

# 4<sup>th</sup> Annual Muskegon River Community Meeting



**March 20, 2014**

# Agenda

**7:00 pm Welcome and introductions (A. Watkins)**

**7:05 pm Overview of previous meetings (A. Watkins)**

**7:15 pm Consumers Energy, Hardy and Croton Dam Operations (B. Schoenlein)**

**7:30 pm Grand Rapids National Weather Service Spring Forecast (M. Walton)**

**7:45 pm What to expect during a Flood (A. Watkins)**

**8:00 pm Mitigation is key (S. Conradson)**

**8:15 pm Goals for the future (A. Watkins)**

**8:30 pm Questions**

**A facilitator will take questions in an organized manner for the panel.**

# Overview of Past Meetings

Abby Watkins, Director  
Newaygo County Emergency Services



# Building Relationships

- **Since July 2013, local officials from Newaygo County have been working with Consumers Energy and the Manistee, Muskegon, Au Sable Coordination Team to identify and evaluate ways to reduce flood risks on the Muskegon River.**



# Past Meetings with the MMAC Team

- **July 25, 2013**
- **October 17, 2013**  
(Local Elected Officials Meeting)
- **October 22, 2013**
- **December 10, 2013**
- **February 7, 2014**



# Key Data Evaluated

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- **Climate and Hydrology Data for the Muskegon River Watershed**
  - Since 1981, maximum rainfall occurs in May.
  - Increased frequency of heavy rainfall events (NOAA Atlas 14).
  - Land use patterns are causing an increase runoff into the watershed
- **Frequency and timing of Flooding Events**
  - Since 1994, there have been 8 flooding events (10 year period). From 1965 – 1994 (29 year period) there were 12 flooding events.
  - 60% of our high water and flooding events occur in March-May
  - Peak flows do not recede until the end of May
- **History of the Hardy Pond Drawdown**
  - Since 1999, the maximum drawdown was 10 feet.
  - On average, the maximum drawdown is 7 feet and occurs in March.



## Points to consider

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- The Hardy and Croton Dams are NOT designed or have the capacity to be flood control structures. However, a minor change in the winter drawdown process may mitigate the impact of flooding.
- Any change to the operations will require an amendment to the Federal Energy Regulatory Commission License for the Dams. This process may take 18 months – 3 years.
- 40% of our high water and flooding events occur outside the March – May timeframe. Homeowners living in the floodplain still need to mitigate their properties to prevent flood damage.



# Croton and Hardy Hydroelectric Projects Operations

Newaygo Muskegon River Community Meeting  
Newaygo, Michigan

The logo for Consumers Energy, featuring the company name in a blue sans-serif font with a green swoosh underline, and the slogan "Count on Us" in a smaller blue font below it.

**Consumers Energy**  
*Count on Us*

# Croton and Hardy FERC License Summary <sup>9</sup>

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- Federal Energy Regulatory Commission (FERC) License
  - Governs Plant Operation and Dam Safety
  - Land Management and Recreation
- Applications for new licenses were filed in December 1991
- The Croton and Hardy licenses were issued on July 15, 1994
- Both licenses have a 40 year duration and will expire on June 30, 2034
- Department of Natural Resources (DNR), United States Forest Service (USFS) and United States Fish and Wildlife Service (USFWS) primary agencies involved in license application review and settlement of issues
- Croton and Hardy are not designed and cannot operate as flood control structures

# Croton Dam License Operating Requirements

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- **Article 401 – Operate Croton in a re-regulation mode**
  - With Hardy at full or minimum pond level, flows from Croton to approximate the inflows from Rogers Dam plus the Little Muskegon River
  - During Hardy drawdown or refill periods Croton is to release the projected daily average flow from Hardy plus the Little Muskegon
  
- **Article 403 –Croton Pond Water Elevation**
  - Maintained at a nominal level of 722.0 feet
  - Determine an operating band for re-regulation operation (a nine inch daily fluctuation is typical)
  - Rates of drawdown and refill for maintenance not to exceed one foot-per 24 hour period

# Hardy Dam License Operating Requirements<sup>14</sup>

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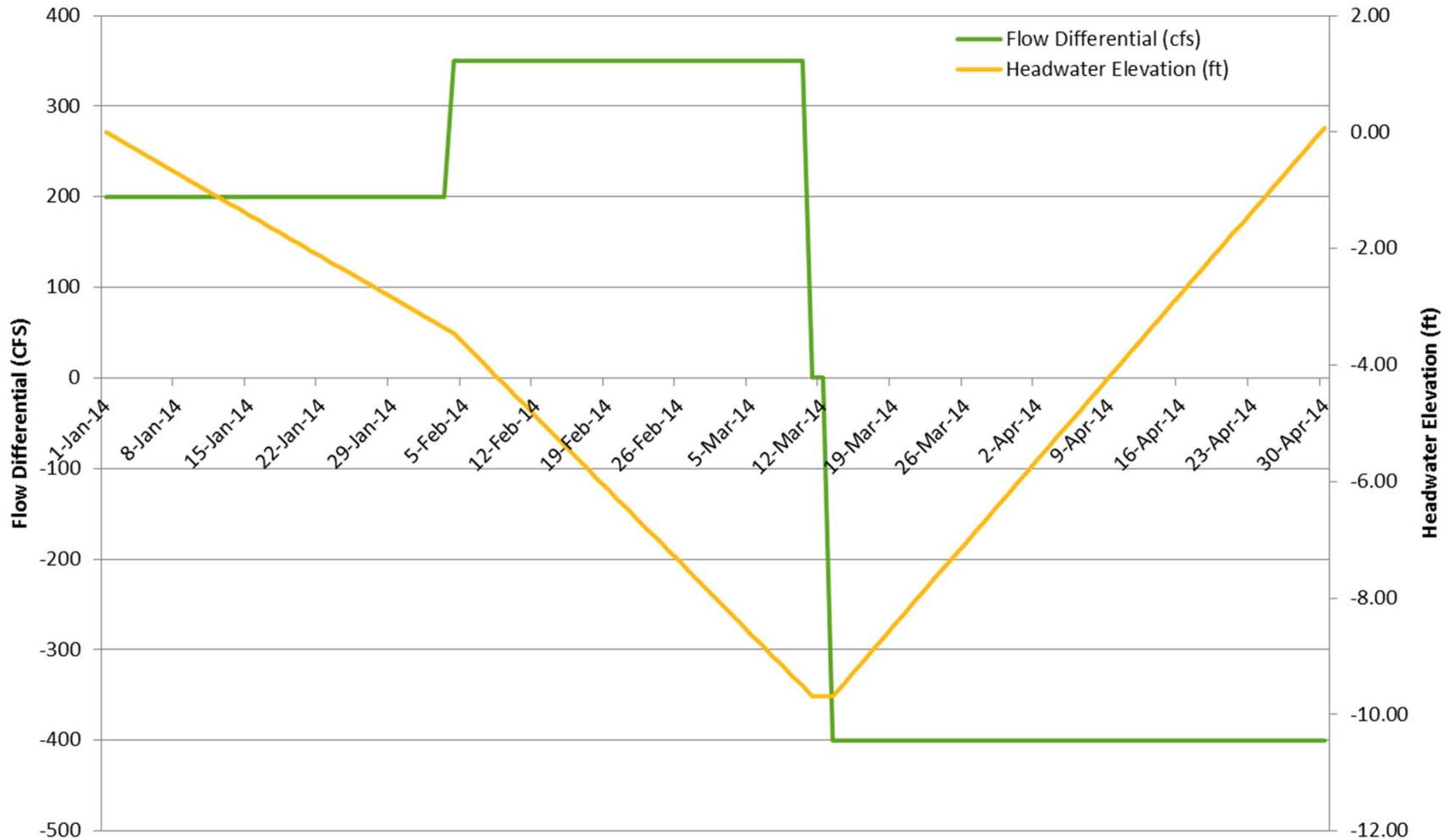
- **Article 401 – Operate Hardy in a peaking mode**
  - Hardy pond maintained within +/- 0.5 feet of the 822.0 feet surface water level on a daily basis (except during drawdown and refill)
  - During Hardy drawdown or refill periods rate of change not to exceed one foot in any 24-hour period
  - Winter drawdown may occur from early January until the end of April, but the Hardy pond must be refilled by May 1
  - Maximum permissible drawdown without Commission approval is 12 feet below 822.0 feet +/- 0.5 feet

# Hardy Dam License Operating Requirements<sup>12</sup>

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- **Article 403 –Hardy Pond Water Elevation**
  - Minimize impacts on aquatic resources upstream and downstream of Hardy of any project maintenance requiring a drawdown of more than 2-feet from 822.0 feet
  - Reservoir water level may be modified for operating emergencies beyond the control of Consumers and for short period of time upon mutual agreement between Consumers and DNR

