SAME 2009 Water Conference
ABSTRACTS

Tuesday Afternoon

Session #:1
Room: 303
Moderator: Rick Sowers
Topic: Water Quality

1:00-1:30 PM

Jacob McQuirk
California Department of Water Resources
Senior Engineer

Title: The South Delta Improvement Program-Acceptable Solutions Don't Come Easy

The Department of Water Resources and Bureau of Reclamation have been planning actions to improve agricultural water supply, protect Delta fisheries, and increase the amount and reliability of Delta exports for over two decades. Hydrologic CalSim II and hydrodynamic DSM2 modeling has shown that this can be accomplished by constructing 4 permanent operable gates, 3 tidal and one to control San Joaquin River flows down Old River, and dredging in the southern portion of the Sacramento San Joaquin Delta. The tidal bottom hinged lift gates were designed to capture the flood tide that contains more high quality Sacramento River water, protect stage, and induce circulation. After completion of Final EIS/EIR for the project, ESA consultation indicated that SDIP would jeopardize endangered anadromous fish. In order to minimize near field velocity changes from the gates that could increase predation, detailed 3 dimensional modeling is supporting gate design modifications. New technology, including non-physical barriers like what was recently deployed at the Head of Old River, are promising, and have the potential to resolve conflicts between endangered Delta smelt and San Joaquin River anadromous fish. Innovative ideas and modeling may result in real solutions that protect water supplies and the environment.

1:30-2:00

Gary Ashby
Forsgren Associates

Title: Integrated Water Management Solutions on the Shasta River

Highly visible water management solutions have recently been implemented at two locations on the Shasta River near Yreka, California. The Shasta River hosts some of the most critical habitat for anadromous fish in the Klamath basin. It is also the center of an important agricultural region. Dramatic changes in climatic patterns and fish populations have brought the finite water resources of this basin into sharp focus. These two Shasta River projects were developed in a multitude of small steps initiated at the grass roots level. Each step was designed to provide practical science, build consensus, address stakeholder concerns, and ultimately develop a project with an integrated solution to water quality, conservation, fisheries enhancement, and economic sustainability. A sustained dedication to collaboration by visionaries at NRCS, the local Resource Conservation District, and the California Department of Fish and Game, coupled with a commitment to address the wide range of stakeholder agendas, were vital elements of success. Recognizing that different funding agencies had divergent interests, project leaders crafted a strategy to address all stakeholder needs comprehensively, including those of agriculture, fisheries, ranching, water conservation, and energy efficiency. As a result, nearly ten miles of anadromous fish habitat that had been blocked for over a half century have been reopened, water for agriculture and ranching is being delivered more efficiently, diversions from the river have been reduced, and the quality of water in the river itself has been improved. These projects demonstrate that conflicting interests can collaborate at the grass- roots level to implement truly win-win solutions. This presentation will provide insights into these high profile solutions to some of California's most challenging water issues.

2:00-2:30 PM

Sean Ragain
GeoEngineers
Principal Geologist

Title: Water Distribution Assessment at Tule Lake National Wildlife Refuge

Following the 2001 Klamath basin water crisis, the U.S. Fish and Wildlife Service contracted GeoEngineers, Inc. to assess and recommend improvements to the water distribution and drainage systems at Lower Klamath and Tule Lake National Wildlife Refuges in northern California. The intent of the project was to improve the Refuge water management systems, which would benefit all water users in this over-appropriated basin. GeoEngineers' work included developing topographic data for the 100,000 acres of the Refuges and assessing the condition and capacity of hundreds of water control structures. Light Detection and Ranging (LiDAR) was utilized to survey of the area and was coupled with digital orthophotography and ground inspections of the control structures using GPS technology. Pairing LiDAR and orthophotography offered rapid, cost-effective survey data over a large area with dense vegetation and provided FWS with a GIS database that could be developed into a Refuge management planning tool. Post-processing of the data provided a digital terrain model (DTM) with an x, y and z coordinate for every 1 square meter of the Refuges. Deliverables provided FWS with a LiDAR dataset and related GIS platform that will result in more effective management of water resources and habitat for wildlife.

Session #:2
Room: 300
Moderator: Robert Boling
Topic: Delta Levees

1:00-1:30

Vida Wright, Ph.D., P.E.
Veridico Group, Inc.
Principal

Co-author: David Cook, PE, Senior Program Manager, Kleinfelder

Title: An In-Depth Portrait of the Current Delta Levee Conditions and Challenges for Improvement

Section 103(f)(3) of PL 108-361, as amended by Section 3015 of the Water Resources Development Act (WRDA) of 2007, authorizes the Secretary of the Army to undertake the construction and implementation of levee stability programs or projects in the Bay Delta area for such purposes as flood control, ecosystem restoration, water supply, water conveyance, and water quality objectives as outlined in the CALFED Bay-Delta Program Programmatic Record of Decision (August 2000 ROD). It also includes rehabilitation of the Suisun Marsh levees.

This presentation will provide an in-depth portrait of a wide range of current levee conditions and the improvement needs in the Delta. It will also highlight technical and financial challenges facing the Reclamation Districts, California Department of Water Resources, and USACE Sacramento District in implementing the required improvements. The presentation is based on 30 site visits and trip reports prepared by Kleinfelder-Geomatrix Joint Venture Team under a Contract to USACE Sacramento District for the CALFED Levee Stability Program.

1:30-2:00

Jay Lund
University of California - Davis
Professor of Civil and Environmental Engineering

Title: Levee Decisions and Sustainability for Sacramento-San Joaquin Delta

The Sacramento-San Joaquin Delta's levees are subject to several physical realities that make them increasingly prone to failure. State planners face the challenge of preparing for future Delta flooding. This study presents an economic method for evaluating Delta island levee upgrade and repair decisions. A Levee Decision Analysis Model (LDAM) is applied to the question: How should the state economically prioritize levee upgrade and repair efforts in the Delta? We focus on 34 subsided

agricultural islands that make up most of the Delta's Primary Zone. This initial analysis indicates that it is economically optimal to not upgrade all 34 Delta islands examined, mostly because levee upgrades are expensive, but produce little improvement in levee reliability. When we assume increased effectiveness of upgrades, it becomes optimal to upgrade some islands. Other islands are never optimally upgraded, even under the most optimistic scenario. Our analysis also suggests that from an economic perspective, taking into account land and asset values, it is not cost effective to repair between 18 and 23 of these islands when they fail. When property values for all islands were doubled in a sensitivity analysis, only four islands of those originally not repaired become cost effective to repair.

