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Metadata: Helping Data Live Longer, Go Farther

by Eleanor Ely, *The Volunteer Monitor*

Editor's note: A great deal of ecological data about creeks in the Bay Area are collected by volunteers working for small local groups. This article contributes to recent discussions that WRCA has been involved in about managing and sharing such data.

Suddenly, everybody seems to be interested in metadata, or “data about data.” Metadata are data descriptors or qualifiers that document the when, where, what, why, how, and “how good” of sample collection and analysis.

The concept of metadata is not new—after all, data documentation has always been important. So why the recent upsurge in interest? When I raised this question with several members of the National Water Quality Monitoring Council (NWQMC), the first thing they mentioned was data sharing. Tight budgets provide strong motivation to find and use existing data whenever possible, and geographic information systems (GIS) are data-hungry. At the same time, sharing data is easier than ever, thanks to email and the Web. Today's data are on the move, and like humans they need documentation to travel.

Good documentation also extends the lifespan of monitoring data. Sometimes programs are unable to use their own old data because no one can find the records explaining why and how the data were collected. And while no one wants to believe their program will end, it is some consolation to realize that even if a program succumbs the data can live on.

Traditionally, volunteer monitoring programs have been advised to first identify intended uses and users of their data and then decide what kinds of documentation are needed for these uses and users. This is good advice, but it can be taken a step further to also consider unintended uses. Rivers of Colorado Water Watch Network coordinator Barb Horn says, “We all get trapped into thinking, ‘I'm generating data for this use and that's it.’ In fact, our data almost always potentially can be used for something else—but only if we can provide the metadata.”

California Colloquium on Water:

Fall 2005 Schedule

Lectures will be held in a new location this fall:
Goldman School of Public Policy, Room 150
2607 Hearst Ave. at LeRoy Ave.
5:30-7:00 p.m.

Visit the Colloquium Web site for more information:
www.lib.berkeley.edu/WRCA/ccow.html. You can view the flyer for each lecture and the brochure for the fall semester as PDF files. As they become available, streaming videos of the lectures will be posted there. The lectures will also become available in VHS format for loan or in-house viewing at WRCA.

September 13

“Hetch Hetchy Valley: Water & California’s Future”
(for more information, see next page)

Sarah Null
Doctoral Student in Geography, UC Davis

Spreck Rosekrans
Economic Analyst, Environmental Defense

Jay Lund
*Professor of Civil & Environmental Engineering,
UC Davis*

October 11

“A Global Perspective on Investments in Municipal
Water & Sanitation Infrastructure”

Dale Whittington
*Professor of Environmental Sciences & Engineering, City
& Regional Planning, and Public Policy,
University of North Carolina at Chapel Hill*

November 8

“Glaciers & the California Waterscape”

Kurt Cuffey
Professor of Geology, UC Berkeley

December 6

“Can California’s Water Infrastructure Sustain
Future Climate Change?”

Norm Miller
*Staff Scientist, Lawrence Berkeley National Laboratory,
and Adjunct Professor of Hydrology, University of Arizona*

The Colloquium is financially supported at UC Berkeley by the Deans of the Colleges of Engineering, Letters & Science, Natural Resources, and the Boalt Hall School of Law; the Beatrix Farrand Fund of the Department of Landscape Architecture & Environmental Planning; and the Executive Vice Chancellor & Provost. The Colloquium is also financially supported by the Earth Sciences Division of the Lawrence Berkeley National Laboratory, the Groundwater Resources Association of California, and the Metropolitan Water District of Southern California.

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Paige Wooden, Public Services Assistant

Mission *To maintain and continue to develop a collection of current and historical water-related materials to meet the needs of the University of California and the people of the state.*

Newsletter edited & designed by Nancy Novitski.
Page 1 photo details © 2005 Brendan DeTemple.

