



National Weather Service River Ice Spotter Training

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Developed with Sarah Jamison
January, 2022

Training Overview

- Why the need for River Ice Spotters?
- Brief History of Ice Jams
- Introduction to River Ice
- NWS Ice Jam Products



River Ice Spotter Services

- Monitoring and Communicating Ice Jams
- Resources

What is an Ice Jams?

An ice jam happens when chunks of ice clump together to block the flow of a river.



These photo shows ice jams on Cazenovia Creek near Stevenson St Bridge leading into the Buffalo River on Jan 1, 2011

Ice jam floods pose a serious threat to riverine communities

Why Threat Level is High

- Unlike open water flooding, it can take a lot less water to produce significant flood impacts
- Unpredictability of location
- Often sudden and difficult to anticipate
- Little time for contingency measures like road barricades or evacuations



Buffalo Creek railroad crossing between Union and I-90 on March 17, 2015

How River Ice Spotters can Reduce Risk?

- Unpredictability of location
 - Spotters can scout the rivers for areas to monitor and report ice conditions
- Often sudden and difficult to anticipate
 - Increased monitoring can reduce “unexpected” flooding
- Little time for contingency measures like road barricades or evacuations
 - Spotter information can be used to help decision makers
 - Reports can alert those vulnerable up and downstream who may not be aware of the threat



Flooding in Cazenovia Park 'Bowl' due to ice jam on Jan 1, 2011

Why We Need River Ice Spotters?

Reduce Risks to Life and Property



Ice Jam Locations 1903-2004

100

Average Accumulated
Freezing Degree-Days

-5°C (23°F)

Average January Temperature

0°C (32°F)

Average January Temperature

1 dot = 1 ice jam

from Daly et al (2004) *Severe Winter
Weather in the Continental U.S. and Global
Climate Cycles*. ERDC/CRREL TR-04-19



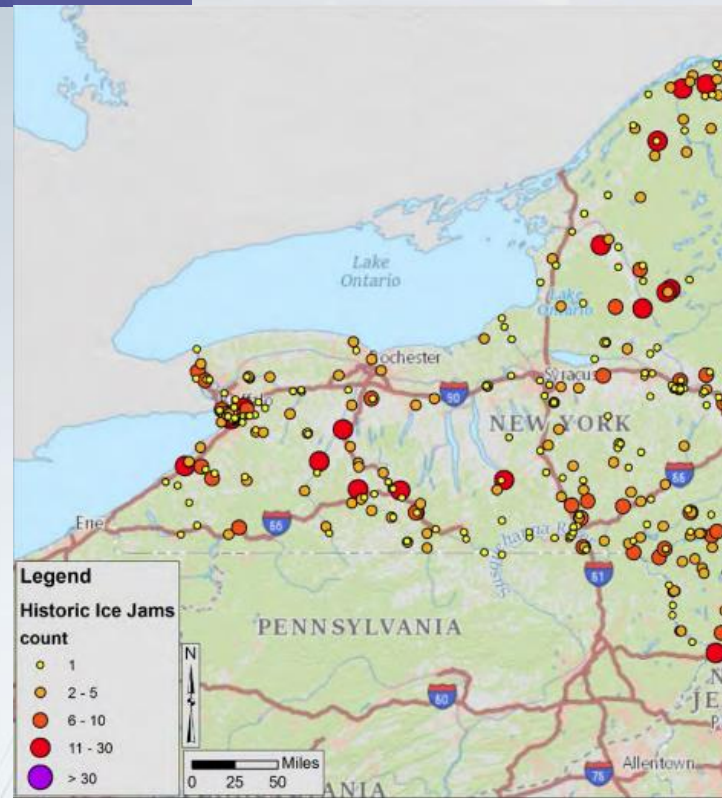
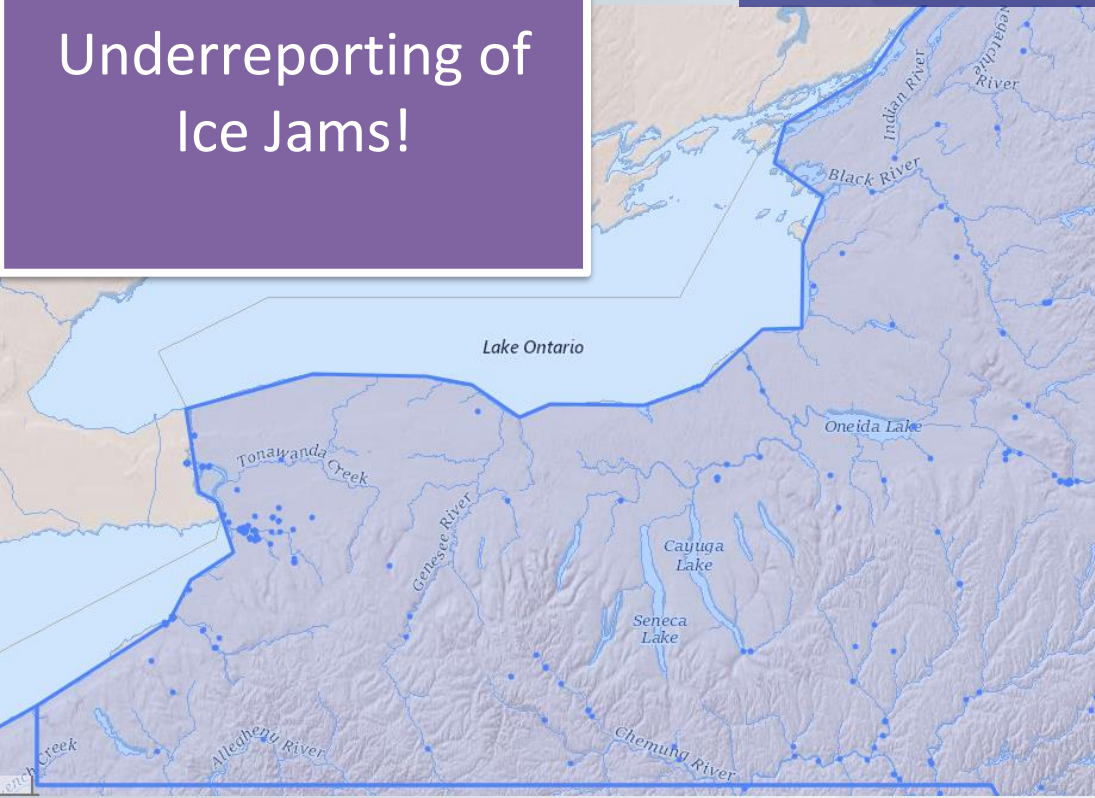
CRREL