2:00-2:30

Peter Wijsman
Netherlands Water Partnership
Liaison Officer

Title: Delta planning - a comparison between the Netherlands and California

The Sacramento-San Joaquin Delta is the center of attention in California's water politics. What are the characteristics of this delta and how does it compare to the Dutch delta. Besides all the similarities between the two there are also a lot of differences and this is where important lessons can be learned, on both sides. Recently Dutch and California government officials met to compare California's Delta Vision with the new Dutch Delta Plan. Key element was how to combine and integrate flood protection, water supply and ecosystem health. So what is the Dutch take on this and how do they try to balance these three important elements, and can they? These are the items that will be covered in this presentation

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Session #:3
Room: 304
Moderator: Paul Baginski
Topic: Dam Safety

1:00-1:30 PM

George V. Sabol, PE, PhD
Stantec Consulting Inc.
Principal

Title: Capay Diversion Dam Modernization for Sustained Irrigation Demand
Present the rehabilitation and betterment of an irrigation diversion dam in Yolo County, California, from inspection to final design.

Capay Dam is a concrete diversion structure on Cache Creek in Yolo County, California. It was constructed in 1915 and has been in continuous operation delivering irrigation water to about 250,000 acres of farm land. It consists of an overflow section, downstream apron, sluices, abutment walls, and two headworks. Sand and gravel extraction from Cache Creek and other urbanization factors resulted in streambed degradation downstream of the dam. That degradation along with local scour and aging of the structure jeopardized the integrity of the dam. A program of inspection, including nondestructive testing of the concrete, geotechnical exploration, structural analyses, review of construction documents and other engineering investigations indicated that remedial measures were necessary to restore the integrity of the dam. Roller compacted concrete (RCC) was selected for the replacement of the apron and to strengthen the abutment walls. The dam inspection, and the rehabilitation and betterment program for Capay Diversion Dam is presented. This includes environmental permitting, stream morphology, sediment transport, RCC mix design and lab testing, and historic data collection.

1:30-2:00 PM

Adam A. Riley, PE
U.S. Army Corps of Engineers-Sacramento District
Project Manager

Title: Hidden Dam, CA Dam Safety Assurance Program Study

Hidden Dam impounds Hensley Lake in Madera County, California. The Dam is built across the Fresno River, a tributary of the San Joaquin River, and is located about 15 miles northeast of the city of Madera. The dam was constructed between 1972 and 1975 for the purpose of flood control, recreation, and irrigation water supply. An initial evaluation of the dam was conducted in 2006 by a Screening Portfolio Risk Assessment (SPRA) cadre. Later the dam was categorized as a Dam Safety Action Class (DSAC) II dam – Urgent (unsafe or potentially unsafe). The high probability of failure along with major downstream infrastructure and population contribute to the urgent nature of the classification. The following are major contributions to the rating:

- Lack of adequate foundation seepage control beneath the embankment.
- Spillway inadequacy for the PMF event.
- Inadequately reinforced intake control tower for the OBE and MDE seismic events.
- Spillway erosion during the PMF.

The Hidden Dam, CA, Dam safety project addresses risk reduction and remediation of the known deficiencies. Geotechnical data collection and various studies and analyses are initially conducted to gather necessary data before formulating and evaluating alternatives. These analyses will ultimately lead to a Dam Safety Modification report and the rehabilitation of the dam.

2:00-2:30 PM

Blaine N. Dwyer, PE, D.WRE
AECOM Water
Vice President

Title: Nacimiento Spillway - Hydrologic and Seismic Challenges at a Major Reservoir

As the owner of one of California's most popular recreational reservoirs, the Monterrey County Water Resource Agency faced many challenges in the modification of its 100,000 cubic-feet-per-second spillway for new hydrologic and seismic criteria at the 400,000 acre-foot reservoir. Subject to both California Division of Safety of Dams and Federal Energy Regulatory Commission (FERC) jurisdiction and located in an adjacent county, the replacement of a 150-foot-wide ogee crest with new 13-foot-high Obermeyer inflatable crest gates was accomplished with close coordination with the regulators and the public. New seismic design accelerations up to 1.12g required high capacity anchorage systems. A new inflow design flood required raising the spillway walls to more than 30 feet. A 1:30 full-width hydraulic model was constructed to: 1) assess the effects of asymmetric approach channel flow; 2) potential for negative pressures at the lowered gates and at grade changes in the chute; 3) cross wave formation and 4) depth of flow characteristics along the entire chute. A supplemental potential failure mode analysis was conducted for the FERC and careful consideration of construction sequencing was required to assure that the work could be safely accomplished if it extended into the typically wet winter season.

Session #:4
Room: 302
Moderator: Stephen Boll
Topic: Levee Evaluations

1:00-1:30 PM

Mike Inamine
California Department of Water Resources
Manager, FloodSAFE Levees Portfolio

Title:California Levee Evaluations Program

DWR is currently engaged in an unprecedented program to evaluate 470 miles of urban levees and 1620 miles of non-urban levees for geotechnical deficiencies. The ULE and NULE project teams are evaluating State-Federal Project levees, including associated non-Project levees to determine whether they meet defined geotechnical criteria and, where needed identify remedial measures to meet those criteria. The information developed through the ULE and NULE projects will be used by the Central Valley Flood Management Planning Project to inform two important documents the Flood Control

System Status Report and the Central Valley Flood Protection Plan. A number of strategic and tactical challenges are described, including the broad role in the overarching California FloodSAFE initiative and specific impacts on the local flood system improvements.

1:30-2:00 PM

Christopher Dunn, P.E.
US Army Corps of Engineers, Hydrologic Engineering Center
Director

Title: New Corps Guidance for Evaluation of Levee Systems

The U.S. Army Corps of Engineers (USACE) is developing Engineer Circular 1110-2-6067, Evaluation of Levee Systems for the NFIP, to address levee system evaluations performed by the Corps. Levee systems risk assessments are being performed in association with the FEMA Map Modernization and National Flood Insurance Program (NFIP) efforts. The EC provides new guidance on how to perform these system-wide risk assessments. The assessments are to determine whether a levee system meets FEMA and USACE requirements for certifying that the system can be reasonably expected to provide flood protection from the 1% annual chance of exceedance flood. .A levee system comprises one or more components which collectively provide flood damage reduction to a defined area. Failure of one component within a system constitutes failure of the entire system. The levee system is inclusive of all components that are interconnected and necessary to ensure protection of the associated separable floodplain – levee and floodwall sections, closure structures, pumping stations, culverts, and interior drainage works. The EC describes policy, study process and outreach, coordination, technical criteria and guidance for complete engineering evaluation, and ITR and staffing/signature requirements. The release of the final EC is anticipated by the end of 2009.