September Lecture Will Examine the Hetch Hetchy Question

This fall's California Colloquium on Water opens with a special joint lecture on a topic that has received both local and national media attention recently: the restoration of Hetch Hetchy Valley in Yosemite National Park. Since the 1923 completion of O'Shaughnessy Dam, Hetch Hetchy Valley has been submerged under a reservoir of Tuolumne River water stored for use by San Francisco and other Bay Area communities.

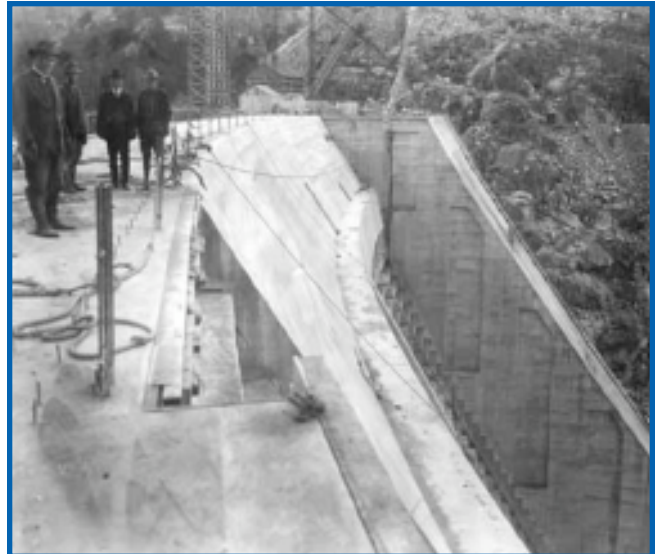
September 13 brings three experts to Berkeley to address this issue. Sarah Null, currently a Ph.D. student in geography at UC Davis, will discuss her master's thesis about the feasibility and potential impacts of draining Hetch Hetchy Reservoir. Spreck Rosekrans, Economic Analyst at Environmental Defense, will present findings from Environmental Defense's analyses of the same question. Null's faculty advisor, UC Davis Civil & Environmental Engineering Professor Jay Lund, will talk about the computer model that enabled her study, which he developed to analyze water supplies and delivery.

These studies address a number of questions: If O'Shaughnessy Dam were removed, where else could water be stored? How could the hydropower from that system be replaced? And at what cost?

This isn't the first time these questions have been asked. In 1987 Interior Secretary Donald Hodel proposed restoring Hetch Hetchy Valley, and a number of government studies were performed at that time.

The upcoming Colloquium speakers are partly responsible for the issue's recent upsurge in publicity. In summer and fall of 2004, after learning of Null's research, *Sacramento Bee* writer Tom Philp wrote his Pulitzer Prize-winning editorials arguing for restoration of the valley. Environmental Defense published its own research in the 2004 report *Paradise Regained: Solutions for Restoring Yosemite's Hetch Hetchy Valley* [WRCA call no. G4195 P4 Locked Cage].

In response to this renewed interest in the restoration of Hetch Hetchy Valley, the California Resources Agency has launched a major review of existing studies on the topic,



San Francisco City Engineer Michael O'Shaughnessy and others atop Hetch Hetchy Dam, January 18, 1923. John D. Galloway Papers; GALLOWAY no. 94(2).

including Null's thesis, *Paradise Regained*, and other analyses from the past 20 years. The Department of Water Resources is studying the statewide water supply ramifications of altering the Hetch Hetchy System, which is neither owned nor operated by the State. The Department of Parks and Recreation is charged with estimating the parkland value of a restored valley (in cooperation with the National Park Service). Due to be completed some time this fall, the overall review will result in a clearing-house of information about restoration and about replacement options for the water and power supply.

More information is available on the following Web sites.

Sarah Null's master's thesis (PDF file):

<http://cee.engr.ucdavis.edu/faculty/lund/students/SarahNullThesis.pdf>

Environmental Defense's "Discover Hetch Hetchy" site:

<http://www.environmentaldefense.org/hetchhetchy>

Resources Agency's Hetch Hetchy Restoration Study:

<http://hetchhetchy.water.ca.gov>

For details about the Colloquium lecture, see page 2.

