e.g., black cottonwood, white alder) and in appropriate channel and bank locations to prevent channel encroachment and geomorphic simplification. The remaining activities, which primarily concern

wildlife monitoring, were generally not well-articulated in the supporting documents, and should be of lower priority. The Foothill Yellow-Legged Frog and Western Pond Turtle activities (13-20 and 13-22) were lacking proposals and budget line items, so it is unclear whether these tasks are intended for inclusion in the FY13 Workplan.

Echoing the general comments of this review, the extensive riparian vegetation monitoring conducted to date (Hoopa Valley Tribe et al. *in prep*; Hoopa Valley Tribe and McBain and Trush *in prep*) provides excellent data to document site-level conditions and dynamics at restoration and reference sites. As a whole, though, it is unclear whether these findings are answering the critical questions, which are well-summarized in Figure 1.1 (p. 16) of the 2009 IHA draft report (Hoopa Valley Tribe et al. *in prep*; e.g., "Is riparian encroachment occurring, and if so, how can it be remedied?"). For example, there should be more synthesis of the comprehensive riparian and geomorphic results presented in both the 2009 and 2011 reports to assess whether the dominant pattern of vegetation/sediment feedbacks in the system under a restoration flow and site rehabilitation regime are maintaining an appropriate channel geometry at most locations or, alternatively, are re-establishing riparian berms at many/most of the restoration sites. The dominant pattern is not clear from the reports, which could benefit from more targeted executive summaries. As for priorities going forward, the panel suggests that the critical riparian/geomorphic questions articulated in Figure 1.1 be assessed over multiple scales (i.e., patch, site, reach) and be used to link, via a conceptual model, the empirical results to future management actions.

In the case of geomorphic/vegetation feedbacks, there is an overwhelming amount of high-quality data collected as part of the IHA, but the interaction between fine sediment deposition and plant establishment patterns appears insufficiently explored. For example, the 2011 draft monitoring report (Hoopa Valley Tribe and McBain and Trush *in prep*) describes the accretion of fine sediment on banks at some sites and highlights concern whether re-initiation of berms is occurring. At the same time, WY2011 flow releases, representing a 'wet' year regime, were successful at removing approximately 80 percent of seedlings less than one centimeter in diameter. However, it is unclear whether the surviving seedlings were associated with the fine sediment deposits, or whether an 80 percent mortality rate is sufficient to reduce densities below the threshold for sediment deposition feedbacks to occur. The assessment of encroachment risk using extant seedling densities may be underestimated, as measured densities in field surveys may have changed (increased or decreased) since the initiation of feedbacks. It appears that these questions need to be addressed at several scales that include quantifying vegetation patch coverage and dynamics for a reach combined with finer-scale demography of individual patches.

Going forward, perhaps the level of field measurement presented in the IHA monitoring could be relaxed a bit, with less emphasis on species or association-level divisions, and more effort placed on analyzing larger-scale patterns. The band transect data collection, for example, is very detailed as to species and plant size (diameter and height of individuals). For understanding encroachment patterns at the site and reach scale, it may be possible to group species by functional groups (e.g., herbaceous, scrub/shrub, small tree, large tree) and general patch density estimates (e.g., log scale) and size classes. Trying to assign age classes to the seedlings is important only if it is desirable to determine when they recruited relative to a given flow event or year, but it is not necessary for estimating scour vulnerability because seedling sizes and densities can vary greatly within a cohort. It would be more beneficial to know the spatial extent of recruitment throughout a reach (with

sampling distributed more broadly across a target bank morphology, or several morphological units), than to know the specific demography of relatively few patches.

The second riparian vegetation process that is directly relevant to fish populations is the potential for LWD recruitment within the channel. For this, the riparian assessment provides good information regarding the distribution of hardwood seedling recruits and their placement within the channel environment. As with the riparian berm question, the panel recommends additional synthesis of data results and macro-scale patterns. Will the current observed rate of establishment of species with large diameter adult forms have the potential to increase the supply of LWD usable by fish to the system, and by how much and with what level of uncertainty? A patch approach that quantifies approximate densities and geomorphic locations may allow for additional resources to be freed up to conduct assessments at more locations.

3.2.4 Activity 13-3 Rehabilitation Site Effectiveness Monitoring and Analytical Framework

Although the panel does not provide specific review comments on each proposal, the focus of this particular activity merits comment inasmuch as it reinforces some of the panel's broader concerns about the Program. The activity proposes a synthesis of ongoing monitoring in support of "developing a new approach to the assessment of rehabilitation site features compared with their design objectives." The proposed approach or framework is intended to tighten the link between the performance of existing projects and the design of future projects. Clearly this activity is at the heart of the Trinity River adaptive management program. The panel is concerned that the proposed work arises from the implementation branch of TRRP, that it apparently competes for funding with other proposed monitoring activities, and that it is at least partly outsourced to contractors. The panel agrees with the SAB review of this activity in its finding that the proposal is insufficient in its explanation (as was the case with many of the proposals). The panel also clearly agrees with the SAB that the work is essential. The panel does not agree with the SAB conclusion that the proposed work is premature and should wait for completion of the SAB Phase I review. The panel suggests that the work be further defined and immediately implemented as a core function of TRRP implementation and science staff. That such an essential aspect of the adaptive management process appears as a vaguely worded proposal with support for external consultants appears to be emblematic of the need for a basic strengthening of the analysis, interpretation, and adaptive management core of the program.

3.3 Response to Review Questions

Below are the panel's comments in response to specific questions that were not included in the General Comments (3.1) and Discipline-specific Comments (3.2) sections. ***Table 1*** summarizes panel comments by activity.

3.3.1 Are there linkages between proposed projects (activities) that are being missed? Please identify and make recommendations on how to achieve those linkages.

It is not clear how activities 13-5a (*Spring and fall Chinook and coho salmon and fall-run steelhead run-size estimation using mark recapture methods*), 13-6a (*Juvenile salmonid outmigrant monitoring program*) and 13-15 (*Juvenile Salmonid Density Monitoring*) will work together to address whether

program goals are being met and whether natural production of salmonids is being estimated. These activities should be coordinated and integrated. If these annual reports were prepared together, important questions could be addressed such as the precision of estimates of young produced per adult and whether there are spatial effects depending on where the channel has been rehabilitated. Without coordination and integration, these questions cannot be addressed.

It appears that activity 13-3 (*Rehabilitation Site Effectiveness Monitoring and Analytical Framework*) is an effort to coordinate a number of other evaluation efforts (i.e., 13-12, *Gravel Implementation Monitoring*; 13-18, *Geomorphic response to high flow duration*; 13-23, *Assess design performance of specific design features*; 13-28, *Map and quantify extent of available adult holding habitat at rehab sites and throughout the mainstem*). There is not sufficient detail to evaluate the coordination among these activities (see also Section 3.2.4).

Activity 13-4 (*Assessing effects of restoration on Chinook Salmon and Coho Salmon rearing and spawning habitat*) is inadequate in terms of detail on methods, number of rehabilitation sites and experimental design, and needs to be integrated with geomorphic, riparian, juvenile density and wildlife studies. It is a major flaw to not integrate gravel monitoring (i.e., 13-12, 13-26) with 13-4. Also, rehabilitation sites need to be reviewed with respect to salmonid rearing habitat (i.e., integration of activities 13-3 and 13-4).

Activity 13-12 (*Gravel Implementation Monitoring*) should be integrated with activities 13-17 (*Geomorphic monitoring and assessment of bed scour and mobility*) and 13-18 (*Geomorphic response to high flow duration*).

Activity 13-13 (*Map and Quantify Riparian Vegetation*) should be integrated with the various geomorphic analyses to assess the likelihood that riparian berms are re-establishing, both at individual restoration sites, and system-wide.

The analysis portion of activity 13-29 (*Model how WY13 streamflow actions will affect riparian hardwood regeneration*) should be integrated within activity 13-13 (*Map and Quantify Riparian Vegetation*).

