

Categorizing Extreme Rainfall Events by Severity, Not Rarity

~Thomas M. Grisa, P.E., F.ASCE, City of Brookfield, Wisconsin

Editor's Note: Tom Grisa spoke during the Plenary Session at our 2014 Annual Conference. A short version of his paper is printed here to encourage further dialog and thought among our members. What do you think? View the complete article here http://stormwater.wef.org/2014/01/relabeling-extreme-rainfall-events-improve-public-understanding/ where you can also cast a vote to voice your opinion and provide written feedback.

Hydrologists understand how recurrence intervals work for extreme rainstorms; but the public does not. They do not understand how the 100-year storm can occur more than once in 100 years. Nor do they understand how engineers call two completely different rainstorms the 100-year storm since they had different total rainfall amounts and durations.

In Brookfield [Wisconsin], rainstorms equaling or exceeding the 100-year storm have occurred five times in the past 14 years. In addition, they occurred in back-to-back years, once in 1997 & 1998 and again in 2008, 2009 & 2010. This can be quite difficult to explain to the public since they do not understand the probabilities and statistical principles behind the ratings of these storms.

There must be a better way to describe these storms. Scientists rate natural disasters such as earthquakes, tornadoes, and hurricanes using scales based on factors other than recurrence intervals or probability of these events occurring. Seismologists use the Richter scale to rate earthquakes. Meteorologists use the Fujita scale (or F-scale) to rate tornadoes and the Saffir-Simpson scale to rate hurricanes.

These professionals use a simple scale to describe the severity of the event, not the rarity of the event. The public understands that for earthquakes, tornadoes and hurricanes, the bigger the number the worse the storm. We should use a similar rating scale for extreme rainfall events.

This article proposes that the industry reevaluate how we rate rainstorms and change the designation from a recurrence interval standard to a simple scale that is understandable by the public. This new system uses existing science and data accumulated to date, specifically rainfall intensities and total rainfall.

Table 1 on the next page shows the rainfall depth in inches by recurrence interval and duration for Southeastern Wisconsin. Using data in Table 1, we can apply a simple formula to establish a relationship between recurrence interval designations for each storm to assign them into categories of rainfall events, or G-factors.

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Storm						
Duration	2 year	5 year	10 year	25 year	50 year	100 year
1 hour	1.31	1.60	1.84	2.20	2.50	2.82
2 hour	1.54	1.93	2.23	2.73	3.16	3.64
3 hour	1.68	2.07	2.40	2.93	3.39	3.89
6 hour	1.95	2.40	2.79	3.44	4.03	4.70
12 hour	2.24	2.74	3.17	3.89	4.53	5.25
24 hour	2.57	3.14	3.62	4.41	5.11	5.88

 Table 1 - Recurrence Interval and Depth of Rainfall (inches)

Rainfall data is based on Milwaukee rainfall data for the 108-year period of 1891 to 1998. Source: Rodgers and Potter (2000)

The Recurrence Interval Conversion Formula is: $G_{Adi} = \{1 + Log(RI)/Log(2)\} \times (DAF) \times (IAF)$

Where:

 G_{Adj} = the Adjusted category of the storm

RI = Recurrence Interval of the storm

DAF = Duration adjustment factor, where:

 $DAF = \frac{\text{Total rainfall for X-year Y hour duration storm}}{\text{Total rainfall for X-year 24 hour duration storm}}$

IAF = Intensity adjustment factor, where:

= Total rainfall for X-year Y hour duration storm Total rainfall for 100-year Y hour duration storm IAF

The new category ratings are shown in Table 2 such that the new rating corresponds to the amount of rain as shown in Table 1 above.

Storm						
Duration	2 year	5 year	10 year	25 year	50 year	100 year
1 hour	0	1	1	2	3	4
2 hour	1	1	2	3	4	5
3 hour	1	1	2	3	4	5
6 hour	1	1	2	3	4	6
12 hour	1	2	2	4	5	7
24 hour	1	2	3	4	6	8

Table 2 – Fully Adjusted Category Storms (G-factor) Recurrence Interval

The proposed system rates rain events into categories on a scale of 1 - 10 based on total rainfall and duration. The 1-10 scale is preferred for use with the public as it conveys the message of how severe the storm was.