History of Ice Jams

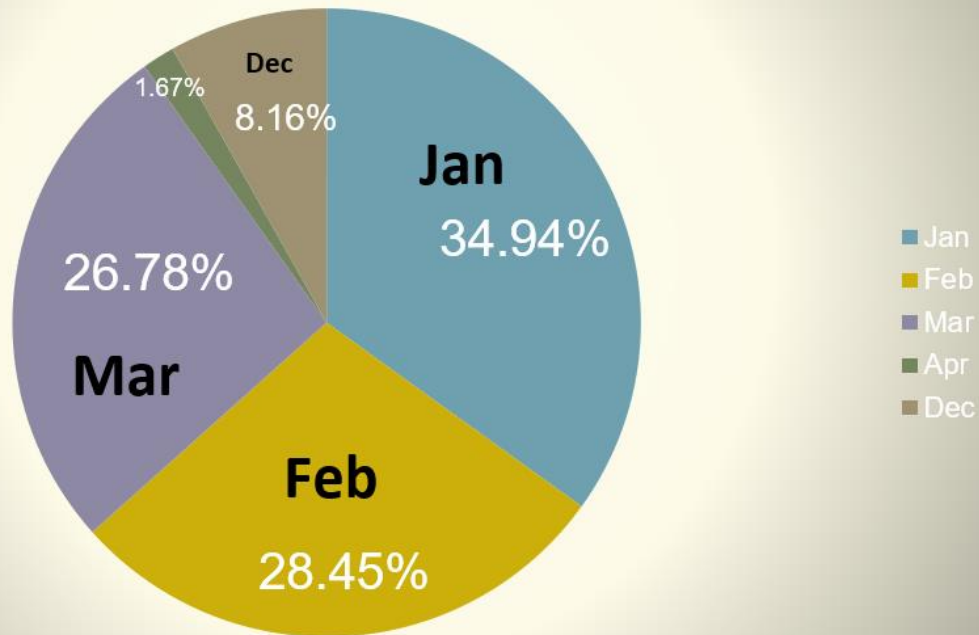
GROSS
Underreporting of
Ice Jams!

