

Ice Damage to Shoreline Properties

Property owners occasionally return to their cabins in the spring only to discover they are dealing with property damage caused by a phenomenon called “ice heaving” or “ice jacking”. This powerful natural force forms a feature along the shoreline known as an “ice ridge”. The result may include significant damage to retaining walls, docks and boat lifts, and sometimes even to the cabin itself.

The Cause of Ice Ridges

Ice damage to shoreline property is often caused by the “pushing” action of an ice sheet. Cracks form in ice because of different contraction rates at the top and bottom of the ice sheet. This is especially true in years lacking an insulating snow cover. Ice cracks also develop because the edges of the ice sheet are sometimes firmly attached to the shoreline. When water rises in the cracks and freezes, the ice sheet expands slightly. When rising air temperature warms the ice, the additional expansion exerts a tremendous thrust against the shore. The expanding ice sheet moves soil

to create ice ridges (also know as “ice pushes” or “ramparts”) as high as five feet or more. Alternate warming and cooling of an ice sheet causes additional pushing action that possesses enough power to nudge masonry bridge piers out of plumb and push houses off their foundations.



Ice ridge along Shamineau Lake, MN
(source: MN DNR).

Mounds of wind-blown ice can pile up on the shoreline, leading to damage of property. Complete melting of lake ice cover occurs first near shore. The ice sheet is free to float on the water and drift with the wind. When a wind-blown ice sheet collides with the shore, it can exert great pressure and push heaps of ice on shore. This phenomenon is most common on larger lakes.

Ice Push

Another form of ice damage occasionally occurs during the breakup of lake ice in the spring.



Ice push on Ottetail Lake, MN (source: MN DNR).

Speaking of lake ice...

Less Ice Cover in Midwestern Lakes Linked to Climate Change

Cheryl Dybas, NSF

If you're planning to ice skate on a local lake or river this winter, you may need to think twice, according to scientists John Magnuson, Olaf Jensen, and Barbara Benson of the University of Wisconsin at Madison. Their research is funded by the National Science Foundation (NSF).

From sources as diverse as newspaper archives, transportation ledgers, and religious observances, the researchers have amassed 150 years of lake and river ice records spanning the Northern Hemisphere. All show a steady trend of fewer days of ice cover. If the pattern continues, only in Currier and Ives prints will ice skaters twirl across frozen rivers. The records show that later freezing and earlier ice breakup occurred on lakes and rivers across the Northern Hemisphere from 1846 to 1995. Over those 150 years, said Magnuson, changes in freeze dates averaged 5.8 days per 100 years later, and changes in ice breakup dates averaged 6.5 days per 100 years earlier. The findings translate to increasing air temperatures of about 1.2 degrees Celsius each century.

Now the scientists have looked more specifically at trends in ice duration in 65 waterbodies across what might be called the last bastion of winter in the U.S. – the Great Lakes region (Minnesota, Wisconsin, Michigan, Ontario, and New York) – during a period of rapid climate warming (1975-2004). Average rates of change in ice freeze and breakup dates were 5.8 and 3.3 times faster, respectively, than historical rates from 1846 to 1995 for the Northern Hemisphere. Average ice duration decreased by 5.3 days per decade.



Ice cover on lakes around Madison, WI and throughout the northern U.S. has formed later each winter. Lake Monona is in the foreground and Lake Mendota lies beyond the Madison isthmus (photo: Peter W. Schmitz, Madison, Wisconsin).

Over the same time period, average temperatures from fall through spring in this region increased by 0.7 degrees Celsius. The average number of days with snow decreased by 5.0 days per decade, and the average snow depth on those days decreased by 1.7 centimeters per decade.

“The formation and breakup of ice are important seasonal events in mid- to high-latitude lakes and rivers,” said Magnuson. “The timing of these events – ‘ice phenology’ – is sensitive to the characteristics of individual waterbodies and to broader-scale weather patterns and climate variability.”

Changes in ice phenology have important consequences for fish and zooplankton communities, said Jensen. Earlier ice breakup has created a temporal mismatch, for example, between the peak spring phytoplankton bloom and the population dynamics of some species of zooplankton. Fewer days of ice cover are also likely to reduce or eliminate winter-kill in shallow eutrophic lakes.