Using the Category storm designation as shown in Table 2, we can now explain to the public that the extreme rain event was a Category G-7 storm, which implies severity, not rarity. This revised method should work better than our current system since it uses a simple scale that the public understands, the bigger the number, the worse the storm.

Numerous professionals of varied backgrounds and interests have reviewed this concept and have provided positive feedback on the proposed method, generally supporting its use throughout the nation. Professionals need to change the rating of these storms and do so before the next big storm arrives. What do you think? Contact the author by email at: grisa@ci.brookfield.wi.us.

2014 IAFSM AWARDS

~IAFSM Awards Committee: David Schein, Ron Davis, Stu Richter, Scott Cofoid, Brian Eber, and Paul Osman

At the 2014 Annual Conference in Rosemont, the following awards were presented:

FLOODPLAIN MANAGER OF THE YEAR

This award recognizes outstanding individual efforts and contributions at the local level. The award honors an individual responsible for the development of a distinguished local program or activity, or someone who struggles to implement flood hazard reduction at the local level in the absence of sophisticated programs and support.

Two floodplain manager awards were presented at the Rosemont conference:

Mary Lou Kalsted was recognized for 32 years of service to the Village of Lisle, where she helped the Village obtain a Class 5 CRS rating and performed stormwater management engineering. Last year, Lisle had record flooding. Mary Lou completed over 200 damage assessments and started a large mitigation project. Mary Lou has also served as an active chairperson of the CRS committee and has been a strong advocate of CRS across the state.

Bob Mack was recognized for 30 years of service to the Cook County Department of Transportation and Highways, where he was the "go-to" person on Cook County flooding issues. As noted during the awards presentation, Bob was always able to negotiate "the minefield of Cook County bureaucracy" and find a way to get things done. Bob managed over 1,500 miles of roadway, drainage, and utilities. Bob was also an instrumental member of the steering committee for the Cook County Hazard Mitigation Plan.

Congratulations to Mary Lou and Bob, our Floodplain Managers of the Year.

OUTSTANDING SERVICE

Awarded to an IAFSM officer, a Federal, State, or Local Official, or a consultant who has gone above and beyond normal expectations and duties to promote or encourage IAFSM goals. This award may also be given to an agency that has inspired floodplain management efforts or implemented unique programs that encourage flood reduction.

Matt Wahl was recognized for his outstanding service to Peoria County, where he has worked since 1987, including working through 37 major flood events. Matt has spent 27 years confronting and solving floodplain issues, including purchasing over 120 flood prone properties and elevating 30 more. In 1996 Peoria County won the National Association of Counties award for flood mitigation. In 1997, Matt was named ASFPM National Floodplain Manager of the Year. Peoria County was one of the state's first CRS communities, now a CRS class 5. Since its start, Matt has chaired the IAFSM Certified Floodplain Manager committee and he currently serves on the national committee. Matt is chairman of the American Planning Association Stormwater Committee and in 2009 he won the American Planning Association Award. Congratulations to Matt for his outstanding service.



Mary Lou Kalsted, Village of Lisle, accepts the Floodplain Manager of the Year award from Loren Wobig.



Loren Wobig congratulates Bob Mack, Cook County DOTH, as Floodplain Manager of the Year.

STORMWATER MANAGEMENT

Awarded to a floodplain manager, an individual, a group of individuals, a consultant, or an agency who improved stormwater management or reduced urban flood risks through creative engineering, regulatory measures, or other approaches. The award can also be considered for someone who struggles to implement flood hazard reduction at the local level in the absence of sophisticated programs and support.

Darren Olsen was recognized with the 2014 Stormwater Management award. In northern Illinois one name often pops up when discussing stormwater projects. Darren Olsen's name is associated with a disproportionately high number of these projects; dozens of projects have been designed by Darren. In addition, Darren serves on the Lt. Governor's Sceince Advisory Committee where he represents floodplain and stormwater management issues across the state. Congratulations, Darren!

MITIGATION

This award is given to an individual or community that has encouraged flood hazard reduction through a buyout program, retrofitting, preparation of a mitigation plan, or other similar mitigation efforts.