Ice Jam Events
1903-2020
USACE CRREL



History of Ice Jams

When Ice Jams Occur in Western and North-Central NY



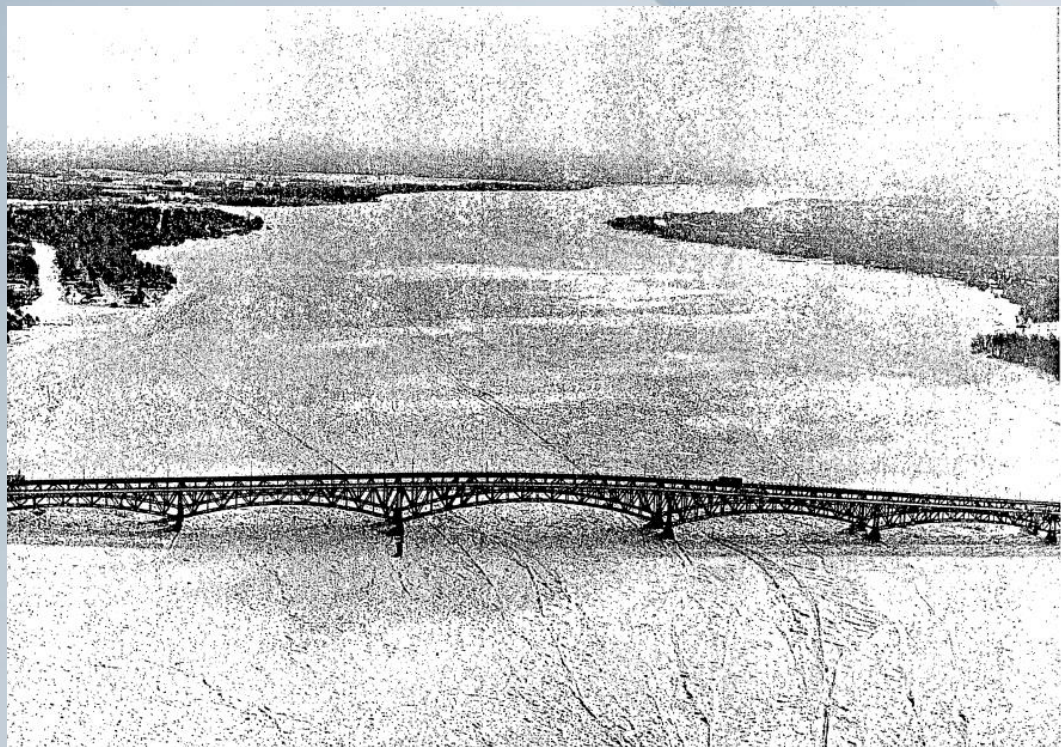


FEBRUARY 1904: On a cold Feb. day river walkers strolled across a frozen Ohio River past the packet boat Bonanza stuck in a 37-mile long ice jam.
<http://retro.cincinnati.com/Topics/Gallery/Frozen-Ohio-River>



DATE UNKNOWN: could be winter of 1905 or winter of 1917-18. The frozen Ohio River stranded boats, but made it possible for people to walk across the river.

History of Ice Jams



Niagara River Ice Jam 1/24/85

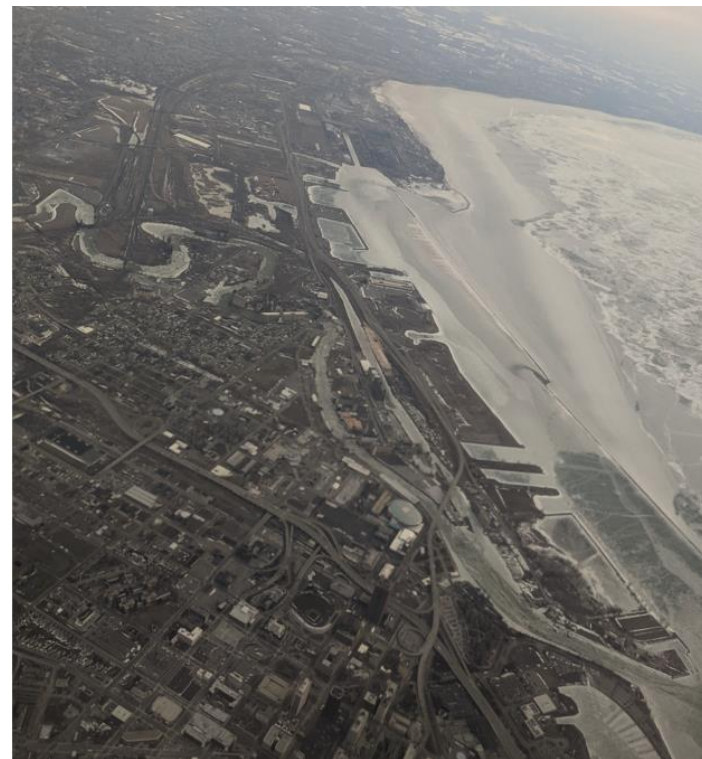


History of Ice Jams



Lexington Green Ice Jam 1/11/14

History of Ice Jams



Buffalo Creeks and Buffalo River 3/8/21

Ice Formation

- Ice formation falls into two classes.
- Sheet Ice or Surface Ice Cover
 - Lakes, reservoirs, slow moving rivers
 - Little wind mixing or turbulence
- Frazil Ice Cover
 - Rivers with higher flow, steepness, or exposed to the wind
 - Turbulent water, temperatures just below freezing
 - Can cause anchor ice when deposited on underwater objects