# Hardy 2014 Drawdown Schedule



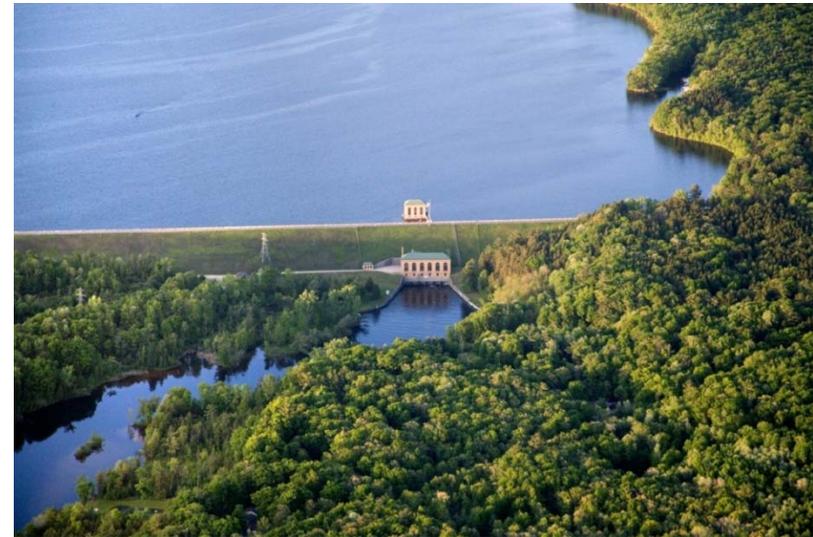
# 2014 Hardy Drawdown

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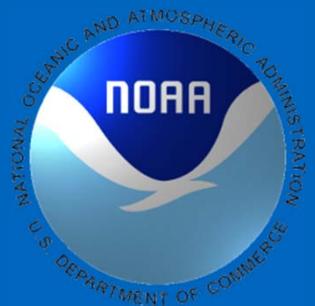
- Consumers works cooperatively with the NWS to determine a drawdown target based on conditions
  - 2014 drawdown target has been increased based on initial snow survey information
- Consumers will be adding a precipitation gauge at Croton to better understand local precipitation and contribution of the Little Muskegon River

# Newaygo Muskegon River Community Meeting<sup>15</sup>



# Spring Flood Forecast

**Mark Walton, Hydrologist  
Grand Rapids National Weather Service**





# Flood Safety Awareness Week March 16-22, 2014



[www.floodsafety.noaa.gov](http://www.floodsafety.noaa.gov)

[www.floodsmart.gov](http://www.floodsmart.gov)

Flood Safety Awareness Week is March 16-22! [More information...](#)

- Flood Safety
- Flood Warning vs. Watch
- Before a Flood
- During a Flood
- After a Flood



Flood waters reach mailbox height in a neighborhood along the Red River in Minnesota. (photo credit: FEMA)



- Flooding Resources**
- Flood Safety
  - Turn Around Don't Drown
  - Flood/Safety Awareness Week
  - State Flood Information
  - Flood Hazards
  - NWS Flood Products
  - Forecasts and Observations
  - Education and Outreach Materials
  - Partner Agencies

Flooding is a coast to coast threat to the United States and its territories nearly every day of the year. This page is designed to teach you how to stay safe in a flood event. If you know what to do before, during, and after a flood you can increase your chances of survival. Here you will find an interactive flood map, information describing the different types of flooding, educational material, and resources on how the National Weather Service keeps you aware of potentially dangerous flooding situations.



Call toll free: 1-888-379-9531 or have us call you

Search FloodSmart.gov 601

- HOME
- FLOODING & FLOOD RISKS
- ABOUT THE NATIONAL FLOOD INSURANCE PROGRAM
- RESIDENTIAL COVERAGE
- COMMERCIAL COVERAGE
- PREPARATION & RECOVERY
- RESOURCES
  - > Agent Site
  - > Agent Locator
  - > Biggert-Waters Reform Act of 2012
  - > Community Rating System
  - > Community Resources
  - > File Your Claim
  - > Frequently Asked Questions
  - > Glossary
  - > Flood Facts
  - > Media Resources
  - > Toolkits
  - > Email Updates

## Winter Rainy Season Is Here. Are You Ready?

Heavy rains during the winter months can cause catastrophic flooding in many areas of the country.

[LEARN MORE](#)

Winter Rainy Season BW-12 New Flood Maps Video Testimonials

### LATEST NEWS

Learn more about how properties and policies might be affected by the Biggert-Waters Flood Insurance Reform Act of 2012.

Find out more about the Preferred Risk Policy Eligibility Extension. [Learn More](#)

Typically, there is a 30-day waiting period on new flood insurance policies.

### GET COVERAGE FOR AS LOW AS \$129 PER YEAR

Find out about our Preferred Risk Policy for homes in moderate-to-low risk areas.

[LEARN MORE](#)

### WHAT COULD FLOODING COST ME?

This interactive tool shows the cost of a flood to your home, inch-by-inch.

[LEARN MORE](#)

### One-Step Flood Risk Profile

#### HOW CAN I GET COVERED?

- Rate your risk
- Estimate your premiums
- Find an agent

Address:



# Latest Flood Outlook – March 20



## **Despite a Couple of Mostly Helpful Weather Weeks Risk for River Flooding Remains Much Higher Than Usual**

Despite some slow melting of Snow and Ice recently  
We are still primed for an Active Flood Season the next Month or so

We Need to Continue to Avoid Rapid Melting and Heavy Rain

## **We continue a general 40-90% Risk for River Flooding Typical Year we have a 5-20% Risk**

A higher risk for flooding does not mean we are predicting record flooding  
Some flooding is likely, we are not here to say widespread significant flooding is certain



# Ice Jam Potential

We Are Seeing More Open Water on Rivers, Streams  
No Ice = No Ice Jam Risk

- Losing Ice does not remove flood threat for the spring, just eliminates ice jamming
- Great Lakes could prevent the escape of any flowing river ice - Offshore winds help by pushing ice to midlake and may open channels
- Breakup or movement of ice means jamming and flooding could develop quickly...ice jams on rivers can result in unpredictable rapid rises in rivers
- Please Share with the NWS immediately if you see ice breakup or movement
- Fast moving water combined with ice poses a very serious threat to rescue operations and first responders



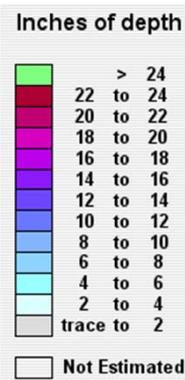
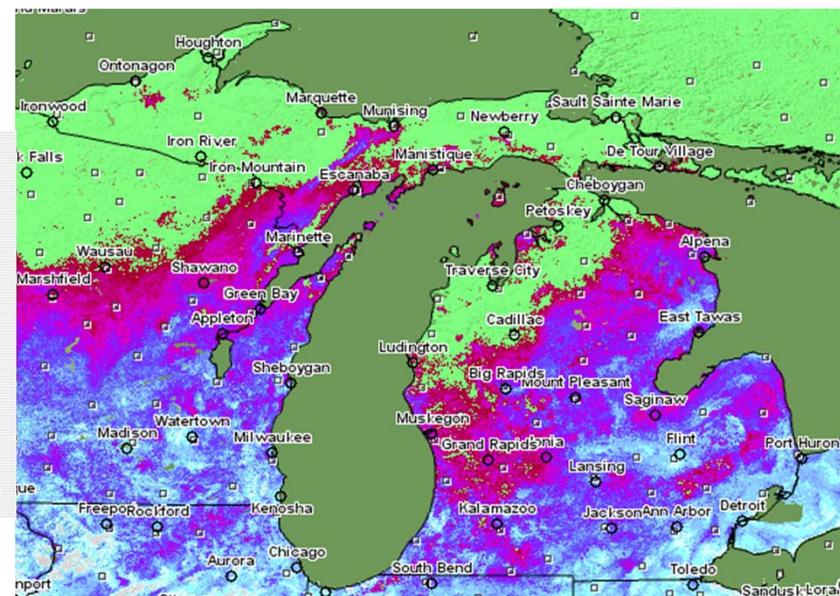
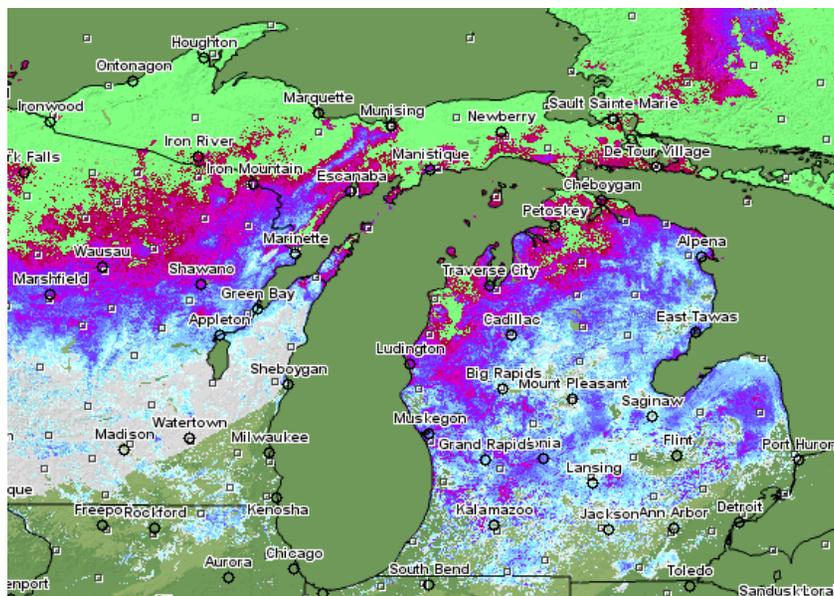
# Snow Pack

