Initial Bulletin

International Commission on Large Dams

August 12-16, 2013
Seattle, Washington USA

2013 ICOLD SEATTLE

81st Annual Meeting

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Invitation from the Chairman of the Organizing Committee

Dear Delegates and Guests of the 81st Annual Meeting of ICOLD:

On behalf of the United States Society on Dams (USSD), I am pleased to extend this invitation to the member countries of the International Commission on Large Dams (ICOLD) to join us in Seattle, Washington, USA, on August 12-16, 2013, for the 81st Annual Meeting of ICOLD. This event offers extraordinary opportunities to our colleagues involved with the development, operation and maintenance of critical water resource infrastructure around the world to share our knowledge and lessons learned.

We have prepared a Call for Papers for a Symposium, **Changing Times: Infrastructure Development to Infrastructure Management**, to focus on the changing challenges of critical water infrastructure projects relating to dams. Specifically, these aging projects require special care to ensure safety, security and longevity to continue their vital functions that serve the populations of our countries. This symposium will also recognize the changing priorities of a global community with climate change, sustainability, generational knowledge transfer and technical knowledge expansion for critical design features such as hydraulics, hydrology and seismicity.

In addition, the ICOLD 2013 Program will feature unique opportunities to meet in a workshop environment to understand key technical challenges being addressed by USSD Technical Committees.

Study tours have been developed to provide our guests with the opportunity to visit several milestone dam and critical infrastructure projects around the United States as a follow-up to the lessons of our symposium and workshops.

This 81st Annual Meeting will be held in scenic downtown Seattle, Washington, with easy access to the airport, shopping, cultural sites and general tourist places of interest. The timing in August will provide a good opportunity for favorable weather for our guests to visit this historic city in the Pacific Northwest region of the United States.

We are excited about the opportunity to host our ICOLD colleagues in the United States for the first time in 25 years. We hope that you will take advantage of the pre- and post-conference Study Tours to see the many projects and inspiring sights of the United States. SEE YOU IN SEATTLE!

Michael F. Rogers
President, United States Society on Dams and
Chairman, ICOLD 2013 Organizing Committee

USSD

www.ussdams.org

Welcome to Seattle!

The U.S. Society on Dams welcomes ICOLD to the United States of America for the 81st Annual Meeting. USSD has selected Seattle, Washington, in the beautiful Pacific Northwest, as the meeting site. Mid-August is a perfect time to visit this lovely city and surrounding area.

Dams and water resources play a key role in the history and economy of the region. There are more than 1,200 dams in the state of Washington, and with approximately 80,000 kilometers of rivers and streams, 7,800 lakes and 5,000 kilometers of coastline, water is an essential resource for the economic, social and cultural well-being of the state. Washington leads the nation in hydroelectricity, with about 87 percent of its electricity produced by hydroelectric facilities. In fact, approximately 31 percent of the United States' total hydropower is generated in Washington.

Seattle, The Emerald City

With an area population of more than 3.2 million people, Seattle is the major economic, cultural and educational center of the Pacific Northwest. A major Pacific Ocean seaport, Seattle is situated on an isthmus between Puget Sound and Lake Washington about 180 kilometers south of the U.S. – Canadian border. Seattle is known for its mild and rainy climate, but during the summer, the weather is generally dry and warm. With hundreds of daily flights by 27 major national and international airlines, the Seattle-Tacoma International Airport serves millions of travelers each year.

While in the city, visitors can enjoy a 360-degree view of the city from the top of the Space Needle, stroll through the historic Pike Place Market, see 300 species of marine life at the Seattle Aquarium or ride on the world's third largest ferry system. Seattle offers a variety of dining options guaranteed to please your palate, from fresh-off-the-boat seafood and locally grown produce to world renowned wines and coffee from the first independent coffee stand in history. With more than 200 art galleries, a variety of performing arts, five professional sports teams and countless outdoor activities, Seattle promises a truly remarkable experience for anyone.

The Sheraton Seattle Hotel — Meeting Venue and Headquarters Hotel

The 35-story Sheraton Seattle Hotel is in the heart of downtown Seattle with breathtaking views of the Seattle skyline. The Sheraton will serve as the venue for ICOLD Committee Meetings, Symposium, Workshops, Exhibition and General Assembly.

The Sheraton features in-room Wi-Fi access, business center, state-of-the-art fitness center with spa and whirlpool, and several restaurants, cafes and lounges. The Hotel's location in thriving downtown Seattle means guests are just steps from exciting nightlife, restaurants, shopping, and entertainment. Walk or take convenient public transportation to Seattle's famous attractions, including Pike Place Market, the Seattle Waterfront, Seattle Center, Space Needle, Seattle Art Museum, Seattle Aquarium, Washington State Convention & Trade Center and the Washington State Ferries.

Program

Sunday, August 11

Arrival of Pre-meeting study tours

Registration

Meeting of ICOLD Board

Monday, August 12

Meeting of Technical Committee Chairs

Welcome reception/Exhibition opens

Tuesday, August 13

Meeting of technical committees

Exhibition continues

Free evening

Wednesday, August 14

Symposium, ***Changing Times: Infrastructure Development to Infrastructure Management***

Exhibition continues

Cultural Event at Seattle Art Museum

Thursday, August 15

Technical tours

Four half-day Workshops by USSD Technical Committees

Exhibition ends after afternoon coffee break

Friday, August 16

81st General Assembly

Four half-day Workshops by USSD Technical Committees

Farewell dinner

Saturday, August 17

Departure, post-meeting study tours

Symposium

Wednesday, August 14

The theme of the one-day Symposium recognizes that much of the world, including the United States, faces the challenges of managing an aging dam infrastructure during a time when sustainability, safety and security concerns are paramount. Concurrent sessions and a poster session will maximize opportunities for delegates to make presentations.