2:00-2:30 PM

Christopher Groves
Shannon & Wilson, Inc.
Associate (Geotechnical Engineer)

Title: Statistical Evaluation of Levee Design Data

The evaluation or design of levees is often based on sparse data. Explorations typically consist of borings spaced at 1,000-foot centers. The levee system may be divided into reaches where height, foundation soils, and soil used for construction are similar. The engineer determines which boring within each reach exhibits the most adverse conditions and uses this information to analyze the entire reach. However, the most adverse conditions in the levee reach may not be encountered by widely spaced

borings. Given the performance of many levees in recent years, it is necessary to continue to improve our levee design procedures.

We are analyzing preliminary exploration data from two levee reaches in the California Urban Levee Evaluation Program using statistical methods. The analysis evaluates the distribution of factor of safety (FS) for various failure modes to estimate the probability that some portion of the levee has a FS less than 1. Our analysis consists of one reach with relatively uniform soil conditions formed by similar geologic processes and a second reach with more varied soil conditions and geologic processes. The analysis will be used to provide a basis for determining the preferred location and number of borings to adequately characterize a levee.

Session #:5
Room: 303
Moderator: Louay Owaidat
Topic: Risk Analysis

3:00-3:30 PM

Scott Shewbridge
URS
Senior Program Manager

Title: Simplified Approach to Assess Levee Seismic Vulnerability

This paper presents an overview of the California Department of Water Resources Urban Levee Program simplified seismic vulnerability method, its development, analysis protocols, and typical results. The methodology is based on a Newmark-type of deformation evaluation, with specialized charts to evaluate levee response to seismic loading, similar to the widely-used Makdisi-Seed simplified approach to evaluate dams. Example seismic hazard, cyclic-stress ratio, maximum seismic loading and deformation estimation charts are presented with details on how they are used to evaluate levee seismic vulnerability in a screening level program.

3:30-4:00 PM

Richard Millet
URS Corporation
Program Manager

Co-author: Wilbur Huang

Title: Erosion Screening Process

The California Department of Water Resources' Urban Levee Geotechnical Evaluations Program is evaluating urban levees in the Sacramento and San Joaquin river systems. A three-tiered Erosion Screening Process (ESP) has been developed to qualitatively assess the current risk of erosion failure on a levee's waterside slope. Erosion is caused mainly by a weakened geometric levee cross section or poor initial construction coupled with high flow velocity and/or wave action. Levees are evaluated through this three-tiered screening process until the erosion risk potential is determined. Each of the tiers

prospectively increases in detail. Tier one assesses overall geometry, fetch length, and historical performance. In the second tier, assessments are performed to evaluate the levee's surface resistance to velocity and wave shear stress. Also, field reconnaissance verifies expected levee performance and look for signs of erosion or unstable conditions. In the third tier, the ESP analyzes levee geometry, river geometry, soil and vegetation types, wind-wave impacts and velocity impacts to categorize levee reaches into a high, medium, or low erosion risk.

4:00-4:30 PM

Igor Linkov
US Army Engineer Research and Development Center
Risk and Decision Science Focus Area Lead

Title: Risk-Informed Decision Making: Sustainable Management of Flood Risks

The conventional approach to planning dams and levees in the US Army Corps of Engineers relies on safety factors for system design and cost benefit analysis to select and justify projects. In response to the devastation wrought by hurricanes Katrina and Rita in 2005, USACE has developed risk-informed decision making (RIDM) that draws from current practice in the fields of risk and uncertainty analysis and multi-criteria decision analysis. It provides an approach to defining attributes that capture a diverse set of objectives and establishing a set of preference weights that reflect the priorities of different stakeholder groups. It also provides a method of deriving quantitative scores for the numerous alternative plans for coastal infrastructure that are now under consideration by USACE. RIDM integrates quantitative uncertainty analysis and scenario planning techniques to assess what implications uncertain future conditions (e.g., future sea level rise and development) might have on the decision. Sensitivity and tradeoff analysis facilitate communication and negotiation among the parties to restoration management and help planners identify which strategies are the most robust performers in multiattribute terms. Emphasis is placed upon the role of adaptive management in connection with RIDM as mechanism for optimizing the performance of flood protection measures.

Session #:6
Room: 300
Moderator: William Swanson
Topic: Hydrology and Hydraulics

3:00-3:00 PM

Brad Moore
US Army Corps of Engineers, Sacramento District

Title: Setting the baseline: Central Valley Flood Hydrology Study

In 2007 the state initiated the FloodSAFE California program, which aims to increase flood protection and improve flood preparedness and response. For the state to achieve its FloodSAFE goals, the data upon which it depends must be updated: the baseline must be set. In support of these efforts, DWR has tasked the US Army Corps of Engineers, Sacramento District (Corps) to complete a hydrologic analysis of the Sacramento and San Joaquin river basins, specifically focused at developing hydrologic input to assess the federal-state levee system, located in the Central Valley. The goal of the hydrologic analysis is to develop the required flood frequency curves and associated volumes at key locations in the watershed, to support Central Valley floodplain mapping efforts.

In this presentation, we will describe the requirements of the study, how it is being coordinated with other agencies and a hydrologic advisory committee, the technical challenges of such a study, and the approach for completing the analysis.

3:30-4:00 PM

Mitch Russo
California Department of Water Resources
Water Resources Engineer

Title: Overview of products of the Central Valley Flood Hydrology Study

This presentation is a follow-up to the presentation above. Here, we will describe the products of the study, such as the developed hydrologic models, hydrographs, flow time series, and flow transforms, and how those can be used for DWR purposes and subsequent analyses. In addition, we will discuss how the products can be change based on changes in analysis assumptions or with various flood management measures constructed in the watershed.