## Some Changes from Last Month - Still High

Modeled Snow Depth

March 19, 2014

February 25, 2014





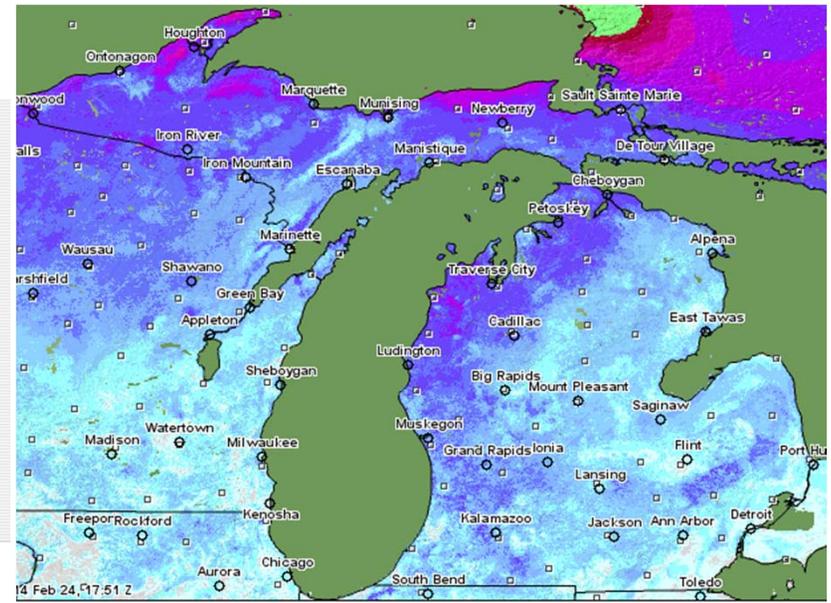
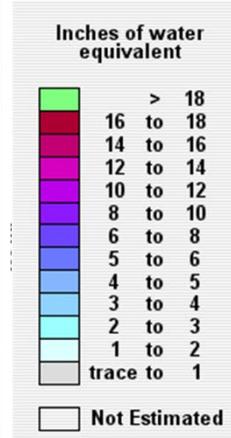
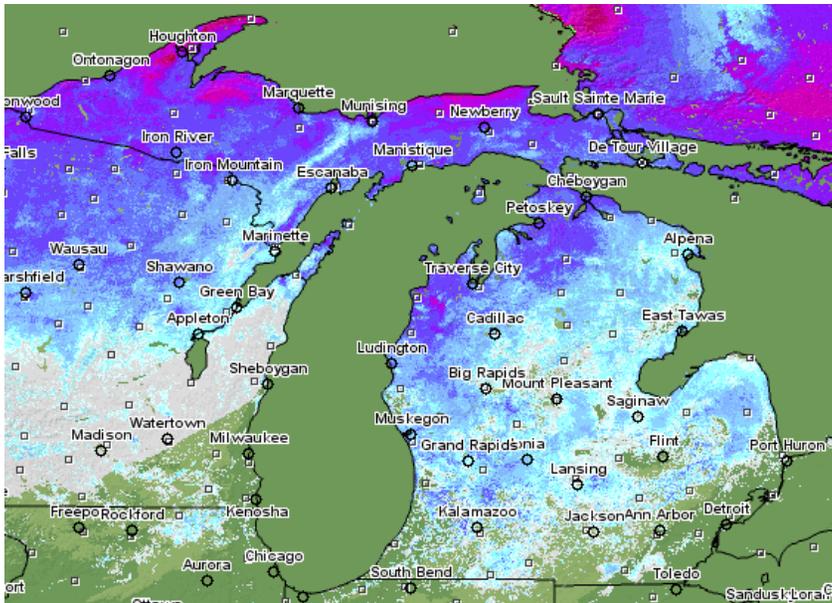
# Water in the Snow Pack

## Some Changes from Last Month - Still High

Modeled Snow Water Equivalent

March 19, 2014

February 25, 2014





# Outlook for the Next Two Weeks



## Transition to Warmer and Wetter Weather Should Start to Occur Very Soon

Very Few Days Expected with Average Temperature Below 20 degrees  
Meaning ice on rivers should not typically grow in depth

### Rain/Snow March 18-20

Around one-half inch of rain or less - Will Add to River Levels, Snow Pack  
Not expected to cause significant issues at this time - some minor flooding possible  
Greatest Rain Amounts Expected: Southern Lower Michigan

### Additional Rainfall the Next Two Weeks Looks Minimal

Some Additional Precipitation Fri-Sat and Mon-Wed next week

**Snowpack Will Absorb Very Little Water  
Ground Will Absorb Some - But Not Much**



# New Forecast Services for Newaygo County



- All weather precipitation gage being installed at the USGS Croton river gaging station
- Inflow forecasts updated daily will now be provided for the Muskegon River at Ewart and the Little Muskegon River near Oak Grove
- Inflow forecasts will be issued daily by the National Weather Service under the River and Lake Summary Product



# Product Example

FGUS53 KGRR 011407  
RVDGRR  
MIC081-133-021607-  
DAILY RIVER AND LAKE SUMMARY  
NATIONAL WEATHER SERVICE GRAND RAPIDS MI  
1007 AM EDT TUE APR 1 2014

THESE RIVER INFLOW FORECASTS INCLUDE EXPECTED PRECIPITATION DURING  
THE 24 HOUR PERIOD ENDING 8 AM WEDNESDAY MORNING.  
RIVER INFLOW FORECASTS ARE IN CUBIC FEET PER SECOND.

.B GRR 0401 DC040110 DH12/HG/DRH+24/QIIF/DRH+48/QIIF  
.B1 /DRH+72/QIIF/DRH+96/QIIF/DRH+120/QIIF/PPDFN  
:  
: STATION                    8AM INFLOW FORECAST IN CFS    QPF  
: ID        NAME                WED THU FRI SAT SUN        24-HR  
:  
: MUSKEGON RIVER  
EVRM4 :EVART                    10100/ 10200/ 10300/ 10400/ 10500/    0.24  
: LITTLE MUSKEGON RIVER  
OKGM4 :OAK GROVE                2000/ 2100/ 2200/ 2300/ 2400/    0.26  
.END

CFS = CUBIC FEET PER SECOND  
QPF 24-HR = FORECAST AVERAGE RAINFALL IN INCHES OVER THE BASIN FOR  
THE NEXT 24 HOURS... FROM 8 AM TODAY TO 8 AM TOMORROW.

ADDITIONAL WEATHER AND RIVER INFORMATION CAN BE FOUND ON OUR HOMEPAGE  
AT [WWW.WEATHER.GOV/GRR](http://WWW.WEATHER.GOV/GRR).

THE LAST ROUTINE DAILY RIVER INFLOW FORECAST FOR THE SEASON FOR THE ABOVE  
FORECAST POINTS WILL BE ISSUED NOVEMBER 30TH. RIVER FORECASTS FROM  
DECEMBER THROUGH MARCH WILL BE ISSUED ON AN AS NEEDED BASIS. ROUTINE  
DAILY RIVER INFLOW FORECASTS FOR THE ABOVE POINTS WILL RESUME APRIL 1ST OF  
NEXT YEAR.

