

DAM SAFETY NEWS

Twenty Years After: The Floods of 1993

It has been 20 years since major flooding struck the upper Midwest during the spring and summer of 1993. While a majority of the damage in the Mississippi/Missouri River Watersheds occurred in Iowa, Illinois and Missouri, Wisconsin experienced severe flooding on numerous rivers and record flooding on the Black River in Jackson and La Crosse Counties. Numerous dams were overtopped and several failed. Damages reported exceeded \$900 million dollars.

In Wisconsin, the 1993 floods began the previous year with the state experiencing a wet fall and winter cover resulting in saturated soil conditions. During the fall of 1992 rains, some areas received as much as 8 inches of rain during a single 24 hour period. Spring floods exceeded expected levels on many rivers due to the above normal snow cover combined with heavy rains. A majority of the flooding was confined to low lying fields and roads. However, the state's dams were beginning to be stressed by the on-going high flows. During the winter, Partridge Lake Dam in Juneau County washed out. A total of eight dam were either washed out or damaged by high water during the spring flooding. Two others were overtopped.

As spring turned into summer, the existing flooding conditions were intensified by a persistent weather pattern which resulted in continuing thunderstorms over the upper Midwest in June. South central portions of the state received rainfall totals that were 150-200% above normal for the first seven months of 1993 with a number of stream systems experiencing flooding levels which exceeded the 1% (100 year) flood. Over Father's Day weekend, 10 dams and dikes were washed out. Another 12 dams reported damage. Numerous other dams suffered damaged which was not reported or discovered until a later inspection. A presidential disaster declaration was issued for 10 counties in southern and western Wisconsin for the period of June 7 - August 25, 1993.

The most notable dam failure associated with the flooding of 1993 was the Hatfield Dam on the Black River in Jackson County. The Hatfield Dam creates Lake Arbutus, a 1,000 acre impoundment and is located less than 15 miles upstream of the city of Black River Falls (pop. 3,628). Heavy rains June 16-21st caused significant flooding on the Black River on June 20th. Operators of the Hatfield Dam began opening the tainter gates on the 17th. Within 24 hours operators opened 7 of the 10 gates. The three unopened gates were inoperable due to broken cables. Two more gates soon became plugged by debris. In an attempt to release additional flow, operators also tried to activate the trip gate section of the dam. Unfortunately, the combined pressure of water and debris prevented the trip gates from opening. Water began to flow around the dam and into the adjoining power canal as the lake level rose. The high flows caused a breach in the canal dike on the 20th. As the flood waters moved downstream, the old



*Canal Breach Hatfield Dam
Jackson County 1993*



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levee protecting the Grove neighborhood was overtopped in Black River Falls. Approximately 90 homes were flooded to an average depth of 5.5 feet. The damage caused by the dike breach and levee overtopping was heavy, but it could have been worse. If the Hatfield Dam had breached, a 20-25 foot wall of water would have rushed through downtown Black River Falls.

The Floods of 1993 were a wake up call for the nation. The flooding which exceeded expected levels and caused widespread damage resulted in changes to the National Flood Insurance Program and a reassessment of how levees should be used in managing floodplains. In Wisconsin, the floods highlighted how vulnerable dams are to sustained high water and debris. The floods also reinforced the need for dam owners to have in place and implement Inspection, Operation and Maintenance Plans (IOM) and Emergency Action Plans (EAP). A major factor in the failure of the Hatfield Dam was the inability of operators to open all the gates as the water rose in the pool because of broken cables and debris. The failure of so many dams also highlighted the need for dam owners and downstream communities to work together on ensuring the appropriate zoning is in place as required under NR 116.08, Wisconsin Administrative Code.



*Debris in gates Hatfield Dam
Jackson County 1993*

Since 1993, WDNR has developed guides for writing IOMs and EAPs. Copies of the guides for writing IOMs and EAPs along with plan templates can be downloaded in PDF format at: <http://dnr.wi.gov/topic/Dams/documents.html>. A copy of the templates in Word format can be obtained by sending an email to DNRDAMSAFETY@wisconsin.gov with either IOM Template or EAP Template in the subject line.

The WDNR has published a report and a video on the Floods of 1993. A PDF copy of The Floods of 1993: The Wisconsin Experience can be downloaded at <http://dnr.wi.gov/topic/floodplains/Communities.html#Handbook>. A short 30 minute video should be available soon.