California Colloquium on Water: Spring 2005 Summary

This past spring semester, WRCA once again brought experts to the podium to share technical information, discuss contentious issues, and present a variety of perspectives on water management. Their lectures may be viewed as streaming videos on the Colloquium Web site (www.lib.berkeley.edu/WRCA/ccow.html). Videotapes of the lectures are available for loan at WRCA.

The spring lecture series opened with Olney Patt, Jr., Executive Director of the Columbia River Inter-Tribal Fish Commission (CRITFC), which coordinates fisheries management for four tribes in Oregon and Washington. A member of the Warm Springs Tribe, Patt has faint memories of visiting tribal fishing sites on the roaring Columbia River as a small child, before dams tamed its flow. In treaties signed by CRITFC member tribes in 1855, the federal government recognized their rights to anadromous fish in the Columbia River. But the dams erected by the government since then have significantly diminished salmon runs. The tribes make recovery of these culturally significant fish a priority.

In March, longtime environmental activist L. Martin Griffin, Jr., M.D., spoke about the impacts of decades of gravel mining along the Russian River in Sonoma County. The removal of gravel from the riverbed has caused it to drop 17 feet since the 1940s, depriving riparian vegetation of water and reducing the riverbed's filtration capacity—especially significant because so many local residents depend upon water from the Russian River watershed. Griffin founded Friends of the Russian River to aid in his fight to end gravel mining, to maintain a healthy water supply, and to restore what American Rivers has listed as one of the country's "most endangered and threatened rivers." (*Griffin recently donated his collection of documents about gravel mining to WRCA; see page 5 for more information.*)

April brought Edmund Andrews, U.S. Geological Survey Hydrologist and Chief of the River Mechanics Project. He spoke about El Niño Southern Oscillation (ENSO), the phenomenon of higher surface-level seawater temperatures in tropical waters. Using the example of the Matilija Dam on the Ventura River in Southern

California, Andrews explained how these higher water temperatures could be used to predict both flood frequency and sediment movement. He also showed how the sediment plug behind the dam could be reduced in size by pulse flows of water.

The spring Colloquium closed with Hal Candee, senior attorney and co-director of the Western Water Project at Natural Resources Defense Council (NRDC). He reflected on the 16 years of litigation he has been involved in, fighting to restore California's San Joaquin River and its salmon run. The legal battle began when contracts for water from the river (specifically from Millerton Lake, formed by Friant Dam) expired in the late 1980s. NRDC led a coalition of 13 conservation and fishing groups in suing the Bureau of Reclamation over its operation of the dam and the renewal of the water supply contracts. In August 2004, ruling in NRDC's favor, a federal judge stated that the Bureau of Reclamation had violated state law by allowing a 60-mile stretch of the river to go dry, affecting salmon populations.

Archival News

Los Angeles Aqueduct Photographs Now Online

WRCA is pleased to announce the completion of the Los Angeles Aqueduct Photograph Digitization Project. For this project WRCA digitized 806 turn-of-the-century photographs from the Joseph B. Lippincott Collection that document the building of the Los Angeles Aqueduct between the Owens Valley and Los Angeles. To view these images online, visit the following Web site: www.lib.berkeley.edu/WRCA/aqueduct.html.

Making these unique images available on the Web greatly facilitates access and enhances existing tools for the study of socio-environmental history. The construction of the aqueduct is of primary importance to the history of California. This tremendous engineering accomplishment not only secured a destiny of growth for Los Angeles, it also set the stage for future water development throughout the state. The ramifications of this

L.A. Aqueduct workers next to Jawbone Siphon, c. 1912. Photo by Joseph B. Lippincott. J. B. Lippincott Collection; LIPP Box 79, no. 627.



aqueduct, and of later projects for which it was a model, continue to profoundly affect the environment and, indeed, almost every aspect of modern life in California.