Sheet Ice



Frazil Ice



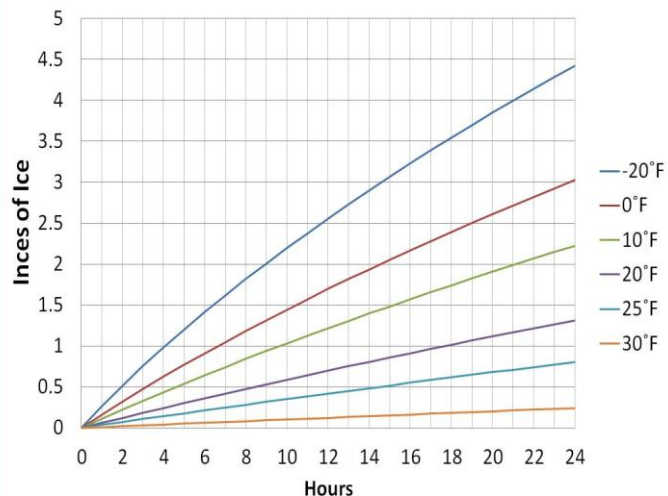
River Ice Growth and Freeze Up Jams

Ice Growth

- Strongly dependent on temperature
- Also dependent on wind speed (light/calm)
- Thickness needed for a jam ~ 4"
- Significant ice thickness 1 ft or more

Sheet Ice Growth

Ice Growth over a Day



Freeze Up Jams

- Early to mid-winter formation
- Consistent sub-freezing temperatures
- Comprised of frazil, surface ice and broken border ice.
- Locks into river until air warms
- Natural flows will show steady or declining discharges



French Creek – Erie County PA

Thermal Breakup

- Long, gradual warming period with limited rainfall
- Ice cover thins, weakens and melts in place
- There is less likely to be an issue with loading in this scenario, unless it's a very significant warm-up.



Mechanical Breakup

- Driven by an increase in flow
- Ice connection to banks is fractured
- Channel geometry constraints overcome
- Movement continues to fracture sheet and block ice into congested areas at obstructions to flow



Impediments to Ice Floe Transport

- Intact Ice Sheets
- Dramatic change in slope
- Sharp bends and riffles
- Natural constrictions
- Barriers – bridge piers



Impediments to Ice Floe Transport

elevated
backwater

rubble
ice

bridge
piers

lodgement
(ice jam toe)



Mouth of the rivers
blocked by ice



Lake Erie MODIS image from 3/12/15

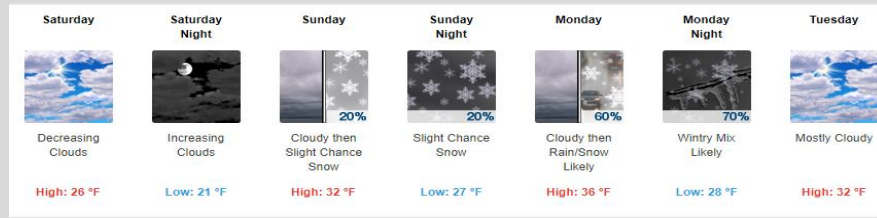
Forecasts

Freeze Up Jam:

- 5 Consecutive Days with daily average temperatures colder than 15°F

Break Up Jam:

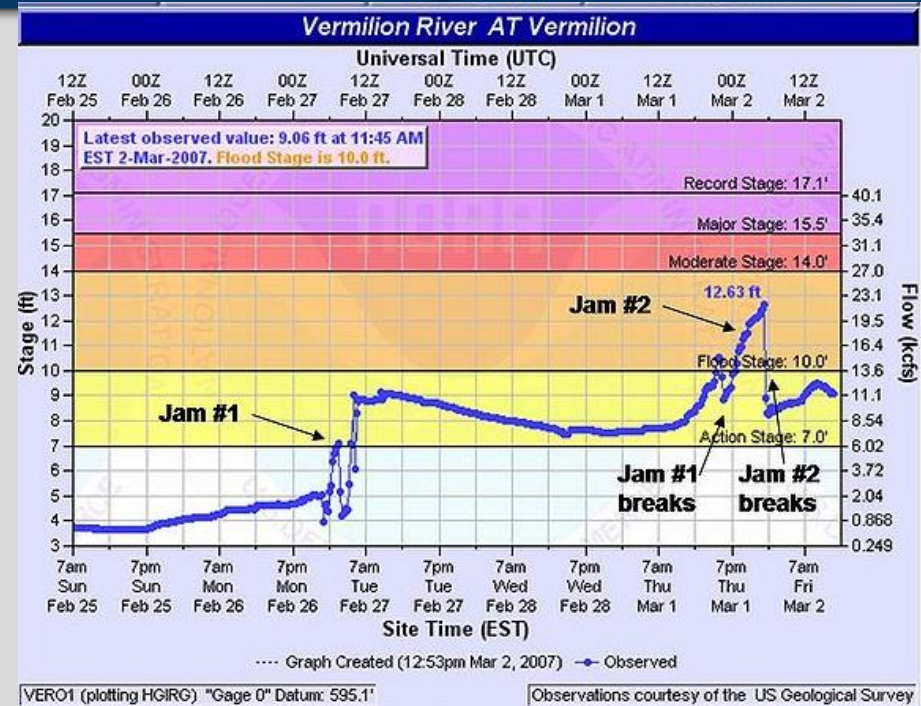
- Daily average temperatures above 42 degrees.
- Heavy rainfall and melting snow.
- Forecast rises in water level of at least 3 times the ice thickness.



River gauges only tell part of the story!

www.weather.gov

Ice Jam Signals



<https://water.weather.gov/ahps/> ← NWS River Gages AHPS Page

NWS Role in Ice Jams

www.weather.gov

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by
City, ST or ZIP code
Enter location ... Go
[Location Help](#)



Two Storms Crossing the U.S. with Rain, Snow, Ice and Gusty Winds

A storm tracking from the southern Plains to the Northeast will bring areas of heavy snow and ice from Kansas into the Great Lakes and Mid-Atlantic today into Wednesday, and a risk for severe thunderstorms and flash flooding from the Arklatex into the Ohio and Tennessee Valleys. A storm moving across the Southwest today and Tuesday will bring gusty winds and snowfall at unusually low elevations. [Read More >](#)

WINTER
SAFETY

Customize
Your
Weather.gov

City, ST

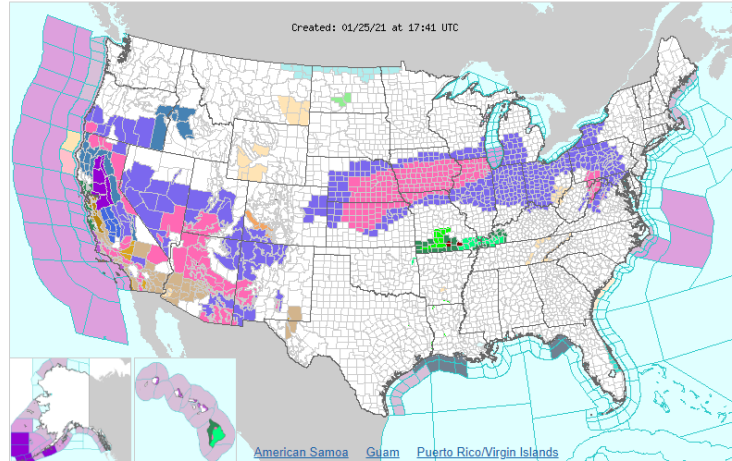
Enter Your City, ST or
ZIP Code

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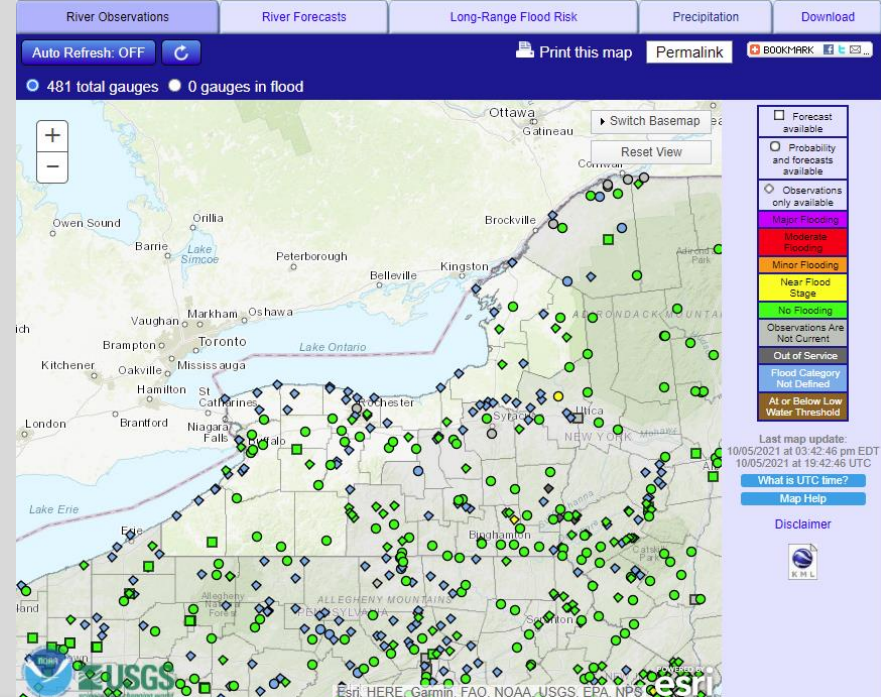
Get Weather