*Erosion damage caused by overtopping
Humbird Dam Clark County 1993*



*Above: Hay Creek Dam Failure
Clark County 1993*



*Left: Taliesen Dam Failure
Iowa County 1993*

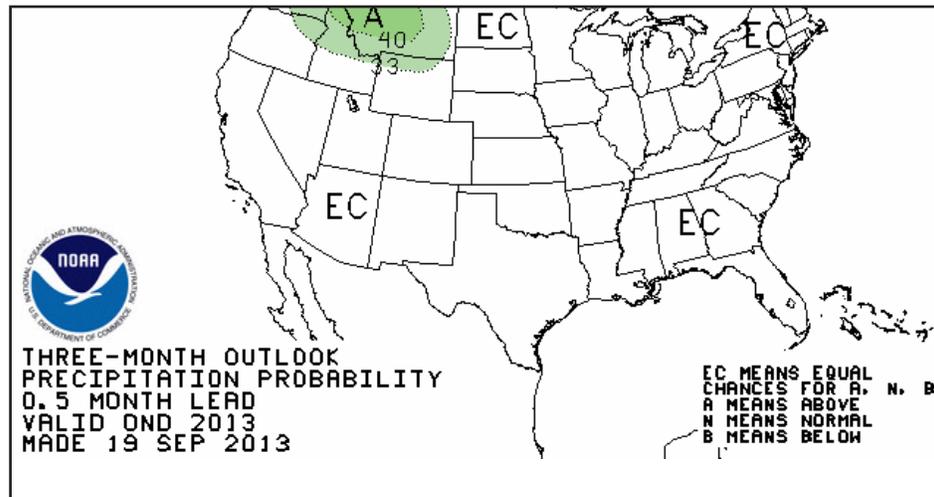
*Below: Hebron Dam Broken Lift Gate
Jefferson County 1993*



Fall Flooding Outlook

Wisconsin has once again ricocheted from flooding conditions back to drought. According to the US Drought Monitor (<http://www.droughtmonitor.unl.edu/>) nearly two thirds of the state is dry with conditions ranging from abnormally dry to severe drought. At the end of June, the National Weather Service (NWS) noted that precipitation rates in Milwaukee were nearly 9 inches above normal and in Madison, nearly 15 inches above normal. These same areas are now considered abnormally dry.

The precipitation outlook for October - December is for an equal chance of precipitation rates being above or below normal. The current precipitation outlook is similar to the fall of 2012. Let's hope the first 6 months of 2014 are not as wet as 2013.



For a graphic display of the Three Month Outlook for temperature and precipitation go to: http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=2

For a technical discussion of the 30-day outlook go to: http://www.cpc.ncep.noaa.gov/products/predictions/long_range/fxus07.html

For the Long-Lead Forecast Release Schedule for 2013 go to: <http://www.cpc.ncep.noaa.gov/products/predictions/schedule.html>.

The next 30-day outlook will be issued on October 17, 2013 for November. The Long-Lead Forecast Release Schedule for 2014 will be released in early December.

While long range forecasts are helpful, it is very important for dam owners to be aware of what is expected for the next few days. Your local NWS office can give you the most current detailed information for your area. Current weather conditions and short term forecasts on a site specific, community or county basis can be found at: http://weather.noaa.gov/weather/WI_cc_us.html.

Municipal Dam Grant Program

The 2013-15 Biennial Budget provided \$4 million for Dam Grants, of which, approximately \$3.5 million will be committed to fund eligible engineering and construction costs associated with the maintenance, repair, modification or abandonment and removal of municipally owned dams. The updated Municipal Dam Grant Application Form 3500-088 (Rev. 8/13) and instructions are available beginning August 21, 2013. The grant application deadline is January 22, 2014.

The Municipal Dam grant program provides a cost-sharing opportunity for eligible engineering and construction costs for dam maintenance, repair, modification or abandonment and removal up to a maximum of \$400,000. Funding sources outside the applicant's own resources can be used toward the local match for this grant.

Cities, towns, villages, counties, tribes, and public inland lake protection and rehabilitation districts (lake districts) may apply for grants to conduct dam maintenance, repair, modification or abandonment and removal on dams that they own. Private dam owners are not eligible to apply. Dams that are inspected, approved and licensed by a federal agency under 18 CFR Part 12 are not eligible to receive funding. (NR 335.02(2)(b))

For more information of the Municipal Dam Grant Program go to: <http://dnr.wi.gov/Aid/DamMunicipal.html>.

Dam Emergency – Who Do You Call?

If despite your best efforts at maintaining your dam, an emergency arises, the first thing to do is to open your Emergency Action Plan (EAP) and follow the steps outlined. If for some reason, you do not yet have an EAP for your dam and failure is imminent, then call 911 and be prepared to provide the following information to the 911 operator:

- name and title of the person reporting the incident;
- callback number of the person reporting the incident
- name/location of the dam including county, waterbody and nearest road; and
- present condition of the dam such as perceived problem, gate status or level of pond in relation to low point in the embankment.

