Ecological Design in the West: Process-based, Performance-driven
October, 6-8, 2015
University of California, Berkeley, Clark Kerr Campus
Summary Report

Workshop Objectives

1. Explore basic ecological design approaches used by ecologists, engineers, landscape architects in Western US.
2. Process-based: build understanding of underlying physical/chemical/biological processes that inform design.
3. Performance-driven: examine the need for and consider appropriate metrics for determining success.
4. Apply aforementioned concepts to a real-world design problem.

Sponsors

- Industry Sponsors – Stillwater Sciences, ReNUWIt, cbec
- UC Berkeley Faculty Sponsor – Dr. Kara Nelson, Civil and Environmental Engineering Department

Planning Committee

- Dr. Maia Singer – Stillwater Sciences
- Dr. Noah Hume – Stillwater Sciences
- Dr. Will Stringfellow – University of the Pacific
- Christina Toms – San Francisco Bay Regional Water Quality Control Board
- Paul Frank – FlowWest
- Dr. Alex Horne – University of California, Berkeley

Participants

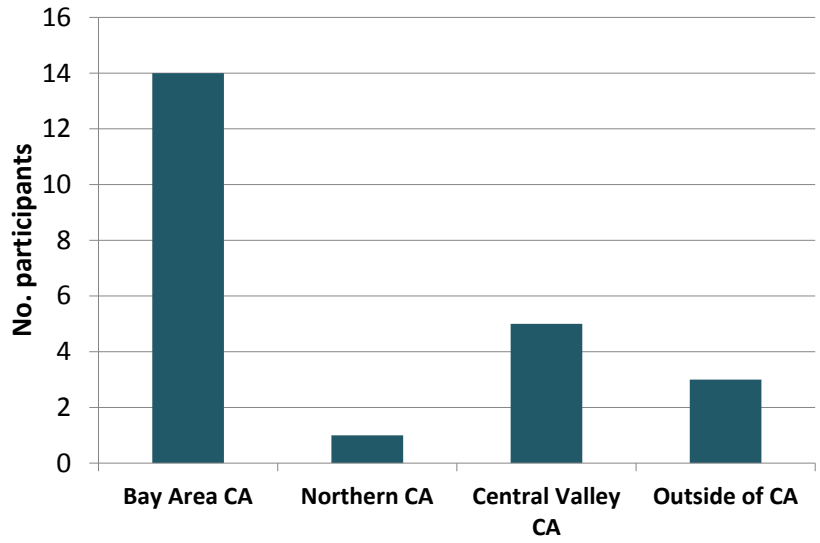

Figure 1. Workshop participant geographic composition.

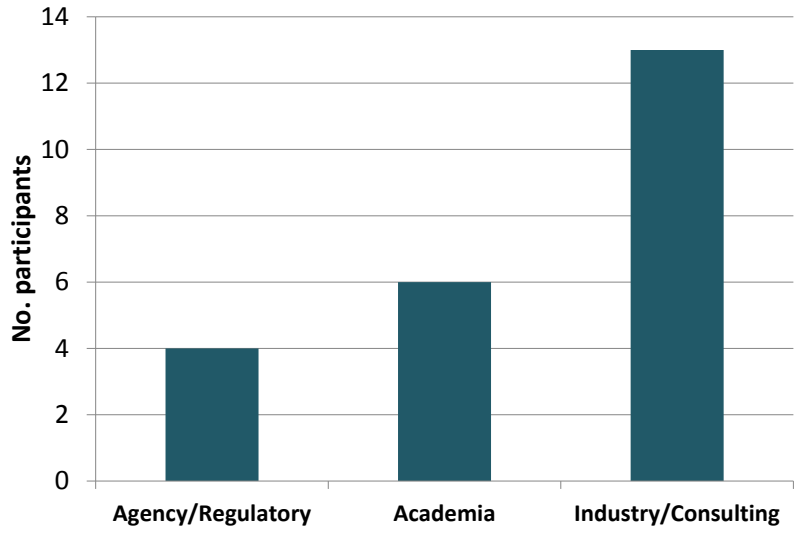

Figure 2. Workshop participant general professional sector.

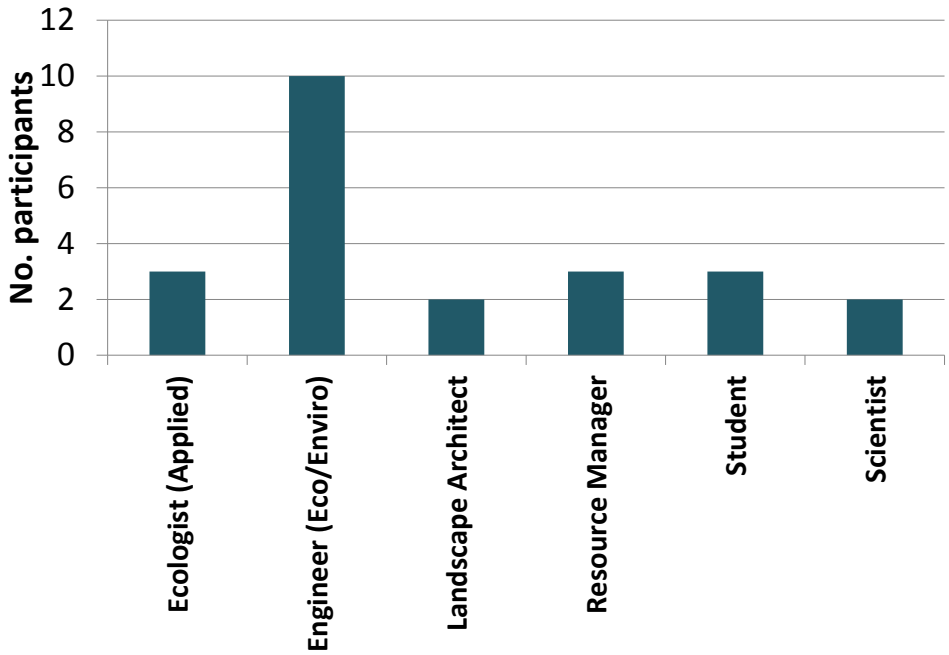

Figure 3. Workshop participant self-identification with particular profession(s).

Attendee List:
Ren Bates – East Bay Regional Parks
Gina Benigno – CA Department of Water Resources
Marc Beutel – University of California, Merced
Chris Blencowe – Blencowe Watershed Management
Aidan Cecchetti – University of California, Berkeley
Dylan Cooper – Virginia Tech
Joseph Crockett – University of California, Merced
Audrey Davenport – Google
Paul Frank – FlowWest
Susan Glendening – San Francisco Bay Regional Water Quality Control Board
Daniel Gillenwater – Independent Consultant
James Gorham – CH2MHill
Chris Hammersmark – cbec
Noah Hume – Stillwater Sciences
Michelle Kreig – Friends of Sausal Creek
David Latrona – Harris & Associates
Jeff Price – Terragraphics
Kara Nelson – University of California, Berkeley
Will Stringfellow – University of the Pacific
George Salvaggio – wra
Maia Singer – Stillwater Sciences
Christina Toms – SF Bay Regional Water Quality Control Board
Louis White – ESA

Schedule

Summary below, see Attachment A for speakers/titles.