3.3.2 Are there duplications between projects (activities) that should be eliminated?

Activities 13-12 (*Gravel Implementation Monitoring*) and 13-25 (*Retrospective evaluation of topographic changes at Rush Creek delta*) overlap in the sense that both include gravel monitoring in Rush Creek pool.

3.3.3 Are there deficiencies in the overall program of work to achieve program objectives?

Deficiencies are described in the General Comments and Overall Conclusions section and in responses to the other questions. Of most importance to effective adaptive management is a more complete, explicit, and active link among hypotheses, monitoring, synthesis, interpretation, and revision of management plans. This linkage should be supported by three high priority activities: (1) update the conceptual model for coarse sediment management (see Section 3.2.1), (2) develop a model of anadromous salmonid population dynamics (see Section 3.2.2) and (3) assess the critical

riparian/geomorphic questions articulated in Figure 1.1 of Hoopa Valley Tribe et al. (*in prep*) over multiple scales and develop a conceptual model to link results to future management actions (Section 3.2.3). These models provide the framework for testing management hypotheses. Performance relative to these hypotheses forms the basis for revised management actions, including planning at the annual level.

3.3.4 Are there projects (activities), or subordinate tasks, that should be elevated or lowered in priority?

The panel found it difficult to address this question without knowing the results of monitoring conducted to date. In general, target dates for sharing assessment information should be elevated in priority to inform operational decisions. With that in mind, the following are some observations and recommendations to address this question.

Activity 13-6b (*Myxosporean parasites effects and energy reserves of juvenile Trinity R. Chinook*) should be lowered in priority as this is not currently an issue; however, the TRRP should be ready to increase the level of parasitic surveillance if needed.

Activity 13-13 (*Map and Quantify Riparian Vegetation*) should be elevated in importance as per comments in Section 3.2.3 in order to address IAP objectives 5 and 6.

Activity 13-14 (*Riparian and Riverine Bird Monitoring*) should be lower in priority because it does not directly relate to fish populations and habitat (Objectives 1-5 of IHA), and proposal reviews indicated that data analysis methods were unclear.

Activity 13-15 (*Juvenile Salmonid Density Monitoring*) should have the same priority as the other salmonid monitoring activities (13-4 through 13-6). These activities, together, address program objectives and 13-15 also provides a direct connection with channel design activities.

No details were included for Activity 13-16 (*Sediment Monitoring*); however, it provides the essential time series needed to track river channel response to management actions and is thus a priority monitoring activity. The linkage between observations from this monitoring and local channel response should be more explicitly defined and tested.

Activity 13-23 (*Assess design performance of specific design features [alcoves, side channels, lowered floodplains, etc.]*) seems essential, but without additional details on background and methods it is hard to determine whether or not it should be elevated. It may be better suited as part of the design team.

Activity 13-26 (*Gravel implementation tracer experiment*) is a good idea, but giving it higher priority requires that the methods be worked out in sufficient detail that the likelihood of success could be evaluated. Perhaps this activity could also be considered for funding under the implementation budget.

3.3.5 Are there projects (activities), or subordinate tasks, that should be expanded or reduced in scope?

The panel felt several individual monitoring activities and components could be expanded or reduced in scope (see responses to questions above and ***Table 1*** for details).

3.3.6 What are the primary projects (activities) or tasks that are necessary to address the program objectives and what would be considered secondary component tasks or projects in achieving these objectives (either between projects or within projects)?

This question is addressed in Section 3.1 above.

3.3.7 Identify any inefficiency in projects (activities) or tasks when considered in context of a unified work plan and how they might be remedied.

This question is addressed in Section 3.1 and in responses to the questions above.

TABLE 1: SUMMARY OF REVIEW PANEL COMMENTS ON MONITORING ACTIVITIES

Item no.	Description	Panel Comments
13-1	Streamgaging	Provides consistent monitoring data over time which is essential; however, no details on methodology were included.
13-2	Water Year Specific	Funding is appropriate to enable response to unexpected events.
13-3	Rehabilitation Site Effectiveness Monitoring and Analytical Framework	Essential activity that should be performed in FY13; however, the proposal needs to be enhanced with scientific rigor and the role of internal (TRRP) staff needs to be expanded. Also, clarification is needed on how this will be coordinated with 13-12, 13-18, 13-23 and 13-28. See Section 3.2.4.
13-4	Assessing effects of restoration on Chinook Salmon and Coho Salmon rearing and spawning habitat	Inadequate detail on methods, number of rehabilitation sites and experimental design (i.e., comparing and contrasting pre- and post-rehabilitation); this monitoring activity should be integrated with 13-3, 13-12 and 13-26.
13-5a	Spring and fall Chinook and coho salmon and fall-run steelhead run-size estimation using markrecapture methods	Should be coordinated and integrated with 13-6a and 13-15.
13-5b	Trinity River Hatchery Chinook Coded Wire Tagging	Essential element of a comprehensive fish monitoring program.
13-5c	Coded Wire Tags	Essential element of a comprehensive fish monitoring program.
13-6a	Trinity River juvenile salmonid outmigrant monitoring program	Should be coordinated and integrated with 13-5a and 13-15.
13-6b	Myxosporean parasites effects and energy reserves of juvenile Trinity R. Chinook	The TRRP should be ready to increase the level of parasite surveillance if needed, but this activity should be lower in priority as it is not currently an issue.
13-7	Annual Operations Process	Insufficient detail provided to evaluate the utility of this activity.
13-8	Temperature Model Support	Insufficient detail provided to evaluate the utility of this activity.
13-9	Address PITA 2	No information provided to evaluate the utility of this activity.
13-10	Mainstem Chinook salmon spawning survey	Essential element of a comprehensive fish monitoring program.
13-11A	Yurok Tribal Fisheries Monitoring (fall Chinook)	Essential element of a comprehensive fish monitoring program.

13-11B	Hoopa Tribal harvest survey of Trinity River fall Chinook	Essential element of a comprehensive fish monitoring program.
13-11C	Lower Trinity River Sport Harvest Survey	Essential element of a comprehensive fish monitoring program.
13-11D	Lower Klamath River Creel Census	Essential element of a comprehensive fish monitoring program.
13-12	Gravel Implementation Monitoring	Should be integrated with 13-17 and 13-18 within a revised hypothesis for coarse sediment management that can be used for more directed guidance on more appropriate gravel monitoring activities. Also overlaps with 13-25 in terms of monitoring in Rush Creek pool.
13-13	Map and Quantify Riparian Vegetation	Should be elevated in priority and 13-29 should be integrated within it. More synthesis is needed combined with riparian and geomorphic monitoring from previous years to test hypotheses regarding berm formation and future LWD supply to the in-stream ecosystem. See Section 3.2.3.
13-14	Riparian and Riverine Bird Monitoring	Should be lower in priority because it does not directly relate to fish populations and habitat (Objectives 1-5 of IHA), and proposal reviews indicated that data analysis methods were unclear.
13-15	Juvenile Salmonid Density Monitoring	Should be elevated and grouped with activities 13-4 through 13-6.
13-16	Sediment Monitoring	Provides essential time series needed to track integrated river channel response to management actions and should be elevated in priority. The linkage between these continuing observations and local channel response providing desired habitat must be more explicitly defined and tested.
13-17	Geomorphic monitoring and assessment of bed scour and mobility	This activity should be integrated with 13-12.
13-18	Geomorphic response to high flow duration	This activity should be integrated with 13-12.
13-19A	Develop cohort reconstructions for fall Chinook to evaluate cohort performance or year class strength, and population growth rate.	Essential element of a comprehensive fish monitoring program.
13-19B	Klamath-Trinity River fall/spring run Chinook scale age analysis	Essential element of a comprehensive fish monitoring program.