In contrast to the observation that climate changes are occurring more rapidly at higher latitudes, said Benson, the greatest rate of change in ice breakup dates in the Great Lakes region is happening at lower latitudes, near the southern

boundary of the area in which lakes are routinely ice-covered during winter.

During the late 1980s and early 1990s, for example, ice breakup occasionally occurred in mid-winter on two lakes in southern Michigan. These lakes previously hadn't seen open water until spring. By the end of the Great Lakes study period, from 1998 through 2002, several southerly lakes did not freeze over. In lakes from Big Green in Wisconsin to Cranberry in New York, from Minnetonka in Minnesota to Gull in Michigan, winter – at least in the form of ice – is fast melting around the edges.

Angola Students Place High in Lakes Appreciation Month Poster Contest

This year nearly 200 poster submissions were received in response to the call for posters that was sent out through both the NALMS listserv and through various school networks across the country. Posters came in from Indiana, Virginia, North Carolina, South Carolina, Alabama, Alaska, and Georgia.

The second-place poster was created by Austin Bauer, who is a middle schooler in Angola, Indiana. The third-place poster was created by Brian Goodrow, a 6th grader also from Angola, Indiana. Both Austin and Brian will receive certificates for their creative contributions. We at *WaterColumn* would like to congratulate both Austin and Brian, and encourage other students to submit entries for the 2008 NALMS Poster Contest (www.NALMS.org). You may see the winning posters in color on the Indiana Clean Lakes Program Web site, here: http://www.spea.indiana.edu/clp/lake_news.htm.

ILMS Small Grants Program

Sara Peel

In 2004, the Indiana Lakes Management Society (ILMS) and the Indiana Department of Environmental Management (IDEM) recognized the need for lake associations to fund small projects. However, at the time, most available grants did not provide funding for projects costing less than \$5,000 or the application required for the funding did not pay off in terms of the time and energy required to obtain the grant money. Together, ILMS and IDEM launched the ILMS Small Grants Program, through which lake associations, watershed groups, and other Indiana non-for-profit organizations could obtain funding for those projects that were deemed too small or too much work for the effort required from traditional grants programs. In order to be funded, ILMS determined that projects needed to cost less than \$5,000, while IDEM required that projects focus on reducing non-point source pollution.

Over the past four years, ILMS and IDEM funded 19 projects, each with a key focus on reducing non-point source pollution. Projects generally focused on lakeshore and watershed stakeholder education, implementation of a water quality improvement project, or water quality monitoring. In total, over the lifetime of the project, grantees educated more than 7,000 Indiana residents and lake enthusiasts, stabilized more than 500 feet of streambank, monitored more than 20 stream and lake sites, created or revegetated five wetlands and/or rain gardens, constructed one fish barrier, and installed one award-winning pervious concrete parking lot. For more information on any of these projects, please contact

Sara Peel, ILMS Small Grants Coordinator, at speel@jfnew.com or (574) 586-3400. Key highlights of these 19 projects are as follows:

Education-based Projects:

- Chapman Lakes Lake Learning Expo: Provided a venue to state-level agency folks and Chapman Lakes' contractors to interact and educate Chapman Lakes' residents. Highlights included a children's education area and tours of watershed projects implemented by the Chapman Lakes Conservation Association. More than 300 attendees visited the Lake Learning Expo.
- Lagrange County Lakes Council Outreach Program: Purchased computer and projector to complete lake association and watershed stakeholder education and outreach. Completed half-day seminars, lake association presentations, news releases, and developed brochures to educate watershed stakeholders and Lagrange County lake association members.
- Loon Lake Purple Loosestrife Treatment and Education Program: Completed treatment of three acres of purple loosestrife within the Loon Lake wetland complex and conducted education and outreach program for the Loon Lake Property Owners Association.
- Valparaiso Chain of Lakes Group: *How to Protect Our Watershed*: Revised and printed a Valparaiso Chain of Lakes information pamphlet, printed other lakes education materials, and distributed materials to more than 500 area residents.
- West Otter Lake Fair: Over 140 local attendees visited the more than 20 exhibitors targeted at educating Steuben County

Have you checked out the Indiana Clean Lakes Program Web page lately?
Take a look at <http://www.spea.indiana.edu/clp/>
and see what's new and happening with the program and with Indiana lakes!

residents on their lakes, lake management issues, and water safety.