Day 1 – morning included presentations on the underlying ecological processes and performance metrics used in ecological design, from the perspective of an ecologist (applied), an engineer (traditional and ecological), and a landscape architect. Afternoon included project examples from western ecosystems: freshwater tidal wetland, freshwater treatment wetlands, coastal river/estuarine systems, coastal stream/forests, and urban ecosystems.

All presentations on Day 1 were followed by small group (2-3 participants) discussions with specific prompts arranged in a matrix. Small group responses to prompts were compiled on the evening of Day 1 (see Attachment B) and provided to all participants on Day 2 to aid in their design charrette process.

Day 2 – morning included background information on design charrette projects, a short presentation on defining and designing to project objectives, and site visits. Afternoon included site visits, a short presentation on common design pitfalls, and first working session for design groups.

Day 3 – morning included design charrette working sessions. Afternoon included group design presentations and group discussion with pre-selected questions/topics.

Figure 4. Day 1, Afternoon Session – Project Example Presentations.

Design Charrettes

The workshop included two design charrette projects:

- Miller Knox Regional Shoreline Lagoon Enhancement, Richmond, CA
- Fern Ravine, Sausal Creek Restoration, Oakland, CA

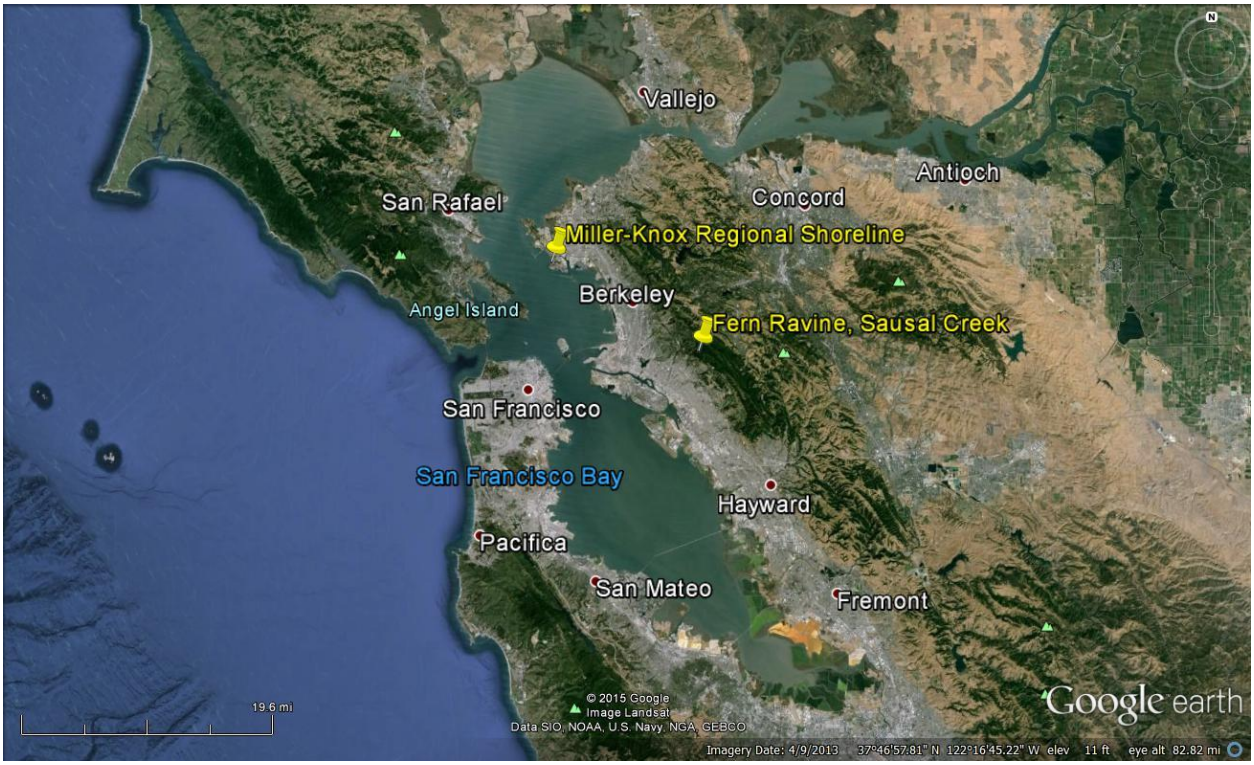

Figure 5. Design Charrette General Locations.

Figure 6. Design Charrette Projects – Miller Knox Shoreline (left), Fern Ravine, Sausal Creek (right).

Project 1 – Miller Knox Regional Shoreline Lagoon Enhancement

Project Objectives – Improve tidal connectivity between lagoon and San Francisco Bay to improve water quality, enhance aquatic habitat, improve sea level rise resiliency, and improve recreational amenities in an economically disadvantaged community.

Project Partners – East Bay Regional Parks, ESA, John Roberts (Landscape Architect, Berkeley)

Project Presenters – Ren Bates (East Bay Regional Parks), Louis White (ESA), John Roberts (Landscape Architect), Christina Toms (SF Bay Regional Water Quality Control Board)

Primary Ecological Processes Driving Project Design – tidal hydrology, future sea level rise, watershed runoff patterns.

Focus of the Design Charrette
Create a conceptual design for lagoon, shoreline, and surrounding park area that addresses the project objectives.

Project Location – Point Richmond Shoreline, East San Francisco Bay, see Figure 5, Figure 6, Figure 7.

Background Information – Excerpts from the Existing Conditions Report (ESA 2013).

Designs – Group 1 and 3 designs were provided to Ren Bates (EBRP) following the workshop (see also Figure 11, bottom, and Attachment C for design narrative example).

Figure 7. Miller-Knox Regional Shoreline Overall Site Plan (Source: EBRP).

Figure 8. Ren Bates (EBRP) giving site tour of Miller Knox Shoreline (top). Existing pond and pickleweed on north shore (bottom).

Figure 9. Ren Bates (EBRP) leading site tour of Miller Knox Shoreline (top). Existing pond and hard edge on south shore (bottom).

Figure 10. Workshop participants looking westward to San Francisco Bay, at possible Miller Knox Shoreline levee breach location on opposite site of railroad tracks (top). Group 1 working on Miller Knox Shoreline design (bottom).