13-20	Monitor the abundance and distribution of FYLF egg masses throughout the forty mile system	No proposal accompanied this activity thus it is unclear if this task is intended to be part of FY13 Workplan.
13-21A	Yurok Tribal Fisheries Monitoring (spring Chinook)	Essential element of a comprehensive fish monitoring program.
13-21B	Hoopa Tribal harvest survey of Trinity River spring Chinook	Essential element of a comprehensive fish monitoring program.
13-22	Monitor the distribution and abundance of WPT	No proposal accompanied this activity thus it is unclear if this task is intended to be part of FY13 Workplan.
13-23	Assess design performance of specific design features (alcoves, side channels, lowered floodplains, etc)	This activity seems essential to a comprehensive monitoring program but it is difficult to determine if it should be elevated without additional details. It should be coordinated with 13-3. (May be better suited for design team to address.)
13-24	Riparian PITAs 3, 4, 5	No proposal accompanied this monitoring activity; thus it is unclear if the task is intended to be part of FY13 Workplan.
13-25	Retrospective evaluation of topographic changes at Rush Creek delta	Overlaps with 13-12 in terms of monitoring within Rush Creek pool. This is an appropriate ranking for this monitoring activity.
13-26	Gravel implementation tracer experiment	Good concept for a monitoring activity, but more detail is needed on the likelihood of success. Could be included as part of the actual implementation effort.
13-27	Integrated flow and sediment modeling to predict planform dynamics	This newly conceived activity is not as critical as others. Other sediment/geomorphology monitoring and modeling activities more directly contribute to testing of management hypotheses.
13-28	Map and quantify the extent (area) of available adult holding habitat at rehab sites and throughout the mainstem	Should be coordinated with 13-3.
13-29	Model how WY13 streamflow actions will affect riparian hardwood regeneration	Not as critical an activity as 13-13, but should be integrated within the scope of that activity.

Note: Shaded activities indicate a proposed change in the priority or an activity that should be coordinated and/or integrated with others.

4.0 REFERENCES

Beechie, T., G. Pess, and H. Imaki. 2012. Estimated changes in chinook salmon (Oncorhynchus tshawytscha) and steelhead (Oncorhycnhus mykiss) habitat carrying capacity from rehabilitation actions for the Trinity River, North Fork Trinity to Lewiston Dam. Completion Report, U. S. Fish and Wildlife Service, Arcata, CA. 39.

Bradford, M. and D. Hankin. 2012. Trinity River Restoration Program Adult Salmonid Monitoring Evaluation. March 26, 2012.

Hoopa Valley Tribe and McBain and Trush. *in prep.* Water year 2011 TRRP Geomorphic and Riparian Monitoring.

Hoopa Valley Tribe, U.S. Fish and Wildlife Service, Yurok Tribe. *in prep*. Integrated Habitat Assessment of the Upper Trinity River, 2009 Draft Report.

McBain and Trush. 2003. Coarse Sediment Management Plan: Lewiston Dam to Grass Valley Creek, Trinity River, CA. Administrative Draft, January 20, 2003.

TRRP and ESSA Technologies Ltd. 2009. Integrated Assessment Plan Version 1.0.

USDOI (United States Department of the Interior). 2000. Record of Decision: Trinity River mainstem fishery restoration final environmental impact statement/environmental impact report, Washington, D.C.

USFWS (U.S. Fish and Wildlife Service) and Hoopa Valley Tribe. 1999. Trinity River Flow Evaluation Final Report. U.S. Department of the Interior, Washington, D.C.

This page intentionally left blank

5.0 APPENDICES

Appendix A: Reviewer Curricula Vitae

This page intentionally left blank

APPENDIX A: REVIEWER CURRICULA VITAE

This page intentionally left blank

EDUCATION:
Ph.D.-Zoology (Environ. Science Option , Statistics minor), Oklahoma State University, 1980
M.S. - Zoology, Oklahoma State University, 1977
B.S. - Environmental Biology, Eastern Illinois University, 1975
Certified Fisheries Professional, American Fisheries Society (#3275 exp. 12/2017)

PROFESSIONAL EXPERIENCE:
2003 – present Thomas H. Jones Professor of Fisheries, Virginia Tech
1999 – 2006 Department Head, Fisheries and Wildlife Sciences, Virginia Tech
1993 - 2003 Professor, Virginia Polytechnic Institute and State University
1995 - 1996 Visiting Scientist, Environmental Science Div., Oak Ridge National Laboratory
1980 - 1993 Associate Professor (1986-93), Assistant Professor (1980-86), VPI&SU

FIELDS OF INTEREST:
Population and community ecology, stream fish ecology and behavior, regulated rivers, modeling and simulation, instream flow and stream habitat assessment, fisheries management, fish population dynamics

HONORS AND AWARDS:
Making a Difference Award, Instream Flow Council (2008); USFWS Regional Director's Conservation Award (2006); Certificate of Teaching Excellence (1999); Outstanding Faculty Award, College of Forestry and Wildlife Resources (1998); W.F. Thompson Award, American Institute of Fishery Research Biologists (1993), Student Paper Outstanding Faculty Award, School of Forestry and Wildlife Resources, VPI&SU (1989); Best Paper Award, *Transactions of the American Fisheries Society* (1982); Fellow, Virginia Natural Resources Leadership Institute; Fellow, American Institute of Fisheries Research Biologists

PROFESSIONAL SERVICE:
Editorial Board Member for *Rivers: Studies in the Science, Environmental Policy and Law of Instream Flow* (1988-2002), *Transactions of the American Fisheries Society* (1984-86), *North American Journal of Fisheries Management* (1989-91), President, Education Section, American Fisheries Society (1991-92), President, National Associate of University Fisheries and Wildlife Programs (2003-2006).

RECENT PUBLICATIONS: (over 150, including 93 refereed articles and book chapters)

Anderson, M.R., D.J. Orth, and S.M. Smith. 2003. Case history: Historical changes in brown trout fishery in the Smith River tailwater, Virginia. *Proceeding of Southeastern Association of Fish & Wildlife Agencies.* 57:150-159

Clark, M. E., K. A. Rose, J. A. Chandler, T. J. Richter, D. J. Orth, and W. Van Winkle. 2008. Water-level fluctuation effects on centrarchid reproductive success in reservoirs: a modeling analysis. *North American Journal of Fisheries Management* 28:1138-1156.

Copeland, J.R., D.J. Orth and G.C. Palmer. 2006. Smallmouth bass management in the New River, Virginia: A case study of population trends with lessons-learned. *Proceeding of the Southeastern Association of Fish and Wildlife Agencies.* 60:180-187

Krause, C.W., B. Lockard, T.J. Newcomb, D. Kibler, V. Lohani, and D.J. Orth. 2004. Predicting influences of urban development on thermal habitat in a warm water stream. *Journal of the American Water Resources Association*. 40:1645-1658.

Krause, C.W., T.J. Newcomb, and D.J. Orth. 2005. Thermal habitat assessment of alternative flow scenarios in a tailwater fishery. Rivers Research and Applications. 21:1-13.

McManamay, R. A., D. J. Orth, C. A. Dolloff, and M. A. Cantrell. 2010. Gravel addition as a habitat restoration technique for tailwaters. *North American Journal of Fisheries Management*. 30:1238-1257.

McManamay, R. A., D. J. Orth, and C. A. Dolloff. 2012. Revisiting the homogenization of dammed rivers in the southeastern US. *Journal of Hydrology* 424-425:217-237.

McManamay, R. A., D. J. Orth, C. A. Dolloff, and E. A. Frimpong. 2012. A regional classification of unregulated streamflows: spatial resolution and hierarchical frameworks. *River Research and Applications* 28:1019-1033. DOI: 10.1002/rra.1493

McManamay, R. A., D. J. Orth, C. A. Dolloff, and E. A. Frimpong. 2012. Regional frameworks applied to hydrology: can landscape-based frameworks capture the hydrologic variability? *River Research and Applications* 26: *online at wileyonlinelibrary.com DOI:* 10.1002/rra.1535

McManamay, R. A., J. T. Young, and D. J. Orth. 2012. Spawning of white sucker (*Catostomus commersoni*) in a stormwater pond inlet. *American Midland Naturalis*t 168:466-476.