Changing Times: Infrastructure Development

Seven Oaks Dam

Call for Papers

A Call for Papers had been issued for abstracts of proposed papers on the following topics and sub-topics:

1. Technical Approaches for Managing an Aging Infrastructure
    a. Addressing concrete deterioration due to climatic conditions and freeze-thaw
    b. Managing structural impacts of alkali-aggregate reactions in dams
    c. Prediction, prevention, and repair of scour damage
    d. Providing for resiliency and reliability in earthen embankments
    e. Seepage control for foundation and abutment stability in existing and new dams
    f. Inspection, repair, and replacement of spillway gates and superstructures
2. Advances in Dam Safety, Security, and Risk Management
    a. Role of risk management in a modern dam safety program
    b. Applying risk management concepts to prioritize improvements to aging facilities
    c. Practical risk management tools for prioritizing upgrades to a portfolio of dams
    d. Adapting inspection, maintenance and operations practices considering changes in climate, loading conditions, water supply uses, and regulatory requirements
    e. Adapting security programs to changing conditions and world events
    f. Integrating safety, security, and incident management into complementary risk management programs

to Infrastructure Management

3. Strategies for Extending Service Life of Dams
    a. Using advanced construction methods to reduce maintenance requirements
    b. Innovative rehabilitation technologies to address repair challenges
    c. Addressing sedimentation impacts on reservoir storage capacity
    d. Advanced methods for increasing reservoir storage and spillway discharge capacity
    e. Non-structural approaches to facility life extension
4. Innovative Surveillance and Monitoring Systems
    a. Emerging technologies for monitoring dams and their foundations
    b. Performance evaluation of dams using monitoring data
    c. Design and construction of instrumentation systems considering operations and maintenance requirements
5. Decommissioning Dams at the Completion of their Useful Service Life
    a. Case studies in dam removal and restoration
    b. Predicting future conditions following removal and restoration

Abstract Submission

Authors are invited to submit an abstract of 300-400 words to Amanda Griffin, ang@freese.com. All accepted papers will be published electronically in the Symposium Proceedings.

Symposium Schedule

Abstracts Submission Deadline:	September 16, 2012
Notify Authors of Acceptance:	October 31, 2012
Draft Papers Due:	January 16, 2013
Review Comments to Authors:	March 12, 2013
Final Papers Due:	May 1, 2013

The Call for Papers may also be found at www.icold2013.org.

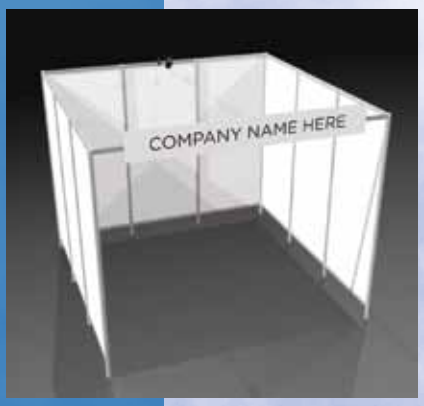
Roosevelt Dam

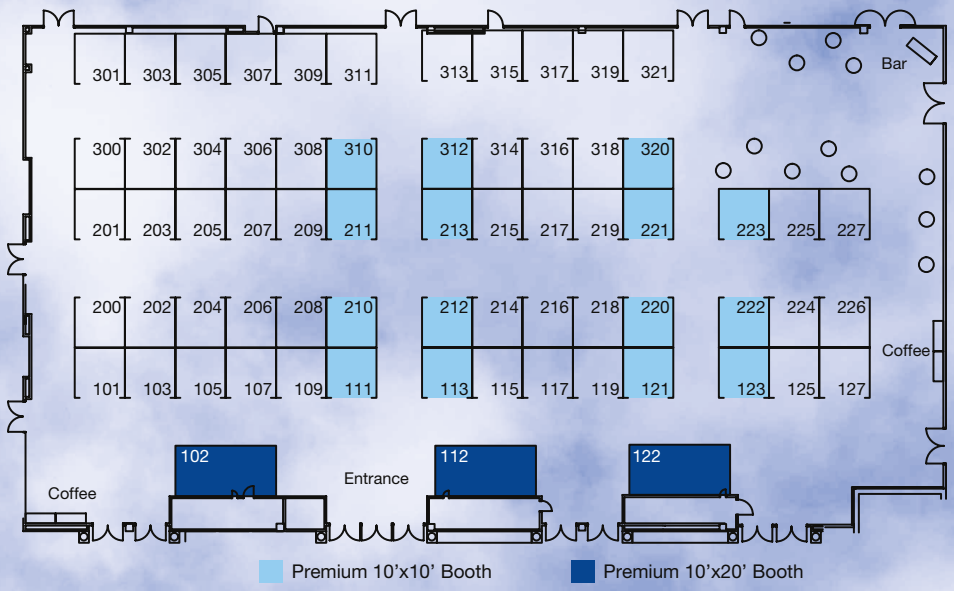
Glen Canyon Dam

Exhibition

An Exhibition will be held August 12-15 at the Sheraton Seattle Hotel. The Exhibition will provide an opportunity for U.S. and international companies to showcase achievements, products and services related to the design, construction, operation and maintenance, and safety of dams.

Exhibitor information and reservation form may be found at www.icold2013.org/exhibit.





Workshops

A program of eight half-day workshops on Thursday and Friday will highlight new developments and experiences in the long term management of dams. The workshops focus on current" hot topics" which have been discussed extensively in the United States, and are of interest internationally. Each Workshop will cover the U.S. experience, and also discuss the international perspective. USSD Technical Committees will organize the workshops

Thursday, August 15

Life Extension Technologies and Strategies for Aging Dams

Techniques for maintaining an aging dam, upgrading and extending service life; rehabilitation verses replacement decisions; case studies

Baker Dam

Dam Safety Risk Management

This workshop will demonstrate how some dam owners have transformed their approach to managing dam safety into a portfolio risk management (PRM) approach. The PRM approach integrates all on-going dam safety activities and a dam safety improvement program within the context of the owners' business. The workshop will commence with an overview of PRM, how it builds on and strengthens traditional approaches to dam safety, and how it can integrate with the owner's business. It will include the experience of government and private dam owning organizations and a dam safety regulator.