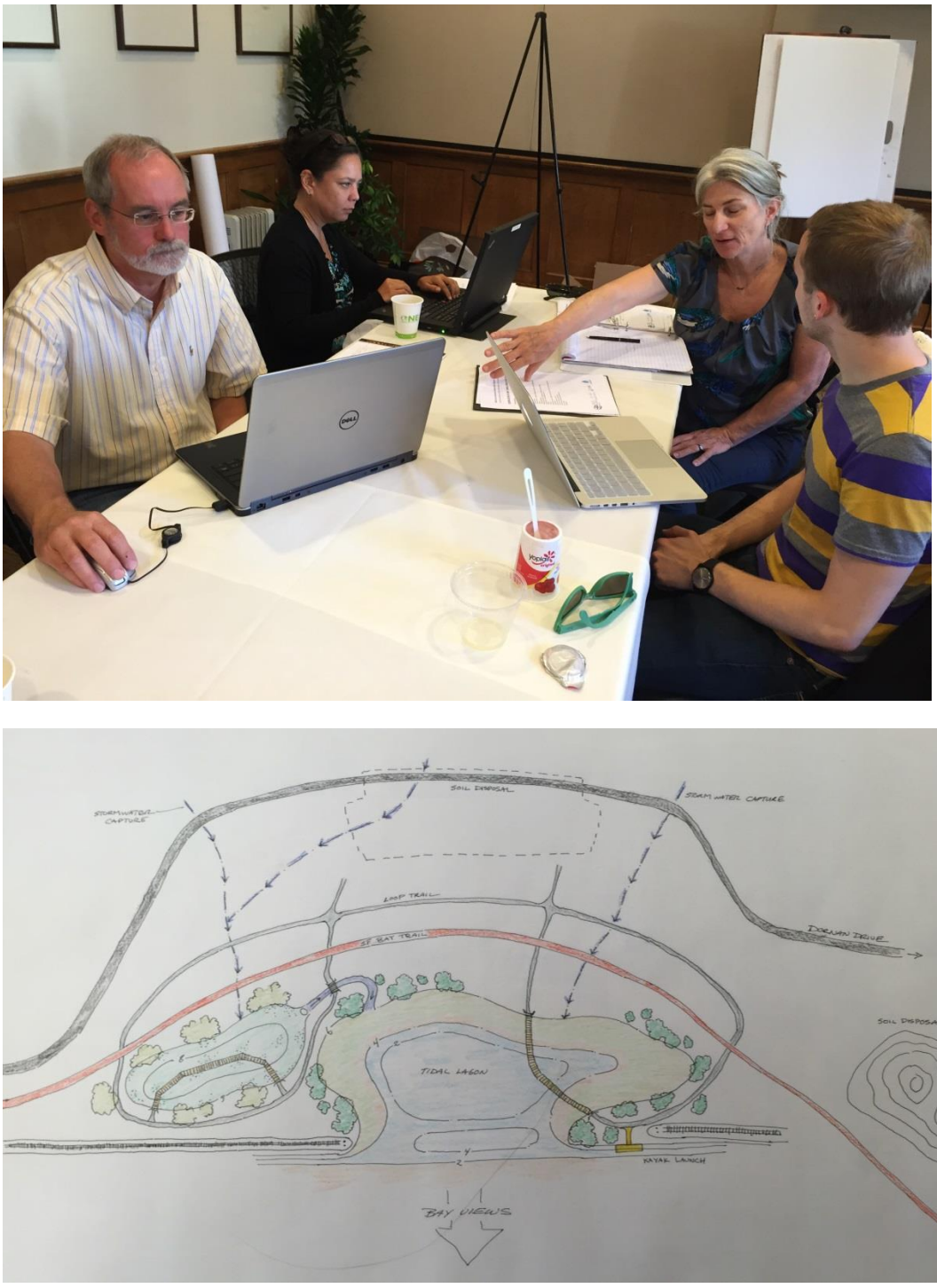

Figure 11. Group 3 working on Miller Knox Shoreline design (top). Conceptual design sketch example for Miller Knox Shoreline (bottom).

Project 2 – Fern Ravine, Sausal Creek

Project Objective – mitigate the effects of runoff, reduce erosion and sediment load to Sausal Creek, and enhance local wetlands.

Project Partners – Friends of Sausal Creek (FOSC), City of Oakland

Project Contacts and Presenters – Paul Frank, FOSC Board of Directors; Kimra McAfee, FOSC Executive Director; Michelle Krieg, FOSC Restoration Coordinator

Primary Ecological Processes Driving Project Design – Watershed urbanization causing hydrologic impacts, erosion/sedimentation impacting wetland/stream ecosystem.

Focus of the Design Charrette – design alternative concept(s) for remedying on-site stormwater issues (see Figure 13), reducing erosion, and enhancing riparian and wetland habitat.

Project Location – Forested East Bay Hills, Oakland, see Figure 5, Figure 6, and Figure 12.

Background Information – Excerpts from the Existing Conditions Report (FOSC 2010).

Designs – The Group 2 design was provided to the Friends of Sausal Creek following the workshop.

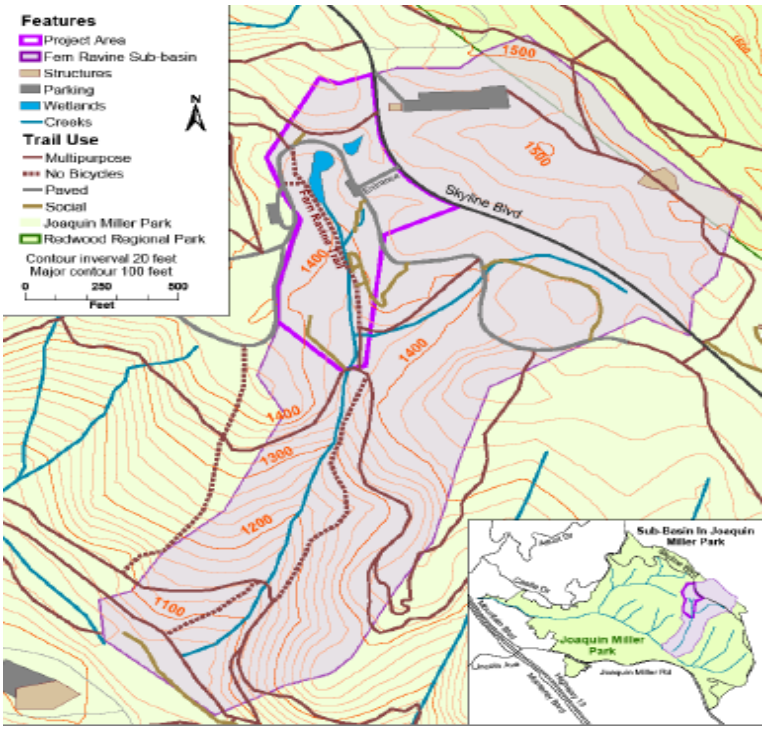

Figure 12. Fern Ravine Sub-basin and Project Site (FOSC 2010).

