WALPA The Washington State Lake Protection Association Newsletter

WATERLINE

Welcome New Board Members!

At September's regional conference, two new officers and six new directors were elected to serve on the WALPA Board of Directors.

Beth Cullen, president-elect, is a Water Quality Planner with King County's Department of Natural Resources and Parks. She works on special projects on King County lakes, and helps with the Lake Stewardship volunteer monitoring program.

Gene Williams, treasurer, is a senior planner in the Surface Water Management Division of Snohomish County. Since 1989, he has been project manager of Snohomish County's lakes program.

Beth Cocchiarella, director, has lived on Liberty Lake since 1995; she and her family have been active in various community watershed efforts.

Steven Fradkin, director, has worked as a Coastal Ecologist/ Limnologist for Olympic National Park since 2000 and is an Affiliate Associate Professor at the University of Idaho Department of Fish and Wildlife Resources.

Arline Fullerton, director, is an independent sub-contractor surveying lake vegetation, hand pulling invasive aquatic plant species, and writing reports. She has vast experience identifying and recording aquatic plant species and monitoring water quality.

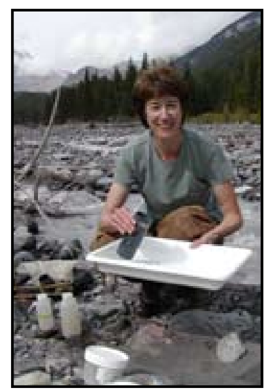
Jean Jacoby, director, is a Professor and Chair of the Department of Civil & Environmental Engineering at Seattle University. She previously worked at several civil and environmental engineering firms where she managed studies of toxic pollution in Puget Sound, watershed and water quality investigations, and lake restoration projects.

Karl Mueller, director, is currently completing his Master of Science in Environmental Science, specializing in freshwater ecology, at Western Washington University. Karl's work experience includes stints as a consultant, fish and wildlife biologist, mussel farm manager, fish culturist and aquarium technician.

Ben Scofield, director, has been a Limnologist for the Spokane Tribe of Indians since 2002. His work there has focused on water quality, lower trophic level interactions, and ecology of planktonic organisms important to fisheries in Lake Roosevelt.

Sincere thanks to outgoing board members Debra Bouchard, Pete deArteaga, Ray Latham, Barry Moore and Bob Roper for their service to WALPA.





Three of our new Directors (left to right): Arline Fullerton, Karl Mueller, and Jean Jacoby

In This Issue

Our 2006-07 WALPA Board Members

President	Bijay Adams	bijay@libertylake.org
President-elect	Beth Cullen	beth.cullen@metrokc.gov
Past President	Sally Abella	sally.abella@metrokc.gov
Secretary	Isabel Ragland	isabelr@piercecountycd.org
Treasurer	Gene Williams	gene.williams@co.snohomish.wa.us
Directors	Peter Burgoon	PeterB@waterqe.com
	Beth Cocchiarella	rbcocchiarella@msn.com
	Steve Fradkin	Steve_Fradkin@nps.gov
	Arline Fullerton	arlinef@hctc.com
	Jean Jacoby	jacoby@SeattleU.edu
	Kelly McLain	kelm461@ecy.wa.gov
	Karl Mueller	karlwmueller@msn.com
	Glen Rothrock	Glen.Rothrock@deq.idaho.gov
	Ben Scofield	bens@spokanetrib.com
	Tricia Shoblom	tsho461@ecy.wa.gov.

Lake Focus on Coeur d'Alene Lake, Idaho

A north Idaho gem with a tainted legacy, by Glen Rothrock, Idaho DEQ

Coeur d'Alene Lake is a large and beautiful lake in a picturesque forested setting in the Idaho Panhandle about 30 miles east of Spokane. The lake is a major draw for tourism and recreation, and has in part spurred the skyrocketing growth and development our area has seen in recent years.

For nearly a century, however, the lake has been the repository of millions of tons of mining process waste from the "Silver Valley." This area, east of the lake in the Bitterroot Mountain Range (near the Montana border), was once one of the nation's most productive silver, lead, and zinc mining areas.