***Under any circumstance, if failure is imminent, call 911 first!
And then call***

**Wisconsin Emergency Hotline
1-800-943-0003 (24 hour)
Press "1"
Ask for "DNR Duty Officer"**

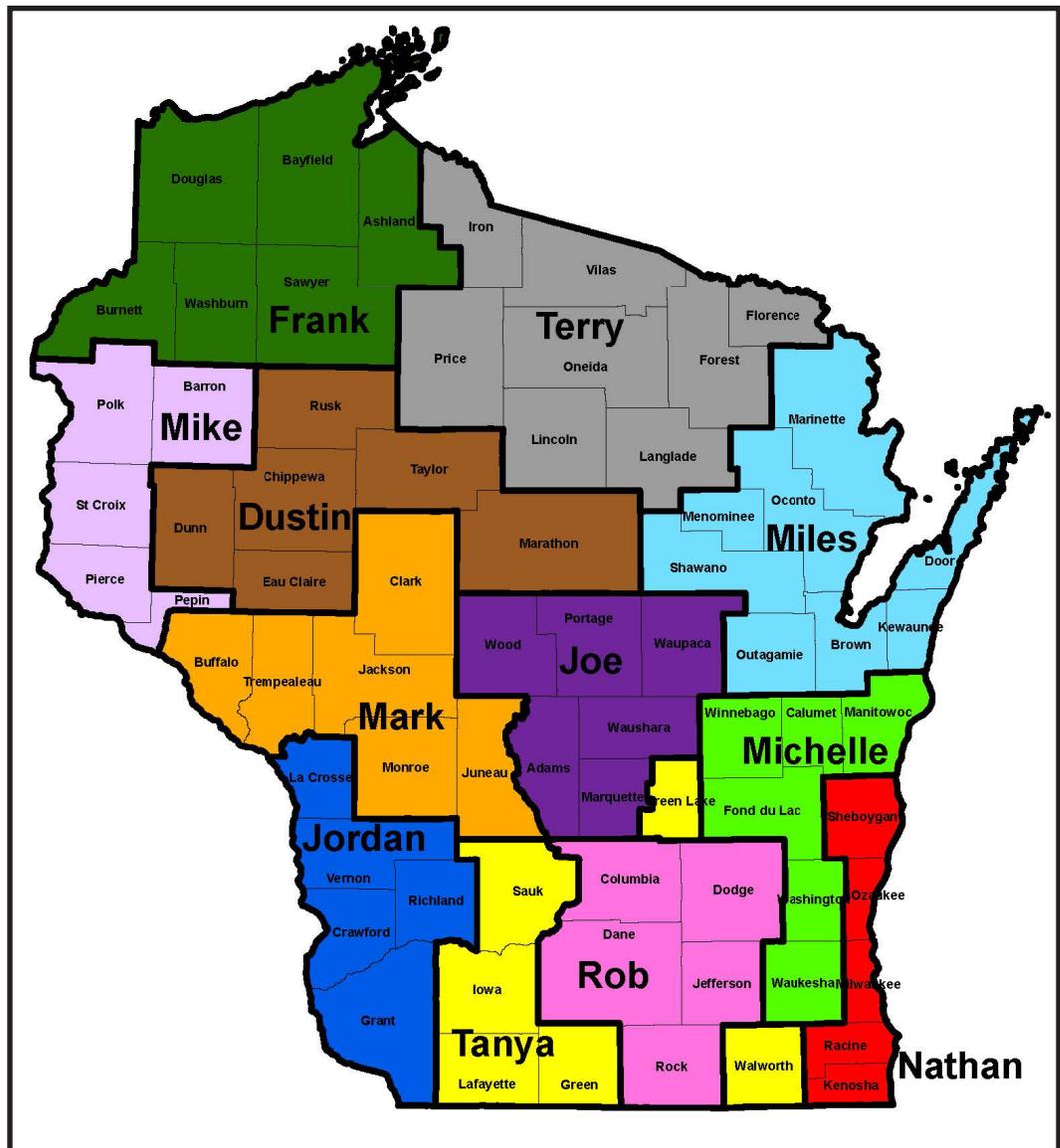
DNR Staff Changes

Over the past year there have been a number of changes in the Dam Safety Section. Two new engineers have been hired for the Eau Claire and Waukesha offices. Also, county assignments have been shifted in order ensure each county was covered. A complete list of Water Management Engineers by county can be found on the WDNR Dam Safety website at: <http://dnr.wi.gov/topic/dams/regionalcontacts.html>.