Managing Spillway and Reservoir Capacity Changes

Approaches to managing spillway and reservoir capacity to address evolving dam safety and operational demands and consideration of potential climate change impacts.

Aging of Concrete Dams

Review of types of expansion chemical reactions in concrete, techniques for prevention in new dams and tools management in existing dams, US case histories.

Note: An optional post-meeting study tour will visit dams in southeastern states that have been affected by AAR.

Friday, August 16

State of the Art Technologies for Monitoring Dams and Levees

A presentation covering currently available and emerging new technologies in monitoring including sensor arrays, data collection, presentation, analysis and management tools and techniques, and surface position measurement technologies.

Closure of Tailings Dams

The workshop will focus on challenges and new trends related to closure of tailing dams. A discussion on regulatory requirements, selection of design criteria and closure methods, and a presentation of a number of examples of closed tailing dams will be included.

Moorewood, West Virginia, Levee

Levees and Embankments: Robustness, Resiliency, and Redundancy

The levee and embankment workshop will be centered around applying the concepts of Robustness, Resiliency, and Redundancy. These design and maintenance issues are becoming the standard framework by which the international engineering community is evaluating existing and proposed embankments and levees. Workshop presentations will include applications of these framework issues for specific levee systems and embankments in selected countries.

Dam Decommissioning—End of Life Decisions for Dams

Review of the role and history of decommissioning in the management of dams in the US, USSD Guidelines and Case Study Examples.

Elwha Dam

Thursday, August 15

Technical Tours will be offered on Thursday, August 16, providing an opportunity for participants and guests to visit dams and water resources facilities near Seattle. Note: All tours are tentative and subject to change prior to publication of the Final Bulletin.

Snoqualmie Falls Hydroelectric Project and Cedar Falls

The world's first hydropower plant built completely underground, Puget Sound Energy's Snoqualmie Falls Hydroelectric Project was constructed in 1898-99 in the Cascade Mountains east of Seattle. The project's original Plant 1 powerhouse — still operational today — lies inside a bedrock cavity 82 meters below ground along the edge of Snoqualmie Falls. The project's public park and trails are one of the Northwest's most-visited tourist destinations. A major, 3½-year redevelopment of the Snoqualmie Falls facilities, scheduled for completion in early 2013, includes substantial upgrades to PSE's power-generating infrastructure and major enhancements to the public recreational facilities at Snoqualmie Falls. Seattle City Light's Cedar Falls facility includes a masonry dam built in 1911 on the Cedar River southeast of Seattle. Participants will learn about ongoing efforts to allow chinook and coho to reach 17 miles of prime spawning grounds, including a fish ladder barrier below the dam to keep salmon from entering the powerhouse.

AECOM Hydraulics Laboratory

AECOM, a leading U.S. engineering firm, has a physical hydraulic modeling laboratory in Redmond, south of Seattle. The lab is one of the few fully equipped hydraulics laboratories in the world. At 24,000 square feet, the large laboratory space allows the firm to undertake numerous hydraulic modeling projects, ranging from pumping station, pipeline and reservoir design, to fish passage and high head dam and navigation facilities evaluations, simultaneously. Many other specialized investigations are performed to develop the designs of any type of conduit or conveyance channel or control structure where flowing water is involved.

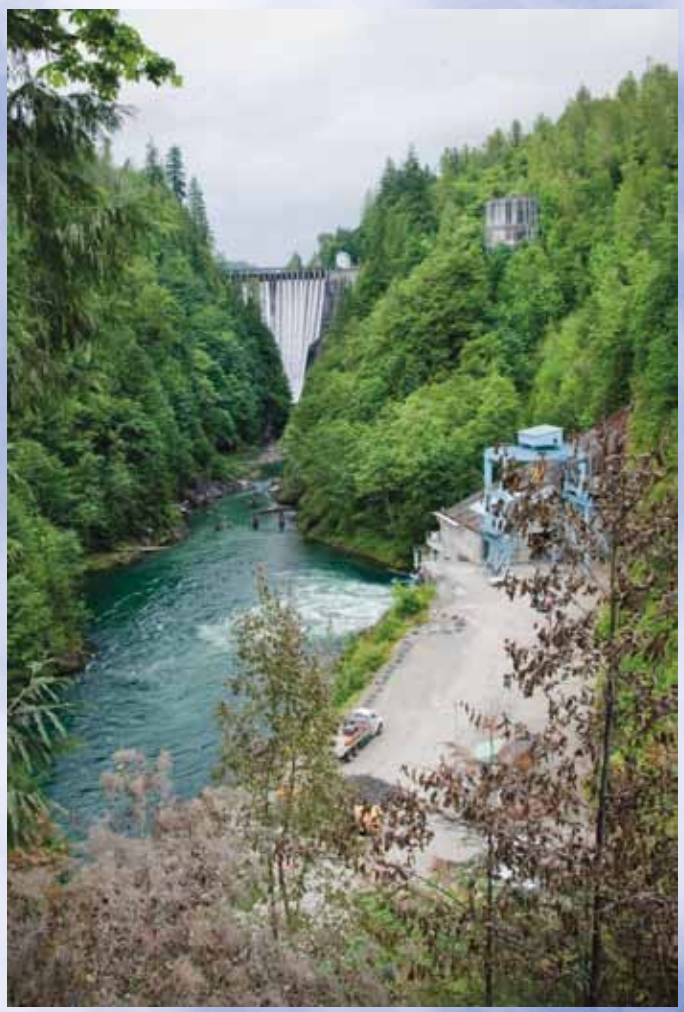
Ballard (Hiram Chittenden) Locks

Ballard Locks are part of Seattle's Lake Washington Ship Canal. The locks and associated facilities maintain the water level of the fresh water Lake Washington and Lake Union; prevent the mixing of sea water from Puget Sound with the fresh water of the lakes; and move boats from the water level of the lakes to the water level of Puget Sound, and vice versa. The complex includes two locks, a 71.6 meter spillway with six gates and a fish ladder to assist the migration of anadromous fish, notably salmon.

