

December 2001

In this issue

WALPA conference 2002	1
Lakes face stress	2
Power boats pollute	3
WALPA brochures available	5
Waterline deadlines	6



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WALPA conference is in Olympia

By Rob Zisette, president-elect, conference organizer

WALPA's 15th annual conference on lakes, reservoirs, and watersheds will be held at the West Coast Olympia Hotel on April 3 through 6. The preliminary conference program and registration form will be mailed to members and posted on WALPA's Web site at www.nalms.org/walpa/ in January.

On Wednesday, April 3, Electronic Data Solutions will conduct a monitoring equipment workshop for operating Hydrolab water quality instruments, Trimble GPS equipment, and an inexpensive telemetry system, and for using various data management programs such as Seveno "LakeWatch" and Juniper Systems "Allegro." WALPA's slide show will be presented to local schools that day.

The conference begins at 8:30 am on Thursday, April 4 with a plenary session on lake issues that will include a summary of results from WALPA's survey of over 300 lake users and presentations by lake association representatives. Concurrent technical sessions will be held for the remainder of Thursday and will end Friday afternoon with a plenary session on the status of lake management in Washington state. The conference will conclude with additional presentations and discussions by lake residents on Saturday morning, April 6.

Technical session topics include lake regulations, goose control, aquatic macrophytes, toxic algae, aquatic nuisance species, Capitol Lake, Soap Lake, mountain lakes, watershed management, reservoir management,

shoreline restoration, sediment toxicity, and lake and stream water quality studies. Doug Larson will present "The Rebirth of Spirit Lake" at lunch on Thursday. The WALPA business lunch will be held on Friday, and will include the multimedia presentation "Nature's splendor at Loon Lake" by Daniel Poleschook and Ginger Gumm.

Exhibitors, non-profit organizations, government agencies, and corporate/commercial enterprises, will show their wares and offer informational materials to conference attendees.

Two new features for the WALPA conference include the presentation of posters by students and professionals, and a photo contest with prizes. Contact Rob Zisette by e-mail at rzisette@herrerainc.com or phone at 206-441-9080, if you want to exhibit, present a poster, enter a photo, or need additional information about the conference.

For hotel information, visit www.westcoasthotels.com and call 1-800-325-4000 for hotel reservations. Reservations must be made by March 4. Notify the operator that you will be attending the Washington State Lake Protection Association conference to get a reduced rate of \$58 per day for a single room and \$68 per day for a double room. Reservations for limited RV parking are also available for \$15 per day without hook-ups and \$35 per day with hook-ups.

Lakes face more stress with fewer resources

By Chris Solomon, Seattle Times Eastside bureau

This article originally appeared in *The Seattle Times, Local News* section on Sunday, August 26, 2001. Used with permission. Copyright © 2001 The Seattle Times Company

Life is pretty good along the shores of Beaver Lake. On a recent balmy afternoon, Bob White faced the waterfront and watched a sailboat slice through blue water, its sailor leaning over the chop like a study from a Wyeth painting. On a neighbor's dock, a bikini-clad woman sank into a chaise lounge. A small fleet of toys — a paddleboat, a canoe — rested at the waterline of the White home.

For White and his neighbors, this 75-acre lake on the Sammamish Plateau offers serenity, nature and recreation — all just 25 miles from downtown Seattle.

But like many other lakes around the state, Beaver Lake faces mounting stress from pollution, home construction and even recreation. Six years ago 360 properties dotted the fairly rural watershed. Today more than 600 parcels fill that area, along with a new golf course. Three hundred more housing units are planned. "The development pressures on this lake are extraordinary," White said.

The story is the same throughout King County and the state, according to lake experts, known as limnologists. At the same time, money to monitor lakes and restoration projects has dramatically decreased in recent years, as budgets are cut back and dollars shift to other water issues.

"Lakes are getting kind of neglected," said Michael Brett, president of the Washington State Lake Protection Association and an assistant professor of limnology at the University of Washington.

