



DHS Bulletin

FY11 - No. 4

April thru June 2011

Presentations and Publications

Journal Articles

Cooper, C.A., and D.L. Decker, 2011, Injection of nuclear rocket exhaust and water into a deep unsaturated zone, *Nuclear Technology*, 174(3), pp. 452-459.

Garcia, C.A., B.J. Andraski, D.A. Stonestrom, C.A. Cooper, J. Simunek, 2011, Interacting vegetative and thermal contributions to water movement in desert soil, *Vadose Zone Journal*, May, v. 10, pp. 552-564.

Conference Abstracts/Papers

Carroll, R., G. Pohll, and D.M. Reeves, 2011. Design guidelines for horizontal drains used for slope stabilization, *Proceedings of MODFLOW and MORE 2011: Integrated Hydrologic Modeling*, June 5-8, Golden, CO.

Huntington, J. and R.G. Allen, 2011. Penman-Monteith Based ET Estimates for Irrigated Agriculture - Historical and Future Periods. *Soil and Water Conservation Society, Nevada and California Chapter, Annual Conference*, Reno, NV, 5/26/-5/27 - Invited Speaker.

Meyer, W.J., Ahmad, S., Young, M.H., Shafer, D.S., Miller, J.J., and Chief, K., 2011. Effect of Spatial and Temporal Variability of Antecedent Moisture Content on Model-Generated Runoff from an Arid Watershed. *American Society of Civil Engineers, Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011*, Palm Springs, California.

Miller, J.J., French, R.H., Mizell, S.A., Cablk, M.E., and Kratt, C.B., 2011. Using Doppler Radar Precipitation Measurements to Enhance Estimates of Playa *Inundation*. *American Society of Civil Engineers, Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011*, Palm Springs, California.

Miller, J.J., Shafer, D.S., Meyer, W.J., Forsee, W.J., and Jenkins, S., 2011. Modeling Transport of High Density Metal Contaminants in Ephemeral Flow Systems. *American Society of Civil Engineers, Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011*, Palm Springs, California.

Parashar, R. and D.M. Reeves, 2011. Computation of flow and transport in fracture networks on a continuum grid, *Proceedings of MODFLOW and MORE 2011: Integrated Hydrologic Modeling*, June 5-8, Golden, CO.

Reeves, D.M. and R. Parashar, 2011. A numerical investigation of soil-bedrock interface flow impedance, *Proceedings of MODFLOW and MORE 2011: Integrated Hydrologic Modeling*, June 5-8, Golden, CO.

Reports

Thomas, J.M. and T.M. Mihevc, 2011. Evaluation of Groundwater Origins, Flow Paths, and Ages in East-Central and Southeastern Nevada. *Desert Research Institute, Division of Hydrologic Sciences Publication No. 41253*.

New Projects

Orange County Water District Litigation

PI: Rina Schumer

Agency: Miller, Axline and Sawyer

Amount: \$105,000

Summary: The Desert Research Institute will conduct work at the request of Miller, Axline, & Sawyer in support of the Orange County Water District litigation. The scope of work will include literature and report review, groundwater modeling, and deposition preparation for Stephen Wheatcraft.

Evaluation of Barnwell Disposal Facility

PI: Bill Albright

Agency: Energy Solutions

Amount: \$7,330

Summary: Visit Barnwell Disposal Facility to become familiar with relevant aspects of the site and discuss specific activities that may be conducted during cap repair. This visit will include inspection of the specific materials used in the cap profile and discussion of anticipated repair procedures.

Technical Support to Southern Nevada Health District for oversight of Reid Gardner Landfill

PI: Karl Pohlmann

Agency: Southern Nevada Health District

Amount: \$40,583

Summary: Advise SNHD on solid waste matters, regarding water quality and landfill performance. Draft, edit, review, and otherwise provide advice and recommendations to SNHD on plans, correspondence, reports, submittals, discussions, and other terms regarding water quality and landfill hydrogeology performance. As requested by SNHD, accompany and speak in behalf of SNHD to meetings, inspections, and other events as requested by SNHD.