Newcomb, T.J., D.J. Orth, and D.F. Stauffer. 2007. Habitat Evaluation. Pages 843-886 in M.L. Brown and C.S. Guy – editors, Analysis and Interpretation of Freshwater Fisheries Data. American Fisheries Society, Bethesda, Maryland.

Persinger, J. W., D. J. Orth, and A. W. Averett. 2011. Using habitat guilds to develop habitat suitability criteria for a warmwater stream fish assemblage. *River Research and Applications* 27:956-966. http://dx.doi.org/10.1002/rra

Orth, D. J., and T. J. Newcomb. 2002. Certainties and uncertainties in defining essential habitats for riverine smallmouth bass. Pages 251-264 in M. S. Ridgway and D. P. Philipp, eds. Black Bass: Ecology, Conservation, and Management. American Fisheries Society, Bethesda, Maryland.

Vadas, R. L., and D. J. Orth. 2001. Formulation of habitat suitability models for stream-fish guilds: do the standard methods work? *Transactions of the American Fisheries Society* 130:217-235.

RECENT RESEARCH PROJECTS:

Dynamics and role of blue catfish *Ictalurus furcatus* in tidal rivers of Virginia. Orth, D.J., Y. Jiao, and A. Rypel. Virginia Department of Game and Inland Fisheries. 2012-2016. $786,674

Life history and stream occupancy of Clinch Dace (*Chrosomus* sp. cf. *saylori*) In The upper Clinch River system, Virginia. Virginia Department of Game and Inland Fisheries. $73,000. 2010-2013

Restoration ecology of fishes in regulated rivers. Orth, D. J., and C. A. Dolloff, North Carolina Cheoah River Fund Board, $97,841, 2007-2011.

Stream flow classification for environmental flow standards and analysis. Orth, D. J., R. M. McManamay, J. Henriksen, and J. Heasley. $31,000. 2010-2011.

CURRICULUM VITAE

John C. Stella

Department of Forest and Natural Resources Management
State University of New York College of Environmental Science and Forestry (SUNY-ESF, Syracuse)
One Forestry Drive, Syracuse, NY 13210
Phone: (315) 470-4902; Fax: (315) 470-6934
E-mail: stella@esf.edu; webpage : www.esf.edu/fnrm/faculty/stella.htm

EDUCATION

University of California, Berkeley	Environmental Science, Policy and Management	Ph.D.	2005
University of California, Berkeley	Environmental Science, Policy and Management	M.S.	1998
Yale University	Architecture	B.A.	1988

APPOINTMENTS

Assistant Professor, Dept. of Forest and Natural Resource Management, SUNY-ESF, 2006–present

Adjunct Assistant Professor, Dept. of Geography, Syracuse University, 2009–present

CALFED Science Program Post-Doctoral Research Fellow, University of California, Berkeley, 2006

Senior Ecologist / Project Manager, Stillwater Sciences, Berkeley, CA, 1998–2006

Doctoral Student Researcher, University of California, Berkeley, 2000–2005

RESEARCH GRANTS

USDA Forest Service, Northeastern States Research Cooperative. *Quantifying Beaver Impacts on Adirondack Forest Communities at a Landscape Scale.* 2012–2014. J.C. Stella (PI), E. Bevilacqua (Co-PI) and J. Frair (Co-PI). $106,866.

National Science Foundation EAR-1024820. *Quantifying Feedbacks between Fluvial Morphodynamics and Pioneer Riparian Vegetation in Sand-Bed Rivers.* 2010–2013. J.C. Stella (PI), A.C. Wilcox (PI), and A.F. Lightbody (PI). $650,000

SUNY-ESF, Research Seed Grant. *A New Tool for Restoration Ecology: Stable Carbon Isotopes in Tree Rings as Indicators of Ecosystem Change.* J.C. Stella (PI) and M. Teece (Co-PI). $8,000.

Western Caucus Pooled Fund. *Riparian Study Development for the Lower Yuba River*. $7,000. 2010–11.

McIntire-Stennis Research Program, SUNY-ESF. Restoring Small, Ephemeral Wetlands in Forested Landscapes in New York State. 2009–2012. J.P. Gibbs, J.C. Stella (Co-PI). $89,850.

CALFED Science Fellows Program. *Modeling physical drivers and age structure of cottonwood forest habitat: an integrated systems approach.* 2008–2010. J.C. Stella (PI) and A.K. Fremier. $228,750.

CALFED Science Fellows Program. *Effects of river regulation and climate on sustainability of Fremont cottonwood (Populus fremontii) forests in California's Central Valley.* 2006–2008. J.J. Battles (PI) and J.C. Stella. $228,750.

McIntire-Stennis Research Program, SUNY-ESF. Quantifying riparian zone structure and function to guide management of the northern hardwood forest ecosystem. 2008–2011. J.C. Stella (PI). $82,000.

SUNY-ESF, Research Seed Grant. Elemental stoichiometry and ecosystem health of Onondaga Creek. 2008. J.C. Stella (PI) and K.E. Limburg. $8,000.

CALFED Science Fellows Program. *A mechanistic model to evaluate and improve riparian restoration success.* 2003–2004. J.C. Stella (doctoral fellowship), with J.J. Battles (PI). $93,491.

NSF Doctoral Dissertation Improvement Grant. *Developing a predictive understanding of recruitment and survival of pioneer riparian trees on regulated rivers.* 2003. J.C. Stella (doctoral fellowship), with J.J. Battles (PI). $11,950.

CALFED Ecosystem Restoration Program. *A mechanistic approach to riparian restoration in the San Joaquin Basin.* 2002–2003. Research grant #1999-B152 awarded to Stillwater Sciences (Project developed by J.C. Stella; data collection used for dissertation research). $289,666.

PUBLICATIONS

Peer-Reviewed Articles Published, in Press, and in Review (*indicates student contributor)

Stella, J.C., J. Riddle*, H. Piégay, M. Gagnage*, M-L. Trémélo. In press. Multi-scale drivers of riparian forest decline along a Mediterranean-climate river. *Geomorphology*

Stella, J.C., P. Rodríguez-González, S. Dufour, J. Bendix. 2012 Riparian vegetation research in Mediterranean-climate regions: common patterns, ecological processes, and considerations for management. *Hydrobiologia.* DOI: 10.1007/s10750-012-1304-9

Eallonardo, A. S.*, D.J. Leopold, J.D. Fridley and **J.C. Stella**. 2012. Salinity tolerance and the decoupling of resource axis plant traits. *Journal of Vegetation Science.* DOI: 10.1111/j.1654-1103.2012.01470.x

Singer, M.B., **J.C. Stella,** S. Dufour, L.B. Johnstone*, H. Piégay, and R.J.S. Wilson**.** 2012. Contrasting water uptake and growth responses to drought in co-occurring riparian tree species. *Ecohydrology.* DOI: 10.1002/eco.1283

Beier C.M., **Stella J.C**., Dovçiak M., McNulty S.A. 2012. Local climatic drivers of changes in phenology at a boreal-temperate ecotone in eastern North America. *Climatic Change* DOI: 10.1007/s10584-012-0455-z

Schifman, L.A.*, **J.C. Stella**, M. Teece and T.A. Volk. 2012. Plant growth and water stress response of hybrid willow (Salix spp.) among sites and years in central New York. *Biomass & Bioenergy* 36: 316-326 DOI: 10.1016/j.biombioe.2011.10.042

Stella, J.C., M.K. Hayden*, J.J. Battles, H. Piégay, S. Dufour, and A.K. Fremier. 2011. The role of abandoned channels as refugia for sustaining pioneer riparian forest ecosystems. *Ecosystems* 14: 776-790. DOI: 10.1007/s10021-011-9446-6

Harper, E.B., **J.C. Stella**, A.K. Fremier. 2011. Global sensitivity analysis for complex ecological models: a case study of riparian cottonwood population dynamics. *Ecological Applications* 21: 1225-1240. DOI:10.1890/10-0506.1