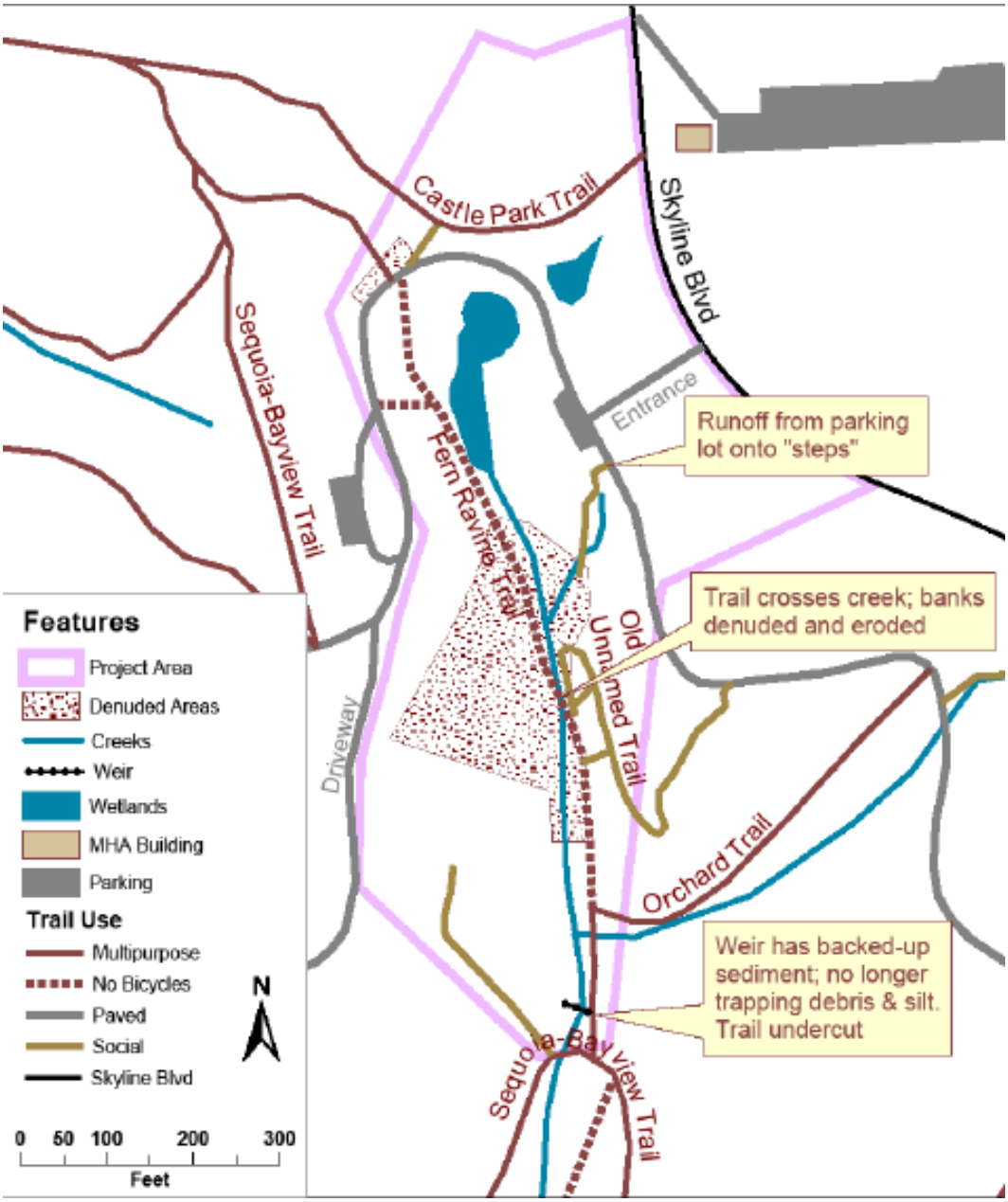

Figure 13. Fern Ravine Creek Hydrology and Erosion Issues in the Project Area (FOSC 2010).

Figure 14. Severely eroded section of hiking trail at Fern Ravine (top). Lower erosion site along dry stream crossing (bottom).

Figure 15. Stormwater discharge point upstream of erosion site at Fern Ravine upper site (top). Michelle Kreig (FOSC) showing participants upper parking lot, source of runoff to the site (bottom).

Figure 16. Michelle Krieg (FOSC) presenting background information for Fern Ravine (top). Group 2 working on Fern Ravine design (bottom).

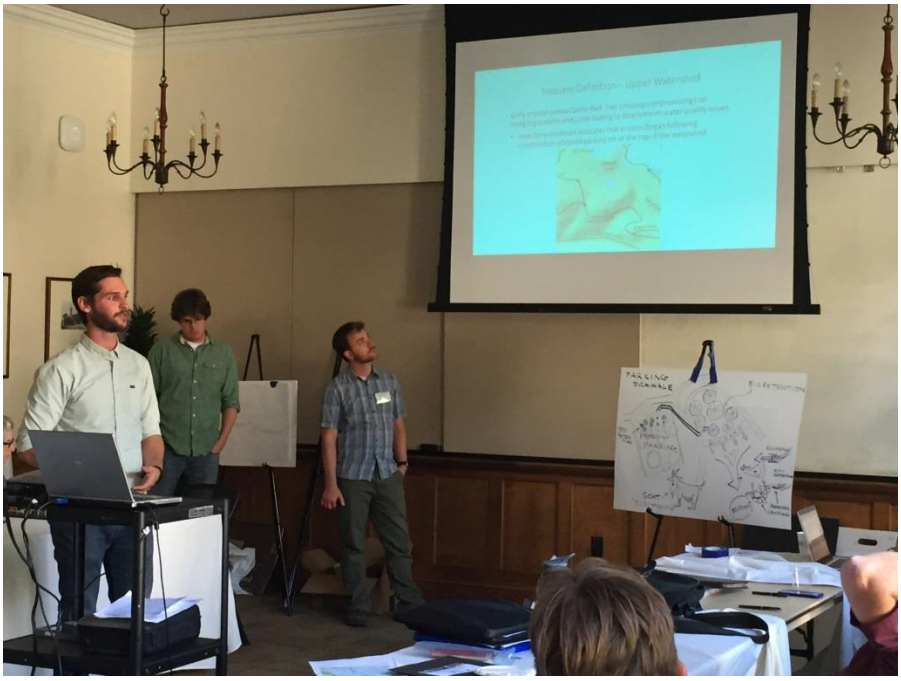

Figure 17. Group 2 presenting Fern Ravine design.

Certificates

All registered participants were issued a certificate of completion at the end of the workshop.