4:00-4:30 PM

Kevin G. Coulton
AECOM
Project Manager

Title: Refining Reservoir Capacity Tables for Improved Water Management

Reservoir operations in the U.S. have been facing increasing water demands. Proposed flow release increases for fisheries mitigation, environmental limitations on new reservoir construction, and increasing hydro power demands are making every increment of water stored in reservoirs more valuable. Given these increasing demands, there is value in re-evaluating conventional tools to manage reservoir water resources, including the reservoir capacity table, which relates water elevation to storage volume. Many U.S. reservoirs were constructed in the early part of the 20th century when aerial photography and even sketch maps were used to derive topographic data to construct capacity tables. These relationships may have significant errors in them due to the accuracy of the methods used at the time, the presence of vegetation, and years of erosion or deposition within the active storage zone of the reservoir. Investigations of the Hungry Horse Reservoir capacity table in Montana are presented to illustrate potential refinements to the capacity table volume estimates. These activities could potentially be part of a drought contingency plan where reservoirs reaching historic low pool elevations would be flown to collect newer LIDAR topographic data that would in turn be used to update and refine existing capacity tables.

Session #:7
Room: 304
Moderator: David Curtis
Topic: Environmental Planning & Permitting

3:00-3:30 PM

Sean K. Hungerford
Diepenbrock Harrison
Shareholder

Title: Eminent domain and land planning for water infrastructure projects

California land use patterns are characterized by a high percentage of privately-owned land. When private land must be acquired for infrastructure, the use of eminent domain may be the only viable solution. Acquiring property by eminent domain requires the public agency to follow time-consuming

and exacting procedures enacted by the State Legislature to protect property owners. These procedures, which have great practical significance in terms of project cost, timing, and selection of sites or alignments, will be detailed in this presentation. In addition, because the cost of acquiring property for large-scale infrastructure projects can be substantial, the presentation will provide emphasis on how property values are determined under California's eminent domain law and should be addressed in the project budget. The presentation will follow the format below:

A. Eminent domain overview
B. Procedures and timing for obtaining pre-judgment possession
C. Land valuation principles

3:30-4:00 PM

Paul Sorci
Kleinfelder
Staff Engineer

Title: Impact of Levee Cutoff Walls on Groundwater Recharge

One of the alternatives often considered for levee remediation includes construction of seepage cutoff walls through the existing levee. These cutoff walls are used to mitigate underseepage issues and reduce exit seepage gradients to the acceptable levels. A concern has been raised that the cutoff walls could potentially impede seepage from the river through the levee foundation and adversely impact groundwater recharge landward of the levee. Conversely, the walls could also impede return flows and cause an unintended rise of groundwater table inside the levee system. To address these conce rn, the authors developed a simplified method using 2D seepage analyses to estimate the aquifer recharge under both existing conditions and with cutoff walls in place. This method was successfully applied for the environmental impact assessment of the Natomas Basin, where several miles of levees are being retrofitted with slurry cutoff walls for the Natomas Levee Improvement Project.

4:00-4:30 PM

Thomas W. Smith, PE, GE
RiverSmith Engineering
President. Water Resources/Geotechnical Engineer

Title: Levee Vegetation - The Good, the Bad and the Ugly

Riparian vegetation along the river banks of our flood control projects is a necessary component for a healthy river and a dynamic environmental corridor. However, trying to apply the Corps of Engineers' National Policy for levee vegetation standards to Central California Rivers is causing considerable

controversy. The positive affects of vegetation and woody materials (both live and dead) in the river environment are well documented while much of the evidence for levee failures in California has been circumstantial at best.

This presentation will focus on the technical aspects of how different types and sizes of vegetation can have an affect on the safety of levees from a hydraulic, structural and maintenance standpoints.

Through the use of example slides of existing conditions, the presentation will also demonstrate good examples of the use of river side vegetation, areas where vegetation is a bad idea and other examples where woody vegetation has been allowed unchecked and provides an ugly example for those who oppose any type of levee vegetation.

Session #:8
Room: 302
Moderator: Saad Merayyan
Topic: Outside of Northern California

3:00-3:30 PM

Leslie F. Harder Jr., PhD., PE, GE
HDR
Senior Water Resources Technical Advisor

Title: Midwest Levee Failures

The Midwestern portion of the United States experienced significant flooding in June 2008 after months of heavy precipitation in the region. The impact was severe on the Midwest levee systems where 22 levee breaches occurred, mainly due to overtopping. These events occurred on both federal and non-federal levee systems in Iowa, Illinois, and Missouri along the Illinois, Mississippi, Cedar, Des Moines, White, and Missouri Rivers. Many of the subject levees were only moderate in height, but were of interest because of the presence of trees or burrowing animals. An inspection team was dispatched to collect and record data related to levee distress and breaches at different levee systems. These systems were identified because of the potential for valuable data on vegetation impacts and failure mechanisms for levees. In two areas, the levees were found to have been seriously compromised by burrowing animals. Another levee system was found to have extensive penetrations by tree roots revealed in breached sections, yet the levees performed well without problem up until they were breached by overtopping flows, and there was no evidence that the roots were detrimental in any way to the performance of the levee. At another site, seepage boils were associated with the removal of trees at the landward toe of a levee berm. This paper presents some of the information and observations from the

inspection trip and discusses some of the key issues associated with levee vegetation its relation to other threats to levee integrity.

3:30-4:00 PM

Dr. Rob Mullins, PE, PMP, AICP
Stantec, Inc
Senior Principal

Title: Geotechnical and Design Challenges in Rebuilding New Orleans' Levees

Hurricane Katrina's rampage through the Gulf region took very little time. The U.S. Army Corps of Engineers' rebuilding efforts will take years. This paper contains a discussion of the unprecedented scope, scale, and challenges associated with geotechnical investigations and design efforts to bring the 350-mile New Orleans levee system up to a 100-year level of protection for the 2011 hurricane season. A discussion of the lessons learned during field investigations, soils lab processing, and design will also be provided.

In order to support this effort, one of the largest, most modern geotechnical laboratories in the country was established in New Orleans. In a two-year period, over 2,600 5-inch borings covering about 200,000 vertical linear feet and approximately 1,400 cone penetrometer soundings covering over 115,000 vertical linear feet have been drilled.

This presentation will also contain information about changes required to industry standard levee safety and stability analysis programs to handle the soft soils in the region. In addition, there will be a brief discussion of geospatial data management efforts to ensure continued access to the data, as needed.

