Assessing Old-growth Forests in New York State Forests and Preserves

Old-growth Rapid Evaluation (OGRE) Version 1.6 (Northern hardwood forests)

User manual and data sheets

Developed by the New York Natural Heritage Program

New York Natural Heritage Program

A partnership between the NYS Department of Environmental Conservation and
SUNY College of Environmental Science and Forestry.

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Project scope

Old-growth background

When you think about old-growth forest, you probably imagine huge, towering trees in a place where people have never been. While big, old trees may be the charismatic feature of old-growth, there is much more to it. A forest may have large trees, but they may be of short-lived, early successional species and may be lacking the bryophytes, coarse woody debris, and physiognomy found in old-growth.

The State of New York is one of few, if not the only, state to have a legal definition of old-growth forest. Enacted in 2008 by Gov. Patterson, the Bruce S. Kershner Old-growth Forest Preservation and Protection Act amended the Environmental Conservation Law, defining old-growth as:

> "… A parcel of at least ten acres which includes all of the following: an abundance of late successional tree species, generally at least 180-200 years old in a contiguous forested landscape, that has evolved and reproduced itself naturally and with the capacity for self perpetuation, arranged in a stratified forest structure consisting of multiple growth layers throughout the canopy and forest floor, featuring canopy gaps formed by natural disturbances creating an uneven canopy, and a conspicuous absence of multiple stemmed trees and coppices. Typically, old growth forest sites also are characterized by an irregular forest floor containing an abundance of coarse woody materials which are often covered by mosses and lichens, show limited signs of human disturbance since European settlement, have distinct soil horizons that include definite organic, mineral, alluvial [sic] accumulation, and unconsolidated layers, and have an understory that displays well-developed and diverse surface herbaceous layers." – NY Environmental Conservation Law § 45-0105

As you can see the State defines old-growth as a lot more than just old trees. This definition encompasses many of the aspects of academic definitions, such as those given by Dunwiddie and Leverett (1996) and Tyrrell et al (1998). All of these

definitions involve old trees (the oldest being at least ½ the maximum age of the species) in relatively large (10+ acres) areas that have had minimal human disturbance or catastrophic disturbances in the last 150-200 years (i.e. since Euro-American forest clearing). As research and public interest in old-growth forests increased in the 1990's, additional forest characteristics of old-growth were realized. These include natural disturbance regimes (Lorimer and Frelich 1994), the bryophytes found on the trees (Cooper-Ellis 1998), and the accumulation of coarse woody debris (CWD; McGee *et al.* 1999).

Today, old-growth forests cover less than 1% of forested areas in the East, compared to >75% of pre-settlement forest (Keeton 2006). About 50,000 acres of old-growth have been identified within the Adirondack Forest Preserve and approximately 25,000 acres in the Catskill Forest Preserve. However, using historical logging and acquisition records, Barbara McMartin estimates that there are at least another 200,000 acres of potential, though unconfirmed, old-growth in the Adirondacks (McMartin 1994). There are other potential old growth forests throughout the State Forests, Parks, and Preserves in New York State. The New York Natural Heritage Program (NYNHP) and Department of Environmental Conservation (DEC) are working to locate and map as much of this potential old-growth as possible in the next five years.

Development of the Old-Growth Rapid Evaluation

The Old-Growth Rapid Evaluation (OGRE) is designed to provide a relatively quick (1½ hours or less) method to assess potential old-growth forests. The *OGRE Field Form* serves as the data collection method. There is both a paper form, for anyone interested in using the OGRE, and an electronic form, currently only available to DEC staff. The *OGRE Cheat Sheet* provides a reusable guide to help complete the evaluation and can be printed for use in the field to assist with completing the OGRE. NYNHP will provide training on the completion of the OGRE to State Forest and Preserve staff each year.

The current version of the OGRE is intended for use in forests such as beech-maple mesic forests, maple-basswood rich mesic forests, hemlock-northern hardwood forests, pine-northern hardwood forests, spruce-northern hardwood forest, and the like. NYNHP sees the OGRE as an evolving process, with 2018 as

the pilot year. We will refine the data collected and methodologies through use and feedback by DEC and NYNHP staff. Ultimately, we plan expand the evaluation of include other forest types and develop a scoring system to quickly determine the most likely old-growth forests of New York Forests and Preserves.