CERTIFIED ECOLOGICAL DESIGNER WORKSHOP
ECOLOGICAL DESIGN IN THE WEST: PROCESS-BASED, PERFORMANCE-DRIVEN

THIS CERTIFIES THAT

NOAH HUME

HAS SUCCESSFULLY COMPLETED THE 2015 WORKSHOP

GIVEN THIS 8 DAY OF OCTOBER, 2015

American Ecological Engineering Society

MAIA S. SINGER
AEES CED CHAIR

Figure 18. Example certificate of completion.

Participant Feedback

1. *What was your biggest take-away from the workshop?*
    - Importance of clarifying objectives
    - Additional capacity for design
    - Understanding processes affecting site evolution
    - Breadth of different engineering disciplines
    - Learning to design to ecological standards that are multi-disciplinary
    - Expanded view of ecological design
    - Communication between landscape architects, ecologists, engineers is critical for successful design

2. *Did you come into the workshop with prior experience in ecological design? If so, how many projects/years?*

    Range of responses, from 0 years (students) to over 20 years.

3. *Are you planning to pursue the AEES Certified Ecological Designer (CED) or the Associate Ecological Designer (AED) certification? If not, why not?*

    Everyone responded "yes", most for CED, a few for AED. Some participants were concerned that they may not have 3 implemented design projects for the CED.

4. *Please comment on the following:*
    a) *Workshop timing (i.e., 3 days, October, Tues-Thurs)*

    General consensus – 3 days was a perfect amount of time. Tues–Thurs was generally good for consultants and people traveling, but difficult for students because of classes. One consultant had to cancel because October is "construction season in California" and she needed to oversee her restoration projects. One regulator felt that fall is difficult because most projects want permitting now, so they can go to construction in the spring.

    b) *Workshop format (i.e., Day 1 – presentations with small group discussion, Day 2 – field visits, design charrette working sessions, Day 3 – design charrette completion and presentation, expert panel discussion)*

- Participants generally felt that the format, structure, and pace of the workshop were excellent.
- The small group discussions between presentations on days 1 and 2 were a great way for participants to interact/network, focus on workshop themes, and to break up the presentations.
- Participants appreciated starting with the fundamentals on Day 1 and moving into practice and design on days 2-3, including site visits.
- The format was an excellent opportunity for relationship building.

c) *Workshop registration fee ($275 student; $375 AEES member; $450 non-member)*

Fair, reasonable, good value, having all daytime food included was great.

5. *Other comments/suggestions for future workshops?*

Accolades:

- Overall, the workshop was very well organized, informative and a fabulous networking opportunity. Great job!
- The workshop was comprehensive and illuminating. Excellent.
- Was one of the best workshops I've been to in a long time. The presentations were great and the expertise represented was quite impressive. Would do it again.
- Appreciated the opportunity to look at ecological design examples in different ecosystem types (i.e., not just wetlands). Should continue this approach for next workshop.
- Was great to have conceptual design presentation from the "pros" after the design groups to compare and contrast. Great model for the design charrettes.

Suggestions:

- Would be helpful to have more presenters that are already CEDs.
- Including an ecologist, and engineer, and a landscape architect in every design group would allow a more balanced expertise to be included on any given project.
- Find a way to encourage more students to attend.
- Could include field visits to successfully designed sites, instead of just sites that need help.

Group Discussion

Q: At the workshop, we've spent time discussing how ecological design can help society contend with the challenges of sea level rise and pollution control (i.e., nutrient removal). How can ecological design help society contend with other pressing problems such as species extinctions and resource management?

A:

- Species extinction – ecological design can give species ability to move/corridors.
- Ecology is dynamic, the more areas we create that are dynamic, the more niches we have and more conditions we support for endangered species. Full expression of processes on landscape.
- Because we don't know how to predict everything.
- Vernal pools use existing hydrology to protect fairy shrimp, which are a protected species.
- Broaden our definition of ecosystem restoration. Lines get blurred between ecosystem restoration, water management, and we need to think broader.

Q: How should community of ecological design professional support greater integration…planners, resource managers, developers?

A:

- Marketing to/education for more traditional engineers.
- Require civil engineers to take a course in ecological design. For awareness building it could be a survey course. Similar idea for ecology and landscape architecture programs.
- Establish more facilitation around public process related to ecological design.
- Regulatory requirements to incorporate ecological design, such that projects can't be permitted otherwise.
- A few lawsuits might change a lot of what we do in creeks. Small stream failures are not a public safety risk, but there could be bridges/properties downstream that could be at risk. For large public agencies who fund the big projects, when projects fail the agency is embarrassed and don't want to daylight the problem, so we lose the learning opportunity.
- What about external technical review as part of the ecosystem restoration? Could require it for projects of a certain size. Would that be a reasonable permitting requirement?
- What about the concept of no net loss? At the end of the day, there are ecological solutions that don't look like no net loss but make more ecological sense. For example, buying out grazing land and fencing it off could be cheaper in the long run than trying to do stream restoration but keeping land use as-is.

- Selection of the least environmentally damaging project/self-sustaining might not be the least expensive. Mitigation could be supplanted by self-sustaining project, even if the 1:1 habitat isn't met.
- Agencies could consider exchanging habitat types for permitting allowances.

Q: The concept of innovation in our technologically focused world is widely touted as critical to a successful future… what does "innovation in ecological design" look like and how might it help advance the discipline?

A:

- Granularity in topographic data, as-constructed projects will probably function as expected if we can design with better data.
- Robots that weed/control invasive species.
- Keeping up with technology, being good at what you do, continuing your own line of inquiry pushing it forward.
- Integration between other fields – innovation comes from cross-pollination of ideas, keeping the conversation open across disciplines.
- The Google project is innovative because they have such a large real estate footprint. The scale may be innovative, but are the individual ideas? Yes, blending ecological design with worker satisfaction is innovative.
- Operating at a basin scale is innovative; we need to move off the site scale e.g., uplands to bay lands.
- Nature is incredibly innovative. As a restoration ecologist, understanding "how nature does it" and capitalizing on that in new and different ways allows us to be innovative.
- Self-design process is inherently innovative; invasive species colonization, human outcomes, but we are often reluctant to turn the system loose and see what happens.
- Is it innovative that we are designing towards future conditions? Climate change?
- "A Prosperous Way Down" by Odum – read the book! We need a book club ☺

Recommendations

- Not all participants were able to secure funding to register for and attend the entire workshop. While 23 total people participated, only 14 registered. Fifteen of the 23 participants were also presenters. A few of the registered participants were present for only 2 out of 3 days due to other professional commitments. Six of the presenters were only able to attend for one day. Securing additional sponsorship would help to partially fund presenter attendance, or perhaps even provide an honorarium for presenters. This may increase full participation of presenters at future workshops.
- Entice existing CEDs to serve as presenters at future workshops. They act as role models and an important resource for participants, particularly during the design charrette.