4:00-4:30

Wayne Wright, PWS
GeoEngineers, Inc.
Managing Principal, Wetlands Scientist

Title: River Bottom Restoration and Enhancement on the Owyhee River, Idaho

The South Fork Owyhee River is in a remote location in Idaho. Historically the bottomlands were a rich wet meadow that provided habitat for a diverse range of species, including bighorn sheep, pronghorns, wolves, bobcats, frogs, trout, and native waterfowl. Past management practices, which included straightening the river, reduced this once vibrant river valley into a dry, desiccated field of weeds. A plan was developed to restore the natural function and habitat of the river and bottomland. In phase one, the pump/ditch irrigation system was replaced by a mile-long gravity-fed system. Converting this system eliminated fuel consumption and spill hazards, and safety hazards, including a dangerous river ford. It

optimized water use and improved fire protection, aesthetics and fish habitat. The irrigation water was conveyed to a new habitat pond and small stream channels, restoring 25 areas of native wetland habitat. Benefits included road and river stabilization and restored public access to 40,000 acres of public land. Phase 2 involved realigning the river to its historic course; enhancing river and riparian habitat along 2 miles of river. The result raised the level of the incised river, raised groundwater, restored hyporheic flows to the meadow and created 40 acres of wetlands.

Wednesday Afternoon—October 28

Session #:9
Room: 303
Moderator: Margie Namba
Topic: Tools and Innovations

1:00-1:30 PM

Michael Blankinship, PE
Blankinship & Associates

Title: Vegetation Management in Flood Control Facilities: Costs and Water Quality Impacts

Non-chemical and chemical techniques were evaluated for emergent, floating and terrestrial vegetation at six locations in northern California. Several weed classifications were examined: emergent weeds including cattails (Typha latifola) and bulrush (Scirpus acutus); floating weeds including primrose (Luwigia peploides) and duckweed (Lemna minor); and the terrestrial weed blackberry (Rubus armeniacus). In one case Eurasian watermilfoil (Myriophyllum spicatum), a submersed weed, was targeted with floating weeds. Evaluation focused on water quality impacts, efficacy, and cost-effectiveness. Weed abatement techniques evaluated were goat grazing, mechanical removal, chemical treatment followed by mechanical removal, and manual removal by labor crews using power equipment. Water quality impacts observed during the implementation of non-chemical controls were largely transitory. The most significant impacts to water quality during weed abatement with goats were the temporary presence of coliform and E. coli above maximum concentrations allowed for recreation. If short-term increases in coliform and E. coli are acceptable, the use of goats is a viable alternative. The use of goats and herbicides are preferable to the use of manual removal techniques. Although effective, manual weed removal is expensive, extremely labor intensive, subjects workers to a high injury potential, and must be repeated annually.

1:30-2:00 PM

Scott Bodensteiner
Weston Solutions
Project Manager

Title: DMMP Development: Sustainable Dredged Material Management in San Francisco Bay

The Corps of Engineers (CoE) is committed to environmentally sound dredged material management. Therefore, the CoE has made it a priority mission to develop dredged material management plans that ensure warranted and environmentally acceptable maintenance dredging. The San Francisco District (District) is developing a Regional Dredged Material Management Plan (RDMMP) to serve as a planning tool for guiding the Maintenance Dredging Program in San Francisco Bay through 2035. DMMP complexity can vary considerably based on underlying objectives and local conditions. Since the Bay comprises the second largest estuary in the U.S. with 11 separate navigation projects, the RDMMP is considered more complex requiring a comprehensive "watershed" approach. Adding to the complexity is the District objective to tier the RDMMP to the Long Term Management Strategy (LTMS) developed by local, state and federal agencies regulating Bay dredging. This presentation discusses implementation of the watershed approach in preparing Phase I of the RDMMP. It also examines how the LTMS goals were incorporated in determining whether placement capacity is sufficient for maintaining the 11 federal projects over the next 25 years, and what Phase II components are necessary to assure capacity will be provided for the continuation of economically and environmentally sound dredging.

2:00-2:30 PM

Layton Hobbs
Woolpert Inc & US Bureau of Reclamation
Group Manager

Title: Airborne LiDAR and Imagery for Canal Infrastructure Mapping and Monitoring

In January of 2008 a portion of the Truckee Canal failed at Fernley, NV, impacting almost 600 homes and triggering a Emergency Declaration by the Governor of Nevada. Later, a report issued by the U.S. Bureau of Reclamation concluded that the century-old irrigation canal failed due to burrowing rodents combined with increased water flow in the canal caused by the nearly 2 inches of rain that fell the day before. The annual rainfall for the area is only about 5 inches. Fernley is a growing, bedroom community 30 miles outside of Reno, NV. Had the breech occurred only 10 years prior the impact would have been minimal, impacting only crops and farmland. Such is the story throughout much of the West where homes, schools and businesses have replaced many of the farms that were once fed by the nearly 8,000 miles of USBR owned canals, many of which are earthen built and over 100 years old. In the fall of 2008, USBR contracted with Woolpert Inc for the collection of over 40 square miles of high

resolution, airborne LiDAR and digital imagery over the Fernley area to document and analyze the canal system and the surrounding community. The LiDAR specification called for 2' interval contours, supplemented by photogrammetric breakline data along the canals and drainage areas. The imagery collection included a high-resolution, 3" GSD pixel requirement. This presentation will provide an overview of how the geospatial data collection requirements were developed, how the data is being used and the benefits of high accuracy terrain and imagery data in mapping and monitoring of the Truckee Canal in Fernley, NV.

Session #:10
Room: 300
Moderator: Phil Welker
Topic: Levee Solutions

1:00-1:30 PM

Tim Abbe
ENTRIX, Inc.
Technical Director, Vice President

Title: Incorporating hardened vegetated buffers along levees

Levee management in the Pacific Northwest is becoming an increasingly pressing issue due to the age of the structures, environmental regulations, riverbed aggradation, and goals to restore salmonid habitat. Sustainable solutions are requiring new approaches that recognize where vegetation is a benefit versus a hazard. Vegetated buffers can provide valuable component of sustainable levee protection, particularly when incorporated with erosion protection measures to deflect flow or protect the bank toe. The foundation of sustainable design is a focus on emulating natural systems. This app roach can offer “self-mitigating” protection. For example, series of engineered logjams (ELJs) and vegetated buffers have been successfully applied to replace poorly performing rock revetments. Along the Lower Puyallup River a complex revetment of dolosse and timber is being constructed in 2009 to protect a segment of the river’s North Levee in highly developed city of Fife, WA. It will be the first maintenance project on the Puyallup to: emulating the complexity and aquatic cover found along native banks; to be considered self-mitigating by regulatory stakeholders; balance traditional flood protection with environmental concerns; eliminate need for dewatering the project site, reducing cost substantially. These approaches offer tremendous potential for more sustainable levee design and maintenance.