Molly O'Toole has been a consistent champion of mitigation over many years. She started in 1984 as the mitigation program director for the Office of Water Resources, and was doing mitigation five years before FEMA's Hazard Mitigation Grant Program kicked off. After the Great Flood of 1993, Molly was chair of the state interagency task force for mitigation, and she developed the mitigation strategy which changed the course of mitigation in Illinois. Many of our programs today were developed with Molly's input. Molly has been involved in dozens of mitigation plans and hundreds of mitigation projects. Congratulations, Molly!

PUBLIC EDUCATION AWARD

This award is generally given media outlet that has produced floodplain or stormwater management special features during the year. The award can include individuals or agencies who have contributed to public awareness of floodplain or stormwater management issues.

Last year, the Center for Neighborhood Technology (CNT) did a major research project looking at urban flooding in Cook County. This study looked at both overland flooding and also basement flooding which is largely ignored. CNT met with local leaders, state representatives, citizens, state and federal agencies, and encouraged action. With fresh ideas and outside-the-box thoughts, they confront problems that most of us would hide from. CNT has sponsored legislation to further study urban flooding. CNT hosted a series of Gross Gatherings across the area where residents could come in and vent their frustrations and meet with experts to help them solve problems. Hal Sprague and Harriet Fessling accepted the award for CNT.



Darren Olsen, CBBEL, accepts the Stormwater Management award.



Loren Wobig presents Molly O'Toole with the IAFSM Mitigation award.



Harriet Fessling and Hal Sprague accept the IAFSM Public Education award from Loren Wobig.

2014 "Best Presentation" Award

New in 2014, IAFSM members were provided with an opportunity to vote for the best workshop presentation they attended. (Plenary Speakers were not included in this vote). Our Annual Conference would not be the great success that it is without the hard work and wonderful presentations of all our speakers. This year, the following presentors were the top five vote getters. Thanks to all members who voted, and thanks to everyone who presented.

- 1. <u>The Cook County Watershed Management Ordinance: From Development to Implementation</u> Dan Feltes & Jason Meyer (MWRDGC)
- 2. <u>Case Study: Lessons Learned: Neighborhood Drainage Infrastructure Improvements Using Green Initiatives</u> <u>in the Village of Hinsdale, Illinois</u> - Phil Stupfert and Logan Gilbertsen (HR Green)
- 3. <u>Stormwater Management Committee Walk-Through Workshop</u> Shauna Urlacher (Smith LaSalle), Kristine Meyer (WBK), Ralph Stark (HR Green), and Mark Phipps (Baxter & Woodman)
- 4. (tie) <u>Heritage Park Flood Control Study</u> Joseph Kratzer (MWRDGC)

(tie) <u>A Lesson Plan for Flood Mitigation: The Gurnee Grade School vs. the Des Plaines River, The Transformation of a Community Liability into a Community Asset</u> - Mike Warner & Chris Gaynes (Lake County SMC)

5. <u>Landscape Design for Stormwater BMPs</u> - Tim Pollowy (Hey & Associates)

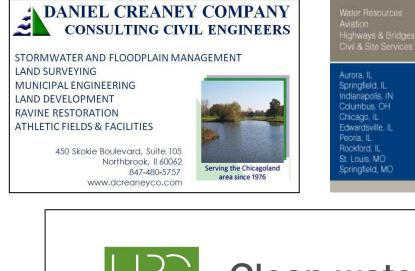


Stormwater Management Tools

-Shauna Urlacher, P.E., CFM, Smith LaSalle

The IAFSM Stormwater Management Committee has assembled a resource table that catalogs the various tools available for stormwater management projects. This table can be found on the IAFSM Stormwater Management Committee webpage or by clicking here. The tools range in complexity and uses, which are applicable for projects from the planning to design stages. The main objective of this resource is to assist engineers and local officials in determining which tool and/or software to use on a particular project.

It is the committee's intention to update the table as new technologies become available. We hope you will find the table useful and you will assist in expanding and updating it. We ask that you review the table. If you have a website, software or other tool that you use that is not included on the table or see an error in the table, please forward that information to Shauna Urlacher at surlacher@smithlasalle.com.