This digitization project was funded by a California Library Services and Technology Act grant.

Griffin Donates Gravel Mining Collection

Martin Griffin says he was “indoctrinated early into the importance of water.” From his birth in a cabin on the banks of Utah’s Ogden River to his more recent campaigns to preserve wild lands and rivers in California’s Marin and Sonoma Counties, water has been a significant element in Dr. Griffin’s life.

One of his longest-running and most persistent battles has been the effort to stop gravel mining in the Russian River. Dr. Griffin recently donated his entire collection of reports, legal papers, and maps on this topic to WRCA.

“These materials are too valuable not to share,” Dr. Griffin says. “The Archives will organize them better than I could and, more importantly, will make them available to others.” Collection highlights include a never-published Russian River enhancement plan that features aerial photographs, several environmental impact statements with “wonderful graphics you wouldn’t find anywhere else,” and maps showing the historic channels of the river and how it has changed over time.

The Russian River is just one of Dr. Griffin’s battlegrounds. As a practicing internist, he

once organized a group of his patients to end the dumping of garbage in San Rafael Bay. He also fought to prevent the planned filling of Richardson Bay, and his efforts to stop damming of the Eel River led to passage of the Wild and Scenic Rivers Act. As an elected director of the Marin Municipal Water District in 1973, Dr. Griffin participated in the water hook-up moratorium that helped prevent overdevelopment of Marin County.

Many of his campaigns are captured in his book, *Saving the Marin-Sonoma Coast: The Battles for Audubon Canyon Ranch, Point Reyes & California’s Russian River* [WRCA call no. G413 N8-4].

Donate Materials

Want to donate books, journals, or other materials to WRCA? Visit www.lib.berkeley.edu/WRCA/donation.html or contact Director Linda Vida for more information.

UC Berkeley Selected to Host Hydrology Research Center

by Patti Meagher, *Forefront*

How does global warming affect water supply in semi-arid regions? Can scientists develop a theory to help predict the onset and duration of droughts? What is the effect of a carbon emissions–constrained world on the hydrologic cycle?

These are some of the questions that scientists will be investigating at a new research center now taking shape on the Berkeley campus that will forge an updated vision for hydrologic science and water resource management.

Berkeley was chosen from 14 competing proposals to host the center, known as the National Center for Hydrology Synthesis (NCHS). An October 2005 start date is planned, pending selection of a state-of-the-art site near campus and securing funding from the National Science Foundation (NSF). Together with NCHS partner support, funding is expected to total nearly \$25



Civil & environmental engineering professor Yoram Rubin is designated director of the new National Center for Hydrology Synthesis (NCHS), a research center in development at Berkeley that will redefine hydrologic science and water resource management. Photo by Aaron Walburg.

million over the next five years.

Strongly supporting the effort were vice chancellor for research Beth Burnside, faculty and deans from engineering, natural resources, and physical sciences, and researchers from Lawrence Berkeley National Laboratory (LBNL), a range of participants that reflects the center's multidisciplinary appeal.

"It is clearly documented that the 20th century hydrology paradigm is inadequate in the face of the increased number, severity, complexity, and scale of water-related science questions facing the world," said civil and environmental engineering professor Yoram Rubin in describing the need for the center. An expert in hydrogeology who joined the Berkeley faculty in 1989, Rubin is the center's designated director. NCHS director of operations will be Susan Hubbard, staff scientist and head of LBNL's Environmental Remediation Program.

The center will provide a "think tank" atmosphere for international multidisciplinary research in hydrology, defined as the science of the Earth's waters, their occurrence, distribution, properties, and environmental relations. Research will be global in scope and performed by working groups, postdoctoral fellows, and sabbatical visitors in mathematics, engineering, and the physical, life, information, and social sciences.

Key elements will include broad involvement of academia, policy makers, industry, and government, as well as public outreach to ensure that NCHS research meets the needs of the hydrology community.