Mine processing wastes ranging from coarse and fine tailings to slurries, containing metals like lead, zinc, cadmium, copper, and arsenic, were stored near, or directly deposited into, the South Fork Coeur d'Alene River and its tributaries. Other contamination came from smelters and drainage from mine entrances. Metals-enriched particles and dissolved metals were carried west to the lake, and even further down the Spokane River into Washington. River banks and floodplains of the lower Coeur d'Alene River, and the lake bottom, have sediments laden with high metal concentrations. This legacy of contamination has affected human health and the environment.

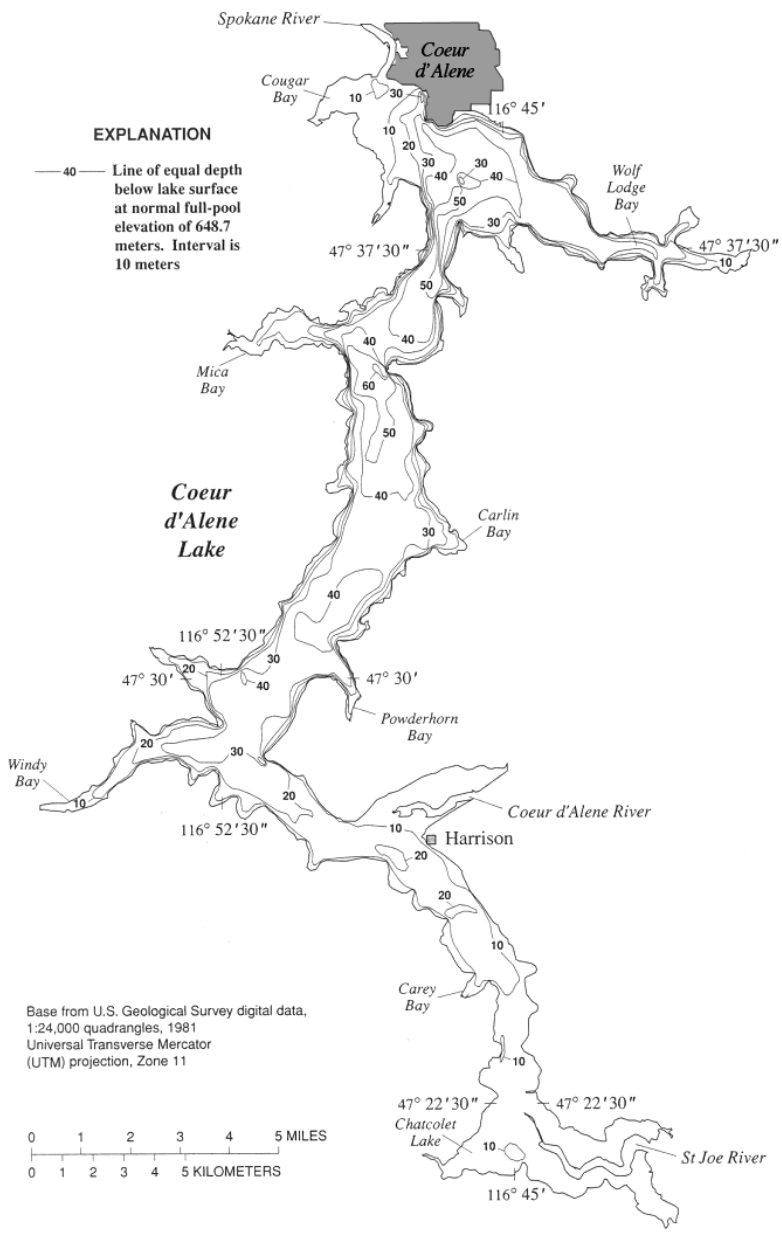
In 1983 EPA listed the Bunker Hill Mining and Metallurgical Complex surrounding Kellogg, Idaho as a Superfund site. Cleanup efforts initially focused on addressing human health concerns in the populated, core area of contamination. Cleanup remedies have since expanded to the mines and tailings piles, and down the corridor of the Coeur d'Alene River.

Coeur d'Alene Lake covers 31,875 acres, has 150 miles of shoreline, and reaches a maximum depth of 65 m. The basin that drains to the lake is huge, around 2.4 million acres, with two major inflowing rivers, the Coeur d'Alene and the St. Joe. The lake outlet creates the Spokane River.