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Multi-County Floodplain Workshop

-Michael Sutfin, CFM, City of Ottawa

After the April 2013 floods, Senator Sue Rezin visited Ottawa as part of her tour of the 38th district. She asked why Ottawa had very little damage compared to communities up and down stream. The answer wasn't a simple one but Michael Sutfin, floodplain manager for the City of Ottawa, explained the City's floodplain management and mitigation efforts. Senator Rezin then asked if Ottawa would share this information with others. The result was a multi-county workshop to which Senator Rezin invited every mayor in her district to attend. A presentation was made by Michael Sutfin representing IAFSM, Paul Osman representing IDNR/OWR, Scott Cofoid representing CRS and Christopher Haring, P.G., representing USACE. Over 40 people attended, representing over 20 communities in seven counties. Key messages from the meeting were to join the CRS program, become members of IAFSM, and have one staff member per community get certified as a floodplain manager.

The workshop was very successful. Future meetings will be held to focus on Floodplain 101, model floodplain ordinances and a more aggressive approach to regulating floodplain development throughout the region.

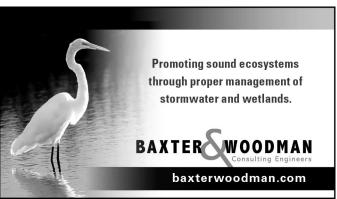
Major Revisions to Biggert Waters Bill Signed by President

~Brian Eber, CFM, IDNR-OWR

On Friday March 21st President Obama signed into law "The Homeowner Flood Insurance Affordability Act." The bill makes major changes to Biggert Waters Flood Insurance Reform Act which was passed by Congress in July 2012. The new bill overturns many efforts made in Biggert Waters to eliminate artificially subsidized premiums and move the NFIP towards an actuarially-sound program. The bill calls on FEMA to "strive" to reach the goal that most policyholders have a premium of no more than 1 percent of the value of their coverage - in other words premiums of \$2,000 for \$200,000 worth of coverage. Among other things, the act:

- Limits yearly premium increases to an average of 15 percent per year, and stipulates that no individual policyholder pay an increase of more than 18 percent per year;
- Reinstates the flood insurance program's grandfathering provision, meaning homes that complied with previous flood maps would not see large premium increases when new maps show greater risk of flooding;
- Ends a provision that required an immediate hike to actuarial levels when a home changes ownership, which was slowing home sales in many communities designated high risk by FEMA flood maps;
- Requires that FEMA obtains input from local communities and accounts for non-federal levees and other locally funded flood protection measures when it completes new flood maps;
- Requires FEMA to refund all policy holders who overpaid with the risk-based actuarial premiums established by Biggert Waters;
- Establishes a process to reimburse property owners who get a map change;
- Provide clear communication, including an increase in the font size on the standard flood insurance policy (going from 30 pages long to 50+ pages long);
- Requires FEMA to complete a study on how to keep the program affordable as it moves to make the program more solvent.

At the time of printing this newsletter, these is no official comment from FEMA on how and when these major changes to the flood insurance program will be enacted. The only comment from FEMA is: "FEMA looks forward to implementing the congressionally mandated reforms".



The Importance of IAFSM Conference Sponsors

Thank you to all of the 2014 IAFSM Conference sponsors. The donations made by sponsors each year go directly towards the costs of the annual conference, and help to keep conference registration fees affordable for everyone, including local officials. IAFSM sets the conference registration fees as low as possible and truly relies on the sponsors. Again, thank you to all of the 2014 IAFSM Conference sponsors for helping IAFSM to fulfill its stated objectives to the membership.

Thanks to our 2014 Conference Sponsors!

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The IAFSM Current

From the Chair

~Loren Wobig, P.E., CFM, IDNR-OWR

Not snow, nor rain, nor dark of night was able to keep the 2014 IAFSM from going on as the largest conference yet with great presentations, great vendors, great food, great conversations, and great sponsors. Thank you again conference sponsors and thank you to all who participated in the conference this year.

This year, we had record-breaking attendance with over 530 attendees who had an opportunity to choose among 49 break-out presentations and two pre-conference workshops, heard four wonderful plenary/lunch speakers, and visited with 25 exhibitors. Field tours were again offered, which gave members an up-close and personal look at the O'Hare Airport Modernization project, IDNR's Dam Removal sites, and the stormwater BMPs implemented at the new police station in Franklin Park.

A HUGE thank you is owed to our Conference Chair, Lillian Prince, for her hard work and commitment to this year's conference. Well done, Lillian.

