Measuring Ice Accretion

Thickness: This guide will focus on measuring the one-dimensional thickness of ice accretion as it accumulates onto different objects.

Measuring Ice Accretion

<u>Volunteer Safety is top priority</u>

Please use precautions and do not put your personal safety or health at risk!

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New!

Report impacts

Submit photos

Category	Descriptions of Impacts
0	No ice or a trace
1	Enough to be annoying/need scraping off your car. Looks pretty on bushes, shrubs. Dangerous to walk or drive.
2	Shrubs and other non-native shrubbery weighed down, trees manage ok
3	Small tree branches start to bend
4	Small and medium branches bend, a few small branches may fail
5	Birch trees are starting to bend, minor branch damage to weak trees
6	Birch trees sag moderately, small and large limbs start to break, ~5-10% branch loss
7	Birch trees bent nearly completely, ~10-20% branch loss on small and large limbs
8	Moderate to significant tree damage, most trees have some damage
	Credit: Jason Shafer, Northern Vermont University-Lyndon

Measure and report ice accretion on branches or other flat objects

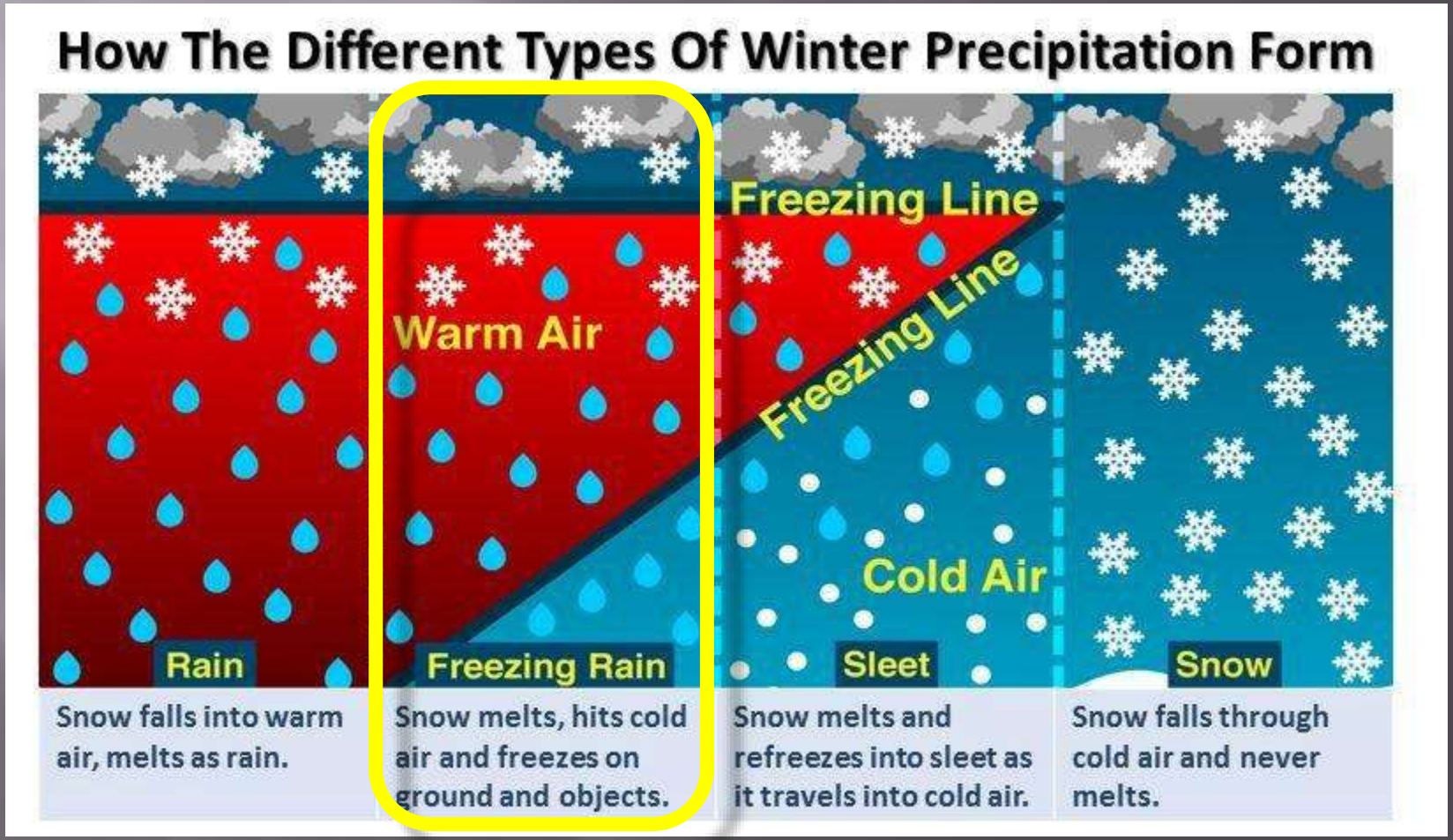
How Ice Accretion Forms

Ice Accretion occurs when rain falls with surface temperatures at or below freezing.

This is commonly called
“freezing rain”, or “glaze”

How Ice Accretion Forms

Ice Accretion occurs when frozen precipitation falls through a warmer layer of air followed by a freezing layer before hitting the ground



Tools for Measuring Ice Accretion

Use a simple caliper with units with 1/10th's of an inch.
You can purchase one here for less than $10.00:
https://www.amazon.com/gp/product/B07VSVMWTJ

Optional: use a "CoCoRaHS Snow Ruler" or an engineering ruler that is graduated in tenths of an inch to measure Ice Accretion.
Don't have a ruler with 1/10th's? Print one out and make your own here!

Or with a regular ruler or tape measure, convert to the nearest tenth-inch increments using this table:

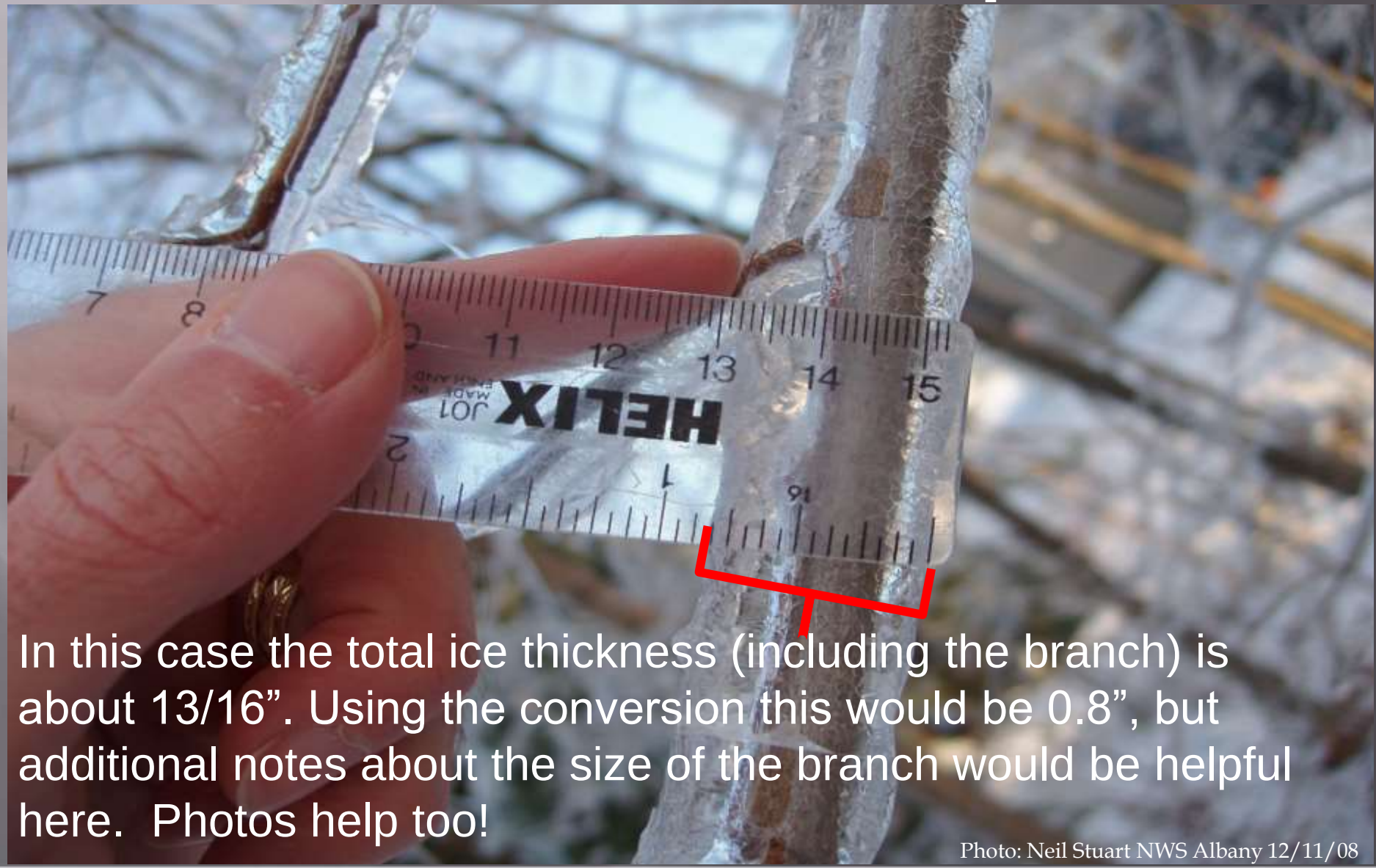
1/16 = 0.1, 1/8 = 0.1, 3/16 = 0.2, 1/4 = 0.3,
5/16 = 0.3, 3/8 = 0.4, 7/16 = 0.4, 1/2 = 0.5,
9/16 = 0.6, 5/8 = 0.6, 11/16 = 0.7, 3/4 = 0.8,
13/16 = 0.8, 7/8 = 0.9, 15/16 = 0.9

