

STATE OF NEW YORK
SUPREME COURT : ALBANY COUNTY

In the Matter of the Application of
PROTECT THE ADIRONDACKS! INC.,

Plaintiff-Petitioner,

For a Judgment Pursuant to Section 5 of
Article 14 of the New York State Constitution
and CPLR Article 78

-against-

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION and
ADIRONDACK PARK AGENCY,

Defendants-Respondents.

AFFIDAVIT OF
TIMOTHY G. HOWARD, Ph.D.

Index No. 2137-13
RJI No. 01-13-ST-4541

Hon. Gerald W. Connolly

State of New York :
 :ss.:
County of Albany :

Timothy G. Howard, being duly sworn, deposes and says:

1. I am Director of Science with the New York Natural Heritage Program located at 625 Broadway, Albany, New York. I received a BA in Biology from Middlebury College (1987), an MS in Biology from the University of Michigan (1994), and a PhD Degree in Biology (Plant Ecology) from The University of Michigan in 1998. I have worked for the New York Natural Heritage Program since November, 2000.

2. The Natural Heritage Program (NYNHP) is a program of the Research Foundation for the State University of New York College of Environmental Science and Forestry (SUNY-ESF). NYNHP provides information and scientific expertise on rare species, natural ecosystems, and landscape assessment. NYNHP works in partnership with the New York State Department of

Environmental Conservation (DEC) and other state, federal, and private organizations involved in natural resource management, land protection and stewardship, and biodiversity conservation. I am responsible for helping with oversight of our science staff and science program, helping to obtain funding for the program, managing projects, and leading most of the landscape analysis and modeling portions of our projects. I have extensive experience in ecological field surveys and condition assessment, landscape assessment and species distribution modeling, mapping and aerial photo interpretation using Geographic Information Systems (GIS), and statistical analysis and modeling. A copy of my resume was attached in a previous affidavit (08-24-2016).

3. I previously submitted an affidavit in support of the State's motion for summary judgment on 08-24-2016.

4. I have read the affidavits submitted by Steve Signell on 06-30-2016 and 08-25-2016 as part of the Plaintiff's motion for summary judgement in this action. The purpose of this affidavit is to respond to details in these two affidavits, primarily about what constitutes a tree and about the ecological significance of different tree sizes and ages for a forested ecosystem.

5. I agree with Steve Signell (08-25-2016 Signell Affidavit, ¶7), that the botanical term 'tree' refers to a specific group of woody plants that typically have a single-stemmed growth form and have the ability to reach a considerable height at maturity.

6. I also agree that the term 'tree' gets confusing (08-25-2016 Signell Affidavit, ¶7) because it also is used to refer to the larger (usually adult-sized) individuals of this group. Thus, a 50-foot tall sugar maple is a 'tree' whereas a sugar maple six inches tall may be a 'seedling,' even though it is still botanically a tree. Similarly, a single acorn is, botanically speaking, an oak tree and a single maple seed is, botanically, a maple tree.

7. The difficulty, as Signell points out (08-25-2016 Affidavit ¶8, ¶9) is deciding what the cutoff should be when determining the number of trees cut for reference to this case.

Determining that an individual with a 1-inch DBH (diameter breast height) counts as a tree would greatly increase the number of ‘trees’ cut along these Class II Connector trails, since only individuals with a 3-inch and greater DBH have been counted up to this point. Signell’s position is that all individuals with a DBH of 1 inch or greater constitute a ‘tree.’ His approach for defining this position is two-fold: 1. To discuss how tree sizes are divided up in the US Forest Service Forest Inventory and Analysis (FIA) inventory methods and reporting tools; and 2. To discuss the “biological functionality” of trees of varying sizes. There appear to be issues with each of those positions, which I will address in turn, next.

8. The following quote describes the purpose of the FIA program (source <http://www.fia.fs.fed.us/>).

The Forest Inventory and Analysis (FIA) Program of the U.S. Forest Service provides the information needed to assess America's forests. ... FIA reports on status and trends in forest area and location; in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest; in wood production and utilization rates by various products; and in forest land ownership.