Operated by the U.S. Army Corps of Engineers, the locks were formally opened on July 4, 1917. In addition to a presentation by the Corps of Engineers, the tour will include a cruise that will take passengers through the locks, providing outstanding views of the historic waterfront and shipping terminals, spectacular city skyline the majestic Cascade and Olympic mountain ranges.

Baker River Hydroelectric Project

Puget Sound Energy's largest hydropower facility is the Baker River Hydroelectric Project, located on a tributary of the Skagit River in northwest Washington. The project has two dams, each with its own powerhouse. The dams' reservoirs, Baker Lake and Lake Shannon, are fed by runoff from the flanks of Mount Baker and Mount Shuksan. Lower Baker Dam, completed in 1925, is a 87-meter-high concrete structure with 79 megawatts of power-generating capacity. The 90-meter-high Upper Baker Dam, completed in 1959, has a generating capacity of 91 megawatts. The power project also contains extensive salmon-enhancement systems, including a new fish hatchery and new, innovative facilities for moving migrating fish both upstream and downstream around PSE's two dams. The project provides numerous amenities for public recreation and flood control for communities in the Skagit River Valley.



Accompanying Persons Tours

A comprehensive program for accompanying persons will allow guests to enjoy the beauty and culture of the Seattle area. Note: All tours are tentative and subject to change prior to publication of the Final Bulletin.

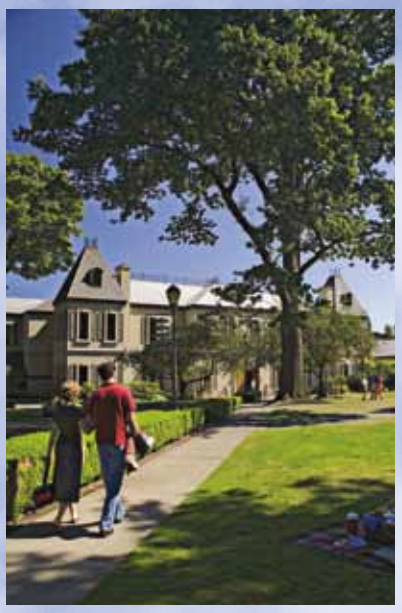
Seattle Landmarks Tour City Tour

This morning or afternoon motorcoach tour will introduce participants to Seattle's historical, cultural and sightseeing highlights. Enjoy a delicious beverage at the original Starbucks. Snap a picture of the famous fish mongers at **Pike Place Market** and maybe even throw a fish yourself! Take a walk outside to **Seattle's Olympic Sculpture Park** and explore the dynamic spaces and layout of this waterfront park. Visit **Alki Beach**, where Seattle's settlers first landed before crossing Puget Sound and making their home in **Pioneer Square** which features over 20 city blocks of Victorian Romanesque architecture and more than 30 fine art and glass galleries. The tour also includes the **International District**, rich with history and culture. The tour will conclude at Seattle's most recognizable landmark – The Space Needle!

Downtown Walking Tour

This guided walking tour is an entertaining and informative introduction to Seattle's very walkable downtown. From the Seattle Sheraton, you are literally steps from the best shopping, activities and dining in the downtown core! Your stroll will take you through our **shopping district** anchored by the Nordstrom Flagship store, the **Theater District**, the world famous **Pike Place Market** and finally past many of Seattle's most **popular restaurants**.

Northwest Winery Tour



As Washington State's oldest and most acclaimed winery, **Chateau Ste. Michelle** offers award-winning wines and a tasting experience second to none at the historic grounds 30 minutes outside of Seattle. The winery combines Old World winemaking tradition with New World innovation. You will take a tour of the Chateau, bottling line and the Barrel Room, ending with a "Theme Tasting" which will feature four of the winery's most popular Columbia Valley Wines. From the Chateau we will cross the street to the intimate, relaxed setting at **Novelty Hill Januik Winery** for a Columbia Valley Tasting. This property is a unique, upscale destination for guests seeking a one-of-a-kind experience or memorable setting to mark a special occasion. The building's contemporary design and surrounding landscaping celebrate wine's agrarian roots and the artistry of fine winemaking.

Boeing Future of Flight

The **Future of Flight Aviation Center & Boeing Tour** features popular learning zones equipped with touch-screen computers that operate an educational program that guides you through the design of your own aircraft! As you experience the gallery, you will learn about the principal features of powered flight as well as the design and technological nuances of commercial airplanes at these interactive stations. You can then digitally create and test your own airliner designs. As part of the tour, visitors will experience the largest building in the world by volume. On the Boeing flight line, visitors will see airplanes in various stages of flight test and manufacture for airline customers around the world.

Snoqualmie Falls and Boehm's Chocolates

At 82 meters tall, **Snoqualmie Falls** is surrounded by a park, hiking trails, observation deck, café and gift shop. Guests will be accompanied by a tour guide who will talk about the history of the area and share some of the interesting secrets Washington has to offer. Lunch with local Washington wines and microbrews will follow at the Terrace at Salish Lodge overlooking the Falls. During the tasting, a Sommelier will walk you through the different area wines and give a special presentation on the history of the wine and the menu item selected for the pairing. On your return, you will stop at the world famous **Boehm's Chocolates** in the small town of Issaquah, the original home of Julius Boehm, a transplanted Swiss Chocolatier. For decades, this kitchen has been a favorite sweet spot for visitors and locals alike!

Tillicum Village

Enjoy the vista of Seattle's spectacular cityscape during the 45-minute cruise to **Blake Island** and **Tillicum Village**. Blake Island State Park was an ancestral campground of the **Suquamish** and **Duwamish Indian Tribes** believed to be the birthplace of Chief Seattle. The island is a wonderful example of a Pacific Northwest lowland forest, with a saltwater beach circling the island park. Experience the heritage and culture of native Americans at the Tillicum Village Northwest Coast Indian Cultural Center. Following the stage show, guests are invited to a demonstration of how salmon are laced onto cedar cooking stakes to be barbecued around fire pits. Savor the **delicious salmon** during lunch on the Island.