From little Mud Lake near Black Diamond to 762 billion-gallon Lake Washington, King County is a land of water. Its potholed topography holds some 700 ponds and lakes.

Water attracts people. The Eastside was popularized by Seattleites who built summer cabins along the hems of water such as Lake Sammamish and Pine Lake, on the Sammamish Plateau. Today about 100 lakes in the western third of the county count humans as close neighbors. That proximity takes its toll. While lakes naturally fill as they age, civilization accelerates the process. Logging and development cause erosion that sends dirt into streams and lakes. Asphalt blocks the ground from soaking up water, flooding waterways with silt.

The biggest problem facing Washington's lakes is excessive nutrients. Lawn fertilizer, pet feces and sewage from leaking septic systems contain phosphorus, which algae gorge on. As they decay, algae also add to the lake's bottom and can kill fish by consuming dissolved oxygen in the water.

Beginning with the very public, and very successful, cleanup of Lake Washington in the 1960s, the Seattle area has been a leader nationwide in efforts to soften humans' effects on waterways and lakes. But in recent years, limnologists say, injury to lakes has been exacerbated by the loss of money to monitor lakes and restore them to health.

The county's \$36 million budget shortfall has forced its Department of Natural Resources to consider cutting \$100,000 from the \$433,000 budget of its lake-stewardship program, which provides education about lakes and helps communities organize to protect them. Such a cut would no longer permit the county to monitor lakes in incorporated cities.

County Executive Ron Sims has asked the department to consider other cuts before the budget is presented to the Metropolitan King County Council this fall.

In the 1980s, money was available for lake-restoration projects through the federal Clean Water Act and state clean-water referendums such as one that created the Centennial Clean

Water Fund. Since the mid-1990s, however, lake projects no longer automatically receive money from that fund.

"All of a sudden lake projects were competing with sewage-treatment projects" and losing, said Allen Moore, an aquatic-pesticides specialist in the state Department of Ecology's water-quality program. In 1989, the fund gave \$4.5 million for nine lake projects. In 1998 and 1999, no projects were funded.

Federal money had largely funded a state program that collected data on more than 184 lakes outside of King County from 1989 through 1999. That money began to dwindle in the early 1990s.

This year, "we have no funding at all for lake monitoring" on the state level, said Dave Hallock, an Ecology Department scientist who supervised the program.

Lake advocates concede that the money has gone to important efforts, such as salmon survival and expensive waste-water-treatment plants. But "if we're constantly shifting our priorities and responding to what's the newest issue on the block, we have trouble paying attention to the things that are in need of more long-term attention," such as lakes, said Sharon Walton, King County's senior limnologist.

"Prevention is much cheaper than restoration," said Walton, "and monitoring helps us keep our finger on the pulse of those resources."

Of the 50 or so lakes that King County studies, two-thirds now have an organized community club or lake association taking an interest in their welfare, Walton said.

One solution may be to petition for a permanent funding source, said Gene Welch, a limnologist and professor emeritus at the UW. In 1991, the Legislature tacked \$3 onto annual boat-trailer licenses to fund a freshwater-weeds program.

Roughly \$600,000 now annually funds grants and education to combat

Continued on page 3.

Power Boating: Polluting our lakes?

By Roy Bouchard

This article was originally published in LakeLine and is reprinted with permission from the editor. This article was condensed, by Mike Brett, for Waterline.

Watercraft are an everyday feature of recreating on North American lakes.

Despite the popularity of power boating, people consistently raise questions about negative effects including wildlife disturbance, shoreline erosion, disruption of vegetation, resuspension of sediments, noise, safety, and pollution.

Pollution caused by powerboats has aroused recent interest, fueled by figures citing the huge amounts of hydrocarbons discharged into the environment. For example, Mele (1993) states that each year outboard engines and personal water craft (PWCs) release 15 times as much hydrocarbons into U.S. waters as the Exxon Valdez spill. However, figures for total discharge do little to tell us what the effects might be without taking into account such factors as loss to the air, dilution, and the dispersal

of the pollutants over large lake areas and an entire boating season.