Precipitation of Dissolved CO₂ in Laboratory Porous Media Following Rapid Depressurization

PI: Clay Cooper

Agency: DHS

Amount: \$36,752

Summary: The objective of this project is to develop and carry out experiments that establish the conditions in which dissolved CO₂ in water precipitates, forms bubbles, and moves through a laboratory chamber filled with glass beads (Figure 1c and d). A fundamental question that is important to successful geologic containment of CO₂ is the following: Given that CO₂-brine plumes will form and sink throughout an aquifer/reservoir, does the water have to be saturated with CO₂ in order for it to come out of solution following a shock? I hypothesize that the conditions in which CO₂ comes out of solution are dependent upon the magnitude of the shock and the partial pressure of the CO₂; bubble ascent through porous media is a function of the permeability and density of bubbles, which is in turn a function of the initial dissolved CO₂ concentration.

Towards the Development of a Reservoir Meteorological Network to Estimate Evaporation

PI: Justin Huntington

Agency: DHS

Amount: \$49,989

Summary: This project aims to monitor reservoir evaporation with a weather station buoy on Boca reservoir, CA, tributary to the Truckee River. Evaporation from Boca reservoir is of great interest to the USBR and Federal Water Master for Truckee River operations. The buoy weather station will measure all required weather variables to estimate evaporation using the aerodynamic-mass transfer approach, while transferring these data in real time to Federal Water Master and USBR offices. The weather station buoy will also be equipped with a net radiometer and thermal profile string to estimate evaporation via the Bowen ratio energy balance. Seasonal and annual estimates of evaporation using the aerodynamic-mass transfer and Bowen ratio energy balance will then be compared to water budget estimates of evaporation. Given that there is no method to measure evaporation from open water, like a lysimeter for measuring evapotranspiration, an analysis of the strengths and weaknesses of each approach will be discussed in terms of their practical application potential on a daily, seasonal, and annual basis.

2011 Aquatic Habitat and Fish Population Monitoring

PI: Don Sada

Agency: E. Read and Associates, Inc.

Amount: \$32,827

Summary: Studies will be conducted to quantify aquatic habitat characteristics and estimate fish population size in three reaches of upper Lee Vining Creek, Mono County, CA during the spring, summer, and autumn of 2011. During these same periods, fish population size will be estimated in the same reaches.

Toward Improved Understanding of the Role of Burning Emissions on Climate: Addition of Ion Chromatography to DRI's State-of-the-Art Ice Core Analytical System

PI: Michael Sigl

Agency: DHS

Amount: \$67,330

Summary: Beside BC and vanillic acid, various substances are used to trace forest fire emissions in the atmosphere and in ice cores. These include: levoglucosan, ammonium, potassium ion formate and acetate. In our existing collaboration with U.C.-Irvine, we will measure levoglucosan using triple-quad mass spectrometry on discrete samples collected during continuous ice core operations. In a related proposal, we are asking for funds to acquire a sophisticated, septum-equipped and temperature controlled fraction collector. We currently measure ammonium using a continuous flow method based on fluorometry, although concentrations in some ice cores (e.g., from Antarctica) are nearly at detection limits of the method. We currently do not have the ability to measure potassium ion, formate, acetate, or other related organic compounds linked to fire emissions.

Payette Watershed Silver Study - 2011

PI: Alan Heyvaert

Agency: Idaho Power Company

Amount: \$49,910

Summary: The work for this task involves collecting water samples at the 16 lotic systems (streams and rivers) identified in the study plan and sampling developed and implemented during Tasks 1-5 of this project and analyzing the samples for silver content. The intent of this Task is to collect the samples during the spring freshet. For this work, the Consultant shall spend up to one week with IPC personnel to collect the samples, plus train IPC on the proper procedures to collect the water and sediment samples. The initial field work and training will begin on May 23, 2011 and end on May 27, 2011, but will depend on the timing of the spring freshet. During this time, the Consultant and IPC personnel will sample as many locations as possible. IPC will collect samples at any remaining locations that are not visited during that week. IPC will provide transportation, meals and lodging during the field sampling work and IPC will reimburse the Consultant for travel, per diem and lodging to and from Boise as stated in the Schedule of Rates, Exhibit A to the MTS/CA. The sampling for water will be completed per the procedures outlined in the Baseline Silver Sampling Plan prepared as part of Tasks 1-5 of this project.

Phoenix Copper Leach Closure Field Test Facility Design and Construction - Phase 2

PI: Bill Albright

Agency: Newmont USA Ltd - AKA Newmont Mining Co.