The center is one of four pillars of HydroView, a project masterminded by the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), formed in 2001 to advance hydrology science.

Reprinted from Forefront, the alumni magazine of the College of Engineering, Spring 2005 (available online at www.coe.berkeley.edu/forefront/spring2005/nchs.html).

Metadata

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To decide whether someone else's data—or, for that matter, “legacy” data collected in the past by your own program—is suitable for any given purpose, you need answers to a host of questions. Were the data collected to characterize baseline conditions, to capture a “worst case” scenario, or for some other reason? Was phosphorus measured as total phosphorus or dissolved orthophosphate? What was the detection limit of the method? What is the quality of the data?

Inevitably, metadata documentation takes effort. As NWQMC member Valerie Connor says, “We have to accept the reality that we have to do more because we want our data to live. But how much more?” Volunteer monitoring program coordinators are rightly concerned with finding a balance among multiple program goals. The challenge is to find a reasonable level of documentation that enhances the data's present and future value without overburdening volunteers or staff.

Fortunately, when it comes to data documentation, volunteer monitoring groups are probably a step ahead of many professional monitoring programs. Knowing that their data will be subjected to extra skepticism and scrutiny, volunteer programs have long been accustomed to documenting the validity of their methods, the performance of their volunteers, and the measures taken to assure the quality of their data.

When it comes to data documentation, volunteer monitoring groups are probably a step ahead of many professional monitoring programs.

Data Elements

The NWQMC, a multi-agency federal advisory committee formed in 1997, is charged with developing water quality monitoring approaches to facilitate collaboration and data sharing among different monitoring entities. Recognizing inconsistency in metadata as one major barrier to collaboration, the Council went to work on defining a set of standard “data elements” for characterizing water quality data. The NWQMC list of data elements is now available at <http://wi.water.usgs.gov/methods/tools/wqdel/>. The Council

hopes that widespread adoption of these data elements will promote data sharing among multiple users for multiple purposes. The length of the Council's list is daunting, but remember that these are potential data elements; not all will be applicable to any given project.

Documenting & Communicating Metadata

The NWQMC categorizes data elements under six headings: who, where, when, what, why, and how. Many of the elements in the first four categories are already typically included on volunteer monitors' field data sheets and entered into program databases. When the dataset is provided to other users, it's likely that these kinds of metadata will accompany it.

The last two categories, why and how, along with a seventh category, how good, represent more complex information that is less likely to be routinely kept with the data and communicated to data users. Most monitoring program spreadsheets are not set up with a neat column or cell for entering the intent of the study, the rationale behind site selection, or the side-by-side studies performed to validate a nontraditional monitoring method. Yet all of this information is critical to potential data users. For volunteer monitoring programs, it's often especially important to document the steps that were taken to assure data quality.

So, how do volunteer monitoring groups communicate this kind of information to data users? One way is by providing users with a copy of the program's quality assurance (QA) plan, which describes in detail most of the *whys* and *hows* of their monitoring activities—the intent, study design, monitoring methods, and so forth. The plan also contains QA-related information such as volunteer training requirements, data quality objectives (target levels of accuracy and precision), and specific quality control (QC) protocols (e.g., instrument calibration, replicate sampling) that will be followed.

Certain quality assurance information related to laboratory analysis, such as instrument calibration records and QC sample results, is often kept in a handwritten logbook. If data users want to see this information, a photocopy of the logbook may be provided.

Another way to communicate critical metadata about your monitoring efforts is through a written report. Many volunteer programs already publish data summaries in an

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Metadata

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annual report or create special publications analyzing the findings for particular water bodies. Such reports could be made even more valuable if they were prepared with an eye to documenting metadata for potential future data users. Barb Horn recommends preparing a basic “fact sheet” with this type of information for each project.