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WALTON

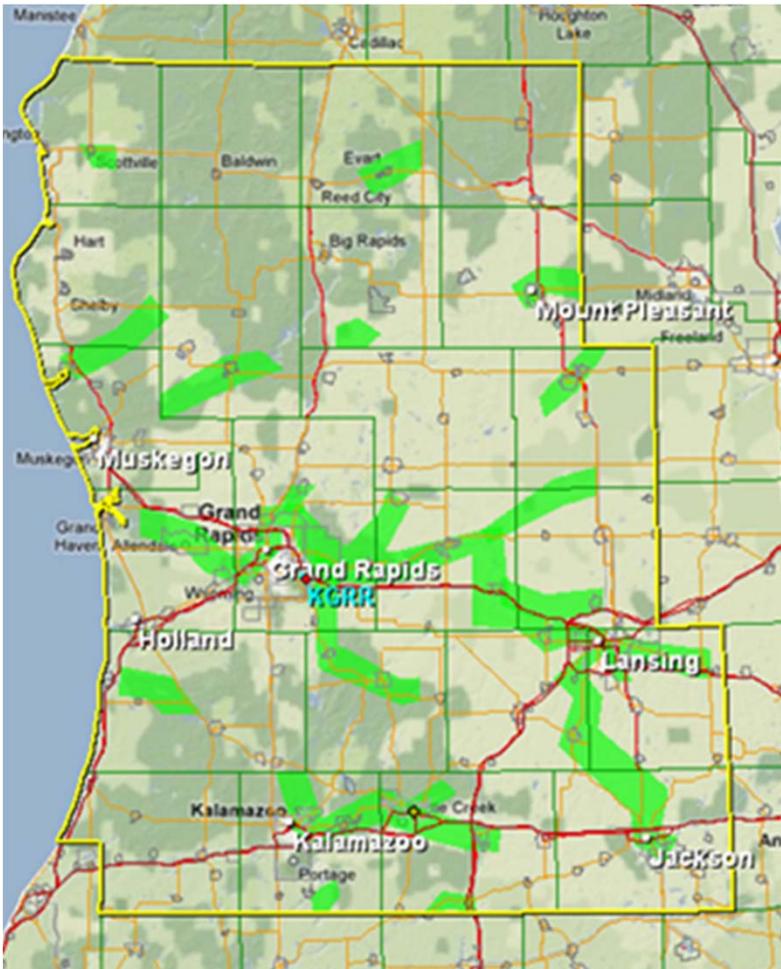


# If River Flood Warnings Are Issued



## Some Changes in Warning Maps for Michigan this Spring

### Example of River Flood Warnings



- More Specific Mapping Than Before
  - Focus Closer to Rivers
  - No Longer Light Up Entire County
- Does Not Mean Entire Area Will Flood
  - Not Inundation Maps
- County Names Still Listed
- Warning Information Same As Before
  - Current Stage
  - Forecast Crest and Time
  - Typical Impacts Listed

**Flood Advisories Will Still Light up entire county**



# Flood Terminology

## Major Flooding

Extensive Inundation - Road, Structure, Communities  
Evacuations  
Movement of Property to Higher Elevations

## Moderate Flooding

Some Inundation - Road, Structure, Communities  
Possible Evacuations  
Movement of Property to Higher Elevations

## Minor Flooding

Minimal Property Damage,  
Public Inconvenience



# Best Case Scenarios



## Would Help Lessen Flood Threat If...

- We continue to see cool temperatures with plenty of sunshine
- Slow Snow Melt with no rain - Gradual Warming with periods Below Freezing
- Spaced Out Smaller Rainfall Events - Allowing Drainage to Occur
- Rivers being free and clear of ice before any big rain event or rapid melting
- Frost leaves the ground



# Worst Case Scenarios



## Would Increase Flood Threat If...

- Significant Additional Wet Snow Events Occur
- Quick Change from Cold to Very Warm and Wet Pattern
- Significant Intense Rainfall Happening at Once or Multiple Times (like April 2013)
- Heavy Rainfall Occurs Across Entire Basins - especially the Headwaters
- Rapid Snow Melt - Long Time Well Above Freezing with Very Warm Days (50+)
- Combination of Lots of Rainfall and Rapid Snow Melt before Ice is off the Rivers
- Quick Breakage and Release of thick River Ice



# Monitoring the Latest Flood Risk

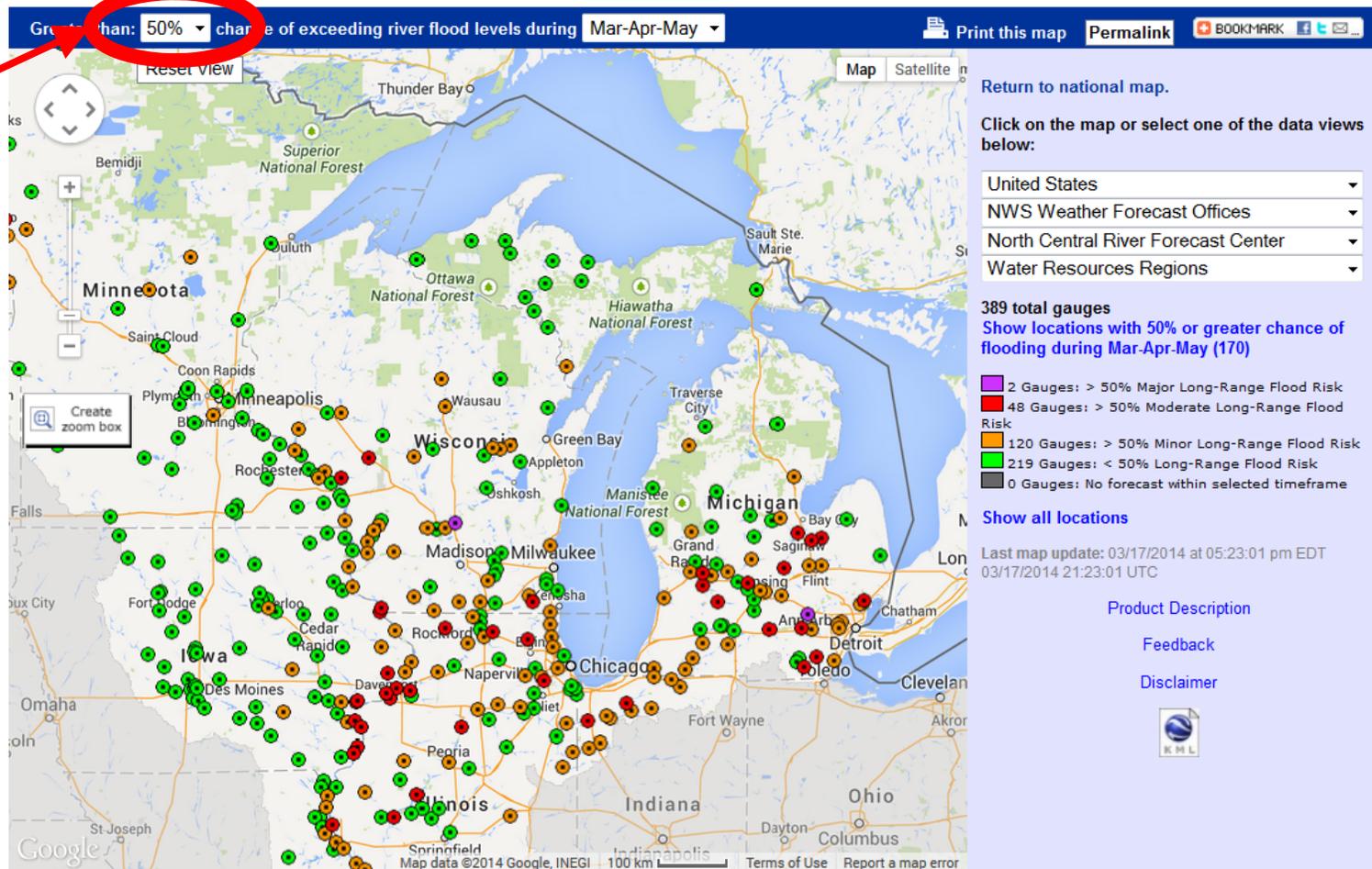


## Map Detailing 50% Chance of Exceeding Flood Stage

<http://go.usa.gov/BFT4>

Can see other percentages

Including...  
25%, 75%, 95%



# What to expect during a Flood

Abby Watkins, Director  
Newaygo County Emergency Services



# Stay Informed



- NOAA Weather Radio

- Will alert you to official advisories, watches, and warnings



- Facebook

- NewaygoES



- Email

- Muskegon River Notification Distribution List

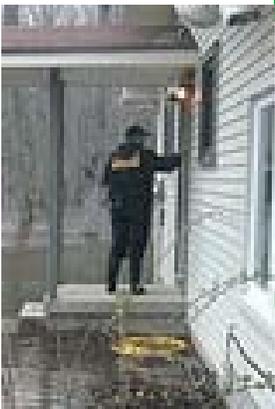
- Citywatch Alert and Notification System

- Automated phone system for home phones



- Door to Door Notification

- Community Emergency Response Team (CERT)
- Emergency First Responders



# Recognize Changing Conditions

- [http://water.usgs.gov/wateralert/subscribe2.html?site\\_no=04121970&type\\_cd=sw](http://water.usgs.gov/wateralert/subscribe2.html?site_no=04121970&type_cd=sw)



## Subscription Form

The U.S. Geological Survey WaterAlert service sends e-mail or text (SMS) messages when [certain parameters](#), as measured by a USGS real-time data-collection station, exceed user-definable thresholds. The development and maintenance of the WaterAlert system is supported by the USGS and its partners, including numerous federal, state, and local agencies.