Downs, P.W., M.S. Singer, B.K. Orr, Z.E. Diggory, T.C. Church, and **J.C. Stella**. 2011. Restoring ecological integrity in highly regulated rivers: The role of baseline data and analytical references. *Environmental Management* 48:847-864. DOI: 10.1007/s00267-011-9736-y

Stella, J.C., and J.J. Battles. 2010. How do riparian woody seedlings survive seasonal drought? *Oecologia* 164:579–590. DOI: 10.1007/s00442-010-1657-6

Stella, J.C., J.J. Battles, J.R. McBride, B.K. Orr. 2010. Riparian seedling mortality from simulated water table recession, and the design of sustainable flow regimes on regulated rivers. *Restoration Ecology*. 18(S2): 284–294. DOI: 10.1111/j.1526-100X.2010.00651.x

Rodríguez-González, P.M.*, **J.C. Stella**, F. Campelo, T. Ferreira, A. Albuquerque. 2010. Subsidy or stress? Tree structure and growth in wetland forests along a hydrological gradient in southern Europe. *Forest Ecology and Management* 259: 2015–2025. DOI: 10.1016/j.foreco.2010.02.012

Stella, J.C., J.J. Battles, B.K. Orr, J.R. McBride. 2006. Synchrony of seed dispersal, hydrology and local climate in a semi-arid river reach in California. *Ecosystems* 9:1200-1214. DOI: 10.1007/s10021-005-0138-y

Book Chapters and Conference Proceeding Papers (*indicates student contributor)

Bendix, J., and **J.C. Stella.** In press. Riparian Vegetation and the Fluvial Environment: A Biogeographic Perspective. In *Treatise on Geomorphology 12: Ecogeomorphology* (D. Butler and C. Hupp, Eds.). Elsevier, San Diego.

Stella, J.C., J.D. Riddle, J.J. Battles, M.K. Hayden*, and A.K. Fremier. 2012. Riparian forest dynamics on a large, regulated river (California, USA): impacts and implications for management. Proceedings of the Integrative Sciences and Sustainable Development of Rivers (IS Rivers) Conference, Lyon, France, 26–28 June 2012. http://www.graie.org/ISRivers/actes/pdf2012/1B109-237STE.pdf

Stella, J.C., J.C. Vick, B.K. Orr. 2004. Riparian vegetation dynamics on the Merced River. *The Wilderness Society Riparian Floodplains Conference Proceedings.* Sacramento, CA. March 2001.

Stella, J.C. 1998. The Greywacke Cover-up. *Soil Survey Horizons* 39(4): 127-130.

Applied Research Reports and Non-Peer Reviewed Articles

Stella, J.C. 2011. Yuba River Riparian Study: Cottonwood Limiting Factors Analysis. Prepared for Yuba County Water Agency. Yuba River Development Project, FERC Project No. 2246.

Stillwater Sciences. 2006. Restoring recruitment processes for riparian cottonwoods and willows: a field-calibrated predictive model for the lower San Joaquin Basin. Prepared for CALFED Bay-Delta Ecosystem Restoration Program, Sacramento, California. Prepared by Stillwater Sciences and Dr. **J.C. Stella**, in conjunction with Dr. J.J. Battles and Dr. J.R. McBride, Department of Environmental Science, Policy, and Management, University of California, Berkeley. (http://www.stillwatersci.com/resources/2006riprecruitbrochure.pdf)

Stillwater Sciences. 2006. Merced River Ranch revegetation experiment. Prepared by Stillwater Sciences, Berkeley, California, for CALFED, Sacramento, California. (http://merced.stillwatersci.com/pdf/10/Tech%20Memo_10_Reveg%20Expt_compiled.pdf)

Stillwater Sciences. 2002. Merced River corridor restoration plan. Prepared by Stillwater Sciences, Berkeley, California for CALFED Bay-Delta Program, Sacramento, California (http://www.stillwatersci.com/resources/2004mercedrestoplan.pdf)

Stillwater Sciences. 2001. Merced River Restoration Plan Phase II. Volume II: Baseline evaluations; geomorphic and riparian vegetation investigations. Prepared by Stillwater Sciences, Berkeley, CA for CALFED Bay-Delta Ecosystem Restoration Program, Sacramento, CA. (http://www.stillwatersci.com/resources/2001mercedrestov2.pdf)

HONORS AND AWARDS

Schubert Prize, Dept. of Environmental Science, Policy and Management, UC Berkeley, 2005

Colman Fellowship in Watershed Management, UC Berkeley, 2000, 2003

ESPM Departmental Fellowships, UC Berkeley, 1996, 1997, 2000

INVITED PRESENTATIONS AND FEATURES

Stella, J.C. (invited), J. Riddle, J.J. Battles. 2012. Coevolution of floodplain and riparian forest dynamics on large, meandering rivers. Invited oral presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2012.

Stella, J.C. (invited instructor). 2012. Partnering with Beaver in Stream Restoration Short Course, Utah State University, 22–24 October 2012.

Stella, J.C. (invited) 2012. *Com'Eau Labo Workshop* - Better communication and collaboration between managers and scientists: discussions about current practices in France and the United States

IS Rivers International Conference (Integrative Sciences and Sustainable Development of Rivers), Lyon, France. 26–28 June 2012.

Stella, J.C. (invited) 2011. Réponse des ripisylves à une modification du régime hydrologique : diagnostic et propositions de restauration (Riparian forest response to modified riparian hydrological regimes: diagnosis and proposals for restoration). Colloque 13: Réhabilitation des hydrosystèmes: enjeux scientifiques et nouvelles perspectives ("Symposium 13: Rehabilitation of hydrosystems: scientific issues and new perspectives"). Entretiens Jacques Cartier 2011. Montreal, Canada, 3-4 October, 2011.

Stella, J.C. (invited instructor). 2011. Partnering with Beaver in Stream Restoration Short Course, Utah State University, 19–21 September 2011.

Stella, J.C. (invited), J. Riddle*, H. Piégay, 2011. Dendroecology as an indicator of riparian function and drivers of meso-scale ecosystem impacts. International Association of Vegetation Science Meeting, Lyon, France, 20–24 June 2011.

Stella, J.C. (invited), J. Riddle*, H. Piégay, M. Teece, 2011. Integrating tree-ring and stable carbon isotope analysis to measure riparian ecosystem function, integrity, and meso-scale hydrogeomorphic impacts. Seventh Symposium for European Freshwater Sciences, Girona, Spain, 27 June – 1 July, 2011.

Stella, J.C. (invited) 2009. A river runs through it: modeling and restoring riparian forests on dynamic floodplains. Invited speaker, Bowdoin College Biology Seminar Series. Brunswick, ME. September 24, 2009.

Stella, J.C. (invited) 2009. Abiotic Controls on Riparian Forest Development at Leaf to Landscape Scales. Invited speaker, Syracuse University Biology Seminar Series. Syracuse, NY. February 6, 2009.

Stella, J.C. (invited) 2007. Scaling from the leaf to the floodplain: Linking physiology studies with life history traits to restore streamside forests in arid regions. IGERT Biogeochemistry and Environmental Biocomplexity Seminar, Cornell University. Ithaca, NY. October 19, 2007.

Stella, J.C. (invited) 2007. Quantitative approaches to restoring streamside forests in a water-limited ecosystem. Department of Geography Symposium, Syracuse University. Syracuse, NY. September 22, 2007.

Stella, J.C. (invited) 2006. Quantitative approaches to riparian restoration in California (USA). River Restoration International Symposium. Madrid, Spain. September 19-21, 2006.