What are the sources and types of pollutants from marine engines?

Marine engines include conventional outboard engines and personal watercraft (PWCs), which use two-stroke technology as well as four-stroke outboards and inboard engine designs. Pollution caused by two-stroke technology occurs because of mixing between the intake and exhaust gasses causing raw fuel to be passed directly out of the engine. Four-stroke engines isolate the intake and exhaust cycles, reducing the amount of pollution generated by as much as 90 percent. Of the 70-plus hydrocarbon constituents in gasoline and oil, the most commonly studied in lakes have included BTEX compounds (benzene, toluene, xylene, etc.), PAHs (polyaromatic hydrocarbons), and MTBE (Methyl Tert-Butyl Ether).

What are the problems associated with these pollutants?

The problems associated with chemicals in the environment depend

on several factors including:

- Persistence;
- Concentration;
- Location of the pollutants in the environment;
- Biological availability; and
- Pathways of organism exposure.

Some chemicals may be so short lived in the environment that exposure times reduce their potential effects. Pollutants that demonstrate low acute toxicity (obvious over short time periods), may have important effects on organisms such as behavior disruption or altered development under chronic exposure to lower concentrations. Various species will display different sensitivities depending on their metabolic capacity to take up, detoxify, or excrete harmful pollutants. It is also common for one life stage to be far more susceptible to toxic effects than others (such as developing larvae vs. adults). Some pollutants are far more toxic when combined with others or are rendered

Continued on page 4

Lakes face more stress with fewer resources *continued from page 2*

foreign weeds such as Eurasian milfoil in Seattle's Green Lake and hydrilla in Pipe Lake and Lake Lucerne. Boats and their trailers frequently transport the weeds.

So far, injury to area lakes has been partly offset by past government efforts and by greater public awareness of the sensitivity of lakes, observers say.

A forthcoming county study of trends in 23 county lakes found "fairly minor" declines in water quality over the past eight to 16 years, considering the intense development the county has seen in that time, said Walton, its author.

None showed "horrible" water quality, Walton said. Most of the declines are modest enough not to be noticed by the eye, she said.

Beaver Lake is an example of how a community has protected its lake without reliance on the swinging pendulum of government funding. In late 1995, residents concerned about the harm of new development voted to become one of the county's two "lake-management districts." Residents in the watershed tax themselves as much as \$200 annually to pay for water monitoring and education. The Beaver Lake community also tightened restrictions on the amount of nutrients dumped into the lake. Developers must build larger storm-water-treatment ponds that sift out 80 percent of phosphorus that enters them, or more than double the standard elsewhere in the county, said lakefront resident White, who is the former executive director of Sound

Transit and a member of the district's advisory board. The county also agreed to higher levels of inspection of land being developed.

In the county's forthcoming report, "Beaver Lake #2," a segment of Beaver Lake showed a small decrease in clarity and an increase in chlorophyll. But that change likely would have been much greater without the changes, the county's Walton said.

Looking across the lake's picturesque, wind-worried waters, White agreed. "We're holding our own in terms of the water quality of the lake," he said.

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Power Boating: Polluting our lakes? from page 3

more or less harmful as they are transformed to other forms in the environment. Because of the difficulty of separating chemical effects from other environmental variables (e.g., competition, temperature stress, etc.), relatively few field studies have been conducted. This is especially true for chronic exposure to chemicals at low concentrations.

Most hydrocarbons in exhausts are biodegradable, although PAH constituents are relatively long lived. Some evidence exists that newer synthetic lubricants may have higher toxicity than mineral oils, although both of these show fairly rapid biodegradation and removal.

Effects of boating exhaust on water quality depend on water and air temperature, turbulence, and type of boating activity. Some portion of the pollutants vaporize quickly into the atmosphere from the water's surface and some are mixed into the lake water where they persist for anywhere from few hours to several weeks. Lubricating oils and heavier fractions are relatively more persistent. Thermocline stability during summer tends to retard transfer of compounds to greater depths. MTBE and BTEX compounds mixed into the surface water are volatilized quite rapidly under test conditions. However, material mixed to depths greater than 10 to 15 feet can persist for longer periods even as their concentrations drop due to dilution.