Real-time data from USGS gages are transmitted via satellite or other telemetry to USGS offices at various intervals; in most cases, 1 to 4 times per hour. Emergency transmissions, such as during floods, may be more frequent. *Notifications will be based on the data received at these site-dependent intervals.*

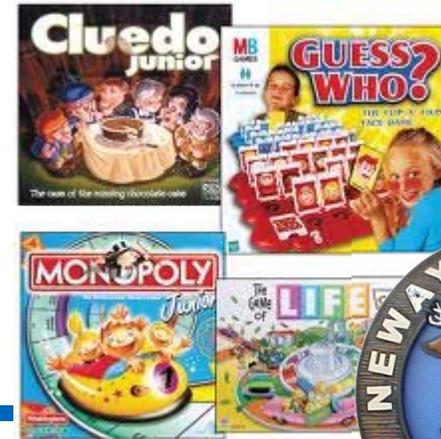
<b>Site Info:</b>		
Site Number:	04121970	
Site Name:	MUSKEGON RIVER NEAR CROTON MI	
Agency:	USGS	
Transaction ID:	H2CZ8	
<b>Send Notification To:</b>	<a href="#">about this...</a>	
<input type="radio"/> My mobile phone		
<input type="radio"/> My email address		
<b>Notification Frequency:</b>	<a href="#">about this...</a>	
Hourly	<input type="radio"/>	
Daily	<input checked="" type="radio"/>	
<b>Streamflow Parameter(s):</b>	<a href="#">about this...</a>	Recent value:
Discharge, DD1 (cfs)	<input checked="" type="radio"/>	1960 <a href="#">[peak chart]</a>
Gage height, DD2 (ft)	<input type="radio"/>	5.64 <a href="#">[peak chart]</a>
<b>Threshold Condition:</b>	<a href="#">about this...</a>	
<input checked="" type="radio"/> Greater than (>)		
<input type="radio"/> Less than (<)		
<input type="radio"/> Outside a range (< or >)		
<input type="radio"/> Inside a range (> and <)		

Real-time value is greater than:  cfs

I have read and acknowledge the [Provisional Data Statement](#) and [Disclaimer](#).



# Disaster Supply Kit



# When to Evacuate

- **Access**
  - Maintain an emergency evacuation route
- **Septic System**
  - If you have an on-site septic system and the soil is saturated, your septic system will not work.
- **Fresh Water**
  - If the well head is submerged or has standing water around it for more than one day, assume that it is contaminated.
- **Electricity**
  - Emergency Officials will cut power to the area if electrical circuits are compromised.



# Steps to Evacuate

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- **Collect only essential items to take with you including prescription medications**
  - **Close and lock all doors and windows**
  - **Turn off your power breaker and propane tanks**
  - **Take all family members and pets with you.**
  - **If you have transportation, offer assistance to your neighbors if they have no transportation.**
  - **Follow recommended evacuation routes. Do not take shortcuts, they may be blocked.**
  - **Be alert for washed out roads and bridges. Do not drive into water covering the road or flooded areas and stay away from downed power lines.**
  - **Continue monitoring your radio for additional information.**
  - **Call 9-1-1 to report a life threatening condition.**
-

# Closure of ALL Public River Access Sites

36

- **9.0 Feet – Advisory**
  - Due to unsafe conditions, all persons are advised to remain off the water until the flood warning had been lifted.
- **10.0 Feet – CLOSED**
  - Use of this property will be prohibited. Violations of this order shall be enforced under MCL 750.552 (Trespass).



# Closure of Bridges

- **At 12.0 Feet the Bridge Street Bridge in Newaygo and Maple Island Bridge in Bridgeton Township will be closed.**



# Damage Assessment

- An organized system to determine the nature and the scope of an event, circumstance or incident by measuring the amount of the suffering and harm done to the community.
- Teams document damage through pictures, videos, gps data, etc.
- Data helps determine if State or Federal Assistance may be available under a Disaster Declaration.



# Damage Classification

What are we looking for?

Damage Classification	Currently Habitable / Useable?	Approximate % of Damage	Flood Depth: Single / Multi-Family Home	Flood Depth: Mobile Home	Flood Duration: 1 Day or Less, Consider This Classification	Flood Duration: >1 Day, Consider This Classification
0 – Affected	Yes	Mostly cosmetic	B = <1 ft in basement NB = minor access problems	Minor access problems	0 – Affected	0 – Affected
1 – Minor Damage	No	Less than 50%	B = <8 ft in basement NB = <2 ft on 1 <sup>st</sup> floor	Flooded utilities / piers	1 – Minor Damage	2 – Major Damage
2 – Major Damage	No	50% or more	B = structural damage NB = 2+ ft on 1 <sup>st</sup> floor	Bottom board soaked / home shifted on piers	2 – Major Damage	3 – Destroyed
3 – Destroyed	No	100%	B = 2+ ft on 1 <sup>st</sup> floor for more than 1 day	Water above floor level / unit swept from foundation	2 – Major Damage	3 – Destroyed



# The Cost of Flooding



## Measure Your Damage

All it takes is a few inches of water to cause major damage to your home and its contents. This interactive tool shows you what a flood to your home could cost, inch by inch.

**LAUNCH THE COST OF FLOODING**

### The Cost Of Flooding

Embed This

**6 inch flood**

Stereo - etc.	\$80
Washer/Dryer	\$80
Accent Furniture & Accessories	\$250
Loss of Personal Items	\$350

**Total Losses \$20,150**  
1,000 Square Foot Home

[See 2,000 Square Feet](#)

[FIND AN AGENT](#)

Estimates are for illustrative purposes only and should not be used to estimate any actual flood loss. A flood certified insurance adjuster making a room-by-room item-by-item, detailed estimate of covered flood damage is the only estimating method approved by and acceptable to the National Flood Insurance Program. These estimated costs are based on an average U.S. home of 1,000 and 2,000 square feet, built on a slab and with typical household items. Costs vary from State to State and home to home.



### The Cost Of Flooding

Embed This

**1 foot flood**

Stereo - etc.	\$150
Washer/Dryer	\$500
Accent Furniture & Accessories	\$250
Loss of Personal Items	\$1,300

**Total Losses \$27,150**  
1,000 Square Foot Home

[See 2,000 Square Feet](#)