Florida Lakewatch receives requests for data from researchers all over the world. According to Lakewatch Assistant Director Mark Hoyer, when the data files are sent out they are accompanied by the Lakewatch annual report (in PDF format), which contains extensive information on study design and methods. Florida Lakewatch (unlike most volunteer monitoring programs) is in the fortunate position of having its data published in scientific journal articles, which are also sent to potential data users.

Capturing Metadata Electronically

Ten years from now, when key people may have moved on, how easy will it be to locate old laboratory logbooks, volunteer training records, or field data sheets and connect these documents with the appropriate monitoring results in your database? Incorporating as much metadata as possible into your electronic database is the best way to ensure that the metadata stays with the data.

A number of volunteer monitoring programs are already moving in this direction—for example, storing detailed site location information such as verbal descriptions, site codes, and latitude/longitude coordinates in tables that are linked to results tables in the database. Some programs’ databases contain a field or table for documenting each volunteer’s training level. Replicate results for field tests (an indicator of precision) may also be recorded in volunteer monitoring databases.

Missouri Stream Team posts all its volunteer monitoring data on the Web, along with several types of QA metadata. The results tables include a column identifying the training level of the volunteer who collected the data, and a separate table lists the detection limit and data quality objectives for each parameter.

| Monitor | Date | Time | Instrument ID | Sampling depth | Parameter | Units | Result | Replicate | RPD (%) |
|---------|---------|------|---------------|----------------|--------------|-------|--------|-----------|---------|
| Jane | 10/6/04 | 9:20 | EC-STB3 | surface | conductivity | µS/cm | 758.7 | 759.2 | 0.0007 |
| Jane | 10/6/04 | 9:20 | DOW-RK2 | surface | diss. oxygen | mg/L | 6.6 | 7.3 | 10 |
| Jane | 10/6/04 | 9:20 | TTP-STB2 | surface | temperature | °C | 23 | -- | -- |

Electronically flagging questionable data is another tool to help document data quality. In a well-run monitoring program, the data manager is constantly on the lookout for irregularities. Anything that suggests a problem—a holding time exceeded, a result that’s very different from past results at the same site—is flagged in the database, usually with an accompanying comment explaining the reason for the flag. These flags and comments constitute a type of metadata—essentially, the data manager’s professional judgment that there is some question about the validity of a particular result. At the data manager’s discretion, some or all of the flagged data may be withheld from certain data uses.

“The Ultimate”

Revital Katznelson, a scientist at the California State Water Resources Control Board, has designed a data management system for volunteer monitoring data that can electronically store and manage a very large amount of metadata—potentially, even more data elements than are included in the NWQMC list, although in practice only a fraction are used in any given dataset. By Katznelson’s own description, the system is “the ultimate in comprehensiveness.” She explains, “The goal is scientifically defensible data of known quality—data that will be good enough for regulatory purposes—data that can be used for anything.” Most volunteer monitoring groups will not need such a comprehensive system, but Katznelson has incorporated several interesting features that other groups may find useful.

Katznelson created her data management system in Excel (a spreadsheet program) rather than a relational database because she wanted a system that would be transparent and accessible for small community volunteer monitoring groups without specialized information technology expertise.

To make it easier to manage the metadata, Katznelson organized her spreadsheets in a “normalized” format, which gives each individual result point its own row as shown below:

Continued on next page

Metadata

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In contrast, most volunteer monitoring programs would format the same results in the following way, sometimes referred to as a “tabular” format, in which each row contains multiple results from the same site visit:

| Monitor | Date | Time | DO 1 mg/L | DO 2 mg/L | Cond 1 µS/cm | Cond 2 µS/cm | Temp °C |
|---------|---------|------|--------------|--------------|-----------------|-----------------|------------|
| Jane | 10/6/04 | 9:20 | 6.6 | 7.3 | 758.7 | 759.2 | 23 |

The normalized table is less reader-friendly and looks repetitive (since identical information about name, date, and time is repeated in every row). For reporting purposes, Katznelson converts her tables to the tabular format, which shows at a glance all the results from one site visit.