Sampling design

The general method consists of recording forest characteristics at two to four variable radius plots (e.g. prism or angle gauge) within a potential old-growth forest to identify whether the forest has a minimum of characteristics to be considered old-growth by NYNHP. The sampling locations (blue circles, Figure 1) should be separated by 5 chains (330 ft; 100 m; blue dashed lines, Figure 1), and should start away from the edge of the suspected old-growth area from where you first think you encountered old growth (e.g. the orange point in Figure 1), moving into what appears to be the core of the old-growth area (black arrow, Figure 1). Distances can be measured, paced, or determined by GPS. Do not begin the OGRE until you have moved away from the presumed edge of the old growth and established your first sampling point. Separating the points at right angles (e.g. Figure 1) will provide better coverage and capture more of the heterogeneity of the potential old-growth area. The typical basal area within an old-growth northern hardwoods forest can be over 130+ ft^2/ac (30+ m^2/ha), so a or 20 BAF prism would be best when completing the OGRE, though the more commonly used 10 BAF prism will work.

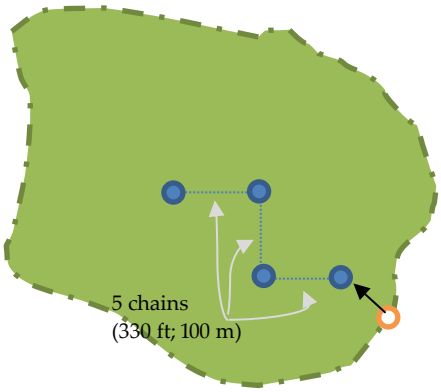

Figure 1. Sample points should be separated by 5 chains (330 ft; 100 m).

The OGRE consists of evaluating six factors that have been identified as the most informative when characterizing northern hardwood-type old-growth forests.

Location

Record a GPS point at each survey location for follow-up surveys. Site names should be named after a nearby lake, stream, mountain, or other nearby natural

feature. The wild forest or wilderness area the site in is should be used as the Unit name.

General area information

The following characteristics are quick to assess within an area of old-growth. The more characteristics present, the more likely an area is to be classified as old-growth.

The trees will probably be the first sign that you are in a forest that might be old-growth. Generally, an old-growth northern hardwood forest will have numerous large (>25 in [65 cm]) trees. These large trees have characteristics of old-growth trees, such as buttressed stumps, spiral trunks, very little taper, few upper limbs, or bark that may vary from very shaggy to balding (Figure 2).