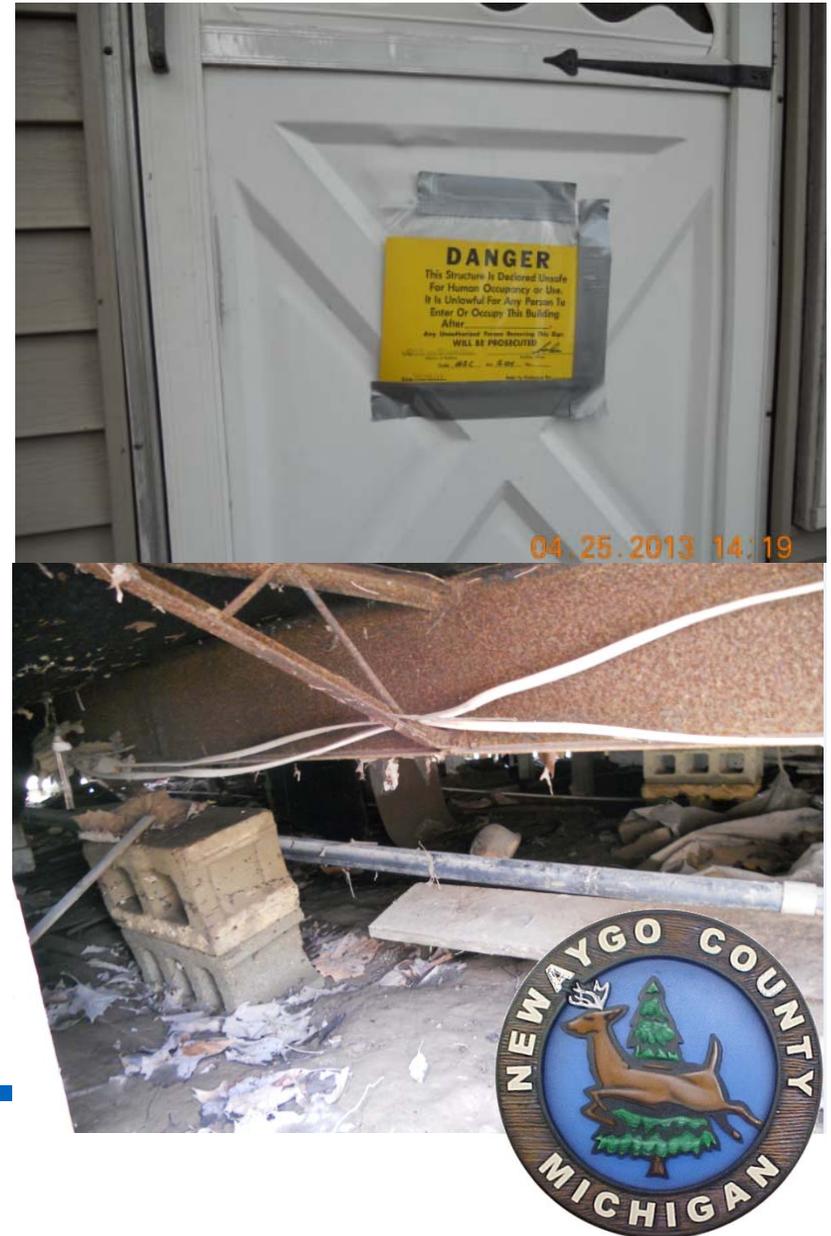
[FIND AN AGENT](#)

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# Posted Homes

- In coordination with the Building Inspector, your home may be declared unsafe to re-enter.
- You may need an electrical plumbing, mechanical or home inspection prior to re-entering your home.
- Please adhere to these postings, as they are for your safety.



# Flood Mitigation

**Sue Conradson, Floodplain / NFIP  
MI Department of Environmental Quality  
Cadillac and Gaylord District**



# Mitigation

- Any cost effective action taken to eliminate or reduce the long-term risk to life and property from natural and technological hazards.



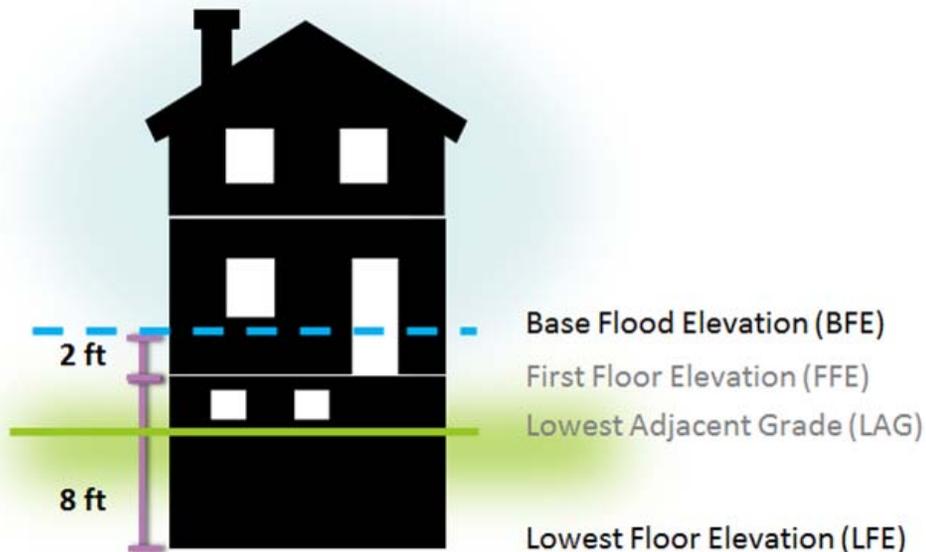
# Mitigation Options or Floodproofing

	Cost	Potential Decrease Flood Insurance	Potential Improved Marketability	Adverse Impact on Other Property	Potential Catastrophic Damage if Exceeded
Elevation on Foundation	\$\$	Y	Y	N	N
Elevation on Fill	\$\$	Y	Y	Y	N
Buyout/Acquisition	\$	Y	N	N	N
Structure Relocation	\$\$\$	Y	Y	N	N
Floodwall	\$\$	N	Y	Y	Y
Dry Floodproofing (Res/Comm)	\$	N	N/Y	N	Y
Elevate Utilities/Equip	\$	Y	Y	N	N
Flood Resistant Materials	\$	N	Y	N	N
Flood Vents	\$	N	Y	N	N
Fill Basement	\$\$	Y	Y	N	N



# Elevation

- Living area is a minimum of 1 foot above the 500 year flood level.
- Elevation may involve 1) lifting the house and building a new, or extending the existing foundation below it or 2) leaving the house in place and either building an elevated floor within the house or adding a new upper story.



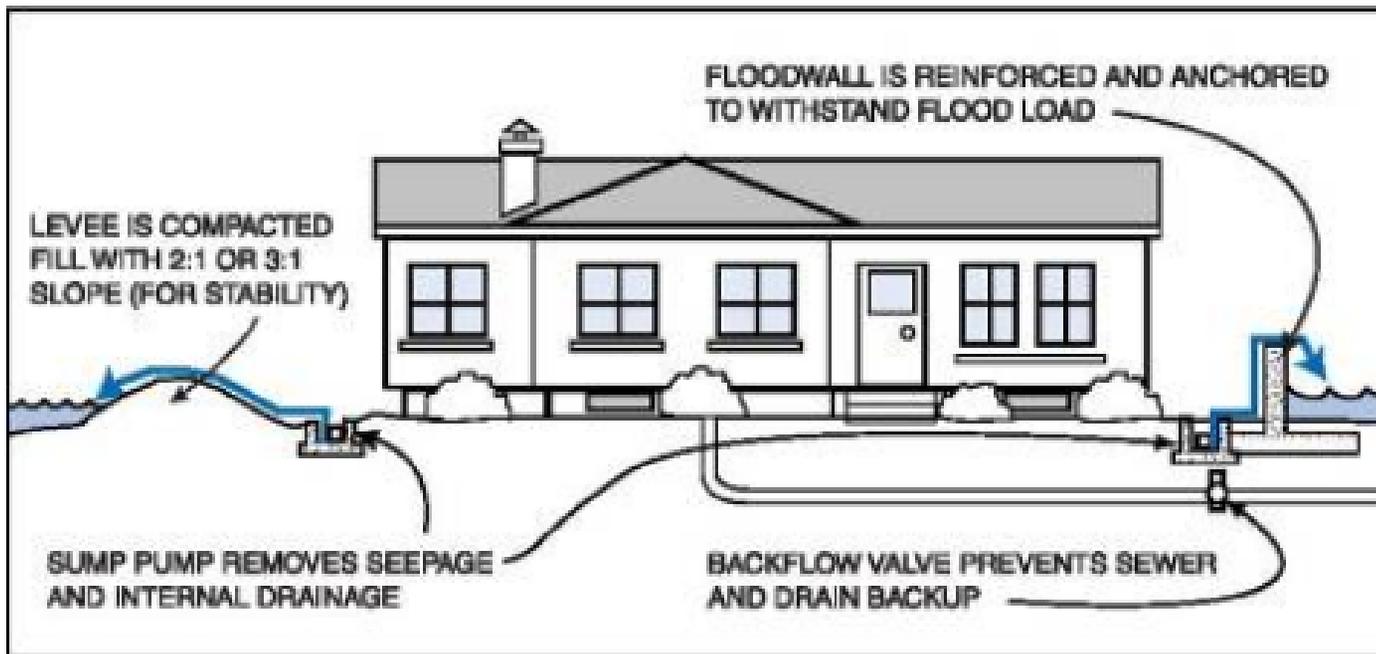
# Voluntary Buyout

- Local community (Townships) identifies willing sellers, conducts appraisals, purchases properties, and takes title. After a home is purchased, it is demolished or relocated and the land is cleared. The land must remain forever as public, open space.