The Coeur d'Alene Tribe has ownership of the southern third of the lake, as well as the lower-most St. Joe River. This southern section is mostly shallow -- 10 m and less -- with beds of rooted aquatic plants including newly discovered Eurasian water milfoil. The deeper, northern two-thirds is owned by the state of Idaho. Coeur d'Alene River flows in from the east, near the boundary line of State and Tribal waters. River flow plumes, with high metals concentrations, primarily move northward, but there is some southward drift.

Studies done by the U.S. Geological Survey and others show that within the northern pool, total phosphorus is low, averaging 5 ug/L. In southern waters, TP concentrations are higher with means between 8–16 ug/L. Water clarity is good in northern waters during mid to late summer, reaching 10 m Secchi depth.

One study of the northern pool sediments documented a median total lead concentration of 1,800 mg/kg (ppb), with a maximum of 7,700 mg/kg. Samples in southern lake sediments, not influenced by historic metals inflow, had a median concentration around 30 mg/kg. Research continues on toxicity to benthic organisms and effects up the food chain.



Bathymetric map of Coeur d'Allene Lake, from Woods and Beckwith 1997

Continued on page 3

Coeur d'Alene Lake

Continued from page 2

Dissolved oxygen (DO) levels are important because they may affect these metals-enriched sediments and possible movement of metals from the upper sediments to overlying waters. In the northern pool there are decent DO concentrations throughout the hypolimnion during summer–fall stratification. At its lowest level in late October before fall turnover, DO in the deepest waters maintains 6–7 mg/L. Researchers believe these oxic conditions prevent significant migration of dissolved metals from the sediments to upper waters. In shallow southern waters of unstable stratification, anoxic waters may be near the sediments for short periods, but metal concentrations are generally low there. Concern and continued study focus on a transitional zone between southern and northern waters, around 15–20 m deep, where sediments contain elevated metals and bottom DO can go as low as 3–4 mg/L.

City of Coeur d'Alene on the shore of Coeur d'Alene Lake

Studies have documented an association between dissolved zinc in northern waters and phytoplankton productivity. Mean zinc concentration for 1991-92 within the photic zone was 95 ug/L. (In Idaho Water Quality Standards the chronic criteria for dissolved zinc, as protection of aquatic life beneficial use, calculates to 36 ug/L (hardness adjusted)). Chlorophyll a concentrations were extremely low, averaging 0.5 ug/L. Bioassays showed that zinc inhibits phytoplankton growth by disrupting phosphorus assimilation.

Data collected from 2003–05 shows a declining trend in northern pool zinc. The mean value is 52 ug/L in the photic zone, which may reflect reduced metals inflow from Superfund remediation. At the same time, though, mean chlorophyll a has increased to 1.5 ug/L. Has reduced zinc lessened its inhibition on phytoplankton productivity? While chlorophyll a is still low, observers worry that as zinc declines, phytoplankton productivity may increase, adding biological oxygen demand and reducing DO levels within the hypolimnion during stratification.

When compared to earlier surveys, data collected since 1990 show an apparent improvement in water quality. Significant upgrades in wastewater treatment, better forestry and agriculture practices, and reduced mining waste inflows over recent decades may account for this.

While nutrient loading may have declined from some land uses, however, new housing, subdivisions, and golf courses can bring increased nutrients to the lake. Earthmoving for new development must be done more carefully to prevent the erosion of fine sediments into the lake. Much of the development around the lake is not serviced by sewage collection and centralized treatment facilities, raising concerns about subsurface sewage disposal systems and their effectiveness.

In 2002, EPA issued its latest Record of Decision for the Superfund area, encompassing the corridor of the lower Coeur d'Alene River, the lake, and the Spokane River. Cleaning up the lake by removing, capping, or treating metals-laden sediments is not practical right now. Instead, the IDEQ and the Coeur d'Alene Tribe will facilitate a multi-agency effort to control nutrient loading to the lake. Dissolved oxygen levels need to be maintained, and improved in some areas, to prevent metals mobilization from the sediments. Governments, businesses and citizens in the Coeur d'Alene Basin community must work together on lake management programs to make this happen.