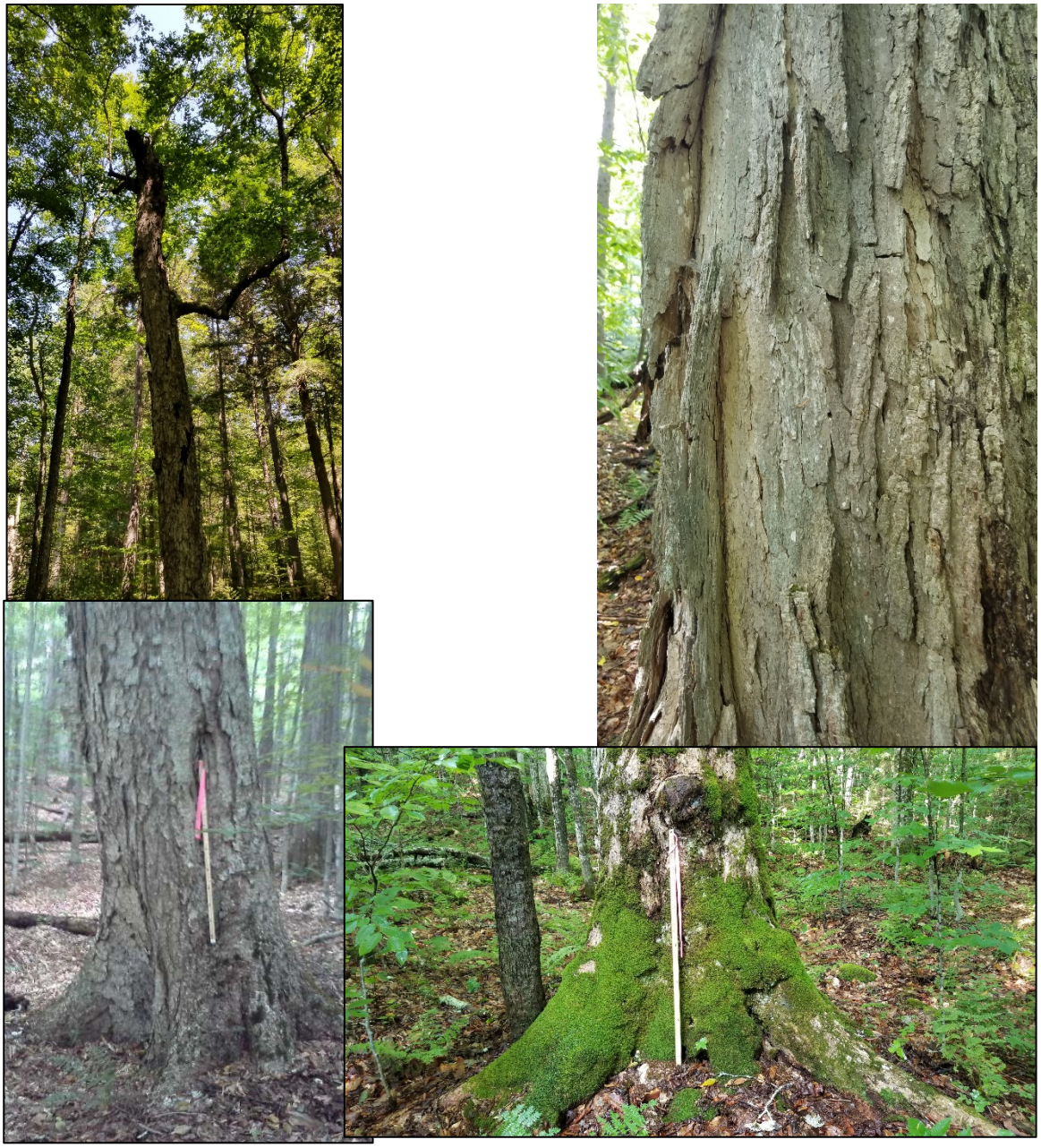

Figure 2. Old-growth tree characteristics. Clockwise, from upper left: Old growth tree showing little bole taper and few but large upper canopy branches (courtesy M. Henschell); large plates on sugar maple (Acer saccharum; courtesy M. Henschell) ; 30-inch DBH sugar maple with a buttressed stump (courtesy M. Henschell); 255 year old Yellow birch (Betula alleghaniensis) showing characteristic "old-growth bark" (courtesy DJ Evans);

Pit and mound microtopography is the result of tree tip-ups (Figure 3). Once tipped, the now vertical root plate decays and collapses, with the associated soil, to create the mound. The pit is where the roots were once anchored. The process to create a single mound can take upwards of 50 years. This time frame and the fact that this is generally a small scale disturbance – typically occurring at the individual tree or small groups of trees – means that the development of extensive pit and mound microtopography, which takes the form of an undulating forest floor, can take hundreds of years (Lorimer and Frelich 1994).

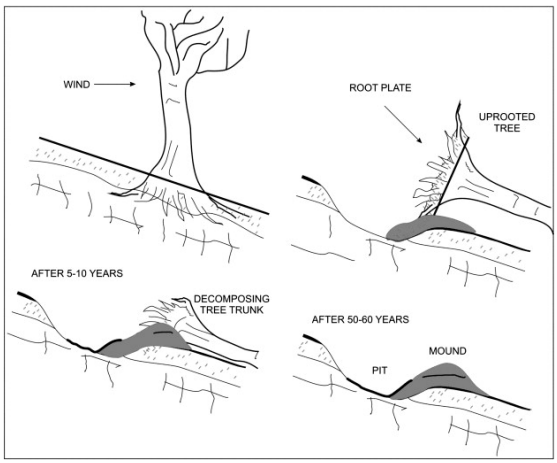

Figure 3. Development of pit and mound topography (from https://goo.gl/mXTsSF).

Another important feature, or lack thereof, of old-growth forests is the absence of logging and other forest-disturbing human activity. Cut stumps are the most definitive sign of past logging, though stumps from the late 19th and early 20th century may no longer be present or may not be separable from those of broken trees. Old logging roads may be overgrown as well. However, if there is obvious evidence of widespread cutting and evident logging roads through an area, it is not likely to be old-growth.

The presence of well-developed and varied coarse woody debris (CWD), including large pieces of coarse woody debris on the forest floor in different stages of decay is important when classifying a forest as old-growth. CWD accumulates slowly as trees fall over, such as those creating the pit and mound microtopography. If the trees comprising the CWD are approaching the diameter of the largest overstory trees, that is further evidence that natural processes have be occurring in the forest for a long time (Figure 4).

Once these characteristics have been identified within an area, the rest of the OGRE can be completed. The OGRE is broken down into four parts, described in detail below.

Overstory trees

Large trees may be the first sign that you are in a forest that might be old-growth. Generally, the basal area of an old-growth forest is >130 ft^2/ac (30+ m^2/ha). Using a 20 BAF prism will reduce the number of trees tallied and make the evaluation quicker, though a 10 BAF prism can be used. Tally trees by species and measure the DBH of the largest tree for each species. Do the same for standing dead wood, recording identifiable species.