- **Indiana Lakes Management Video:** Produced and distributed more than 3,000 copies of this video targeting smart lake management and lake education.
- **Steuben County Lakes Council Soundings Mailing:** Facilitated distribution of the Steuben County Lakes Council fall mailing, *Soundings*, to more than 2,000 individuals
- **ILMS Shoreline Lakescaping Program:** Purchased books from the Minnesota DNR to launch Indiana's Shoreline Lakescaping Program. This program will debut at the 20th annual lakes management conference in March 2008.

Water Quality Improvement Project Implementation:

- **Putney Ditch Streambank Stabilization:** Provided matching funds for the implementation of nearly 300 feet of streambank stabilization along Little Barbee Lake's main inlet.
- **Carpenter Drain Streambank Stabilization:** Provided matching funds for the implementation of nearly 200 feet of streambank stabilization along this tributary to Crooked Lake, Steuben County.
- **Curtiss Ditch Constructed Wetland Revegetation:** Purchased and established spatterdock plantings throughout the wetland.
- **Silver Lake Bioretention Filter Creation:** Designed and implemented a bioretention filter or rain garden to reduce nutrient loading to Silver Lake. Project included excavation, plant purchase and transportation, and installation.
- **Loon Lake Wetland Vegetation Diversification:** Purchased and installed wetland plants to diversify the Loon Lake wetland restoration size.

- **Lake Gage Fish Barrier:** Fabricated and installed fish barrier between Lake Gage and Crooked Lake to limit the movement of "rough fish", such as carp, between the lakes.
- **Pervious Concrete Parking Lot Implementation:** Completed construction of 1,700-square foot pervious concrete parking lot for the Grandview Veterinary Clinic in the Lake James watershed.
- **Eagle Creek Watershed Bioretention Filter Installation:** Purchase of materials and plants and implementation of rain garden or bioretention filter. Project serves to reduce stormwater runoff and as a demonstration project for Eagle Creek Watershed residents.

Water Quality Monitoring:

- **Lagrange County SWCD Water Quality Monitoring:** Purchased field sampling equipment to augment the SWCD's water quality sampling program.
- **Valparaiso Chain of Lakes Watershed Water Quality Monitoring:** Monitored multiple sites within the Valparaiso Lakes to identify water quality changes and variations within the chain.
- **Prairie Creek Watershed Water Quality Monitoring:** Monitored water quality within the tributaries draining to Prairie Creek and conducted measurements necessary to develop mass loading and nutrient budgets for each tributary and the reservoir as a whole.

National Assessment Database

The National Assessment Database summarizes electronic information submitted by the states to EPA. This information should not be used to compare water quality conditions between states or to identify statewide or national trends because of differences in state

assessment methods and changes to EPA guidance. This represents the most recent electronically available state water quality information. This Web site provides a summary of state-reported water quality information and allows the user to view assessments of individual waterbodies. It presents data in a format designed for quick reference by water quality professionals and those familiar with water quality reporting. EPA is working with the states to improve future electronic reporting. See: <http://www.epa.gov/waters/305b/index.html>.

Clever Eurasian Watermilfoil Public Service Announcement

The 100th Meridian Initiative is a cooperative effort among state, provincial, and federal agencies to prevent the westward spread of zebra mussels and other aquatic nuisance species in North America. They have recently prepared a funny, but effective, public service announcement regarding the spread of the nuisance aquatic plant, Eurasian watermilfoil. To view the video, go to: http://100thmeridian.org/Video/milfoil_PSA_player.asp?version=real.

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The 2008 NALMS Annual National Conference program focuses on the importance of fisheries in developing comprehensive lake management strategies. That translates into better conditions for anglers and other lake enthusiasts.