How much pollution comes from marine engines?

Fuel use and emissions vary greatly depending on speed, horsepower and engine type. Trolling speeds are significantly less fuel-efficient than cruising speeds. Data from Vermont and California indicate average use rate for conventional outboards at about 20 to 25 hours per year (90 gallons fuel use). PWCs have more average horsepower than outboards and their average use is around 41 hours (250 gallons) annu-

ally. Although many outboard engines use substantially less gasoline than PWCs on a per hour and total use basis, they make up a much larger portion of the fleet and thus produce the majority of total emissions.

Conventional marine engines produce large amounts of hydrocarbons (HC), oxides of nitrogen (NO_x) and other air pollutants. EPA estimates that all types of marine engines combined are responsible for 30 percent of the total output from non-road, mobile equipment sources (3 percent of all HC emissions). Older outboard engines and PWCs pass up to 25 to 30 percent of their fuel into the water unburned and, subsequently, into the air. For example, normal operation of a 50 horsepower engine for four hours uses about six gallons of fuel. This would translate into one to one-and-a-half gallons discharged unburned. A typical personal watercraft consuming five gallons of gasoline per hour and operated 40 hours per year, discharges between 50 and 60 gallons of unburned fuel into the environment.

Carbureted two-stroke engines release 10 to 15 times more gasoline than four-strokes. During tests, conventional two cycle outboards lost as much as 30 percent of the MTBE in the gas tank compared with 10 percent for PWCs and 0.2-2.3 percent for four-stroke engines. Values for Benzene and Toluene discharged are similar for both PWCs and two-stroke outboards (eight to 12 percent) vs. 0.3-1.8 percent for four-strokes. Inboard and inboard/outboard engines are consistently lower in emissions than four-stroke outboards.

What is the new engine technology?

Electronic fuel injection (EFI) two-stroke engines provide improved starting and operating performance. They still produce substantial pollutant discharges, only about 15 to 24 percent less HC than older carbureted engines. In comparison, four-stroke engines and direct injection two-

strokes are 75 to 95 percent cleaner. DFI (direct fuel injection) radically re-designs the intake functions of two-strokes and may soon rival four stroke engines in efficiency. DFI is generally available for engines above 80 horsepower. Four-stroke designs weigh more and are currently used for smaller engines but at least one manufacturer builds engines up to 130 hp. Advances in design are expected to introduce DFI into lower horsepower ranges and higher horsepower four strokes will become available over the next several years.

Where do we go from here?

If measurable levels of outboard pollution are being generated in high-use lakes, is this a real problem? Studies regarding the impacts of oil and gas discharged from motorized watercraft on the aquatic environment are not conclusive. Most monitoring studies suggest that lake water concentrations of compounds such as benzene or MTBE do not pose a known threat to human health or likely acute effects on aquatic life. However, subtler chronic or sub-lethal effects may be occurring depending on the season, location in the lake, intensity of boating activity and other factors.

The U.S. EPA, the State of California, and some local governments have enacted regulations phasing in marine engines which are much higher efficiency and which should greatly alleviate both air and water pollution from these sources. EPA's rules require a 75 percent reduction in hydrocarbon plus nitrogen oxide emissions by 2006. However, EPA predicts it will take until the year 2025 to realize a 75 percent reduction in total emissions and until 2050 for the old fleet of engines to be completely replaced with more efficient designs.

New technology engines provide the advantages of higher fuel efficiency, reduced smoke, fumes and noise, quicker starting, and better throttle response than conventional

Continued on page 5

Power Boating: Polluting our lakes? from page 4

engines. The savings in operating costs for fuel and oil can largely offset their more expensive purchase price. For example, a 90 hp four-stroke engine can travel 60 percent farther at cruising speed on a tank of gas and use relatively no lubricating oil. Over a 10-year period, the savings could easily exceed \$1,000. For all these reasons, the New England states and New York have recently joined in promoting the more rapid conversion of outboards to efficient designs.