Amount: \$50,058

Summary: Phase 2 - Test Section Design and Field Implementation

Predicting the Interactions between Flow, Sediment, and Riparian Vegetation

PI: Li Chen

Agency: Department of the Interior

Amount: \$45,000

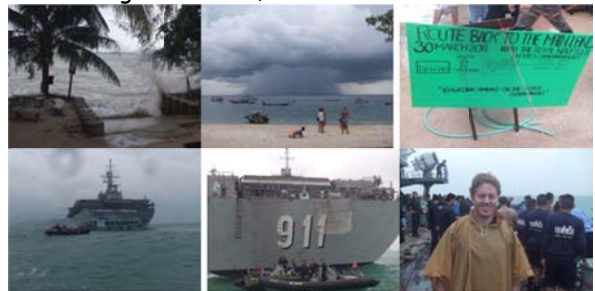
Summary: The objective of this project is to develop tools to better predict the interactions of flow, sediment, and vegetation. One focus of the project is the development and documentation of a tool to predict the establishment and survival of riparian species. The other focus will be the development of methodologies and a tool to predict the effect of vegetation on river flood stage. A collaborative effort between Reclamation, the Desert Research Institute (DRI), and the University of New Mexico (UNM) recently got underway to advance the methodology of describing the influence of vegetation on channel hydraulics within Reclamation's SRH-2D model. Past research by DRI, UNM, and the U.S. Army Corps of Engineers (USACE) has produced much of the field data and theory that will be necessary to develop the SRH-2D vegetation module. To date, the USACE has supported over \$300,000 worth of research at DRI and UNM on this topic. The primary product of this research will be a new module for Reclamation's SRH-2D model that is capable of representing the impacts of vegetation on water surface elevations and vegetation washout by high flows during floods. The resulting module will provide a powerful tool for Reclamation to evaluate the influence of flow management alternatives on riparian structure and the influence of riparian characteristics on flood risks. Even though this is an ambitious goal, there has been a significant amount of work already accomplished. We have also involved many collaborators with experience in this field.

New Hires (April thru June 2011)

- ✦ Shogo Imada, Postdoctoral Fellow, SNSC
- ✦ Hongguang Sun, Hourly Technical, SNSC
- ✦ Bryan Holloway, Letter of Appointment, NNSC
- ✦ Rose Shillito, Staff Research Scientist, SNSC
- ✦ Noah Fraser, Hourly Staff Research Scientist, NNSC
- ✦ Shellie Tingey, Hourly Community Monitor, SNSC
- ✦ Zhongbo Yu, Hourly Research Professor, SNSC

Did You Know . . .

- 🎤 **Greetings from Karletta Chief:**
Good news! I gave birth to my son Tachinii Kazuo Chief Walker on June 10, 2011 at 1:01 PM. Tachinii means "red-running-into-the-water" in Navajo and is my paternal grandfather's clan. The name stems from the four original Navajo clans that explains the type of water that was found. Kazuo is Japanese for Harmony or Peace. Tachinii is a healthy boy weighing 6 lbs 5.8 oz and 19.8 inches at birth. He was born at Tuba City Regional Health Care Center on the Navajo Nation. My husband and I are enjoying parenthood and Tachinii is doing great! Congratulations Karletta and family!
- 🎤 The following awards were presented at the 2011 DRI Convocation in June. Congratulations to everyone!
 - Rina Schumer - named one of the 2011 Rising Researchers by the NSHE Board of Regents
 - Ramon Naranjo and Marion Bisiaux - George Burke Maxey Graduate Student Paper Award
 - Matt Reeves - 2010 Peter B. Wagner Medal of Excellence for DRI Scholars in the Early Stages of Career Development
 - Julian Zhu - 2010 Maki Faculty Chair of Hydrologic Sciences Award
 - Zach Johnson and Mustafa Eissa - 2011 George Burke Maxey Graduate Student Fellowship Award
- 🎤 Kumud Acharya, Mark Stone (now at UNM) and Julianne Miller taught a short course at the American Society of Civil Engineers, Environmental and Water Resources Institute, World Environmental and Water Resources Congress 2011, Palm Springs, California, entitled "Stream Restoration in Arid Regions."
- 🎤 Dan Coming attended an IEEE Virtual Reality Conference in Singapore and a Eurographics Symposium on Parallel Graphics and Visualization in Llandudno, Wales from 4/10 through 4/15. The pictures below are of his evacuation to an aircraft carrier while vacationing in Koh Tao, Thailand. Fun times!