1:30-2:00 PM

Boniface Bigornia
ARCADIS
Vice President

Title: Developing an Intelligent Flood Management System with Levee Sensors

New technologies are available to develop an improved flood management system. There are 3 main components that need to be integrated to create an 'intelligent flood risk management system'. The structural component addresses acceptable design levels. The maintenance component addresses monitoring of the structural system's various features to identify and help prioritize repairs, maintenance and emergency activities. The floodplain management component addresses the reduction of the consequences of flooding through flood forecasting, evacuation plans, zoning, public awareness, and most importantly developing 'action plans' to manage residual risk and unanticipated problems.

An understanding and coordination of these three components can be improved using ongoing research and technology, and integrating the features into a life-cycle process that is adaptive, anticipatory, and sustainable, based on changing knowledge, politics, funding, laws, and local priorities.

Use of technologies and processes developed after Katrina, will help us coordinate, cooperate, and collaborate on complex solutions, integrating multi-disciplinary experts from planning to engineering to operations to emergency management.

This presentation will show the possibilities in developing an intelligent flood management system using state-of-the-art research examples being done nationally and oversees.

2:00-2:30 PM

Mara Jane Johnson
Tremaine and Associates DBA Argus Technologies
Senior Scientist

Title: The Buried Hazards Toolbox-What's Inside Your Levee?

Sacramento-San Joaquin Delta levees contain hidden hazards, implicated as causes of levee failure. Continuously collected electromagnetic induction data locate buried encroachments (relict pipes/cables, beaver dens, concrete blocks, saturated areas, and storage tanks) and map lateral changes in embankment materials (pervious/non-pervious), pinpointing sources of uncertainty for internal erosion. Twenty-five electromagnetic induction surveys on Project and Non-Project Delta levees are complete (1000+ miles of data). Thousands of anomalies (data deviations) were located/classified, using criteria derived from results of 200 ground truth/remediation excavations. The material producing the anomaly

is successfully predicted, the location pinpointed (GPS), the orientation determined (fully penetrating levee versus waterside/center/landside), and the depth estimated. To complement this rapid scoping tool, the system is tailored to quantitative three-dimensional imaging of specific problem areas. With the large volume of data, the scale of analysis broadens from an island-level focus to Delta-wide. The concept of whether levee anomalies and failures are randomly distributed (unpredictable) versus patterned (predictable) will be addressed. The Buried Hazards Toolbox is a validated approach that complements current levee inspection methods (visual, surficial), provides baseline data cataloging levee embankment materials, improves the accuracy of inventories in State and National levee databases, and identifies risks to prioritize repair/remediation.

Session #:11
Room: 304
Moderator: Tim Anenson
Topic: Climate change

1:00-1:30 PM

Elissa Lynn
California Department of Water Resources
Senior Meteorologist

Title: Climate Change Modeling: Can you get what you need?

We've all heard of global warming, but what specifically does it mean for statewide precipitation in the future? Former television broadcaster Elissa Lynn explains the state of the science, as well as meteorological ties between projected climate change and the current drought. California turns out to be one of the harder places to forecast climate change. Several downscaling efforts are underway, but may not yet provide all the answers planners need to incorporate potential impacts into their risk assessment strategies. Hydrologic trends are already occurring, though, and they give us an idea of what to expect: greater variability and greater uncertainty.

1:30-2:00 PM

Rich Juricich
California Department of Water Resources
Supervising Water Resources Engineer

Title: Integrated Scenario Analysis for the California Water Plan

For California Water Plan Update 2009, we evaluated different ways of managing water in California depending on different future conditions and different regions of the state. The ultimate goal is to evaluate how different regional response packages, or combinations of resource management strategies from Volume 2, perform under alternative possible future conditions. The alternative future conditions are described as future scenarios. Together the response packages and future scenarios show what management options could provide for sustainability of resources and ways to manage uncertainty and risk at a regional level. In Update 2009 the Water Plan has made significant improvements to the scenarios by considering the potential effect of long-term climate change on future water demands. We have taken some modest steps to quantify regional response packages. More work will be required in the next Update to refine this information based on the differing conditions and opportunities in the various regions. This presentation summarizes the scenarios and shows how they were used in estimating future water demands and response packages for meeting those demands.

2:00-2-30 PM

Paul M. Leonard
ENTRIX Inc
Technical Director, Water Resources

Title: Incorporating Climate Change into Environmental Flows

Many current approaches for determining environmental flow requirements rely heavily on analysis of historical hydrology data and flow times series analysis. These approaches then use flow and habitat frequency analysis to create an estimate of historical (also referred to as baseline or “unimpaired”) and use them as a proxy for prediction of future conditions and the evaluation of needed environmental flows. Climate change predictions now strongly suggest that in the Southeast, we can expect changing patterns of precipitation and streamflow, including lower summer flows and more extreme high flows. This potentially invalidates or creates bias in the use of historical flow analysis as a proxy for future conditions. We summarize and examine methods now being used for prediction of future precipitation/streamflow and assess how they may be used with widely applied instream flow methods and the potential implications for environmental flow requirements. We consider the need for adding adaptive management or uncertainty/risk analysis to these approaches. We hope that this examination will stimulate discussion and thought about how best to build climate change considerations into environmental flows.

Session #:12
Room: 302
Moderator: Mike Conrad
Topic: Business Opportunities

Business topics session runs from 1:00 -3:00 with break for these attendees delayed until 3:00-3:30 PM rather than 2:30-3:00.

Session #:13
Room: 303
Moderator: Roy Phares
Topic: Construction Methods

3:00-3:30 PM

Jeremy J. McKnight
Magnus Pacific Corporation
Project Director

Title: Construction Methods for Napa River East Duden Flood Control Project

The project consisted of in-water excavation in order to expand the marsh and floodplains of the tidally influenced Napa River. The site had been a historic dump site for a variety of materials, primarily concrete construction debris mixed with soils. Contaminated materials were excavated for offsite disposal and construction debris was crushed and reused in creation of a nearby park. Excavated soils from the floodplain were utilized to construct adjacent levees along creek alignment. The floodplain was drill seeded with native plants to restore the natural vegetation.