Stella, J.C. (special feature) 2003. Research featured in Forests Round the Bend, a special issue on riparian restoration efforts on the Sacramento River. Science-In-Action Newsletter, CALFED Bay-Delta Program. Sacramento, CA

CONFERENCE PRESENTATIONS (*indicates student contributor)

Kui, L.*, J**.C. Stella**, K. Skorko*, A. Lightbody, A.C. Wilcox, S. Bywater-Reyes*. Variation in experimental flood impacts and ecogeomorphic feedbacks among native and exotic riparian tree seedlings. Oral presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2012. (accepted)

Bywater-Reyes, S.*, A.C. Wilcox, A. Lightbody, **J.C. Stella**. Uprooting force balance for pioneer woody plants: A quantification of the relative contribution of above- and below-ground plant architecture to uprooting susceptibility. Poster presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2012. (accepted)

Stella, J.C., J. Riddle, H. Piégay, M. Teece, M-L Trémelo. Interannual trens in water use efficiency in declining riparian woodlands. Oral presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2012. (submitted).

Singer, M.B., H. Piégay, R. Wilson, **J.C. Stella**. Floodplain ecohydrology: Discerning climatic v. anthropogenic controls from tree-ring $\delta^{18}O$, dendrochronology, and instrumental climate records**.** Oral presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2012. (submitted)

Stella J.C., G.M. Kondolf, P. Rodríguez-González, C. Anderson, A. Albuquerque, S. Walls* and T. Ferreira. Riparian habitat structure and change downstream of reservoirs in the Sado River basin (Portugal). TEMPRIV 2012 – International Conference on Temporary Rivers. Evora, Portugal. 12–14 Sept., 2012.

Lightbody, A.K., K. Skorko*, L. Kui*, **J.C. Stella**, A.C. Wilcox. Hydraulic and topographic response of sand-be rivers to riparian vegetation presence and patterns: field-scale laboratory methods and results. 2012 Hydraulic Measurements and Experimental Methods Conference (HMEM 2012). Snowbird, UT. 12–15 August 2012.

Kui, L.*, **J.C. Stella**, K. Skorko*, A. Lightbody, A.C. Wilcox, S. Bywater-Reyes*. Flood effects on native and exotic woody riparian seedlings. Oral presentation at the Annual Meeting of the Ecological Society of America, Portland, OR, 5–10 August 2012.

Stella J.C., G.M. Kondolf, P. Rodríguez-González, C. Anderson, A. Albuquerque, S. Walls* and T. Ferreira. Regulation effects on riparian vegetation composition and structure in the Sado River basin, Portugal. XVI Congress of the Iberian Association of Limnology. Guimarães, Portugal. 2–6 July, 2012.

Stella, J.C. J.D. Riddle*, J.J. Battles, M.K. Hayden*, A.K. Fremier. Riparian forest dynamics on a large, regulated river (Sacramento, California, USA): impacts and implications for management. IS Rivers International Conference (Integrative Sciences and Sustainable Development of Rivers), Lyon, France. 26–28 June 2012.

Wilcox, A.C., P.B. Shafroth, A. Lightbody, **J.C. Stella**, S. Bywater-Reyes*, L. Kiu*, and K. Skorko*. Feedbacks among floods, pioneer woody vegetation, and channel change in sand-bed rivers: insights from field studies of controlled flood releases and models. European Geophysical Union, Vienna, Austria. 22–27 April 2012.

Stella, J.C., J. Riddle, H. Piégay, M. Teece. Tree-ring growth and stable carbon isotope indicators of hydrogeomorphic change in dryland riparian zones. Oral presentation at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2011.

Singer, M.B., S. Dufour, **J.C. Stella,** L.B. Johnstone*, H. Piégay, and R.J.S. Wilson. Contrasts in growth and water sources in co-occurring Mediterranean riparian tree species: evidence from tree ring isotopes and dendrochronology. Poster H11E-1097 at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2011.

Eallonardo, A. S.*, D.J. Leopold, J.D. Fridley and **J.C. Stella.** Linking plant traits to stress and resource gradients in inland salt and freshwater marsh communities. Northeast Natural History Conference, Albany, NY, 6-9 April 2011.

Stella, J.C. (Convener), J. Bendix, H. Piégay, and P. Downs. S*pecial session* on "Non-equilibrium Drivers in Mediterranean Climate River and Riparian Ecosystems" at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2010.

Stella, J.C., J. Riddle; H. Piégay; M. Gagnage; M. Trémolo. Multi-Scale Drivers of Riparian Forest Decline Along a Mediterranean-Climate River. Poster at the American Geophysical Union Fall Meeting, San Francisco, CA, December 2010.

Harper. E.B., **J.C. Stella**, A.K. Fremier. Multiscale Validation of a Spatially Explicit Demographic Model of Fremont Cottonwood on the Sacramento River. Poster at the 6th Biennial CALFED Science Conference (Ecosystem Sustainability : Focusing Science on Managing California's Water Future), 27-29 September 2010, Sacramento, California.

Hayden, M.K.*, J.J. Battles, **Stella, J.C.** Drivers of Pioneer Riparian Forest Establishment within Abandoned Channel Refugia. Poster at the 6th Biennial CALFED Science Conference (Ecosystem Sustainability : Focusing Science on Managing California's Water Future), 27-29 September 2010, Sacramento, California.

Harper. E.B., **J.C. Stella**, A.K. Fremier. Multiscale validation of a spatially explicit patch-based population model: Understanding the population dynamics of Fremont cottonwood in the Sacramento River watershed. Oral presentation at the Annual Meeting of the Ecological Society of America, Pittsburgh, PA, August 2010.

Harrison, A.M.*, **J.C. Stella**. Engineering the forest ecosystem: impacts on woody vegetation structure and composition by beaver, a central place forager. Oral presentation at the Annual Meeting of the Ecological Society of America, Pittsburgh, PA, August 2010.

Eallonardo, A. S.*, D.J. Leopold, J.D. Fridley and **J.C. Stella.** The salinity tolerance axis and other functional drivers of inland salt marsh assembly. Oral presentation at the Annual Meeting of the Ecological Society of America, Pittsburgh, PA, August 2010.

Bendix, J. and **J.C. Stella**. 2010. A Geographic Analysis of Riparian Biogeomorphology. Annual Meeting of the American Association of Geographers. Washington, D.C, April 2010.

Harrison, A.M.*, **J.C. Stella**, S.E. McNulty. 2010. The influence of landscape factors on beaver (Castor canadensis) occupancy in the Adirondack region of NY. Adirondack Research Consortium Annual Conference, Lake Placid, NY. 20 May 2010.

Stella, J.C. (Convener), A.K. Fremier. S. Dufour, and H. Piégay. *Special session* on "Ecological Processes on Abandoned Riparian Floodplains" at the Annual Meeting of the Ecological Society of America, Albuquerque, NM, August 2009.

Stella, J.C., E.B. Harper, A.K. Fremier. 2009. Quantifying geomorphic process controls on riparian forest dynamics using a linked physical-biological model: implications for river corridor conservation. Oral presented at American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2009.

Harper, E.B., **J.C. Stella,** A.K. Fremier. 2009. Identifying data gaps and prioritizing restoration strategies for Fremont cottonwood using linked geomorphic and population models. Poster presented at American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2009.

Stella, J.C., E.B. Harper, A.K. Fremier, M.K. Hayden, J.J. Battles. 2009. Using a patch dynamics approach to model cottonwood forest populations in river floodplains Oral presentation at the Annual Meeting of the Ecological Society of America, Albuquerque, NM. August 2-7, 2009.

Harper. E.B., **J.C. Stella**, A.K. Fremier. 2009. Ecologically meaningful sensitivity analyses: A case study of Fremont cottonwood (Populus fremontii). Oral presentation at the Annual Meeting of the Ecological Society of America, Albuquerque, NM. August 2-7, 2009.

Hayden, M.K., **J.C. Stella**, J.J. Battles, S. Dufour, and H. Piégay. 2009. Drivers of pioneer riparian forest dynamics in abandoned channels: an alternate recruitment pathway? Oral presentation at the Annual Meeting of the Ecological Society of America, Albuquerque, NM. August 2-7, 2009.

