NEEDLE RETENTION CALCULATION

New Protocol—February 2013

In response to widespread and continuing needle cast on white pines, Forest Watch requests participating schools to assist in gathering more data about this phenomenon. Greater detail about needle cast impacts may help us to identify causes and responses by our trees.

Please continue to report NEEDLE RETENTION on your 5 or 10 Forest Watch trees in the exact same manner as you have in the past—simply report what is the highest year for any needle retention. Record this as usual on your report of field and laboratory measurements.

This Protocol is in addition.

Learning Expectations

In this exercise, students will:

Identify years of needle retention or cast.

Count how many needles are present on fully and partially foliated twigs and calculate how many needles have been cast.

Calculate what percentage of needles have been cast.

Consider what the loss of needles may do to the white pine.

Materials

Pine branch morphology guide

Needle sample from a Forest Watch tree

Needle Retention Data Sheet

Needle Retention Data Report Sheet

Calculator and Pencils

Procedure

Sample twigs from other white pines near your Forest Watch trees. Do NOT sample the tagged Forest Watch trees—save their branches for regular sampling and analysis.

Sample branches as high into the mid-section of the crown as possible. Cut branches which are at least four years in length. Cut enough branches so that teams of students can study and count full apical (end distal) needles or flourishing large lateral twigs. Discard small single-year twigs.

Select sample branches from either north or south side of tree. (Very young trees may have very long first-year growth stems). Bag as usual in a labeled plastic bag with a wet paper bag. Place sample in a cooler with blue ice immediately. Close cooler lid. Transport to school. Refrigerate samples until laboratory time.

Distribute data sheets and one branch containing at least three years of growth to two or three students.

Label the Data Sheet with the name of the sample and the date of the sampling.

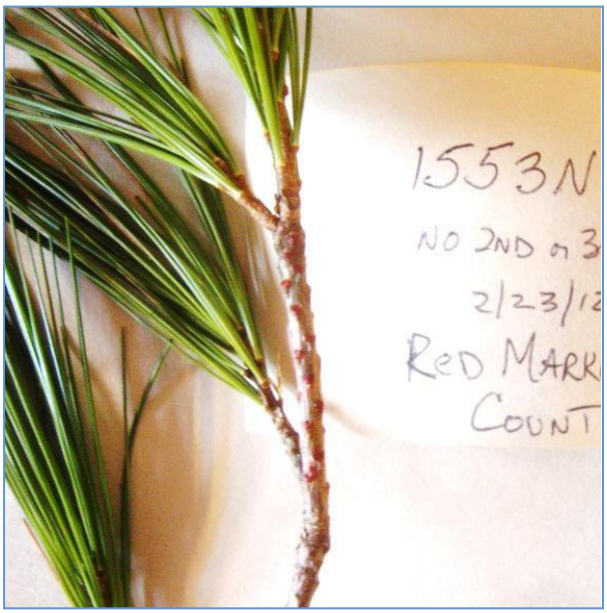
Refer to the labeled diagram of a typical white pine branch as you determine how many years of growth are found on your sample branch.

Identify the one year-old twig and needles. Note the terminal bud which contains needles for the coming June.

Find the bud scar below the one year-old twig, several small rings. There may be branches from just above the bud scar. Move down the twig and find the next bud scar. There may be branches here also. The twig between the two scars contains two-year-old needles. The twig below the second scar contains third-year needles if they are present.

Answer the questions on the form as to whether any needles are present on the second and third-year stem. On very healthy trees, there may be fourth-year needles.

At left, St. Johnsbury School's tree 1551, clearly has no 2nd year needles. But 1553S has a few, a very few. Should those few needles be counted as a tree which retains 2nd year needles? Yes, Forest Watch will still count it as a year with 2 years of needle retention—in our normal sampling. New data can be compared with old data. But….



In our new protocol—an extra measurement--we cut the 2nd year stem from the 1st year tip and the old 3rd year twig. We removed all 2nd year needles to make a careful count. At right, we marked each pedicel with a red marker so we could make an accurate count. This twig had a precise needle retention of 1.82 years of retention.

Branch of *Pinus strobus* (White Pine)