Proposals (submitted April thru June 2011)

Date Submitted	PI(s), CO-PI(s)	Sponsor	Title	Status	Funding (\$)
21-Apr-11	Chen, Li	Department of Interior	Predicting the Interactions between Flow, Sediment, and Riparian Vegetation	Funded	6,702
22-Apr-11	Huntington, Justin	Southern Nevada Water Authority	Estimating Actual Historical Evapotranspiration from Irrigated Agriculture and Phreatophytes in the Muddy River, Moapa, and Lower Virgin River Areas	Pending	32,143
26-Apr-11	Chen, Li (PI) Acharya, Kumud Berli, Markus Miller, Julie	TBD - NonFed	Investigations of the Effect of Virgin River Water Quality on Native Fishes	Funded	136,992
02-May-11	Albright, Bill	Energy Solutions	Evaluation of Barnwell Disposal Facility	Funded	7,330
09-May-11	Schumer, Rina	Miller, Sher & Sawyer	Orange County Water District Litigation	Funded	105,000
10-May-11	McConnell, Joe	NASA	Greenland Ice Sheet Snow Accumulation from IceBridge Airborne Radar	Rejected	67,861
11-May-11	Acharya, Kumud	Desert Research Institute	Prevention and Containment of Quagga mussels in the Lower Colorado River systems: Invasive Species Management and Control	Pending	50,063
11-May-11	Zhang, Yong	Desert Research Institute	Fractional-RWHet: A transport code for the next generation	Pending	49,166
13-May-11	Huntington, Justin	DOI - Bureau of Reclamation	Developing Historical and Future Agricultural Evapotranspiration and Irrigation Water Requirements for U.S. Bureau of Reclamation Projects	Pending	199,761
13-May-11	Heyvaert, Alan	Idaho Power Company	Payette Watershed Silver Study - 2011	Funded	49,910
24-May-11	Lutz, Alexandra	University of Nevada, Reno	Water Quality Impacts Assessment Analysis of Watershed Scale Monitoring Data Using Quantitative Indices to Relate Water Quality Response to Extreme Event Intensity	Pending	130,239
24-May-11	Thomas, Jim	Southern Nevada Water Authority	Impacts of a Changing Climate on Water Resources in the Eastern Great Basin	Pending	249,888
15-Jun-11	Acharya, Kumud	US Department of Agriculture	Quagga Mussels in Lake Tahoe	Pending	102,804
16-Jun-11	Acharya, Kumud	DOI - Bureau of Reclamation	Prevention and Containment of Quagga mussels in the Lower Colorado River	Pending	155,633
16-Jun-11	Pohlmann, Karl	Southern Nevada Health District	Technical Support to Southern Nevada Health District for oversight of Reid Gardner Landfill	Funded	40,017
16-Jun-11	Zhang, Yong	National Science Foundation	Collaborative Research: Non-Darcian Flow and Non-Fickian Transport in Fractures: Systematic Laboratory Experiments and Physical Model Development	Pending	329,831
16-Jun-11	Zhu, Jianting	National Science Foundation	RUI: Collaborative Research: The Significance of Lateral Flows on Water Budget Estimation Across Heterogeneous Fields	Pending	85,154
23-Jun-11	McConnell, Joe	National Science Foundation	Collaborative Research: Investigating Upper Pleistocene Rapid Climate Change using Continuous, Ultra-High-Resolution Aerosol and Gas Measurements in the WAIS Divide Ice Core	Pending	498,724
24-Jun-11	Sada, Donald (PI) Acharya, Kumud	Environmental Protection Agency	Finalizing a Nevada Wetland Program Plan (WPP) and Assessing Biotic Integrity of the State's Priority Wetlands: Isolated Great Basin and Mojave Desert Springs	Pending	289,348
30-Jun-11	Albright, Bill	Newmont USA Limited - AKA Newmont Mining Co.	Phoenix Copper Leach Closure Field Test Facility Design and Construction - Phase 2	Funded	50,058