Seattle Lakes and Locks Cruise

Enjoy **Lake Union**, the houseboat communities of **Portage Bay** and a cruise past many homes of Seattle's rich and famous during this lunch cruise. Your sailing begins in Lake Union and includes live narration pointing out fascinating history and interesting facts about the places you are seeing including the "Sleepless in Seattle" houseboat. The cruise continues under one of our state's three floating bridges and past the homes of some of the world's most well-known multi-millionaires, including Microsoft's Bill Gates. On the return from the Lakes, your private boat will journey through the **Hiram Chittenden Locks** and out into **Puget Sound**. Once you have arrived in Puget Sound and Shilshole Bay, there is a chance you will encounter whales and bald eagles. The cruise ends as you sail into Elliott Bay and the Seattle Waterfront.

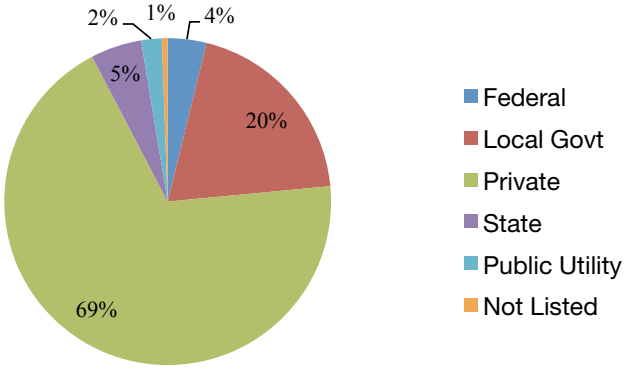
Dams in the United States

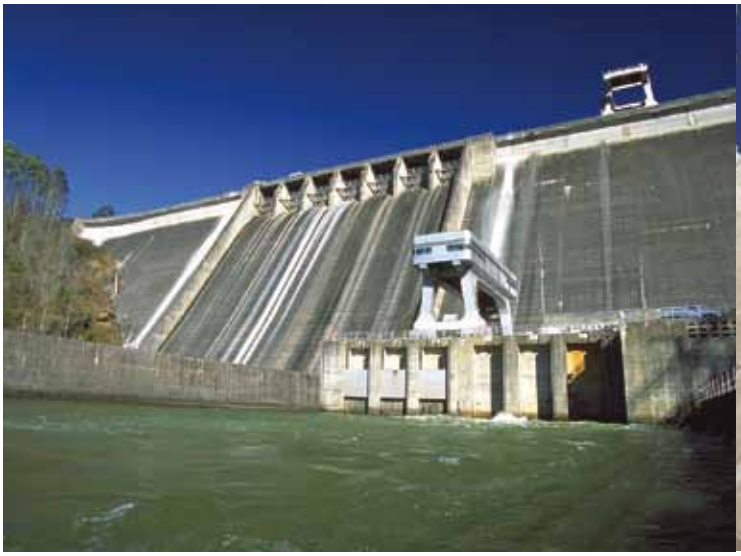
There are more than 84,000 dams in the U.S., according to the National Inventory of Dams (NID), a congressionally authorized database which documents dams in the U.S. and its territories.

Interesting statistics on U.S. dams

- The oldest dam in the NID is Old Oaken Bucket Pond Dam in Massachussetts, completed in 1640.
- Oroville Dam on the Feather River in California, at 235 meters tall, is the tallest dam in the U.S.
- Hoover Dam's Lake Mead on the Colorado River in Nevada, is the largest reservoir with more than 37 trillion cubic meters of storage.
- Almost 70% of the dams are privately owned.
- The federal government owns only 4% of the total NID, which includes approximately 40% of the tallest dams