One-dimensional Measurement

In this case the Ice Accretion measured from the top of the metal post is 0.5”.

Photo: Neil Stuart NWS Albany 1/15/07

Other One-dimensional Measurement Examples



In this case the total ice thickness (including the branch) is about 13/16”. Using the conversion this would be 0.8”, but additional notes about the size of the branch would be helpful here. Photos help too!

Photo: Neil Stuart NWS Albany 12/11/08

Other One-dimensional Measurement Examples

Example of one-dimensional ice thickness

Recommended Method for measuring ice accretion using the CoCoRaHS rain gauge post

Affixing a ¾ inch dowel to the post

Ice Accretion: Setting up the dowel

Purchase a ¾” dowel from a local hardware or hobby store and cut it to 20 inches in length

Ice Accretion: Setting up the dowel

Attach dowel to post using ½” size straps
(not a typo – ½” straps fit snug on the ¾” dowel)

Ice Accretion: Setting up the dowel

After attaching to the post, make sure it is level:

Ice Accretion: Setting up the dowel

Document before an ice event

Measure the base thickness (with no accumulation)

-- This is only needed once at the beginning of the season

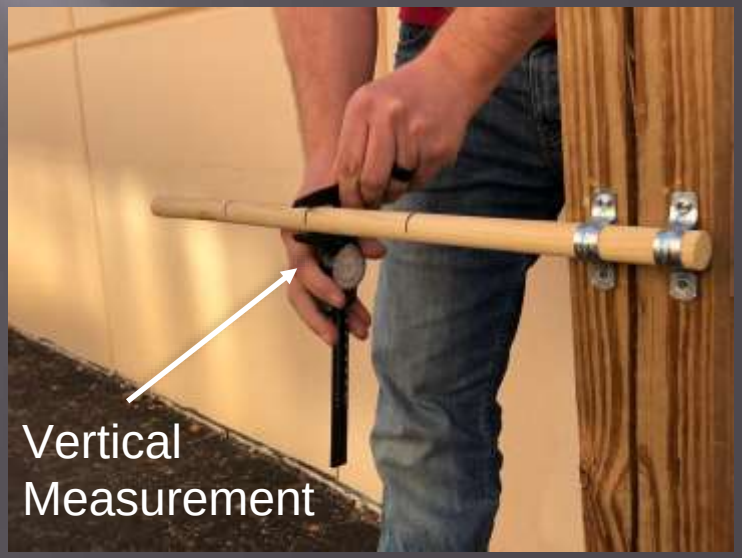
-- Enter the value to the nearest 1/10th of an inch