Coarse woody debris

Coarse woody debris (CWD) is typically considered any down, dead tree over 5 inches (13 cm) in diameter and can be classified into five classes based on the structural integrity of the remaining wood (see the *Cheat Sheet*: Coarse woody debris for characteristics of each class). As down dead decays, it loses it's smallest twigs first, followed by a gradual breakdown of the heartwood and bark (class 1-3). As the larger branches holding the tree off the ground and the heartwood decay, the tree loses it's round shape and structural stability and will fall onto the ground (class 4). Finally, class 5 CWD may be nearly completely submerged beneath the ground, or covered in moss.

Figure 4. Large sugar maple coarse woody debris in an Adirondacks old-growth forest (photo courtesy DJ Evans).

Having CWD in all stages of decay is an indicator that a forest has been in continuous forest cover for long enough to accumulate. As discussed above, having shade tolerant species in the CWD is an excellent indicator of old-growth (Figure 4). When identifiable, record the CWD size and decay classes for shade tolerant, intermediate shade tolerant, and shade intolerant species separately. Record unidentifiable CWD separately. The size classes are estimated in 5-inch (~13 cm) classes, starting with CWD 5-10 inches (13-25 cm) in size.

Epiphytes

Figure 5. Lungwort (Lobaria pulmonaria), an easy to recognize lichen in mesic old-growth forests

Epiphytes are plants that grow on other plants. Epiphytes are not parasitic; they only grow on the surface of the tree and do not negatively affect it. The most common epiphytes in New York old-growth forests are bryophytes (mosses, liverworts, and hornworts) and lichens. Some are good indicators of old-growth because they grow only on late successional species and take a long time to grow into large colonies.

While the identification of bryophytes and lichens might seem daunting, the four most frequently found on the bark of trees in old-growth forests are relatively straight-forward to identify. Lungwort (*Lobaria pulmonaria*, Figure 5) is one of the easiest to identify and one of the best indicators of old-growth. The next two, Wall Scalewort (*Porella platyphylla*) and Shingle Moss (*Neckera pennata*) have a similar appearance, but on closer inspection are easily separable. The leaves of Wall Scalewort grow tight along the stems, giving them a smooth appearance, while the leaves of Shingle Moss are not tight, giving it a feathered appearance. When measuring the DBH of the largest trees, above, mark if any of these species are present. see the *OGRE Cheat Sheet* for photos of each, including variations in color and close-up photos.

Forest health concerns

As a part of another project NYNHP is working on with DEC, we are requesting that you also note the presence or absence of several invasive pests that may be detrimental to State Forests and Preserves. Information on identifying these forest health issues can be found on the following webpages: Hemlock woolly adelgid, balsam woolly adelgid, beech bark disease, emerald ash borer, white pine blister rust, oak wilt.

Other information and observations

To better understand the conditions of a site, we have included an area to record general notes. The notes section is also useful for recording wildlife, vegetation, or other characteristics of the site you think would be important.

After the OGRE

Once the OGRE is completed, paper forms should be returned to the New York Natural Heritage Program by scanning and emailing it to max.henschell@dec.ny.gov with the subject line "OGRE – unit_name-site_name" replacing unit_name with the unit (e.g. Wilcox Lake Wild Forest) and site_name with a unique name for the location surveyed (e.g. Wilcox Mountain). The Survey123 data collection system has an automatic upload feature that will allow for online access to the data.

Detailed assessment

Once the OGRE is received by the New York Natural Heritage, it will be reviewed to determine if a follow-up site assessment is warranted. No single attribute gathered in the OGRE is enough to qualify or disqualify a site for a follow-up assessment. NYNHP will re-visit those sites they consider potential old-growth and collect detailed ecological information including CWD volume and composition, vegetation composition and age, and extent of the old-growth area, among other measurements. Most sites will be revisited in the first several years to assess what measured features in the OGRE are most associated with old-growth forests. DEC staff are welcome to join NYNHP staff in completing the detailed assessment if interested.

Mapping old-growth boundaries

NYNHP is in the process of refining a rapid mapping method for old-growth. The method involves following a *Big Tree Transect* to delimit the core old-growth area.

Once a large tree is located (e.g. starting from a large tree in your first OGRE point at a site), find the next closest large tree. Record the location and defining old-growth characteristics of the tree including buttressing, bark plates, trunk twisting, minimal taper, few large crown branches, and the presence of any of

the four bryophytes from the OGRE. Repeat this for several trees until a perimeter begins to form.