While it will take time for more scientific work to clarify the picture, we do know several things:

- Two-stroke boat engines are highly inefficient and produce large amounts of air and water pollutants compared to other power craft.
- Low levels of exhaust constituents are found in many lakes in summertime.
- Acute toxicity from outboard exhaust is probably not a problem in most lakes.
- Chronic exposure of sensitive aquatic organisms to outboard exhaust is harmful.

Prudence suggests we should do what we can to reduce this obvious pollution source of by adopting a few simple practices. These include limiting full throttle operation, eliminating unnecessary idling, following recommended maintenance schedules, eliminating spillage when refueling, and properly measuring fuel and oil. Probably the best thing we can do is to replace older engines with cleaner alternatives: they make economic sense and are a good investment in the future.

About the author

Ray Bouchard, a Maine native, coordinates the Maine Lake Assessment Program. The program includes a geographic analysis of lake water quality conditions, watershed and lake response modeling, development of

watershed and lake protection tools, and interpretation of lake water quality information for the general public. He serves on the Belgrade Planning Board and serves as Secretary of the Belgrade Regional Conservation Alliance. You can contact Roy at Maine DEP, Bureau of Land and Water Quality Control, State House Station 17, Augusta, ME 04333.

Further reading:

Izaak Walton League at www.iwla.org

Wisconsin DNR at www.dnr.state.wi.us/org/water/fhp/papers/lakes.pdf

Tahoe Regional Planning Agency at <http://ceres/ca.gov/trpa>

USEPA Office of Mobile Sources: Marine Engine Emissions at www.epa.gov/oms/marine.htm

National Center for Environmental Assessment at www.epa.gov/ncea

California Air Resources Board at <http://o3.arb.ca.gov/homepage.htm>

California EPA (CAL EPA) at www.calepa.cahwnet.gov/epadocs

National Marine Manufacturer's Association at www.nmma.org or www.nmma-medialink.com

Waterline accepts ads

The *Waterline* accepts advertising for lake-related products or services.

For advertising information and rates, call Paula Lowe, 360-491-0109, or e-mail her at pmlowe@aol.com.

Ask a neighbor or co-worker to join WALPA

New WALPA membership brochures are available! Distribute them at your next lake association meeting or in your next newsletter. Give brochures to your neighbors.

For copies of the membership brochure, call Paula Lowe, 360-491-0109.

Leave your name, address, phone number, e-mail address, and the quantity of brochures you need, so she can send them to you.

Week-long water workshop for kids

A week-long marine science and watershed exploration program for fifth and sixth graders is offered by Centrum and The Port Townsend Marine Science Center from April 28 to May 2.

The five-day, hands-on experience in marine and freshwater environments on the Olympic Peninsula, integrate art and science.

School and community groups are welcome, as well as homeschool teams. The cost is \$250 for tuition, room and board, and scholarships are available.

Teams of four to six students along with a chaperone may apply to Centrum, P.O. Box 1158, Port Townsend, WA 98368-0958. For an application or information, call Jessica Plumb, Carla Vander Ven or Lizzy Crumley, 360-385-3102, or e-mail jessica@centrum.org.

Speakers talk to associations

Members of WALPA are available to speak to lakes associations around the state. They'll bring the new slide show and talk with lake residents and others about limnology, eutrophication, food webs, non-point source pollutants and the threats to lakes posed by Eurasian watermilfoil and the zebra mussel, and other subjects.

To schedule a WALPA speaker, call WALPA at 1-800-607-5498.

Waterline newsletter published quarterly

Waterline deadlines and publication dates for the next two issues:

<u>Deadline</u>	<u>Issue date</u>
February 1	March 1
May 1	June 1

Story ideas are always welcome. Send your ideas to *Waterline* Editor Paula Lowe, pmrlowe@aol.com or call 360-491-0109.

Be sure to include the topic, suggested writer, contact person with phone number and e-mail address.

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