However, for storage and management the normalized format is preferable. Because each row contains information about just one result, it’s possible to attach a large amount of metadata to each individual result point. (In theory this could be done with the second format as well, by adding in additional columns such as “DO instrument ID,” “DO sampling depth,” etc.; but the row would become extremely long and data manipulation would be extremely cumbersome.) Another reason Katznelson chose the normalized format was to facilitate uploading the data to EPA’s national database, STORET, which is formatted the same way.

Katznelson’s actual results table documents many more pieces of metadata besides those shown in the example, but for the purposes of this article let’s just consider two fields, “RPD,” and “Instrument ID.” The RPD field calculates the relative percent difference of replicate measurements, which is a measure of the precision of the data. One unusual feature of Katznelson’s system is that it allows you to document each individual data point’s RPD. More commonly, volunteer monitoring programs simply report the data quality objectives that the data met.

The Instrument ID field contains a unique identifier code for each piece of equipment. The code encapsulates information about the parameter and method (e.g., DOE = dissolved oxygen electrode; DOW = dissolved oxygen Winkler) and equipment owner (e.g., STB = State Board). The Instrument ID also links to another spreadsheet that contains detailed information for each

instrument (manufacturer, model number, detection limit and range, etc.). Using instrument ID codes is especially convenient in situations where monitoring equipment is kept at a central location and loaned out to different volunteers at different times.

Katznelson stresses that not all the metadata a program documents is provided to data users; some is for internal program use only. “It’s all there,” she says, “but you never need all of it. You select the relevant metadata needed for each use.”

While this basic overview has only scratched the surface, I hope the information presented here may help set volunteer monitoring data on the path to a longer and more productive life.

Reprinted, with minor changes, from *The Volunteer Monitor newsletter*, vol. 17, no. 1, Winter 2005 (available online at www.epa.gov/owow/volunteer/vm_index.html).

Upcoming Conferences

State of the Estuary Conference: Celebrating Science & Stewardship

Dates: October 4-6
Location: Henry J. Kaiser Convention Center
10 Tenth Street, Oakland
Web site: www.abag.ca.gov/abag/events/estuary
Host: San Francisco Estuary Project

WRCA is a co-sponsor and will be exhibiting.

25th Biennial Groundwater Conference: Past Lessons & Future Prospects

Dates: October 25 & 26
Location: Sacramento Convention Center
1400 J Street, Sacramento
Web site: www.waterresources.ucr.edu
Host: UC Center for Water Resources

WRCA Director Linda Vida has created a cumulative table of contents for the proceedings of all 24 previous conferences, and an alphabetical index of all presenters; hard copies will be distributed to conference participants. WRCA will also present a special exhibit of historical photographs and documents relating to groundwater in California.

Staff Update

Welcome Back, Pat

Charged with cataloging maps and other cartographic materials, Pat Fell has returned to WRCA, the place where she began her cataloging career in 1997 as an intern under the tutelage of Randal Brandt. An original cataloger ever since that time, Pat has worked with theses and dissertations, compiled an annotated catalog of Web sites in humanistic psychology, and cataloged Web sites for the Librarians' Index to the Internet (<http://lii.org>). She has spent the past 2 years at the Bancroft Library working with her favorite format: maps. Pat is delighted to be back at WRCA part-time, seeing to it that cartographic materials are fully incorporated into the collection.

Welcome Back, Jessica

Jessica Jaramillo has returned to WRCA to work on a short-term periodicals project. Her last stint at WRCA was during her undergrad years at UC Berkeley. During the few interim years, Jessica returned to her hometown of Whittier, which, like so many places in Southern California, is about a half hour from L.A. While in Whittier, she enjoyed a year working at the Getty Research Institute as a Library Assistant in the Circulation Department, as well as spending time with her family.