[Privacy Policy](#)

ACTIVE ALERTS FORECAST MAPS RADAR **RIVERS, LAKES, RAINFALL** AIR QUALITY SATELLITE PAST WEATHER



AHPS River Gauges

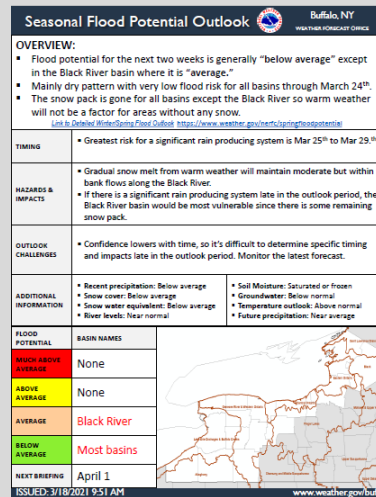


<https://water.weather.gov/ahps/> ← NWS River Gages AHPS Page

Messaging

NWS will highlight the general risk using these public products:

- Bi-weekly Winter/Spring Flood Outlook
- Hazardous Weather Outlook
- Flood Watch (if confidence high)
- Flood warning or (in extreme cases) a
- Flash Flood Warning



Flood Watch for Ice Jams

URGENT - IMMEDIATE BROADCAST REQUESTED

Flood Watch

National Weather Service Buffalo NY

834 PM EST Tue Jan 9 2018

...Ice Jam Flooding Threat Thursday through Friday night...

Behind an area of high pressure, southerly winds will develop Wednesday and persist through Friday morning across Western New York. These southerly winds will promote an extended period of above freezing temperatures through Friday morning. Air temperatures will increase into the 40s Wednesday, and on increasing winds Thursday, rise into the 50s.

There is plenty of ice in place on area creeks and rivers, and the primary risk for flooding will be from ice jams. Rainfall through Friday night will average a quarter to half an inch.

The warm weather and increased flows will break thick river ice, which can then become jammed where there are constrictions in the river or creek channel, such as curves or other restrictions.

People living in areas that are prone to ice jam flooding should take the time in advance to prepare for the potential for flooding this Thursday and Friday.

Flood Warning For Ice Jam Flooding

BULLETIN - IMMEDIATE BROADCAST REQUESTED

Flood Warning

National Weather Service Buffalo NY

815 AM EST THU JAN 11 2018

NYC013-120115-

/O.NEW.KBUF.FA.W.0001.180111T1315Z-180112T0115Z/

/00000.0.IJ.000000T0000Z.000000T0000Z.000000T0000Z.OO/

Chautauqua NY-

815 AM EST THU JAN 11 2018

The National Weather Service in Buffalo has issued a

* Flood Warning for...

An Ice Jam in...

Northeastern Chautauqua County in western New York...

* Until 815 PM EST Thursday..

* At 811 AM EST, emergency management reported ice jams occurring along Silver Creek and Walnut Creek near the Village of Silver Creek. Expect rapid rises and falls in water levels along these creeks as the ice jams work their way downstream through the Village of Silver Creek toward Lake Erie. Flooding is expected to occur along route 20, Main Street and Central Ave in Silver Creek.

* Some locations that will experience flooding include...

Silver Creek.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

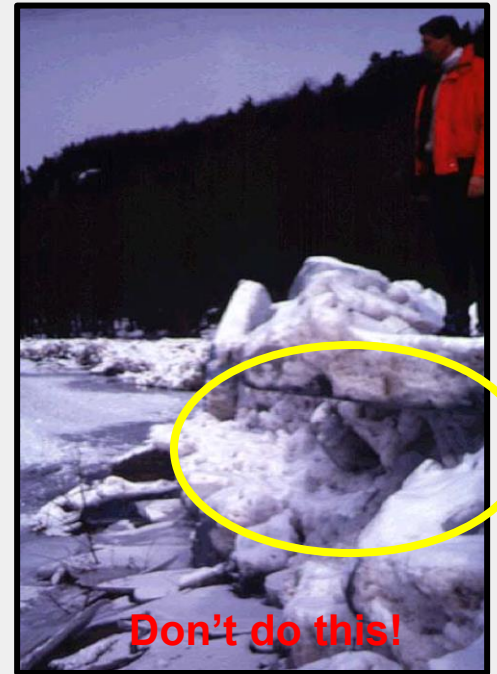
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Ice Observing Safety

STAY OFF THE ICE. PERIOD. FULL STOP.