Youth Outreach Committee Chair Needed

IAFSM is seeking a new Youth Outreach Committee Chair. In the past, this committee has helped with events for younger students (such as Boy Scout programs and a State Fair booth) and has worked with older students by offering research funding to college students pursuing degrees related to stormwater and floodplain management. We welcome your ideas for developing this committee and engaging those who have not yet entered the working world. If interested in chairing this committee, please contact Loren Wobig at loren.wobig@illinois.gov to discuss why you want the position and what ideas / direction you would bring to the committee.







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CEC Education & Training Opportunities

Looking for training opportunities? The following opportunities are coming up in the next few months. If you are looking for credits, be sure to review the material and confirm they meet the appropriate requirements.

National Conference

The ASFPM annual conference is being held in Seattle, Washington June 1st to June 6th ! www.asfpmconference.org/

Additional Training Opportunities:

- EMI provides a wide range of training opportunities and upcoming training includes Floodproofing Residential Buildings (E279), April 14-17, and Managing Floodplain Development through the NFIP, (E273) June 16-19.
 - EMI courses are free for local and state government employees. Learn more at http://training.fema.gov/EMI/

Webinars/ Online:

- STARR/FEMA, atkinsglobalna.webex.com and search by title, free-registration required
 - o CRS: Developing Outreach Projects, April 16th
 - o Elevation Certificates, April 17th
 - Introduction to CRS: May 20th, July 16th
- Association of State Floodplain Managers (ASFPM) **Finding that BFE**, April 23rd, \$30 members, \$60 nonmembers
 - o http://www.floods.org/n-calendar/uploads/Find_BFE_Webinar_Promo.pdf
- XP Solutions, Regulatory Review of 1D/2D hydraulic models, Apr 24, 1-2pm, free, https://www2.gotomeeting.com/register/859781650

Out of state annual conferences:

• Missouri Floodplain and Stormwater Management Association Conference, Tan-Tar-A Resort, April 9th, http://www.mfsma.org



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Important Stuff We Tell You in Every Newsletter...

Save the Dates! 2015 Conference on THURSDAY AND FRIDAY

The 2015 Annual Conference will return to Bloomington-Normal and be held THURSDAY AND FRIDAY, March 12-13, 2015, at the Marriott Bloomington-Normal Hotel and Conference Center. This is a departure from our typical Wednesday and Thursday conference, so please mark your calendar and plan accordingly.

Wanted: Newsletter Ideas and Articles

IAFSM members, this is YOUR newsletter! Email Jennifer Maercklein, editor, at jmaercklein@v3co.com if there are topics that you'd like us to cover. You don't need to write the article - we just want your ideas! If you're gifted with a pen and would like to provide content, we welcome your written contributions as well.

Get Involved with IAFSM!

IAFSM Committee Chairs welcome your help and involvement. See the list of chairs on the last page of this newsletter, or visit the committee webpage to learn more about volunteer opportunities. http://www.illinoisfloods.org/committees.html

Borrow our Water Table

IAFSM has two Watershed Tabletop Models available for all members to check out (free of charge) and bring to Public Works Open Houses, Scout meetings, 4-H meetings, school classrooms, etc. This offers a great opportunity to educate about the dangers and impact of unplanned development and human activity in the floodplain. IAFSM keeps one in Springfield and the other in northeast Illinois. Contact Sarah at IAFSM@illinoisfloods.org to make arrangements.

Next Board Meeting

The next IAFSM Board Meeting will be held on May 14, 2014 at 10:00 a.m. at the City of Ottawa, addressaddress. All members are welcome and encouraged to attend these meetings. See you there!

<u>Jobmart</u>

Visit our Jobmart at http://www.illinoisfloods.org/jobmart.html Jobmart is a free service to members of IAFSM. If you would like to post a position, send complete information to IAFSM@sbcglobal.net.

2014 CFM Exam Schedule

To view 2014 exam dates and register, visit www.illinoisfloods.org/certification.html.







The IAFSM Newsletter is published quarterly for members of the Illinois Association for Floodplain and Stormwater Management. Information and opinions contained herein do not necessarily reflect the views of all members. Items for publication and other editorial matters should be directed to the editor at jmaercklein@v3co.com.

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