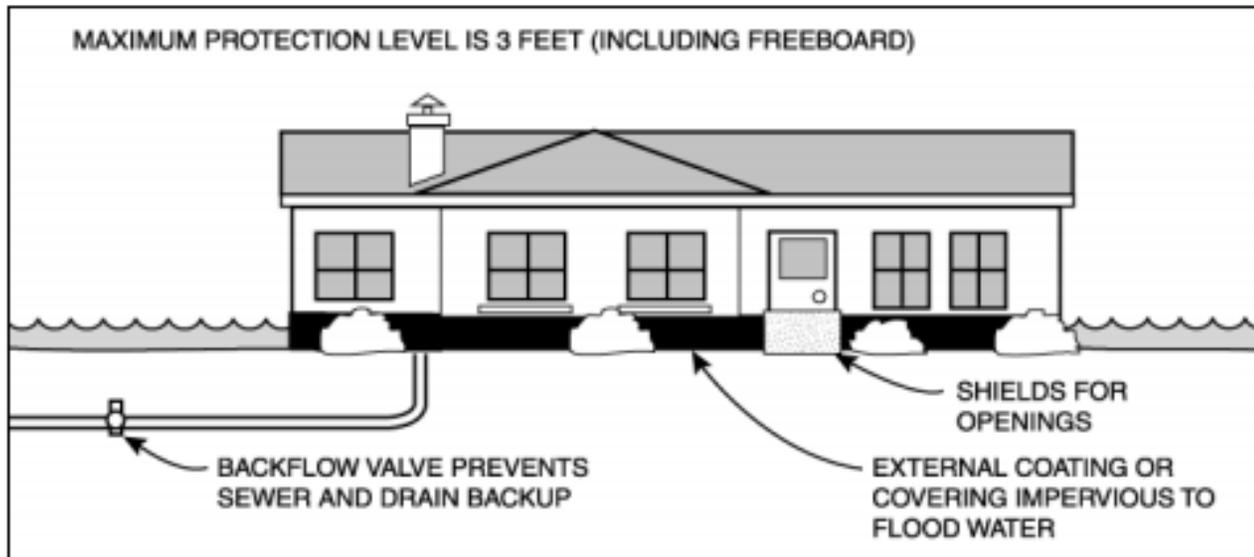
# Barriers

- Levees and floodwalls are types of flood protection barriers.
  - A Levee is typically a compacted earthen structure.
  - A floodwall is an engineered structure usually built of concrete, masonry, or a combination of both.



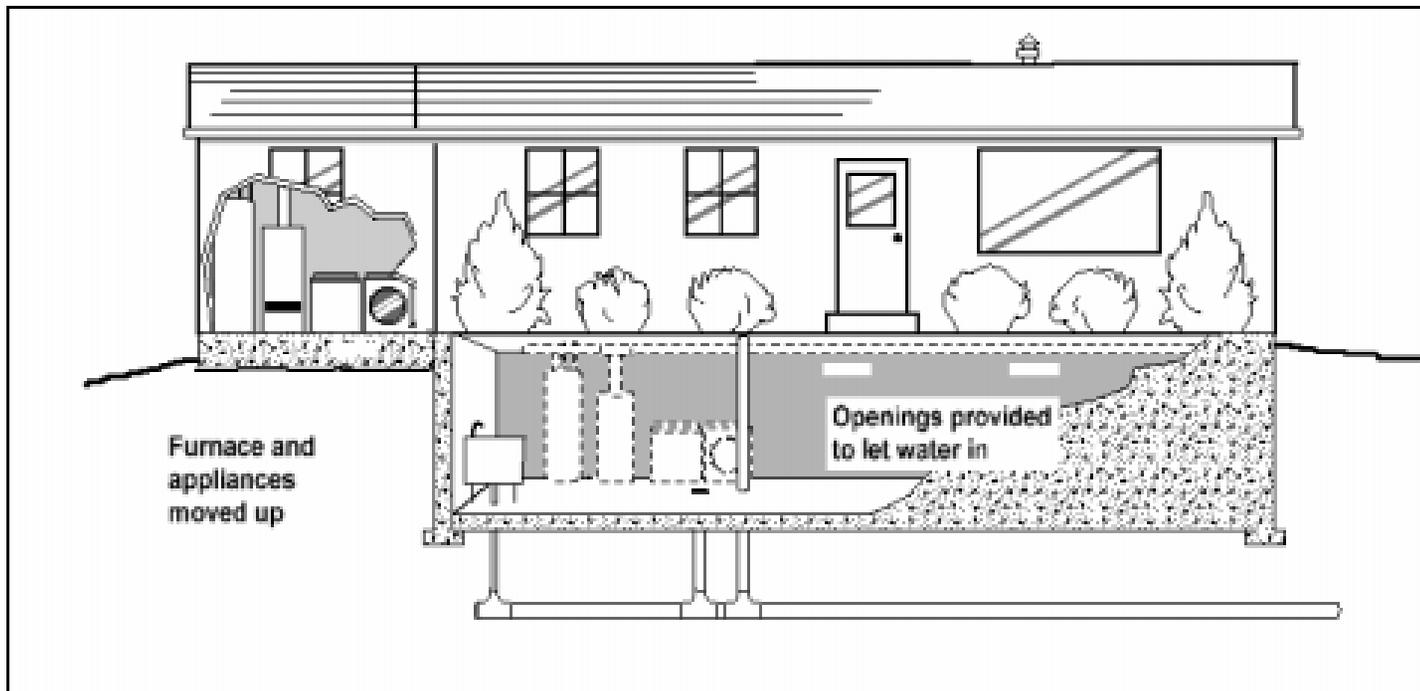
# Dry Floodproofing

- A dry floodproofed structure is made watertight below the level that needs flood protection to prevent floodwaters from entering.
- Making the structure watertight requires sealing the walls with waterproof coatings, impermeable membranes, or a supplemental layer of masonry or concrete.



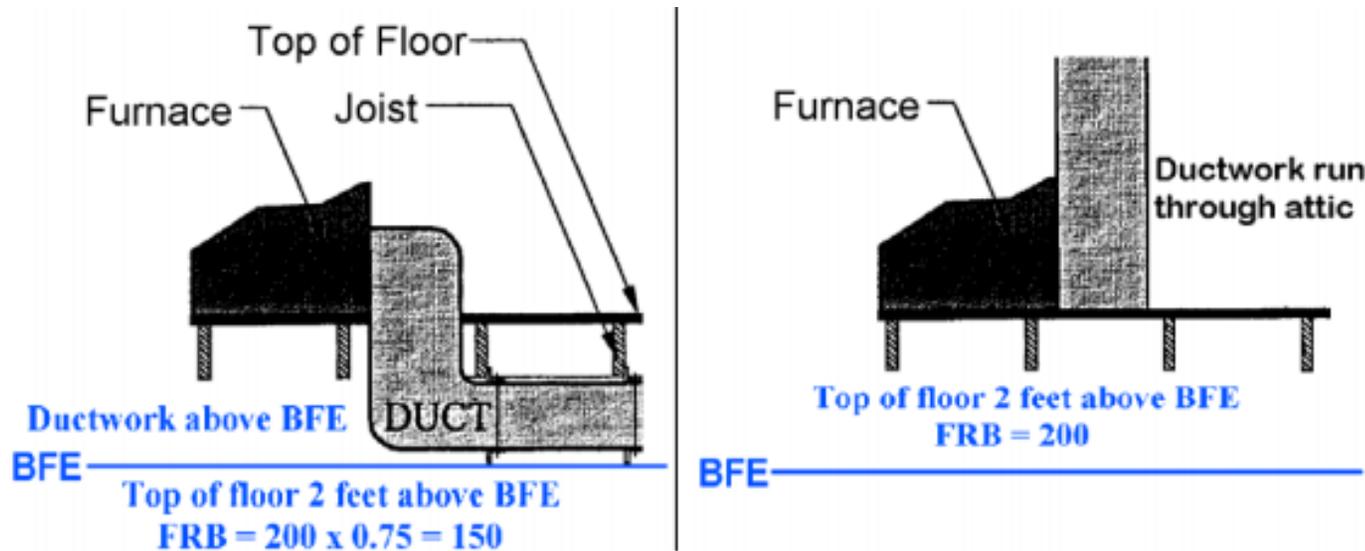
# Wet Floodproofing and Vents

- Making uninhabited portions of the structure resistant to flood damage and allowing water to enter during flooding.
- Damage to a structure is reduced since water is allowed to enter and balances the hydrostatic pressure on both sides of the walls and floors.



# Elevate Utilities and Equipment

- Electrical, Heating, ventilation, plumbing, and air conditioning equipment and other service facilities are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.