Mike Rogney was hired as a Water Management Engineer for the West Central Region - Eau Claire. He is a recent graduate from UW-Madison majoring in Biological Systems Engineering, specializing in Natural Resource Management. He previously worked with the USDA-NRCS while in school, which included investigating dam hydrology and hydraulics in Vernon County. In his new position, Mike will provide dam safety, floodplain management, and engineering assistance to the Water Regulation Program. His contact information is Wisconsin Department of Natural Resources, 1300 West Clairemont Avenue, Eau Claire, WI 54701, (715) 879-3735, Michael.rogney@wisconsin.gov.

Nathan Zoch was hired as a Water Management Engineer for the Southeast Region - Waukesha. He is recent graduate from UW-Milwaukee with a bachelor's degree in Civil Engineering. He previously worked for the Indian Health Services, a division of the U. S. Department of Health and Human Services. Prior to obtaining his BS, Nathan was an active duty Army Combat Engineer/Construction Masonry Engineer and served two deployments in Iraq. In his new position, Nathan will provide dam safety, floodplain management, and engineering assistance to the Water Regulation Program. His contact information is Wisconsin Department of Natural Resources, 141 NW Barstow St, Room 180, Waukesha WI, 53188, (262) 574-2188, Nathan.zoch@wisconsin.gov.

The map below can be used as a quick and easy guide in determining who is your Water Management Engineer. WMEs are your local contact regarding questions floodplain management and dams. WMEs also provide technical assistance regarding engineering questions. A complete list of the Water Management Engineers by county including telephone numbers, email addresses and mailing addresses can be found on the WDNR Floodplain Management website at: http://dnr.wi.gov/topic/floodplains/staff_flood.html.



New Publications

The WDNR *Guide to Writing Inspection, Operation and Maintenance Plans* and the IOM Template are now available for download at <http://dnr.wi.gov/topic/Dams/documents.html> in PDF format. For a different format, please send a request to DNRDAMSAFETY@wisconsin.gov, and enter "IOM" in the subject line.

All owners of large dams are required to develop an adequate IOM for each dam they own under Chapter NR 333, Wisconsin Administrative Code, Dam Design and Construction. Because ch. NR 333.07(3)(a) does not specify the components of an IOM, the WDNR Dam Safety is developing a guidebook and template to assist dam owners in writing a plan which meets an accepted minimum standard.

Each IOM must be tailored to site specific conditions and the requirements of the owner, agency or organization that operates or regulates the use of the dam. Once the draft IOM is written, it must be sent to the Department Regional Water Management Engineer responsible for the county in which the dam is located for review and approval. Contact information for the Department Regional Water Management Engineers can be found at: <http://dnr.wi.gov/topic/dams/regionalcontacts.html>.

For more information on or assistance in writing an IOM, contact Miriam Anderson, Planning Specialist at 608-266-5228 or Miriam.Anderson@wisconsin.gov or your regional Water Management Engineer.

Association of State Dam Safety Officials

The Association of State Dam Safety Officials (ASDSO) is a national non-profit organization serving state dam safety programs and the broader dam safety community, which includes federal dam safety professionals, dam owners and operators, engineering consultants, emergency managers, manufacturers, suppliers, academia, contractors, and others interested in improving dam safety. ASDSO's mission is to advance and improve the safety of dams by supporting the dam safety community and state dam safety programs, raising awareness of dam safety issues, facilitating cooperation, providing a forum for the exchange of information, representing dam safety interests before governments, providing outreach programs, and creating a unified community of dam safety advocates.

ASDSO promotes dam owner education through webinars, workshops and conferences. A list of upcoming webinars and workshops can be found at <http://www.damsafety.org/>. Information on webinars including how to register and professional development hours can be found at <http://eo2.commpartners.com/users/asdso/index.php>.

Email Notification of Updates

After the Spring 2014 newsletter, the Wisconsin *Dam Safety News* will become an electronic-only newsletter sent via email using the WDNR's GovDelivery system. To be added to the electronic mailing list, please go to <http://dnr.wi.gov/topic/dams/newsletters.html> to subscribe. Click on "Subscribe to DNR Updates" and then choose "Dam Information". Copies of this newsletter in PDF format can be found at: <http://dnr.wi.gov/topic/dams/newsletters.html>.

If you wish to continue to receive a paper copy of the *Dam Safety News*, please contact either Miriam Anderson at 608-266-5228 or LuVenus Mayas at 608-266-9273 or send a request to WDNR at [DNR DAMSAFETY@wisconsin.gov](mailto:DNRDAMSAFETY@wisconsin.gov).

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For further information regarding the WI Dam Safety Program, please visit our website at: <http://dnr.wi.gov/topic/dams/> or email: dnrdamsafety@wisconsin.gov.