- Work to balance workshop participants such that an ecologist, an engineer, and a landscape architect can be included in in every design charrette group to allow a more balanced set of expertise.
- Encourage more students to attend. Future workshops might consider having students "apply" for participation where they would be competitively selected for attendance and funding to cover their expenses. Make sure application requests occur early with plenty of time for review and selection prior to the workshop.
- Consider including field visits to successfully designed sites prior to the design charrette, instead of only sites that are in need of design/redesign. This may extend the workshop beyond 3 days, so this could be offered as an optional day prior to the start of the workshop, particularly if it requires additional travel.
- Breaking into small discussion groups after each presentation, or group of related presentations, with prompt worksheets was very well received. Continue this approach at future workshops as a great way to break up the monotony of multiple presentations and get participants talking to one another and reinforcing concepts.

ATTACHMENT A

WORKSHOP SCHEDULE

Tuesday, October 6, 2015		
8:30 am – 9:00 am	Sign-in and Continental Breakfast – Executive Dining Room (Bldg 10)	
Morning Session – Introduction to Concepts		
9:00 – 9:15 am	Introduction to Workshop	Dr. Maia Singer (Stillwater Sciences)
9:15 – 10:00 am	Ecology – Basic Processes and Performance Metrics	Dr. Will Stringfellow (University of the Pacific)
10:00 – 10:45 am	Ecological Engineering – Basic Processes and Performance Metrics	Paul Frank (FlowWest)
10:45 – 11:00 am	Break	
11:00 – 11:45 am	Landscape Architecture – Basic Processes and Performance Metrics	George Salvaggio (wra)
11:45 am – 12:00 pm	Morning Wrap-up	Dr. Maia Singer
12:00 – 1:15 pm	Buffet Lunch – Garden Room (Bldg 10)	
Afternoon Session – Project Examples		
1:15 – 1:50 pm	Prospect Island Tidal Habitat Restoration Project	Dr. Noah Hume (Stillwater Sciences)
1:50 – 2:25 pm	Unit Process Wetlands for Removal of Nitrate, Trace Organics, and Pathogens	Dr. Kara Nelson (UC Berkeley)
2:25 – 3:00 pm	The Horizontal Levee: Coupling Nutrient Removal from Wastewater with Habitat Restoration	Aidan Cecchetti (UC Berkeley)
3:00 – 3:15 pm	Break	
3:15 – 3:50 pm	Santa Clara River Estuary Habitat Restoration and Enhancement Project	Dr. Chris Hammersmark (cbec)
3:50 – 4:25 pm	Accelerated Recruitment: Using Unanchored Large Wood to Rapidly Increase Instream Salmonid Habitat and Shelter	Christopher Blencowe (Blencowe Watershed Management)
4:25 – 5:00 pm	Resilient Silicon Valley	Audrey Davenport (Google)
5:00 – 5:10 pm	Day 1 Wrap-up	Dr. Maia Singer

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WORKSHOP SCHEDULE

Wednesday, October 7, 2015		
8:30 am – 9:00 am	Continental Breakfast – Executive Dining Room (Bldg 10)	
Morning Session – Design Charrettes and Field Visits		
9:00 – 9:10 am	Introduction to Design Charrette Concept	Dr. Maia Singer
9:10 – 9:30 am	Defining and Designing to Project Objectives	James Gorham (CH2MHill)
9:30 – 10:15 am	Background on Miller-Knox Shoreline	Ren Bates (East Bay Regional Parks) Louis White (ESA) Christina Toms (Regional Water Quality Control Board)
10:15 – 10:30 am	Break	
10:30 – 11:15 am	Background on Fern Ravine	Michelle Krieg (Friends of Sausal Creek Restoration Coordinator)
11:15 – 11:45 am	Travel to Miller-Knox Shoreline	
11:45 am – 12:30 pm	Miller-Knox Shoreline Site Tour	Ren Bates, Louis White, Christina Toms
12:30 – 1:00 pm	Box Lunch at Miller-Knox Shoreline	
Afternoon Session – Design Charrettes and Field Visits (cont.)		
1:00 – 1:30 pm	Travel to Fern Ravine	
1:30 – 2:15 pm	Fern Ravine Site Tour	
2:15 – 2:45 pm	Travel back to Clark Kerr Campus	
2:45 – 3:00 pm	Common Design Pitfalls	James Gorham
3:00 – 4:50 pm	Design Charrette - Working Session I	Workshop presenters circulate
4:50 – 5:00 pm	Day 2 Wrap-up	Dr. Maia Singer
5:00 – 7:30 pm	Evening Mixer at Dr. Alex Horne's home, El Cerrito	

WORKSHOP SCHEDULE

Thursday, October 8, 2015		
8:30 am – 9:00 am	Continental Breakfast – Executive Dining Room	
Morning Session – Design Charrette Completion		
9:00 – 10:15 am	Design charrette - working session II	Workshop presenters circulate
10:15 – 10:30 am	Break	
10:30 am – 12:00 pm	Design charrette - working session III	Workshop presenters circulate
12:00 – 1:15 pm	Buffet Lunch – Garden Room (Bldg 10)	
Afternoon Session – Design Charrette Presentations and Panel Discussion		
1:00 – 1:40 pm	Group Presentations	Assume 20 mins each
1:40 – 2:00 pm	ESA Conceptual Designs for Miller-Knox Regional Shoreline	Louis White
2:00 – 2:15 pm	Break	
2:15 – 3:15 pm	Panel Discussion – What is the Future of Ecological Design?	Christina Toms Dr. Will Stringfellow George Salvaggio Dr. Kara Nelson Paul Frank James Gorham
3:15 – 3:30 pm	Day 3 Wrap-up and Workshop Certificates	Dr. Maia Singer

LIST OF PRESENTERS

Christopher Blencowe, Blencowe Watershed Management

Christopher Blencowe is a CA Registered Professional Forester and owner/operator of Blencowe Watershed Management based on the Mendocino Coast. He has been responsible for developing and implementing the Accelerated Recruitment method for instream large wood shelter and habitat enhancement projects on private and public timberlands. Christopher received his bachelor's degree in Ecology at Western State College of Colorado in 2002. He has held positions with Idaho Fish and Game, Colorado Division of Wildlife and Campbell Timberland Management in Fort Bragg, CA. He currently works part-time as a subcontract watershed manager for The Conservation Fund (TCF) and as consulting forester working primarily with small landowners administering Non-Industrial Timber Management Plans. His background in aquatic resource management and extensive experience in forestry and forest engineering have contributed to the success of Accelerated Recruitment instream habitat enhancement projects. Since 2006, Christopher has served as the Lead Project Manager in 26 unique projects placing a total of nearly 3,000 pieces of large wood across 74 miles of salmonid streams.