Measuring Ice Accretion

After an ice event

Measure the TOTAL thickness (Dowel + Ice)

-- Horizontal and Vertical Measurements are encouraged
-- Enter the value to the nearest 1/10th of an inch



Reporting Ice Accretion Impacts

Since physical measurements aren't always possible, impacts can be visually assessed and reported.

Using the table below, consider a category based on the impacts and descriptions

Category	Descriptions of Impacts
0	No ice or a trace
1	Enough to be annoying/need scraping off your car. Looks pretty on bushes, shrubs. Dangerous to walk or drive.
2	Shrubs and other non-native shrubbery weighed down, trees manage ok
3	Small tree branches start to bend
4	Small and medium branches bend, a few small branches may fail
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	Credit: Jason Shafer, Northern Vermont University-Lyndon

Reporting Ice Accretion

-- Make sure to report the **total thickness** including the dowel + the accumulated ice. CoCoRaHS will do the math of subtracting the base thickness reported at the beginning of the season (and averaging horizontal and vertical measurements).

-- If there is only a small amount of Ice Accretion which is less than a tenth of an inch report it as Trace in the notes.

-- If you are **not** using a dowel, report the one-dimensional ice accretion thickness. Please leave notes about what you used to measure, i.e. the metal pole or tree branch shown in the previous slides

-- Enter any notes that may be of value, including any impacts such as damage or power outages

Reporting Ice Accretion

Photo Upload

Upload up to four photos (live or saved in your files or phone).

Please leave extra descriptions in the field provided

Reporting Ice Accretion

Additional Considerations

It is important to clear snow off the dowel after each snowstorm. Accumulated snow will melt and freeze, potentially making it difficult to measure ice thickness in the event of an ice storm.

***Optional: Some photos in this guide show marks on the dowel. Starting at the edge of the post, you can add marks every four inches (4”, 8” and 12” out). If you do this, measure all three marks and report the average (separate horizontal and vertical), but please include notes about your horizontal and vertical measurements at each 4”, 8” and 12” mark.**

Reporting Ice Accretion

Final Step

CoCoRaHS still wants to know the water content from the ice that accumulated inside the rain gauge!

- **Remove the outer cylinder from the post (you may need to pour warm water along the bracket in order to remove without breaking)**

- **Bring the outer cylinder inside for an initial thaw. After a few minutes, clean the outside of the cylinder with a towel or rag in order to avoid measuring any water that is melting along the outside of the gauge**

- **Melt and measure the water content from inside the gauge and report this value on your normal 'daily precipitation' report page in the main field, "Rain and melted snow…during the past 24 Hours"**

Reporting Ice Accretion

As we pilot this new protocol, data entry (and data viewing) will be hosted outside of the CoCoRaHS website through a site called JotForm. The data entry is mobile friendly!

Click here to open the data entry page

Or point your smartphone camera at the QR code below to enter data through your phone!

Viewing Ice Accretion Data (and feedback)

For privacy concerns, we will initially only provide photos to the NWS and CoCoRaHS Coordinators.

Eventually, as the process is refined, it will be implemented onto a normal CoCoRaHS data entry page and viewing the data will be available to the public.

- Click here to view reports of pre-measured dowels only
- Click here to view reports submitted after an ice event – (impacts, measurements and comments only)
- Click here to provide feedback

Contact HQ if you are a coordinator or NWS employee to request access to all data including photos.