- Snow/Ice surveys should be conducted with two people if possible. Otherwise notify someone of your trip.
- A cell phone should be part of your survey equipment for any emergencies that arise.
- Proper attire should be worn. This includes:
 - Layered clothing that covers all exposed skin.
 - Sturdy boots containing hefty soles for traction

Estimate ice thickness or measure ice chunks on the bank in a safe location.



Ice Observing Safety

- All ice surveying should be made from a safe distance from the river bank or nearby bridge.
- If the ice is flowing, stay further back as moving ice is very unpredictable.
- Moving ice can easily and quickly jam and spill out of the river bank quickly.



Avoid this action. A slight shift could cause this ice to collapse on you and cause serious injury.



Ice Observing Safety

- **Never drive into flooded roadways! Report flooding to local authorities and NWS ASAP**



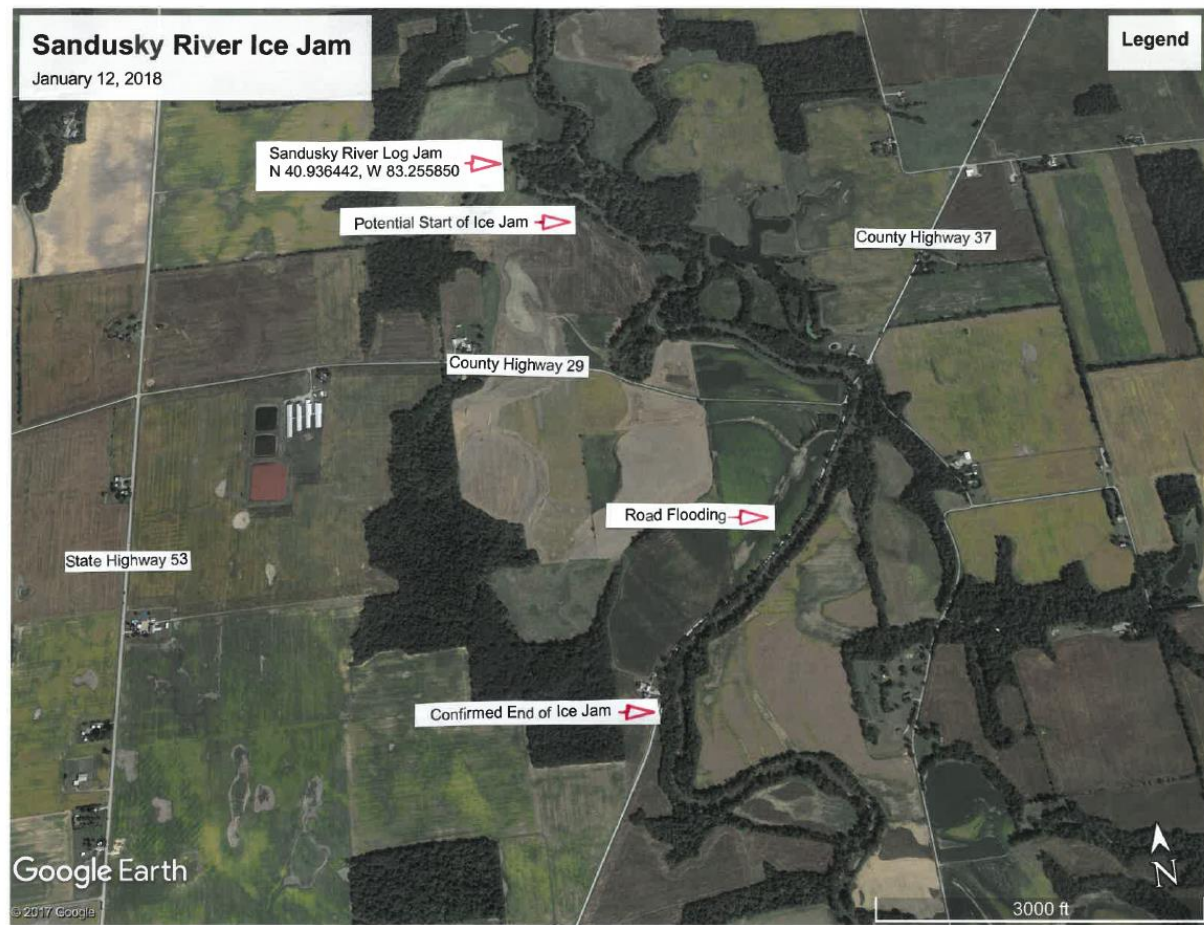
Report Details

Date, time, location, conditions.