The complex nature of the excavation presented a challenge due to the in-water excavation in tidal areas. This required turbidity control, daily monitoring of the Napa River, and access to tidally inundated areas for construction. Due to the tidal influence, a turbidity curtain installed in the river required daily adjustment to ensure coverage of the excavation areas and to monitor for any stranded fish of a threatened species. Additional key construction components were levee keyway construction, debris removal, and recycling and disposal.

3:30-4:00 PM

Mathew D. Marks
Magnus Pacific Corporation
Project Director

Co-author: Louay M. Owaidat, President

Title: Construction Methods for Folsom Lake Modification

The project involved constructing drainage modifications of an existing dike at Folsom Lake in northern California. The modifications included excavating 40,000 cy from the existing downstream face of the dike to a 2H:1V slope, constructing a chimney drain system, installing 1,500 lf toe drain collection pipe and outfall, and reconstructing the downstream face of the dike to a 2.5H:1V slope. The purpose of these modifications was to reduce erosion potential and ultimately dike failure caused by lateral seepage and infiltration from rain events.

Excavation of shell material and installing toe drain and outfall were performed utilizing heavy excavating equipment with GPS control to minimize ground survey and increase grading precision. The toe drain consisted of 15-inch perforated HDPE pipe surrounded by coarse filter material and an outer layer of fine filter material which extended over the entire face of the 2H:1V slope and approximately 90 vertical feet to the top of the dike. The granular filter materials were placed utilizing specialized conveyor trucks while the outer shell was constructed with onsite borrow material and utilizing conventional equipment.

The complex design of the drainage system presented a challenge in the placement of various types of material within concentrated areas without cross blending or waste. The most unique challenge involved the placement of the fine filter material in compliance with the specification requirement for the No. 200 sieve. By implementing a strict regimen for material handling and placement, approximately 26,000 tons of imported sand was placed without any failing No. 200 sieve. In addition, the survey controls reduced the waste factor to less than 1%.

Other challenges included working on steep terrain, limited access and contract schedule constraints.

4:00-4:30 PM

Felipe Martin
Martin Brothers Construction
President

Title: Partnering - A Strategy for Successful Construction Projects

The project is located at Folsom dam and connects to the American River. The Folsom Spillway Phase II project consist of excavating approximately 820,000 CY of Common Excavation, 890,000CY of rock excavation, 710,000cy of embankment material at LWD and Dyke7, a government designed cofferdam, a contractor designed cofferdam, relocating the Natoma Pipeline, temporary and permanent rock slope protection, just to name a few.

There are numerous challenges that have been overcome in performing the work without considering any design or contract changes. Some of the challenges that had to be overcome with the implementation of partnering were:

1. The City of Folsom and restriction on lane closures.
2. The California Air Resource Board
3. Expediting the completion of the project for the benefit of the project.

The partnering process normally starts with a joint session for top executives; project managers and above. This is done to achieve executive consensus on what "Partnering" means; a common understanding of roles and responsibilities and identification of corporate / agency executive level business objectives for the project. Clear issue resolution process and evaluation policies are developed.

Phase II – An off-site team workshop where all interested parties are invited to participate in the development of a business plan for the project. Extensive team building takes place by working project specific issues, not "touchy – feely" exercises. The business plan is comprised of a "project business charter" consisting of a mission statement, team conduct guidelines and strategic goals. It also includes detailed action plans identifying the "who, what and when", to achieve charter goals and minimize project risks. This business plan, underpinned with effective issue resolution and evaluation processes developed during the workshop, is key to effective follow-through.

During the workshop, extensive team building takes place by working project specific issues, not "touch feely" exercises. A significant part of Partnering is getting to know each other better. An off-site workshop with team dinners in the evenings provides an opportunity to discuss project and partnering issues in an informal, friendly atmosphere advancing team relationships by months.

Follow-through; the aggressive implementation and evaluation of the business plan for the duration of the project. Critical in this phase is assuring the issue resolution process is working effectively. Monthly formal team evaluation takes place in conjunction with joint executive level oversight meetings where project managers for the owner and contractor jointly brief status to executives above the project. Follow-through also includes quarterly half-day sessions to incorporate new players, update the business plan, recognize successes and identify opportunities for improvement.

Closure; a two to four hour session at the end of the project provides feedback to all participants

on the success of the Partnering endeavor. Insight is gained on what worked well, what didn't and what should be done on future project for greater success. This is also the time to reward superior performance of teams and individuals.

Partnering is a mindset that all parties have to buy into and create a culture within the project, in order for the partnering to be successful. This creates a formula for a successful project.

Session #:14
Room: 300
Moderator: Brian Monaghan
Topic: Major Local Projects

3:00-3:30 PM

Dan Tibbitts, P.E.
U.S. Army Corps of Engineers
Project Manager
Title: American River Watershed (Common Features)

The record floods of 1986 nearly led to the inundation of the City of Sacramento; a disaster that would have been on the same order of magnitude as Hurricane Katrina and the inundation of New Orleans. After this flood event, the Corps of Engineers analyzed improvements to the flood control system that could be put in to reduce the flood risk of the community. The Corps of Engineers recommended a detention dam at Auburn and levee improvements downstream to improve the flood risk for Sacramento. Due to many technical, policy, and environmental reasons, Auburn Dam was not authorized. Instead, Congress chose to authorize common elements from all candidate plans within the feasibility studies. These common elements were for the most part levee improvements and were authorized by Congress as the American River Common Features Project as part of the Water Resource Development Act (WRDA) of 1996. Soon after this authorization, Congress chose to not authorize Auburn Dam and instead authorized improvements to Folsom Dam, which was authorized by Congress as the Folsom Dam Modifications Project (Folsom Mods.) in WRDA 1999. Because of the specific authorization of Folsom Mods., levee improvements downstream could be fine tuned to work in conjunction with Folsom Mods. These revisions involved segments of levee strengthening and levee raising in order to convey a peak release of 160,000 cfs.

Work authorized under the ARCF project in WRDA 1996 and 1999 includes the following: 1) construction of approximately 25 miles of seepage cutoff wall in the American River levees; 2) construction of approximately 12 miles of levee raising on the Sacramento River, and 5 miles on the Natomas Cross Canal in the Natomas basin; 3) construction of approximately 2 miles of levee raising on

the right bank of the American River; 4) Install 3 telemeter stream flow gages upstream of Folsom Dam; and 5) Modify the flood warning system along the American River.