Dams by Owner Type

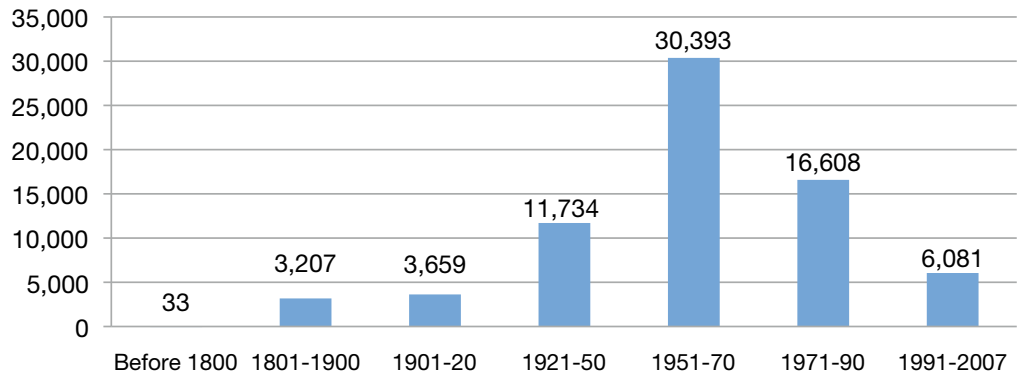




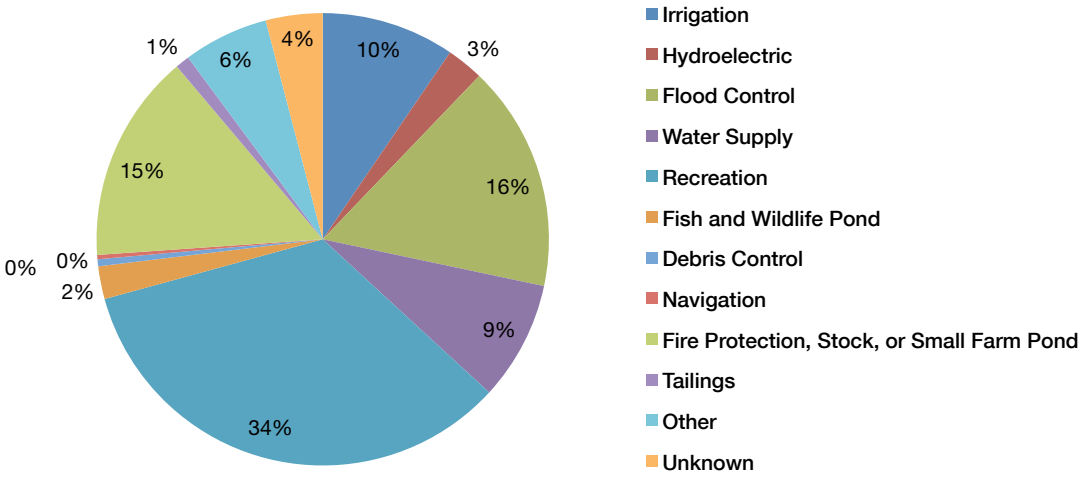
Hiwassee Dam

Glen Canyon Dam

Dams by Completion Date



Dams by Primary Purpose



New Waddell Dam

Hoover Dam

Interesting statistics on U.S. dams

- 13,990 dams are classified as high hazard potential, 12,662 significant, 57,362 low and 116 undetermined.
- 488 dams are 60 meters or taller; 18,476 dams are 4.6 meters or lower
- The average age of a NID dam is 53 years
- Recreation is the primary purpose of more than 28,000 (34%) of the dams. More than 15,000 (18%) are primarily for flood damage reduction and storm water management.

Each delegate to the 2013 ICOLD Annual Meeting will receive a beautiful hardcover book portraying one hundred of the most significant U.S. dams, with statistics and other information for each dam. An electronic supplement to the hardcover book will include an overview of dams in the U.S., current state of the practice, legislation and regulation of dams, and key personalities in U.S. dam engineering history. Notable projects of the past 25 years will be described, as well as new design and construction trends, and recent developments such as use of risk analysis, security issues, analytical methods, delivery methods, dam decommissioning, etc. Expected future trends will be highlighted as well.

Social Events

Social events are an essential part of the ICOLD meetings. A wide range of fun events will allow participants and accompanying persons to socialize and network in a casual, festive atmosphere.

We will start by welcoming everyone on Monday evening for hors d'oeuvres and refreshments. This event will also feature the opening of the exhibition.

We have left Tuesday evening open for National Committees to have their own gatherings and also for other private hosting events.

On Wednesday evening, we are pleased to host a cultural event to take a break from the heavy technical program. You will enjoy a spectacular evening at the Seattle Art Museum. SAM is known locally and internationally for its diverse collections, especially in Asian, African, Northwest Coast Native American and modern/contemporary art. SAM will be open exclusively for ICOLD, providing access to collections and special exhibitions. Refreshments and musical entertainment will add to the incredible ambience at the Seattle Art Museum.

Thursday evening is kept free so delegates can explore the many dining opportunities in downtown Seattle. We will provide listings of restaurant and entertainment options.

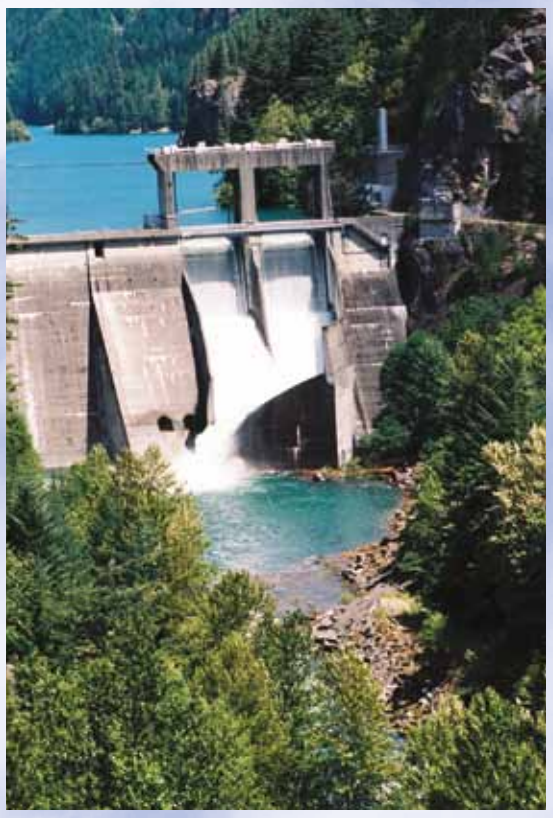
On Friday evening the "grand finale" will be the Farewell Banquet at the Sheraton Hotel where you will enjoy fine international foods and refreshments while you mingle with longtime friends and new acquaintances.

Pre-Tour A1 — North Cascade Mountains

August 9-10

Day 1 —Depart Seattle, travel by motorcoach through the **Skagit River Valley** and the **North Cascades National Park** which preserves some of North America's most spectacular alpine scenery. Visit Seattle City Light's **Skagit Hydroelectric Project**, which includes **Gorge Dam**, **Diablo Dam** and **Ross Dam**. Travel by boat on Diablo Lake to the base of Ross Dam. Overnight in the "Old West" town of Winthrop, Washington.

Day 2 — Drive down the east side of the **Cascade Mountains** and along the **Columbia River**. After climbing over Snoqualmie Pass, continue to a **winery** in Woodinville, Washington, for lunch and wine tasting. Tour ends in Seattle.



Gorge Dam

Several study tours before and after the meeting will showcase dams and the spectacular sights of western and southeastern regions of the United States. Participants will learn about contemporary issues facing dam engineers in the U.S. and throughout the world — issues such as modernization, seismic stability, safety and security, monitoring and instrumentation, even dam removal.