Rodríguez-González, P.M., **J.C. Stella**, F. Campelo, T, Ferreira, A. Albuquerque. 2009. Hydrologic controls on stand structure, tree architecture and growth in southern-European forested wetlands. Oral presentation at the 6th Symposium for European Freshwater Sciences, Bucharest, Romania.

Harper. E.B., **J.C. Stella**, A.K. Fremier. 2009. Ecologically meaningful sensitivity analyses: A case study of Fremont cottonwood (Populus fremontii). Poster presentation at the NSF Idaho EPSCoR Annual Meeting, Moscow, ID. Aug 31-Sept 1 2009.

Gehl, K.L., K.E. Limburg, **J.C. Stella**, 2009. Three Watershed Approaches for Evaluating Nutrient Loads, Onondaga Creek, NY. Poster presentation. Healthy Buildings 2009 Conference and Exhibition. Sept. 15, 2009.

Stella, J.C., M.K. Hayden, J.J. Battles, H. Piégay, S. Dufour, and A.K. Fremier. 2008. A Conceptual Model of Riparian Forest Response to Channel Abandonment on Meandering Rivers. EOS Transactions of the American Geophysical Union, Fall 2008 Meeting Supplement, Abstract H31H-07 (Fall 2008 AGU meeting, San Francisco, CA, December 15-19).

Stella, J.C, J.J. Battles, J.R. McBride, B.K. Orr. 2008. Riparian seedling mortality in semi-arid ecosystems and applications to river restoration. Oral presentation at the 5th Biennial CALFED Science Conference (Global Perspectives and Regional Results: Science and Management in the Bay-Delta System), 22-24 October, 2008, Sacramento, California.

M.K. Hayden, **J.C. Stella**, J.J. Battles, S. Dufour, and H. Piégay. 2008. Riparian forest patterns in abandoned channels on the middle Sacramento River: an alternative recruitment pathway for pioneer riparian vegetation in gravel-bed meandering rivers. Oral presentation at the 5th Biennial CALFED Science Conference (Global Perspectives and Regional Results: Science and Management in the Bay-Delta System), 22-24 October, 2008, Sacramento, California.

Fremier, A.K., J. H. Viers, **J.C. Stella**. 2008. Floodplain Heterogeneity Drives Riparian Vegetation Composition and Structure Through Channel Meander Migration and Channel Abandonment. EOS Transactions of the American Geophysical Union, Fall 2008 Meeting Supplement, Abstract H33B-1007, (Fall 2008 AGU meeting, San Francisco, CA, December 15-19).

Dufour S., H. Piégay, M.K. Hayden, **J.C. Stella**, and J.J. Battles. 2008. Impacts de la dynamique sédimentaire sur la végétation terrestre en plaine alluviale, variabilité spatiale et interactions d'échelles (Impacts of sediment dynamics on terrestrial vegetation of alluvial plains, spatial variability and scaling). Séminaire "Interactions végétation et contraintes physiques" (Vegetation Interactions and Physical Constraints Workshop), 28-29 January 2008, Grenoble, France.

Stella, J.C., J.J. Battles, J.R. McBride, B.K. Orr. 2007. Using mechanistic studies to model riparian tree establishment under environmental flow scenarios on regulated rivers. 6th Annual Meeting of the American Geophysical Union. San Francisco, CA. December 10-14, 2007.

Stella, J.C., M.K. Hayden, J.J. Battles, H. Piégay, and S. Dufour. 2007. A conceptual model of geomorphically-driven riparian forest dynamics along the middle Sacramento River, California. Poster presented at the 8th biennial State of the San Francisco Estuary Conference, Oakland, CA, October 16-18, 2007.

Stella, J.C., J.J. Battles, J.R. McBride, B.K. Orr. 2007. Physiological adaptations increase survival for riparian tree seedlings subject to river stage decline. Annual Meeting of the Ecological Society of America, San Jose, CA. August 6-10, 2007.

Hayden, M.K. A.J. Keith, W.M. Swaney, C.D. Jaquette, M.D. Reil, **J.C. Stella**, and B.K. Orr. 2007. Former agricultural fields restored to riparian floodplains along the lower Tuolumne River, CA: Inundation patterns, fish use, and revegetation results. Annual Meeting of the Ecological Society of America, San Jose, CA. August 6-10, 2007.

Stella, J.C., J.J. Battles, J.R. McBride, B.K. Orr. 2006. A field-calibrated model of pioneer riparian tree recruitment for the San Joaquin Basin, CA. 6th Annual Meeting of the American Ecological Engineering Society. Berkeley, CA. April 13-14, 2006

Stella, J.C., J.J. Battles, J.R. McBride, B.K. Orr. 2006 Integrating field and experimental data to model recruitment of cottonwood and willow seedlings in the San Joaquin Basin, CA: implications for restoring riparian ecosystems. CALFED Science Conference, Sacramento, CA. 2006.

Diggory, Z., **J.C. Stella**, B. Orr, and M. Reil. 2006. Growth and survival of riparian trees two years after revegetation of graded floodplain dredger tailings at the Merced River Ranch. Poster. Presented at the Fourth Bienial CALFED Science Conference, Sacramento, California.

Stella, J.C., J.J. Battles, B.K. Orr, J.R. McBride. 2004. Riparian forest sustainability: calibrating a physical and biological recruitment model for the lower Tuolumne River, CA. Annual Meeting of the Ecological Society of America, Portland, OR.

Stella, J.C., J.J. Battles, B.K. Orr, J.R. McBride. 2004. Seed release patterns of native riparian trees and implication for flow-based restoration strategies. CALFED Science Conference, Sacramento, CA.

Stella, J.C., B.K. Orr, J.J. Battles, J.R. McBride. 2003. Riparian forest sustainability: calibrating a physical and biological recruitment model for the lower Tuolumne River, CA. North American Forest Ecology Workshop, Corvallis, OR.

Stella, J.C., B.K. Orr, J.J. Battles, J.R. McBride. 2003. Reproductive phenology and groundwater requirements for seedlings of three pioneer riparian species on the lower Tuolumne River, CA. CALFED Science Conference, Sacramento, CA.

Stella, J.C., B.K. Orr, J.J. Battles, J.R. McBride. 2002. Calibrating a model of seedling recruitment for riparian pioneer tree species on the lower Tuolumne River, CA. Annual Meeting of the Ecological Society of America, Tucson, AZ.

Stella, J.C., J.C. Vick, B.K. Orr. 2001. Riparian vegetation dynamics on the Merced River. The Wilderness Society Riparian Floodplains Conference. Sacramento, CA.

PROFESSIONAL SERVICE

Editorial Advisory Board member, *Riparian Ecology and Conservation*. 2012.

Guest co-editor, special issue for *River Restoration and Applications* on ecology and geomorphology of abandoned river channels. 2011.

Journal reviews for

Ecohydrology; Global Change Biology; River Research and Applications; Hydrobiologia; Ecoscience; Wetlands; Ecological Restoration; Environmental Management; Journal of the American Water Resources Association

Proposal reviews for

- National Science Foundation
- Northeastern States Research Cooperative (USDA Forest Service)
- USDA McIntire Stennis Program

Technical reviews for:

- Trinity River Restoration Program, Technical Review for FY13 Assessment Program
- Platte River Recovery Implementation Program, Directed Vegetation Research Study. 2011.
- Yuba River Development Project, FERC Relicensing Project No. 2246. 2011.
- USGS Geomorphic and Sediment Transport Laboratory. Project for monitoring vegetation change on the central Platte River, NE. 2007.
- CA Regional Water Quality Control Boards. Proposed Stream and Wetlands Protection Policy for North Coast and San Francisco Bay Regions. 2006.
- CA Department of Fish and Game. Protocol for quantitative studies of riparian vegetation restoration effectiveness. 2004.
- CA Department of Water Resources. Robinson Reach revegetation and monitoring plan, Merced River, CA. 2002.