Audrey Davenport, Google

Audrey Davenport leads the Ecology Program for Google's Global Real Estate & Workplace Services Team where she working to improve ecosystem-scale health in the communities Google calls home. Previously, Audrey worked for Google.org's Energy & Sustainability team, Environmental Defense Fund's Corporate Partnerships Group and The Nature Conservancy's Conservation Science Program. Audrey was also a Fulbright Scholar in Malaysia where she studied the effectiveness of marine protected area management schemes. She has taught graduate level sustainable management courses at Johns Hopkins Krieger School of Arts and Sciences and the Presidio School of Management. Audrey holds a BA with Honors from Stanford University, an MEM from the Yale School of Forestry and Environmental Studies and an MBA from the Yale School of Management.

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Paul Frank, P.E., CED, FlowWest

Paul is a Principal Engineer at FlowWest and a Certified Ecological Designer. He has 13 years of international consulting engineering experience having led or managed river and wetland planning, design, and construction projects in North America, Europe, the Middle East, and Asia. His specialty is the siting, planning, design, and construction oversight of multi-objective projects that combine habitat restoration, civil infrastructure, and human interaction with the landscape.

Dr. Chris Hammersmark, Ph.D., P.E., cbec eco-engineering

Dr. Hammersmark is a Principal Ecohydrologist at cbec eco-engineering (www.cbecoeng.com). Chris has over 15 years of experience on a diverse array of projects involving stream/river, meadow, floodplain and estuary rehabilitation/restoration design, as well as others focused on sediment transport, water quality, flood inundation and water supply. Working at the multidisciplinary nexus of geomorphology, hydrology, ecology and engineering, Chris seeks innovative and sustainable process-based solutions to complex multi-objective water resource and ecosystem restoration challenges.

Dr. Noah Hume, Ph.D., P.E., Stillwater Sciences

Dr. Hume is a Senior Scientist at Stillwater Sciences (www.stillwatersci.com). Originally trained in ocean engineering, Dr. Hume has more than 25 years of experience spanning aquatic and terrestrial ecology, biogeochemistry, engineering design, water quality, water supply and treatment. He currently focuses on physical and water quality impacts to aquatic species, participating in a variety of interdisciplinary projects, including aquatic habitat assessments, fisheries monitoring programs, wetland, estuarine and river restoration projects.

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George Salvaggio, wra

George Salvaggio is a Principal with 20 years of experience in designing habitat restoration/mitigation projects, designing public open space projects, and planning and designing low impact development projects. George supervises the Landscape Architecture Department at WRA. He received his Master's degree in Landscape Architecture from Cornell University where he specialized in native plant propagation, wetland design, and wetland feasibility analysis. George is a licensed Landscape Architect in the State of California.

Dr. Maia Singer, Ph.D., CED, Stillwater Sciences

Dr. Singer is a Senior Scientist and Water Quality Specialist at Stillwater Sciences (www.stillwatersci.com). She has 15 years of experience in aquatic sciences and engineering spanning water quality, nutrient removal using natural treatment systems, river and wetland ecology, restoration planning, monitoring design, dam removal effects on water quality, and climate change. Dr. Singer also has experience balancing restoration project needs with water rights issues in both California and Oregon. Dr. Singer is currently serving as the Certified Ecological Designer Chair for the American Ecological Engineering Society (www.aees.com).

LIST OF PRESENTERS

Dr. William Stringfellow, Ph.D.,
University of the Pacific, Lawrence Berkeley National Laboratory

Dr. Stringfellow is Director of the Ecological Engineering Research Program at the University of the Pacific and has a joint appointment with Berkeley National Laboratory in Berkeley, CA. His research is directed at quantifying the impact of non-point (diffuse) pollution on surface waters and the application of wetlands and natural systems as "best management practices" for the mitigation of diffuse pollution impacts. Dr. Stringfellow's current research is focused on understanding the impact of diffuse pollution on the San Joaquin River in the Central Valley of California. The San Joaquin River is a highly engineered ecosystem and it is widely recognized that new tools are needed to manage this critical water resource. He is currently working on projects integrating managed wetlands and riparian habitat into programs supporting sustainable agricultural in the Central Valley.

Christina Toms, San Francisco Bay Regional Water Quality Control Board

Christina Toms is an Environmental Engineer at the San Francisco Bay Regional Water Quality Control Board. For over 12 years, she has worked at the interface between applied science, engineering, and the regulatory compliance processes in order to protect and enhance Northern California ecosystems. Her professional focus is the streams, estuaries, wetlands, and watersheds of the San Francisco Bay-Delta and the Central California coast. She integrates governing physical processes (e.g. hydrology, geomorphology, and water quality) with ecosystem responses (e.g. habitat structure, special-status species requirements) in order to identify, analyze, and implement solutions to California's most pressing sustainability challenges. The vast majority of her projects address multiple objectives, most common among them improving ecosystem services at the site- or landscape-scale while reducing flood risk, improving water quality, and adapting to climate change.

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Kara Nelson, Ph.D., University of California, Berkeley
Dr. Nelson is a professor in Civil and Environmental Engineering. She received her B.A. degree in biophysics from U.C. Berkeley, her M.S.E. degree in environmental engineering from the University of Washington, and her Ph.D. in environmental engineering from U.C. Davis. Her research program addresses critical issues at the intersection of public health and the environment, with a focus on reducing the threat posed by waterborne pathogens by improving our engineering infrastructure to make it more effective, affordable, as well as maximize its environmental benefits. She is the Director of Graduate Education at the Engineering Research Center for Reinventing our Nation's Urban Water Infrastructure (ReNUWIt), and the faculty leader of the Research Thrust Area on Safe Water and Sanitation at Berkeley Water Center. Dr. Nelson was awarded the Presidential Early Career Award for Scientists and Engineers (PECASE) at a ceremony in the White House in 2004. This award is the nation's highest honor for scientists in the early stages of their career. She currently conducts research in the United States, India, Bangladesh, Kenya, Panama, and Colombia.

Michelle Krieg, Friends of Sausal Creek
As the restoration and nursery manager for, Michelle leads or coordinates many of our ongoing watershed restoration efforts and manages the volunteer-based Joaquin Miller Native Plant Nursery. For the past seven years she has been involved in nonprofit, community-based habitat restoration work with organizations in California, Wisconsin, Maryland, and Central America. Her experience includes nonnative, invasive species removal, GPS mapping, bird monitoring, seed collection, native plant propagation and planting, outdoor education, and volunteer management. Michelle received a B.S. in Geological Sciences and Biological Sciences from Arizona State University, where she studied the effects of climate change on plants and arthropods in tundra along the Antarctic Peninsula.

American Ecological Engineering Society

Stillwater Sciences

cbec eco engineering

ReNUWIt

LIST OF PRESENTERS

Louis White, P.E., ESA

Louis is a registered professional engineer with over 8 years of experience in civil and coastal engineering. Louis' experience includes restoration design of coastal, estuarine, and wetland habitats using a combined approach of applied geomorphology, hydrodynamic modeling, and empircal techniques to develop innovative designs at locations throughout the west coast. Louis has also completed several coastal hazard mapping studies, sea level rise vulnerability assessments, and has developed restoration design guidelines of estuarine habitats in the Lower Columbia River, as well as contributing to planning and resource management plans. He provides technical and project management skills to projects, including coastal engineering, flood management, preparation of construction documents and permitting support, as well as adhering to tight schedules and budgets. Louis frequently performs as part of a multi-disciplinary team, collaborating with planners, architects, engineers, geomorphologists, and biologists to develop optimal solutions to complex, multi-objective problems for local, regional, state and federal agencies, non-profits, and private companies.