From rainforests to deserts, mountains to beaches, participants will soak up the gorgeous scenery of the U.S. and experience the bright lights of cities such as Las Vegas, San Francisco and Los Angeles. We're proud to have this opportunity to showcase meaningful U.S. dam projects in our beautiful country.

Note: All tour schedules are tentative and subject to change prior to publication of the Final Bulletin.

Pre-Tour A2 — Elwha River Restoration Project, Olympic Peninsula

August 9-10

Olympic National Park

Day 1 — Depart Seattle, travel to the **Olympic Peninsula**. Visit **Elwha Dam** site and **Glines Canyon Dam** site. Both hydroelectric dams, on the Elwah River, are being removed for river restoration and enhance fish passage. Removal began in September 2011 and will be complete by September 2014. Tour **Olympic National Park's Hurricane Ridge**. Overnight in Port Angeles, Washington.

Day 2 — Tour additional features of **Olympic National Park**, including Lake Crescent Lodge and the **Hoh Rain Forest.** Tour ends in Seattle.

Hoh Rain Forest

Glines Canyon Dam

Pre-Tour A3 — San Francisco Bay Area Dams

August 7-10

Calaveras Dam

Los Vaqueros Dam

Day 1 —Participants arrive independently in **San Francisco**. Tour begins Wednesday afternoon with registration and welcome dinner.

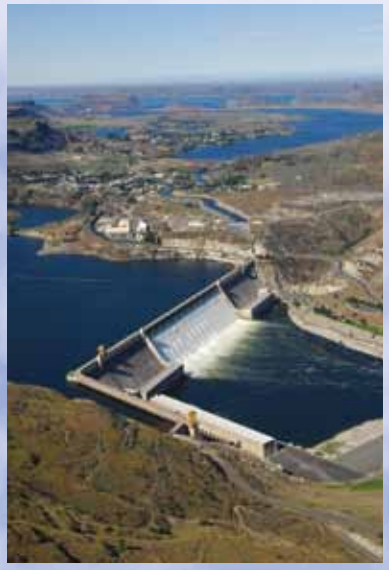
Day 2 — Travel to **San Pablo Dam**. Originally constructed in 1920, a recent seismic upgrade project was recently completed. The in-place improvement technique utilized cement deep soil mixing (CDSM) technology. Visit **Muir Woods National Monument**, travel along scenic Highway 1, with a visit to the **Point Reyes National Seashore**. Dinner in Sausalito. Overnight in San Francisco.

Day 2 — Travel to **Calaveras Dam**. Observe construction of the Calaveras Dam Replacement Project. Due to seismic safety concerns, the existing dam is being replaced with a new earth and rockfill embankment dam, spillway and inlet/outlet works. Travel to **Los Vaqueros Dam**. Originally constructed in the late 1990s, a recently completed expansion project raised the dam by 10 meters and increased the capacity of the reservoir by more than 50%. Dinner at a **Livermore Valley winery**. Overnight in San Francisco.

Day 3 — Enjoy a motorcoach tour of San Francisco. Travel to **Anderson Dam**, a 427-meter-foot-long zoned earth-rock embankment dam with a maximum height of 73 meters. The owner is initiating a project to seismically retrofit the dam. Travel to **Lower Crystal Springs Dam**, a concrete gravity dam completed in 1888. The dam has survived numerous historic earthquakes, and recently underwent hydraulic improvements. Fly from San Francisco international Airport to Seattle.

Post-Tour B1 — Upper Columbia River Hydro Projects

August 17-19



Grand Coulee Dam

Day 1 — Travel over the Cascade Mountains to **Wanapum Dam**, completed in the 1960s. View recently completed downstream fish bypass. Continue up the Columbia River to **Rocky Reach Dam** and tour the unique juvenile fish bypass. Overnight in the lakeside city of Chelan, Washington.

Day 2 — Travel to **Grand Coulee Dam**, tour dam and the **John W. Keys Pump Generating Plant**. Owned and operated by the Bureau of Reclamation, Grand Coulee is one of the largest concrete dams in the world. In addition to its irrigation and power functions, it is a primary factor in controlling Columbia River floods. Following lunch, travel to the **Wells Project** and learn about the unique design that combines the 10 generating units, spillways, switchyard and fish passage facilities into a single structure referred to as the hydrocombine. Overnight in the "Old West" town of Winthrop, Washington.

Day 3 — Travel over the scenic **North Cascade Highway** en route to an afternoon visit to Seattle City Light's **Diablo Dam**. At the time it was completed in the 1920s, Diablo Dam was the tallest dam in the world. Tour a **Skagit Valley winery** on the return to Seattle. Tour ends in Seattle.

Post-Tour B2 — Lower Columbia River Dams and Mt. St. Helens

August 17-19

Mount St. Helens

Day 1 — Travel to **Mount St. Helens**, site of the catastrophic eruption in May 1980. Tour the Visitor Centers and learn about the **Sediment Retention Structure** built by the Corps of Engineers. Overnight near Stevenson, Washington.

Day 2 — Tour **Bonneville Lock and Dam** in the Columbia River Gorge, owned and operated by the Corps of Engineers. A total of 18 generators produce more than 1320 MW of power; the project also includes a 206-meter-long navigation lock and has extensive fish passage features. See fish hatchery and sturgeon and trout ponds. The afternoon will include a visit to the **Columbia Gorge Discovery Center**, where local experts will discuss the geology of the Gorge, and issues relating to dams, including a presentation on **The Dalles Dam**, which spans the Columbia River above Bonneville Dam. En route to Portland, Oregon, stop at the amazing **Multomah Falls.** With its two-step fall totaling 189 meters, Multomah is one of the tallest waterfalls in the U.S. Overnight in Portland.

Bonneville Lock and Dam

Day 3 — Following a city tour of beautiful Portland, tour the **Bonneville Power Authority** operations center in Vancouver, Washington. Return to Seattle.