PROFESSIONAL AFFILIATIONS

American Association for the Advancement of Science
Ecological Society of America
Society for Ecological Restoration
American Geophysical Union
Society of Wetland Scientists
California Native Plant Society

Peter Richard Wilcock

Professor, Geography & Environmental Engineering, Johns Hopkins University
Baltimore MD 21218 wilcock@jhu.edu (410) 516-5421

PROFESSIONAL PREPARATION

University of Illinois, Urbana, IL, Dept. of Geography, B.S.(summa cum laude), May, 1978.
McGill University, Montreal, PQ, Dept. of Geography, M.Sc., 1981
Massachusetts Institute of Technology, Cambridge MA.,
Dept. of Earth, Atmospheric, and Planetary Sciences, Ph.D., 1987

APPOINTMENTS

1997 - present: Professor, The Johns Hopkins University, Dept. of Geography and Environmental Engineering; Assoc. Dept. Chair 2004 - present
1993 - 1997: Associate Professor; 1987 - 1993: Assistant Professor
1990 - present: Joint appointment, Dept. of Civil Engineering, The Johns Hopkins University
2011 - present: Joint appointment, Dept. of Earth and Planetary Science, The Johns Hopkins University
1985 - 1987: Research Assistant, Dept. of Earth, Atmospheric, and Planetary Sciences, MIT
1982 - 1985: Teaching Assistant, Dept. of Earth, Atmospheric, and Planetary Sciences, MIT

PUBLICATIONS

Ten recent publications

Belmont, P., K.B. Gran, S.P. Schottler, P.R. Wilcock, S.S. Day, C. Jennings, J.W. Lauer, E. Viparelli, J.K. Willenbring, D.R. Engstrom, G. Parker, 2011. Large shift in sediment source challenges Upper Mississippi River Cleanup, *Environ. Sci. Technol*., 2011, 45 (20), pp 8804–8810.

Gran, K.B, P. Belmont, S.S. Day, N. Finnegan, C. Jennings, J.W. Lauer, P.R. Wilcock, 2011. Landscape evolution in South-Central Minnesota and the role of geomorphic history on modern erosional processes, *GSA Today*, v. 21. no. 9, doi: 10.1130/G121A.1.

Kenney, M., P. Wilcock, B. Hobbs, N. Flores, D. Martinez, 2012. Is Urban Stream Restoration Worth It?, *J. Am. Water Res. Assoc.* DOI:10.1111/j.1752-1688.2011.00635.x

Smith, S.M.C., P. Belmont, P.R. Wilcock, 2011. Closing the gap between watershed modeling, sediment budgeting, and stream restoration, in Simon, A., Bennett, S.J. and Castro, J.M. (Eds), *Stream restoration in dynamics fluvial systems*, Geophysical Monograph194, Am. Geophys. Union

Wilcock, P.R., 2012. Stream restoration in gravel-bed rivers, Ch. 12 in Church, M., Biron, P. and Roy, A. (eds.), *Gravel Bed Rivers: Processes, Tools, Environments*, pp. 137-149, John Wiley and Sons, Chichester, U.K.

Jacobi, S.K., B.F. Hobbs, P.R. Wilcock, in press. A Bayesian framework for cost-effective non-point sediment source management and research with an application to the Minnesota River Basin, *J. of Water Resources Planning and Management*, ASCE.

Singh, A., S. Lanzoni, P. R. Wilcock and E. Foufoula-Georgiou, 2011. Multi-scale statistical characterization of migrating dunes in sand-bed rivers, *Water Res. Research*.47, DOI: 10.1029/2010WR010122

Viparelli,E., D. Gaeuman, P. Wilcock, and G. Parker, 2011. A model to predict the evolution of a gravel bed river under an imposed cyclic hydrograph and its application to the Trinity River, *Water Resources Research*, Vol. 47, W02533, doi:10.1029/2010WR009164.

Salant, N.L., J.C. Schmidt, P.E. Budy, P.R. Wilcock, in press. Unintended consequences of restoration: Loss of riffle habitats and gravel substrates following weir installation, *J. Env. Mgt*.

Schmelter, M.L., S.O. Erwin, P.R. Wilcock, in press. Accounting for Uncertainty in Cumulative Sediment Transport using a Bayesian Approach, *Geomorphology*.

SYNERGISTIC ACTIVITIES

National Center for Earth-Surface Dynamics, Lead PI, Stream Restoration Integrated Program.
Coordinate research, convene partner meetings, conduct short courses, and develop computational tools to support the project goal of improving the science and practice of stream restoration.
Stream Project - Director of collaborative project to introduce quantitative decision analysis and design guidance to stream restoration practice. project includes design and decision tools, guidance manual, and short course. Collaboration between NCED, US Army Corps of Engineers, and the Intermountain Center for River Restoration and Rehabilitation
Sediment Transport and Stream Restoration Short Courses:
Univ. California, (w/ G.M. Kondolf, UCB), (5 day course) Annual, 2003 - present.
Utah State University (w/ John C. Schmidt, USU) (10 day course) Annual, 2004 - present.
University of Maryland (w/ Margaret Palmer, UMCP) (5 day course) Annual, 2005 - 2009
Approx 12 other one-day or two-day courses
NCED Morphodynamics for (i) Mountain Rivers, Dec. 2005, (ii) Sand-bed Rivers, May, 2006
US Forest Service, Stream System Technology Center. Co-developed software, manual, and primer for practical predictions of sediment transport in coarse-bedded streams, 2005-2009.
Advisory Panels
BAYSTAT Science Advisory Panel, Governor's Bay Cabinet, State of Maryland.
Advisory Committee on Water Information, U.S.D.I.. Subcommittee on Sedimentation
National Research Council, Ocean Science Board and Water Science and Technology Board, Panel Chair: Panel on River Basin and Coastal Systems Planning, Committee to Assess the U.S. Army Corps of Engineers Water Resources Project Planning. 2002-2004.
National Research Council, Water Science and Technology Board, Committee on U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning, 2010-.
National Research Council, Water Science and Technology Board, Committee to Review Science and Planning for the Grand Canyon Monitoring and Research Center, 1998-1999.
Am. Geophysical Union, Journal Geophysical Research – Earth Surfaces, Associate editor, 2002-2006.

HONORS

American Society of Civil Engineers, Hans Albert Einstein Award (2008).
National Science Foundation, Graduate Fellow, 1978 to 1982
U. Illinois, Highest University Honors (top 3%), Highest Departmental Distinction, $\phi\beta\kappa$

COLLABORATORS AND OTHER AFFILIATIONS

J. Pitlick, U. Colorado; S. Wiele, Jon Major, Jim O'Connor, USGS; J. Pizzuto, U. Delaware; M. Doyle, UNC; K. Gran, U. Minnesota; M. Palmer, U. Maryland; C. Orr, Washington State U; J. Schmidt, USU; G.M. Kondolf, UC Berkeley; Gordon Grant, USFS.

ADVISEES (Total of 18 graduate students, 8 postdocs)

Post-Doctoral – Daniel Baker (2010-2012), Patrick Belmont (2008-2010), Nancy Brown (2006-2007), Melissa Kenney (2008-2010), Cailin Orr (2006-2007), Barbara Utley (2010-2011), Milada Majerova (2010 - present), Amy Hansen (2012 - present)
PhD – Jeffrey Clark (1997), Mark Colosimo (2002), Se Jong Cho (current), Joanna Curran (2002), Brendan DeTemple (current), Paul Grams (2006), Stephen Kenworthy (2002), Andreas Krause (current), Brian McArdell (1996), David Miller (1995), Charles Podolak (2012), Conor Shea (1995), Sean Smith (2011)
MS - D. Shane Cherry (1996), Adelaide Johnson (1997), Joseph Schweitzer (1993), Rachel Shea (1994), Dennis Sugrue (2009)

Graduate Advisors

John Southard (MIT emeritus), Ph.D. Advisor. M.A. Carson (McGill, retired), M.S. Advisor