Once a perimeter begins to form, attempt to locate trees away from the core to push the boundary outwards. For example, if the first five trees suggest that the old-growth core is to the west, attempt to locate big trees to east (Figure 6). This method can be effectively employed for areas of approximately 30-40 acres in 2-3 hours. Larger areas may require more time or repeat visits.

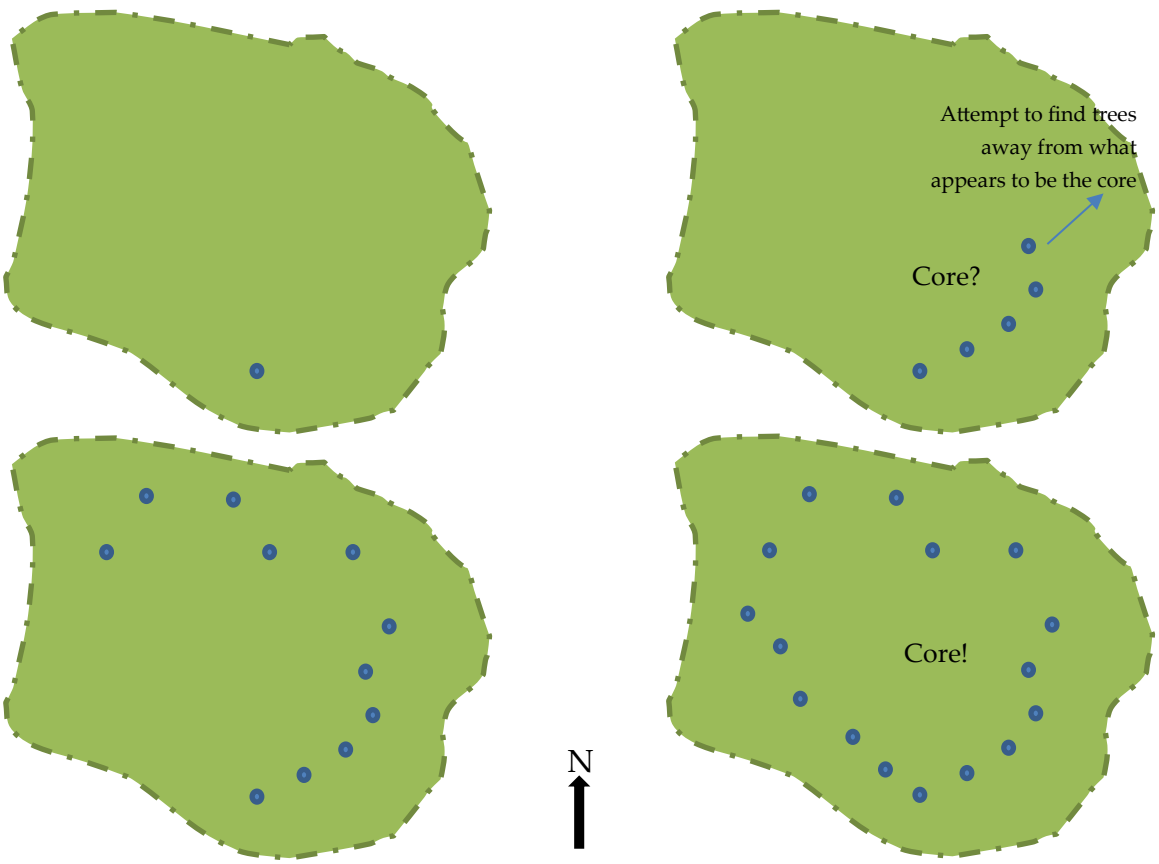

Figure 6. Clockwise, from upper left: (1) First big tree found. (2) Working (for example) counter-clockwise from the first tree, a perimeter should start to form after several trees have been located. The number of trees for this to occur depends on the size of the old-growth area and where within the area the big tree transect was started. From this point, it appears that the core is to the west of your perimeter. In order to map the true perimeter, attempt to find the next trees to the east and north. (3) Using this method, you will find the edge of where the big trees are growing. (4) You should be able to map a 30-40 acre old-growth core within 2-3 hours using this method.

Literature cited

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Dunwiddie, P. W., and R. T. Leverett. 1996. Survey of old-growth forest in Massachusetts. Rhodora:419–444.

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Appendices

OGRE field form

Printable version

Survey123 form (for DEC staff)

OGRE Cheat Sheet

Cheat Sheet PDF

Big Tree Transect

Survey123 form (for DEC staff)