Sources for this article:

Brennan, T.S., A.K. Lehmann, and I. O'Dell. 2005. Water resources data, Idaho, water year 2004, Volume 2. U.S. Geological Survey Water-Data Report ID-04-2, Boise, ID.
http://id.water.usgs.gov

National Research Council of the National Academies. 2005. Superfund and mining megasites – lessons learned from the Coeur d'Alene River Basin. National Academies Press.
www.nap.edu

Woods, P.F. and M.A. Beckwith. 1997. Nutrient and trace-element enrichment of Coeur d'Alene Lake, Idaho. U.S. Geological Survey, Open File report 95-740, Boise, ID.
http://id.water.usgs.gov

WATERLINE is the newsletter of the Washington State Lake Protection Assoc. (WALPA). Send submissions to Polly Freeman at pfreeman98107@yahoo.com. Articles may be reproduced. Please credit *WATERLINE*.

For information about the organization call
1-800-607-5498
or visit the WALPA website

www.nalms.org/walpa/

Please save *WATERLINE* issues for future reference.

WALPA Photo Contest Winners

Winner, Lake Problems
Bruce Andre
Cyanobacteria bloom, Liberty Lake

Winner, Lake Wildlife
BiJay Adams
Turtle, Liberty Lake

Winner, Lake Scenery
Bruce Andre
Fog, Liberty Lake

Septic Systems and Water Pollution:

Do on-site septic systems keep fecal coliform out of lakes? By Peter Burgoon

In the last issue of Waterline, we discussed septic systems and how they work. This issue explores the role of septic systems in protecting lakes from fecal coliform pollution.

Around the state, the Washington State Department of Ecology (WA DOE) assesses pollution in rivers, creeks, and lakes as required by the federal Clean Water Act. When a surface water body is found to violate water quality standards, DOE initiates a cleanup program with stakeholders in the watershed.

This assessment program means that watershed residents must often work to figure out the sources of fecal coliform and nutrient pollution in the lakes, creeks, and rivers they enjoy. While "point" sources of pollution, like discharge from a wastewater facility's pipe, are relatively straightforward to track and control, "non-point" sources -- which may be small individually but can have a large collective impact – are trickier to evaluate. Typical non-point sources include backyard fertilizer, agricultural runoff, pet wastes, and on-site septic systems. Rightly or wrongly, septic systems are often suspected as non-point sources of lake and river pollution, sometimes leading to calls for centralized collection and treatment of waste.

While many waterbodies are found to have elevated concentrations of fecal coliform, however, standard tests do not distinguish between "natural" sources of coliform bacteria (from animals naturally found in the watershed) and human-generated coliform bacteria. Further studies around the U.S. have shown that the majority of coliform in a watershed may often be traceable to warm-blooded non-humans. There is also usually a significant, but lower, percentage from human waste. Pet wastes, cattle and horses may also be major non-point sources due to unrestricted creek access or poor manure management.

Generally, problematic septic systems are those that were installed without oversight and/or a permit from the local health department. Suspect systems can be identified by a review of county health department records or interviews of homeowners in older houses. Failing septic systems can be found by sampling programs that help locate either surfacing sewage or subsurface failure. These should be repaired or replaced. Regulations were initially established to protect human health by reducing chances for contamination of clean water with pathogens. New regulations are being established to protect environmental health as well.

If a septic system was installed after about 1985 and has been properly maintained, however, the soils in the drain field are probably removing pathogens from wastewater properly. Fine soils like fine sand, silts, and loams are the most effective filters. Very coarse gravels and coarse sands are less effective at straining out harmful organisms. For systems in those soils, regulations established by WA DOH in the mid 1990's specify additional treatment and pressure distribution to improve removal of bacteria.

In the next Waterline we will discuss how septic systems protect (or fail to protect) lakes from nutrient pollution and will examine some relevant data from Washington lakes.

Portland Regional Conference a Success

By BiJay Adams, WALPA President

On September 13-15, the Washington State Lake Protection Association (WALPA) and the Oregon Lakes Association (OLA) co-hosted their annual conference with support from the North American Lake Management Society (NALMS) and the Portland State University Center for Lakes and Reservoirs. The Pacific Northwest Regional Conference, the first of its kind in nearly 15 years, was held at Portland State University. Sponsors included the Pacific States Marine Fisheries Commission, Hach Environmental, Washington State Department of Ecology, and TG Eco-Logic LLC.