Ultimately Jessica decided to live the dream and work toward a master's degree in library and information science at San Jose State University. She is now almost halfway through her program and looks forward to the day when she becomes a full-fledged librarian. "Returning to the Bay Area has been a great pleasure," she says, "and returning to the place that first got me interested in librarianship has been an even greater one."

Congratulations, Paige

After three years as a part-time student employee at WRCA, Paige Wooden has joined the staff full-time as the Public Services Library Assistant. As a student, Paige became a true Interlibrary Loan expert, but she has passed the ILL baton (to Grayson Vincent) and now spends her time purchasing books for the collection, keeping track of circulation, organizing the Colloquium lecture series, assisting with fundraising for the library, and executing any other tasks that are asked of her. She enjoys working for WRCA because it provides a friendly, hard-working, intellectual atmosphere, and staff members also like to have a little fun on the side. She is looking forward to helping the UC Berkeley academic community and the general public with water-related research needs in the coming year. Paige graduated in May from UC Berkeley with a bachelor's degree in English literature and plans to move on to graduate studies in the next few years.

Donations 2005

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Thank you!

Donor Highlight: Bureau of Reclamation Funds Cataloging & Conservation

This April, two U.S. Bureau of Reclamation regional offices each donated \$10,000 to WRCA to fund the preservation of certain materials in WRCA's collection and the processing of materials waiting to be cataloged.

WRCA thanks Kirk Rodgers, director of the Mid-Pacific Region, and Robert W. Johnson, director of the Lower Colorado Region, for these generous donations, and also WRCA Board Member Dennis Underwood, CEO and General Manager of the Metropolitan Water District of Southern California, for facilitating the gifts.

These donations will allow WRCA to purchase supplies for conserving fragile maps and other archival materials, to send certain items to the UC Berkeley Library Preservation Department for special treatment, and to hire a part-time librarian for one year to tackle the cataloging backlog of contemporary and archival materials. Documents about the Colorado River will be given first priority for cataloging because of their relevance to current events.

Friends of the Archives

Please consider supporting WRCA by becoming a member. Membership forms are available on the Friends of the Archives Web site: www.lib.berkeley.edu/WRCA/friends.html.

Corporate Memberships

| | |
|------------|--------------|
| Member | \$150/year |
| Associate | \$250/year |
| Sponsor | \$500/year |
| Benefactor | \$1,000/year |

Member **\$150**

Services include:

- Extended loan period (*1 semester*)
- Annual WRCA calendar of historic photographs
- Acknowledgement in WRCA newsletter, Web site, and annual report

Associate **\$250**

Services include all of the above, plus:

- 1/2 hour of research each month (*upon request*)

Sponsor **\$500**

Services include all of the above, plus:

- 1 hour of research each month (*upon request*)
- Document delivery by mail (*1 loan or 2 photocopies*)

Benefactor **\$1,000**

Services include all of the above, plus:

- Annual WRCA calendar of historic photographs (*3*)
- Document delivery by mail (*2 loans or 4 photocopies*)
- Acknowledgement on commemorative plaque on display at WRCA

Individual Memberships

| | |
|-----------|------------|
| Creek | \$25/year |
| River | \$50/year |
| Cascade | \$75/year |
| Watershed | \$100/year |

Creek **\$25**

Services include:

- Extended loan period (*1 semester*)
- Acknowledgement in WRCA newsletter, Web site, and annual report

River **\$50**

Services include all of the above, plus:

- Annual WRCA calendar of historic photographs

Cascade **\$75**

Services include all of the above, plus:

- Document delivery by mail (*1 photocopy upon request*)

Watershed **\$100**

Services include all of the above, plus:

- Annual WRCA calendar of historic photographs (*2*)

Individual donations are tax-deductible.

Please make checks payable to "University of California Regents." Be sure to include contact information: name, organization name (if applicable), address, phone number, and email address.

Send checks to: Water Resources Center Archives
410 O'Brien Hall
University of California
Berkeley, CA 94720