ATTACHMENT B

COMPILATION OF DAY 1 SMALL GROUP PROMPTS

Unique perspectives

- LA – respecting landscape forms, experiential aesthetics, consensus building as part of design
- Engineering – focus on benefits for people, safety, durability, simplicity
- Ecology – focus on benefits for ecosystem; habitat complexity, multi-species

Underlying processes driving design

- Surface water hydrology – seasonal, flood, tidal
- Ground water hydrology
- Sea level rise
- Wave attenuation
- Sediment transport – erosion/scour, deposition/accretion (e.g., beach building/sand bar dynamics)
- Large wood recruitment
- Stratification and mixing – salinity, water temperature, dissolved oxygen
- Particle settling – turbidity, pathogen removal
- Photolysis
- Diffusion
- Biogeochemical nutrient cycling – redox in soil/water columns, nitrogen cycling, carbon sequestration
- Biologic (community) succession
- Resource limitation (population level)
- Growth rates of biota (kinetics), limiting factors
- Energy transfer
- Urbanization

COMPILATION (CONT.)

Performance metrics
- Flood frequency & duration
- Consecutive inundation days
- Water velocity
- Nutrient removal effectiveness
- Pathogen removal effectiveness
- Successful fish passage
- Absolute coverage of indicator species
- Relative coverage indicator species
- % coverage of non-native invasive species
- Species diversity/richness/abundance
- Desired community assemblage thresholds
- Habitat structure – ratio upland to wetland area

Potential design opportunities
- Site within migratory paths of species of interest
- Existing topography/elevations appropriate
- Land readily available
- Beneficial reuse of (waste) materials on-site
- Local material, no need to import
- Ability to control hydrology
- Features can be scaled to target different properties

Potential design constraints
- Adjacent land ownership is “hardscape”, built environment
- Invasive species (e.g., predator fish, plants) likely to colonize, difficult to control
- Regulatory/permitting requirements
- Cost/funding availability
- Size limitations
- Dynamic site, hard to design for changing conditions
- Competing project objectives/species niche needs

ATTACHMENT C

Miller-Knox Regional Shoreline Park – Design Charrette Group 1

Dylan Cooper, Noah Hume, David Latrona, George Salvaggio

Goals

- Overarching: improve the hydrologic and ecological function of the coastal lagoon to a more natural and more self-sustaining (low maintenance) conditions.
- Primary: balance complementary and mutually supportive public recreational access with the healthy ecological function of the lagoon
- Primary: conceive technically feasible cost effective improvements that will withstand the test of time.
- End goal: identify a feasible solution to a tidal connection with the existing lagoon that improves both habitat and recreational benefits of the park

Objectives

- An interconnected habitat from saltwater to freshwater
- Bayfront recreational opportunities
- New recreational opportunities on unused lands
- Link to the Bay Trail
- Maintain mile loop
- Minimize maintenance
- Develop future goals
- Guidelines
- Plan for 4-6 feet of sea-level rise
- Maintain railroad switching capabilities along levee

Design Processes

- Tidal scour
- Wind-wave erosion
- Sand movement
- Sedimentation
- Sea-level rise

Design Opportunities

- Proximity to tidal and non-tidal habitat
- People-to-nature interactions
- Preserving and integrate heritage of transcontinental railway
- Incorporate multi-use objectives of park (e.g. walking, biking, kayaking, wildlife habitat, education)
- Stormwater treatment and storage capacity

Design Constraints

- Maintaining existing railway private property
- Site has no source of perennial water (salt or fresh) at existing elevations
- Existing site attracts goose populations, leading to bacterial issues
- Anticipated sea-level rise may alter functionality of created habitats
- Elevation of existing stormwater drains is below existing pond water levels
- Sedimentation may cause maintenance concerns
- Recent park improvements
- Limit Canada Geese access

Design Elements

- Breach levee and excavate broad area to MHHW (6')
    - Take out 800 feet of levee, all the way to edge of railroad property
        - 300 feet wide
        - 6 feet deep
        - 53,333 cubic yards
    -
- Excavate tidal lagoon:
    - Maintain outlet sill at 4 feet
    - Excavate lagoon bottom at 2 feet
    - Grade to upland elevations in gentle bands
    - Habitat Bands
        - Upland edge (7+ feet): coastal shrub-scrub
        - High marsh (5-7 feet): pickleweed
        - Low marsh (4-5 feet): cordgrasses
        - Mudflat
        - Open water
    - Approximately 56,000 cu yds

- Beneficial re-use of excavated soils
    - Raise the road up to 15 feet contour
        - 1,500 feet long
        - 40 feet wide
        - 2 feet high
        - 45,000 cubic yards
    - Fill in triangle area on Ferry Point
        - 18,0000 sq ft
        - 5 feet high
        - 33,000 cu yds
    - Remaining fill near parking lot (raise up for sea-level rise)
- Seasonal freshwater wetland, separated by a berm
    - Top at 10 feet, bottom at 8 feet
    - Outlet at 9 feet, bioswale downslope to tidal lagoon
    - Will go dry in summer: interpret to public
    - Inside plants: reeds
    - Edge: willow
- Create stormwater bioswales
    - Captures hillslope and parking lot runoff
    - Directs day-lighted channel to seasonal freshwater wetland
        - Less land to maintain(benches, sod, mowing, etc.)
- Landscaping
    - Create vegetated deterrents for unwanted Canada Geese
        - Brushy shorelines
        - Dispersed bushes and paths split up open areas to prohibit landing and taking off
        - Upland savannah
- Bay trail
    - Skirts between ponds and road
    - goes out to Ferry Point
- Park trail
    - loops around parts of both ponds
    - more dynamic path
- Boardwalks
    - Over freshwater wetland
    - Over tidal lagoon
- Park multi-use/education
    - Enhances visualization of Bay
    - Additional bike path
    - Bringing Bay Trail into the park

    - Promoting recreational uses
    - Promote interpretive art
    - Highlights historical rail use
- Additional parking lot over near triangle on ferry point
    - To facilitate estimated increase in park-goers
    - Shortened access to kayak launch
- Create a Hand-launch area on water side of railroad berm, south side of breach

Performance Metrics

- Check tidal inundation
- Self-maintaining inlet
- Water quality (bacterial indicators, dissolved oxygen)
- Sediment accumulation
- Wildlife count
- Visitor usage
- Vegetation establishment (percent coverage)