Citizens, managers, consultants and government officials – 133 people in all – attended the conference, whose theme was "Research and Management Trends in the Pacific Northwest." Dr. Roy Koch, Portland State University Provost and Vice President for Academic Affairs, opened the conference, and the keynote speaker was Dr. John Stockner, Principal Limnologist for TG Eco-Logic LLC. Dr. Stockner's presentation on how lakes react to nutrient imbalances included a dialogue on the impact of the 'cultural oligotrophication' that we see in most PNW reservoirs as they age and in many salmon lakes and rivers as salmon runs diminish.

Dr. Douglas W. Larson, retired Limnologist for the U.S. Army Corps of Engineers, entertained his September 13 lunch audience with stories from 25 years of research on Spirit Lake, Mount St. Helens, Washington. He discussed the recovery of Spirit Lake from the catastrophic eruption of Mount St. Helens in May 1980, and described the logistical and sampling difficulties of research in the blast area, which required considerable creativity, money, and personal risk.

In addition to the conference's scientific presentations, WALPA and OLA held their business meetings at the gathering. At WALPA's meeting, photo contest winners were announced (see photos page 4) and three more scholarships were awarded, including the $750 Nancy Weller Memorial Scholarship which commemorates Nancy Weller of the Washington Department of Ecology's Eastern Regional Office. In other business, WALPA board and members recognized Paula Lowe for her many years of service as our publisher.

Seventeen vendors staged exhibits at the conference, along with five scientific and educational posters. One vendor held a preconference trade fair to acquaint people with new technology and instrumentation. A gathering on Wednesday evening allowed conference attendees to network and socialize. And on Friday nearly a dozen conference attendees enjoyed a tour on Lake Oswego guided by Lake Manager Mark Rosenkranz.

Next year's WALPA conference is slated for October 18-19 at Campbells Resort on Lake Chelan. Watch for more information in upcoming issues of *Waterline*. Thanks to everyone who made the Pacific Northwest Regional Conference such a success!

Green Lake Carp

Continued from back cover

gave us a population estimate of 4,670 with a 90% confidence interval of 3,442 – 6,957.

We captured the carp in Green Lake by electrofishing and gill net. Electrofishing creates an electrical field in the water that temporarily stuns fish. Crewmembers dip the fish out of the water with long-handled nets and put them into live boxes on board. We also used gill nets -- stationary nets 200 feet long by six feet deep. These capture fish that get stuck in the monofilament mesh. We used nets with three different mesh sizes to determine differences in catch rates and to accommodate a larger range of carp. The smallest mesh (2-inch) caught very few fish, while the two larger meshes (2.5 and 3-inch) caught far more fish and larger fish (Figure 2). This correlates with the fact that most Green Lake carp are larger, older fish (Figure 2).

Bill Baker, Washington Department of Fish and Wildlife biologist, poses with a 24-pound Green Lake carp on the front deck of an electroshock boat.

We removed carp from Green Lake between July 21, 2004 and the end of June 2005. We picked and reset the gill nets every time we came to the lake, so they were fishing around the clock for 11 months. Carp are known as very adaptable animals, filling niches left vacant in fish communities and out-competing other fish for food and space. In surveys around the world, they have also demonstrated an ability to learn net-avoidance. Green Lake carp are no exception, and catch rates in the gill nets were lower than expected. It appeared that the carp also learned to avoid the shock boat, swimming away when first feeling the low amps, before they could be surrounded by the strong part of the electrical field.

We removed a total of 1,183 carp from Green Lake (632 by electrofishing boat and 531 by gill netting). While we had hoped to remove more carp, we believe we took out about 25% of the population, a significant portion. Without pre- and post-removal suveys of the lake bottom, we cannot know for sure whether removing the carp will increase the longevity of the alum treatment. Still, removing 25% of a carp population that averaged over six pounds a fish should have helped slow carp damage considerably.