Most of the work authorized for the American River has been constructed with the remainder in various phases of design and construction. Work authorized in the Natomas Basin was put on hold pending the findings of a General Re-Evaluation Report (GRR). The scope of this re-evaluation was expanded in 2007 to also look at the other basins comprising the City of Sacramento. Besides the remaining work authorized (the levee raising in the Natomas Basin), much additional work will be required to significantly improve the level of flood risk for the City of Sacramento. This work is likely to include the following: 1) seepage and stability remediation of most of the perimeter levee protecting the Natomas Basin as well as the Sacramento River below the American River; 2) erosion/degradation/scour remediation of the American River and the Sacramento River throughout the City of Sacramento; 3) levee height increase on other areas of the Sacramento River not specifically authorized in WRDA 1996 or 1999.

The Natomas portion of this re-evaluation is likely to be complete in 2010 with Congressional authorization coming shortly thereafter. The remaining portion of this reevaluation will not be complete until 2012 or 2013 with Congressional authorization coming again, shortly thereafter. Construction activities will likely go on for another 5 to 7 years. This time frame also roughly corresponds with the improvements being constructed at Folsom Dam. Therefore, the City of Sacramento should have a much improved level of flood protection by 2018.

3:30-4:00 PM

Mark Ellis
US Army Corps of Engineers
Project Manager

Title: Downtown Guadalupe River, San Jose

The downtown segment of the Guadalupe River Project was authorized in 1986 to provide 100-year flood reduction benefits and improved riparian habitat and recreation along the Guadalupe River between Interstate Highway 280 (I-280) and Interstate Highway 880 (I-880) in downtown San Jose, CA. The project includes a 0.6-mile-long double-barrel flood bypass box culvert, a low-flow channel for fish passage, terraced river banks with gabion and concrete walls, recreation riverwalks, overlook plazas and other features.

Construction in the downtown area presented challenges that required innovative solutions and close coordination among all stakeholders. Some of these challenges included:
-Regulatory requirements for fish passage and limited in-stream activities
-Large public events at downtown venues imposed traffic flow and parking requirements for ingress and egress throughout the downtown area

-Local design requirements and needs for maintenance, traffic control, utility accommodation, and other services
-Recreational, landscaping, and architectural details
-Construction of a major business park in the area
-Construction of the box culvert under a railroad line without interrupting train traffic
-Strict vibration and noise controls for work adjacent to a historical building
-Culvert crossings at major traffic arteries without causing traffic disruptions

4:00 -4:30 PM

Roger Henderson, PE
U.S. Army Corps of Engineers-Sacramento District
Senior Project Manager

Title: Truckee Meadows Flood Control Project

The Truckee Meadows flood control project is designed to provide flood damage reduction elements (e.g. levees/floodwalls, bridge raises, benching, etc.), ecosystem restoration and recreation features along a 60 mile reach of the Truckee River from the California border to Pyramid Lake in Nevada. In 1996 the Corps began a general reevaluation of the original but less popular project that was authorized in 1988. Since then, the project has significantly grown in size and complexity while encountering many challenges, delays and one-of-a-kind issues. The project is currently in the last stages of its feasibility study with a planned Congressional authorization/appropriation in 2011. The current cost estimate for construction ranges from $1.2 to $1.6 billion dollars. This presentation will outline the unique features of the project, present current and near term engineering activities and discuss unique issues that continue to challenge both the USACE and its sponsors.

Session #:15
Room: 304
Moderator: Nadia Burleson
Topic: Flood Emergency Planning

3:00-3:30 PM

Jennifer Dunn
USACE, Institute for Water Resources
Silver Jackets Program Manager

Title: Silver Jackets: Many Agencies, One Solution in Flood Risk Management

Through the Silver Jackets Program, the US Army Corps of Engineers (USACE), the Federal Emergency Management Agency (FEMA) and other Federal agencies team with state and local agencies to develop and implement solutions to state flooding priorities. This program provides a formal and consistent strategy for an interagency collaborative approach to planning and implementing measures to reduce the risks of flooding throughout the life-cycle. The primary goals are to 1) leverage information and resources, 2) improve public risk communication through a united effort, and 3) create a mechanism to collaboratively solve issues and implement initiatives. The presentation will discuss the accomplishments of pilot programs, as well as recently established teams across the nation. In addition, opportunities to develop teams in additional states will be presented.

3:30-4:00 PM

Stephen Bradley
California Department of Water Resources
FloodSAFE/Delta Executive Coordinator
Title: The DWR Delta Flood Emergency Preparedness & Response Project

The Sacramento-San Joaquin River Delta (Delta) is a unique resource and a critical part of California's water system. The Delta is California's water crossroads. Runoff from 40 percent of California's land surface passes through the Delta and this water is part of the drinking water portfolio for 26 million people and it irrigates more than 3 million acres.

The Department of Water Resources (DWR) has developed and is implementing the Delta Flood Emergency Preparedness & Response Project in order to improve its ability to respond to large-scale flood emergencies in the Delta and minimize recovery time. DWR is executing this project with full cooperation from its flood emergency responding partners; chiefly the USACE, Cal EMA, the five Delta counties, and local Delta Reclamation Districts. Project deliverables include:

- Response Facility Development
- Logistical & Communications Systems Improvement
- Flood Response Feasibility Studies
- Preparation of a DWR specific Delta Flood Emergency Operations Plan (EOP)
- Emergency Response Exercise Development & Coordination

This project is a vital component of DWR's effort to improve its emergency response capabilities and a vital element of the FloodSAFE California initiative approved by California voters via the Disaster Preparedness and Flood Prevention Bond Act of 2006.

4:00-4:30 PM

Gary Hester
California Department of Water Resources
Principal Engineer

Title: FloodSAFE Central Valley Flood Management Planning

The presentation will discuss the mission, scope, schedule and approach of the Central Valley Flood Management Planning program.

Session #:16
Room:320
Facilitator: Cheryl Bly-Chester:
Topic: Resilient and Sustainable Infrastructure Implications in the Delta

3:30-4:30 PM

Cheryl Bly-Chester
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Panel Discussion: Delta Infrastructure

John Radke
Scott Nicholson
Emery Roe