# Which Mitigation Option is right for you?

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## FEMA Publication 551 “*Selecting Appropriate Mitigation Measures for Floodprone Structures*” **Technical Considerations Scorecard**

- **Determine your flood risk**
- **Identify if you are in the Floodway or Floodplain**
- **Obtain an Elevation Certificate**
- **Assess your home**
  - Type of structure (Stick, Masonry, Manufactured, etc)
  - Condition of structure (Good, Fair, Poor)
  - Foundation type (Slab, Basement/split level, piers, post, columns, crawl)
  - Number of stories
  - Size of Home
  - Flood protection depth



# National Flood Insurance Program



Call toll free: **1-888-379-9531** or **have us call you**

## HOME

### FLOODING & FLOOD RISKS

### ABOUT THE NATIONAL FLOOD INSURANCE PROGRAM

### RESIDENTIAL COVERAGE

### COMMERCIAL COVERAGE

### PREPARATION & RECOVERY

## RESOURCES

- > Agent Site
- > Agent Locator
- > Biggert-Waters Reform Act of 2012
- > Community Rating System
- > Community Resources
- > File Your Claim
- > Frequently Asked Questions
- > Glossary
- > Flood Facts
- > Media Resources
- > Toolkits
- > Email Updates

# Winter Rainy Season Is Here. Are You Ready?

Heavy rains during the winter months can cause catastrophic flooding in many areas of the country.

[LEARN MORE](#)

[Winter Rainy Season](#)   [BW-12](#)   [New Flood Maps](#)   [Video Testimonials](#)

## LATEST NEWS

Flood Safety Awareness Week starts March 16. Find information and tips [here](#).



### One-Step Flood Risk Profile

## HOW CAN I GET COVERED?

- Rate your risk
- Estimate your premiums
- Find an agent

Address:

City:

# Goals Moving Forward

Abby Watkins, Director  
Newaygo County Emergency Services



# Work toward amending the FERC License

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- The Hardy and Croton Dams are not built for flood control, however, our analysis indicates that a minor change in winter draw down process may mitigate the impact of flooding to downstream property owners and public infrastructure.
- **On March 13, 2014 a letter from Newaygo County was submitted to FERC summarizing discussions with MMAC and initial findings.**
  - Build flexibility into the water level management of the Hardy and Croton Ponds to enhance water storage during spring runoff events.



- Target is to extend the winter drawdown until May 15<sup>th</sup>.
- Consideration to be given to a seasonal drawdown of the Croton Pond
  - Identify what formal studies have already been conducted and what studies need to be obtained to evaluate environmental and economic impacts.

Draft March, 14, 2008

## Muskegon Futures: Mega Model Forecasting

Muskegon Watershed Research Partnership Volume One

**Overview: The Muskegon Watershed Research Partnership**

In June of 2002, approximately 36 researchers in the field of ecosystem analysis and watershed management met with 50 stakeholders, members of public/private organizations, and government officials and over a four day period participated in a workshop specifically convened to consider the current health and future sustainability of the Muskegon River Watershed. During this time, the attendees broadly laid out on the table what they currently knew about the Muskegon River system, identified gaps in the existing knowledge, agreed on current priorities, and set the agenda for the workshop's second phase. Following four days of intensive discussion, the final Muskegon River Watershed Research Summit came to a close, and a comprehensive action plan began to emerge. Many of those attending the pivotal meeting came away with specific ideas about how they might contribute to a better understanding of these issues that are, or will soon become, a priority in the Muskegon River Watershed.

Working together, stakeholders and researchers agreed, advised, and for the end of the June 2002 Summit had proposed several new large multi-agency research projects. The Muskegon Watershed Research Partnership was born. The Water Foundation stepped up to support the acquisition of the Muskegon River Watershed.

**The Muskegon River Watershed**

At 212 miles long, the Muskegon River is the second longest river in Michigan. The drainage basin encompasses 6,098.5 km<sup>2</sup> and contains 123 Major Civil Ditchlines (MCD). The drainage basin is slightly smaller than the entire state of Delaware. Headwaters of the Muskegon and AuSable Rivers flow into the river. River flow eventually becomes Muskegon Lake, which runs along the Lake Michigan shoreline for a distance of 100 miles. The river discharges a total of 575 feet from the headwaters to Lake Michigan and has approximately 94 tributaries that flow into it. The Indian name "Muskegon" refers to the lower river's extensive open wetlands, "the river of grasses".



## Muskegon Futures: Climate Change

Muskegon Watershed Research Partnership Bulletin 7

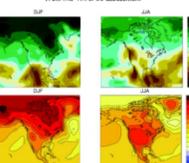
**Michigan's Weather is Changing**

It is hard to imagine that the Muskegon River Watershed (MRW) could experience a more dramatic transformation than the massive harvesting of its forests between the 1850s and the turn of the 20<sup>th</sup> century. Yet Muskegon Watershed Research Partnership (MWWRP) projections suggest that the next century will see a greater ecological upheaval than this last. As described in earlier bulletins and management decisions we make today have significant effects on the future of the Muskegon River ecosystem. But, changes in land management are not the only kind of change the watershed is going to experience during coming decades. It is now clear that climate around the world and in Michigan is changing at an extraordinarily rapid pace.

How will climate change affect the ecology of the Muskegon River? Will it impact our key fisheries? Will it alter the water quality in our rivers and lakes? Risk the investments of riparian owners? In this bulletin we report the first comprehensive evaluation of likely effects of climate change on a Michigan River ecosystem. The projected ecological and economic consequences of a shifting future climate are sobering. And they are consequential enough to make long-term planning for the Muskegon River watershed's successful adaptation to climate change an important basin-wide priority.

**Scenario Modeling Methods**

Six years ago, representatives from 13 Muskegon watershed organizations and government agencies operating in the MRW met with MWWRP scientists to discuss what management issues should be explored with the developing MWWRP Muskegon River Ecological Modeling System (MEMS or Mega Model). Together the group decided to evaluate a number of future land management options ranging from reducing rates of urbanization to increasing rates forest expansion along their corridor. Ten different future landscape scenarios for the period 2010-2050 and ten historical (1830-1970) landscapes have been evaluated using Mega Model estimates of hydrology, temperature, main stem hydro-




NOAA Atlas 14

## Precipitation-Frequency Atlas of the United States

Volume 8 Version 2.0: Midwestern States  
(Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin)

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekel, Geoffrey Bonnin



# Work with homeowners to mitigate properties

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- When you live in a floodplain and or floodway, the only way to lessen or prevent flood damage is to mitigate your property.
- Hazard Mitigation Grant Funding may be available in the future to help homeowner with select types of flood mitigation.
- <http://www.Floodsmart.gov> has great tools and information to help you assess which option is right for you.



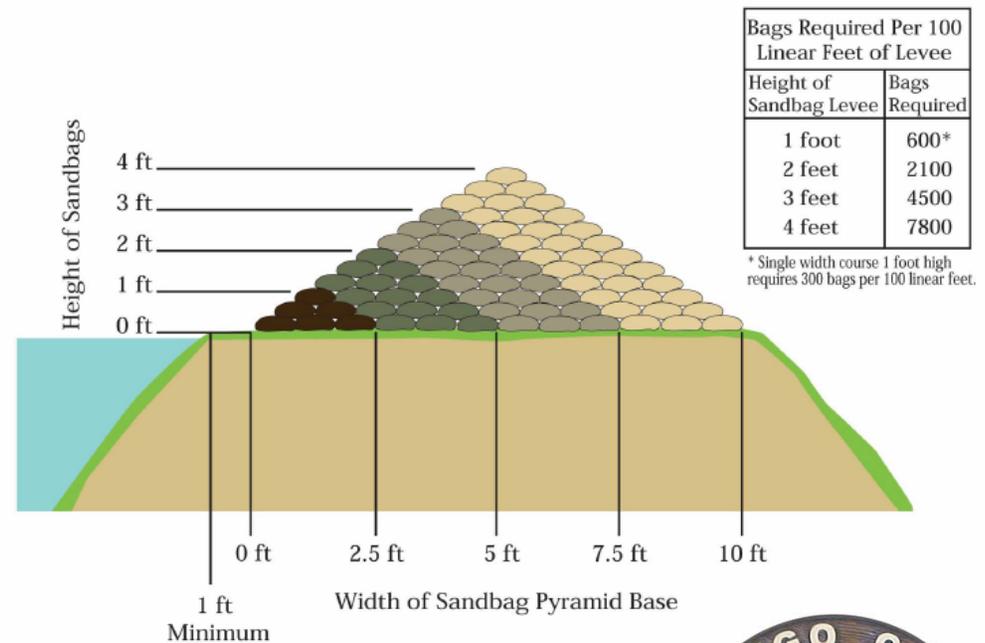
# Sandbag Training

- US Army Corps of Engineers



This two-member team uses correct positions for sandbag filling.

## TYPICAL PYRAMID SANDBAG PLACEMENT



# QUESTIONS

**Please limit questions to 2 per person for a maximum of 5 minutes.**



# Newaygo County

# E M D

## EMERGENCY SERVICES DEPARTMENT



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