- River name, Coordinates, Town
- Behaviour like flooding, damage, etc.
- Geo-tagged pictures! Up and downstream
- Thickness of ice (estimates)
- Coverage of ice (total, 50% across, start/end points of jam, etc)



Monitoring and Communicating Ice Jams



Detailed report submitted for an ice jam on the Sandusky River in January 2018

Observation Best Practices

- Location, location, location.
- High elevation
- Ability to observe up and downstream
- Helpful if near a USGS stream gauge
- Stable and safe part of the river's edge, avoid steep banks
- Near/on a bridge. Safety first and wear a yellow vest



Observation Best Practices

- Aerial video of ice jam activity would be indispensable to NWS river operations.
- Able to analyze the head and toe of ice jam and extent of water coverage.
- Clear documentation for future research purposes.
- **For drones, be familiar with local rules on usage**



Areal photograph of the Black River ice jam
winter 2015

Frequency of Reports

- Varies according to ice behavior
- Daily while freezing up and breakup
- Weekly + after cover established
- Multiple times a day if flooding occurring



Submitting a Report

- For NWS Buffalo, use reporting form at www.weather.gov/buf/rivericespotters
- Report details used to update NWS products with the best available information
- Later used in the event report (historical records)

Call NWS *Unlisted

Spotter Line dedicated for reports only

Attend training course ← NWS Buffalo

Reporting Methods

Online River Ice Reporting Form

River Ice Spotter

[Weather.gov](#) > [Buffalo, NY](#) > River Ice Spotter

Buffalo, NY

Weather Forecast Office

[Current Hazards](#) [Current Conditions](#) [Radar](#) [Forecasts](#) [Rivers and Lakes](#) [Climate and Past Weather](#) [Local Programs](#)

The focus of a River Ice Spotter will be on identifying, monitoring, and reporting river ice in your area. Help us and your community stay ahead of ice jam flooding!

Report Ice Observations: [River Ice Spotter Form](#)

Why River Ice Spotters?

During the winter season, flooding may occur due to ice jams. Unfortunately, ice jams are often localized and in many respects unpredictable. Information such as the extent of the ice cover, ice cover trends, and location of ice jams is very important for the National Weather Service issuing timely warnings to protect life and property. This information can only be obtained by visual observations from boots on the ground.

Qualifications

No special qualifications are required other than being 18 years or older and living or working near the river and a willingness to report river and ice conditions.

Reporting Ice Observations

A [Google form](#) is used to enter routine reports. For time-sensitive information such as ice jam formation, ice jam break-up, or flooding, we provide a non-public number to call that you will receive upon contacting us for the training information. Alternative methods to share ice jam reports is by submitting them to our twitter [@NWSBUFFALO](#) or facebook pages [www.facebook.com/NWSBuffalo](#)

River Ice Reporting Form

Submitting a Report



www.weather.gov/buf/rivericespotters



@NWSBUF



<https://www.facebook.com/NWSBuffalo>



Bufstorm.report@noaa.gov

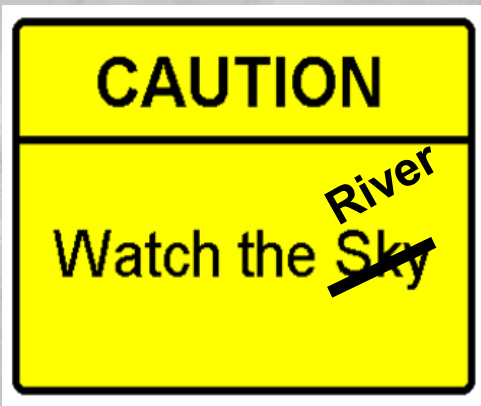
Remember if there is flooding or heightened risk of property damage be sure to notify your local officials or call 911!

Takeaways

- Ice jams may not happen every year, but when they do they can be more impactful than a warm season flood.
- River ice reports are key! In fact, it's the **ONLY** way for us (NWS) to know.
- **SAFETY FIRST!** While this information is extremely valuable, it must be collected safely.
- There are multiple ways to report river ice and ice jams
- Ice jams can be unpredictable. But with more boots on the ground and improved sharing of information we can collectively improve our readiness.

Resources

www.weather.gov/buf/rivericespotters



Questions?



Ice jam flooding on the Grand River in Painesville January 2014. NWS photo