The Dalles Dam

Post-Tour B3 — Northern California Dams

August 17-20

Day 1 — Fly to Sacramento, California. Tour **Folsom Dam**, built by the Corps of Engineers in 1955 and operated by the Bureau of Reclamation. The dam has a concrete center section with earthen wing dams. A new spillway is under construction and scheduled for completion in 2015. Overnight in Sacramento.

Folsom Dam

Shasta Dam

Day 2 — Travel to **Shasta Dam** and tour the dam, visitor center and fishway. Shasta Dam is a Bureau of Reclamation concrete gravity arch dam, 183 meters high and 1,036 meters long. Overnight in Redding, California.

Day 3 — Tour **Oroville Dam**, the tallest dam in the U.S. at 234 meters high. The zoned earthfill embankment is 2,109 meters long. Overnight in Sacramento, with time to visit Old Sacramento on Sacramento River, home to shopping, dining, entertainment, historical attractions and world-renowned museums set within the time of the California Gold Rush and the Transcontinental Railroad.

Day 4 — Travel to nearby Davis and tour the **University of California, Davis Laboratory**. Tour the **Hydraulic Engineering Center**, a Corps of Engineers facility for technical research and training in hydrologic engineering and water resources planning and management. Overnight in Sacramento.

Post-Tour B4 — Southeastern U.S. Dams/Alkali Aggregate Reaction

August 17-20

This tour will focus on the management of alkali-aggregate reactions in damsalkali-aggregate reaction, with technical presentations and tours of dams that have been affected by AAR.

Day 1 — Travel by air to Chattanooga, Tennessee.

Day 2 — Tour local attractions in this lovely southern city. **Technical presentations** by AAR experts. Overnight in Chattanooga.

Day 3 — Tour the Tennessee Valley Authority's **Chickamauga Lock and Dam**. Following lunch, tour TVA's **Hiwassee Dam**. Overnight in Chattanooga.

Day 4 — Tour TVA's **Fontana Dam** and ALCOA's **Santeetlah Dam**. Travel to Atlanta, Georgia.

Chickamauga Lock and Dam

Post-Tour B5 — Southern California

August 17-21

Day 1 — Travel by air to **San Diego, California,** visit local attractions. Overnight in San Diego.

Day 2 — Motorcoach tour of tourist highlights in the San Diego area. Overnight in San Diego.

Day 3 — Tour **Olivenhain Reservoir,** the largest roller compacted concrete dam in the U.S. and first RCC dam permitted in seismicly active southern California. Tour **San Vicente Dam,** where a dam raise is scheduled for completion in early 2013. The raise, which will double the capacity of the reservoir, constructs an RCC dam over the existing dam. Overnight in San Diego.

Day 4 — As we travel north toward Los Angeles, visit **Carlsbad Sea Water Desalination Plant**. Tour **Seven Oaks Dam,** completed in 1999, the 10th largest earthfill dam in the U. S. and built to withstand an 8.0 magnitude earthquake. Overnight in Los Angeles.

Day 5 — Tour **Diamond Valley Lake**, an offstream storage reservoir formed by three dams. Enjoy a visit to a local winery in the beautiful Temecula Valley. Tour **Big Tujunga Dam,** which recently underwent a seismic upgrade project. Overnight in Los Angeles.

San Vicente Dam

Post-Tour B6 — Colorado River Dams and the Grand Canyon

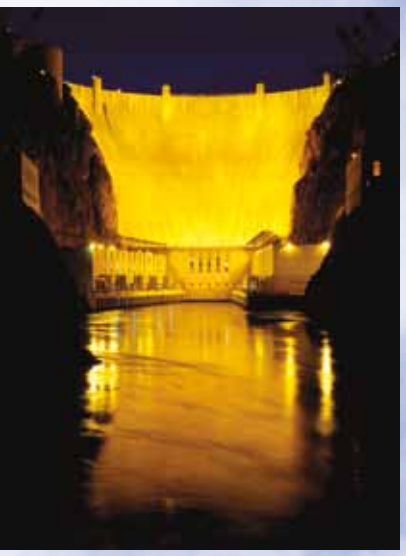
August 17-21

Day 1 — Fly to **Las Vegas**. Tour **Hoover Dam**, a concrete arch gravity dam built between 1931 and 1936, impounding Lake Mead. Overnight Las Vegas.

Day 2 — Travel by motorcoach to the **Grand Canyon**. Tour Grand Canyon. Overnight in the Grand Canyon.

Day 3 — Travel to Page, Arizona. Tour **Glen Canyon Dam**, the second largest dam on the Colorado River. Travel to Flagstaff, Arizona.

Day 4 — Travel to Phoenix, Arizona. **Tour New Waddell Dam**, a zoned earthfill dam completed in 1994 and **Central Arizona Project** facilities. Overnight in Phoenix.



Hoover Dam

Day 5 — Tour **Theodore Roosevelt Dam**, originally completed in 1911, then the highest masonry dam in the world. A project to expand and renovate the dam was completed in 1996, using a concrete overlay. Return to Phoenix.

New Waddell Dam

Grand Canyon

General Information

Transportation

Seattle-Tacoma International Airport, served by 27 airlines, is just 24 kilometers south of downtown Seattle. Seattle is also served by Amtrak passenger trains.

Weather

Summer is delightful in Seattle. Visitors will enjoy warm days, late sunsets and lush, green vegetation. The average daily maximum temperature in August is 23.3°C, and the average monthly rainfall is 2.95 cm.

Visas

For those requiring visas to visit the United States, we recommend beginning the process early, as it may take several months or longer to obtain a visa. For more information, visit the U.S. Department of State website, http://travel.state.gov/visa/. USSD will provide letters of invitation and/or confirmation of participation upon request.

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Contact Information

Larry D. Stephens
U.S. Society on Dams

1616 17th Street,
Suite 483
Denver, CO 80202
USA

Phone: 303-628-5430

Fax: 303-628-5431

E-mail:
stephens@ussdams.org

www.ussdams.org

Symposium Abstract Submissions

Amanda Griffin
Freese and Nichols, Inc.

E-mail: ang@freese.com