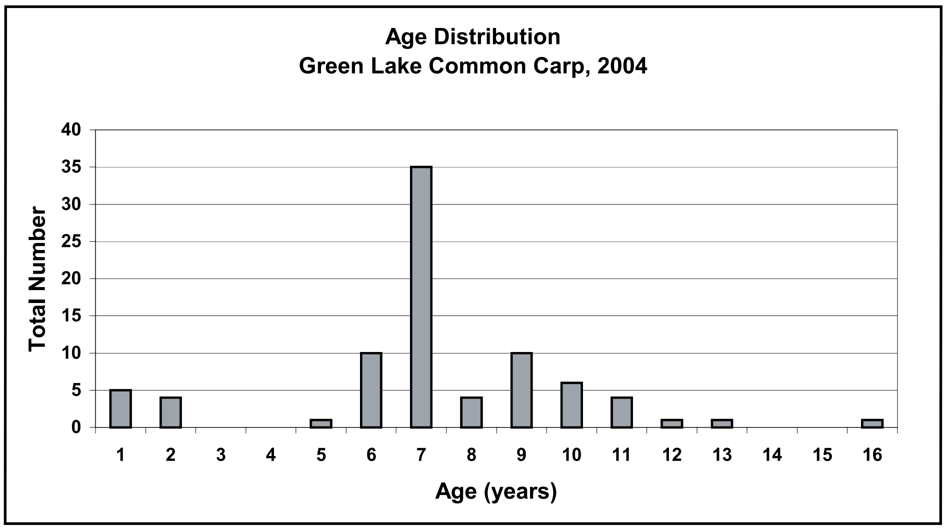


Figure 1. Age distribution of common carp captured in Green Lake, July 2003– June 2004.

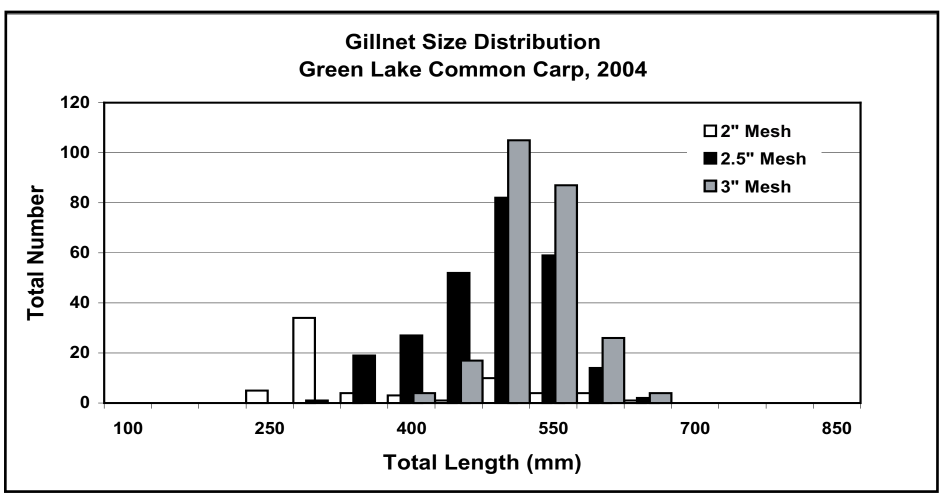


Figure 2. Size distribution of common carp captured in Green Lake gill nets from three different mesh sizes

Washington State Lake
Protection Association
P.O. Box 1206
Seattle, WA 98111-1206

In this issue:

The Trouble with Green Lake Carp - Conclusion

by Bruce Bolding, Washington Department of Fish and Wildlife

In our last episode, common carp (*cyprinus carpio*), which is native to Asia and Europe and considered a serious pest in this country, had invaded Green Lake. The City of Seattle had contracted with the Washington Department of Fish and Wildlife to remove as many carp as possible in a year to minimize damage to the expensive "alum" treatment applied to the lake to curb blue-green algae blooms.

A carp from Green Lake has its left pelvic fin clipped for a multiple-mark-and-recapture population estimate. The fish was then released back into the population.

Common carp are the largest member of the minnow family in Washington State. They can grow quite large (the U.S. record is 74 lbs.) and the average maximum age in Washington is 15-20 years. The carp captured in Green Lake averaged 6-10 years old; the oldest was 16 (Figure 1). Carp are distributed widely throughout Washington, inhabiting most lowland lakes and some of the larger rivers. Their reputation as a pest is well documented and in most cases well deserved, as described in Part 1 of this story.

For the Green Lake removal project, we first estimated the lake's existing carp population to get a baseline against which to measure our success. To do this, we caught as many fish as possible in a set period of time and clipped their fins. We then compared the number of recaptured fish (with clipped fins) against the total captured. Between May 18 and July 19, 2004, we captured 578 carp, with 34 recaptured fish. This

Continued inside on page 7