21st Annual National Conference Enhancing the States' Lake Management Programs

Building Partnerships for Improved Fisheries and Lake Water Quality

Each year for over two decades, state lake program managers have gathered in Chicago to discuss successes, evaluate obstacles, and explore new approaches for improving the states' lake management programs. The 2008 program focuses on the importance of fisheries in developing comprehensive lake management strategies. Accordingly, fisheries managers and specialists are encouraged to attend as the program will examine approaches for enhancing fisheries interactions with other lake management objectives such as water quality, recreation, and overall ecosystem health.

Leaders from statewide lake associations, also a target audience for this conference, will continue to receive training and guidance on nonprofit organization management while learning

from the experiences of their sister associations from across the country. And together, state agency staff and statewide lake association leaders will explore new opportunities for future cooperation. Federal and local managers are invited to join in the lively discussions, both during the sessions and at special programs offered during luncheons and evening social functions.

The conference host is the Holiday Inn Chicago Mart Plaza, convenient to downtown Chicago's great restaurants and just steps from our many cultural attractions. For more information: <http://www.nalms.org/Conferences/2008Chicago/>.

What is a Low Impact Development – and Why Should I Care?

What is a "Low Impact Development (LID)"? A LID is an innovative stormwater management land development approach with a basic principle that is modeled after nature. A LID manages rainfall at the source using uniformly distributed decentralized smaller-than-normal-scale control

practices. A LID's goal is to mimic a site's predevelopment storm water runoff or hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. LID techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and managing/treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LIDs address storm water through small, cost-effective landscape features located at the lot level. These landscape features, known as "Integrated Management Practices (IMPs)", are the building blocks of LID. Almost all components of the urban environment have the potential to serve as an IMP. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LIDs use a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.

Why should I care and why are more central Indiana communities now considering using LID techniques? A LID has numerous benefits and advantages over conventional stormwater management approaches. In short, it is a more environmentally sound technology and a more economically sustainable approach to addressing the adverse impacts of urbanization. By managing runoff close to its source through intelligent site design, LID can enhance the local environment, protect public health, and improve community livability – all while saving developers and local governments money. The need for such an approach has never been greater. Current storm water programs require that a wide array of complex and challenging ecosystem and human health protection goals be addressed. Many of these goals are not being met by conventional stormwater management technology, and



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communities are struggling with the economic reality of funding aging and ever-expanding stormwater infrastructure. The challenge of how to restore stream quality in watersheds that have already been densely developed is even more daunting. Simply relying on impervious reduction and/or conventional detention ponds to address these issues is not feasible, practical, or sustainable. LID provides the key in its emphasis on controlling or at least minimizing the changes to the local hydrologic cycle or regime.

Communities can use LID to address a wide range of “wet weather” flow issues, including Combined Sewer Overflows (CSOs), National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II permits, Total Maximum Daily Load (TMDL) permits, Nonpoint Source Program goals, and other Water Quality Standards. Local

permitting agencies can use LID as a model in revising local zoning and subdivision regulations in favor of more cost-effective, ecologically sound development practices. Developers can achieve greater project success and cost savings through the intelligent use of LID, and designers can apply these techniques for innovative, educational, and more aesthetically pleasing sites.

What are the costs associated with LID? Current experience has shown that LID often saves money over conventional approaches through reduced infrastructure and site preparation work. LID case studies and pilot programs show at least a 25- to 30-percent reduction in costs associated with site development, stormwater fees, and maintenance for residential developments that use LID techniques. These savings are achieved by reductions in clearing,

grading, pipes, ponds, inlets, curbs, and paving. Far outweighing any of the cost increases due to the use of LID, these infrastructure reduction savings enable builders to add value-enhancing features to the property, to be more flexible and competitive in pricing their products, or even to recover more developable space since there is no need to waste land for a stormwater pond. Costs are very site-specific. Each project will be unique based on the site’s soil conditions, topography, existing vegetation, land availability, etc.

More information about LID is available on the Web at The Low Impact Development Center, a non-profit organization, at www.lowimpactdevelopment.org/ and the Environmental Protection Agency’s (EPA’s) Web site at www.epa.gov/owow/nps/lid/.

Source: Marion County SWCD