Expected Takeaways

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 Risks

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
Ice Jam Risks

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
History of Ice Jams

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


Cold Regions Research and Engineering Laboratory https://www.erdc.usace.army.mil/Locations/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

- **Jan**: 34.94%
- **Feb**: 28.45%
- **Mar**: 26.78%
- **Dec**: 1.67%

Legend:
- **Jan**
- **Feb**
- **Mar**
- **Apr**
- **Dec**
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
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
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

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 flooding 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
Problem Areas

Impediments to Ice Floe Transport

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

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

Sunset Bay
Walnut Creek
Jan 11, 2018
NWS Role in Ice Jams

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

www.weather.gov

https://water.weather.gov/ahps/ ← NWS River Gages AHPS Page
NWS Role in Ice Jams

www.weather.gov

AHPS River Gauges

https://water.weather.gov/ahps/ ← NWS River Gages AHPS Page
NWS Role in Ice Jams

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

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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

NYC013-120118-
O.NEW.KBUF.F01.010111723312-1B011207011127-
00000000000000000000000000000000000000000000
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 815 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.

**
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.
Ice Observing Safety

- Never drive into flooded roadways! Report flooding to local authorities and NWS ASAP.
Monitoring and Communicating Ice Jams

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

Monitoring and Communicating Ice Jams

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.
Monitoring and Communicating Ice Jams

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
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

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