9. To fulfil this goal, the FIA program estimates how many trees there are for all sizes of germinated trees, from the smallest seedling to the largest canopy tree. They simply use different methods depending on tree size. The FIA manual is clear about this (the following quotes are from the core FIA manual, located here: <http://www.fia.fs.fed.us/library/field-guides-methods-proc/docs/2015/Core-FIA-FG-7.pdf>). Surveyors are instructed to measure trees larger than 5.0 inches DBH as follows (FIA manual, page 68):

Trees at least 5.0 inches in diameter are sampled within the subplot. ‘Tally trees’ are defined as all live and standing dead trees in accessible forest land condition classes encountered on the subplot the first time a subplot is established, and all trees that grow into a subplot thereafter. These data yield information on tree volume, growth, mortality, and removals; wildlife habitats; forest structure and composition; biomass; and carbon sequestration.

Surveyors are instructed to measure saplings as follows (FIA manual, page 68):

Trees with a diameter at least 1.0 inch but less than 5.0 inches, termed saplings, are sampled within the microplot. ‘Tally saplings’ are defined as all live and standing dead saplings in accessible forest land condition classes encountered the first time a microplot is established, and all saplings that grow into each microplot thereafter are included until they grow to 5.0 inches or larger, at which time they are tallied on the subplot and referenced (new AZIMUTH and HORIZONTAL DISTANCE taken) to the subplot center.

Surveyors are instructed to measure seedlings as follows (FIA manual, page 102. Note the term DRC refers to “Diameter Root Crown” and is used in ecosystems not present in NY):

Regeneration information is obtained by counting live seedlings within the 6.8-foot radius microplot located 90 degrees and 12.0 feet from each subplot center within each of the four subplots. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH/DRC in order to qualify for tallying. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH/DRC in order to qualify for tallying. For woodland species, each stem on a single tree must be less than 1.0 inch in DRC. Seedlings are counted in groups by species and condition class, up to five individuals per species. Counts beyond five estimated. Only count seedlings occurring in accessible forest land condition classes.

[additional instruction further down page 102]:

On each microplot, record the number of live tally tree seedlings, by species and condition class.

10. The point of providing these quotes is to illustrate that the FIA program strives to samples trees at all stages of life, post-germination, and that the 1-inch DBH cutoff utilized by FIA separates seedlings from saplings (not seedlings from trees). A full FIA plot actually samples saplings and seedlings in the ‘microplot’ while trees are sampled at the macroplot (FIA

manual, page 5), emphasizing that seedlings and saplings are closer in nature than the larger size class, trees. This is counter to Signell's argument that saplings and trees are more similar to each other than saplings to seedlings (Affidavit 08-25-2016 ¶10). What this means is if FIA standards are used for cutoffs as to the determination of a tree, a 5-inch DBH cutoff is actually most appropriate, not 1 inch (as Signell suggests) or 3 inches (as DEC suggests).

11. The reporting system for FIA agrees with this seedling-sapling-tree grouping system as cited in the Signell Affidavit (08-25-2016), Exhibit C, again indicating that a 'tree' by FIA standards are individuals with DBH greater than five inches. The only other clear alternative would be that a 'tree' should include all individuals in all size classes: seedlings, saplings, and trees.

12. The term 'biological functionality' (Signell Affidavit 08-25-2016, ¶11, 12) was not defined but was used in these ways: "The biological functionality of a sapling is essentially the same as the largest overstory tree – they just happen to be smaller" (¶11), and "The biological functionality and ecological role of very small trees is fundamentally different than that of saplings and larger trees." (¶12).

13. Interestingly, as evidence that saplings have important biological functionality in the forest ecosystem, the Signell Affidavit (08-25-2016) uses tree age-and-diameter data he collected (Affidavit 08-25-2016, Table 4). The table presents measured diameters of red spruce along with estimated ages based on ring counts, with some quite small trees coming out to being decades old. A quick comparison of the numbers suggests this is the same data set presented in the earlier Signell Affidavit (06-30-2016, ¶ 24, Exhibit H). Although the methods are not entirely clear, this statement "I also determined the ages by counting tree rings on the stumps" (Affidavit 06-30-2016 ¶24) suggests that these measurements are not taken at DBH but at ground level (e.g. DSH,

or diameter stump height). Trees with diameters less than 3 inches at the stump are very likely to have a DBH of less than 1 inch, and even perhaps be shorter than breast height. That means that these data are showing that *seedlings*, not saplings, “have survived long enough in the forest understory proving they are well established members of the forest ecosystem.” (Affidavit 08-25-2016, ¶11). Since these data provide information for seedlings (as defined by FIA; trees with DBH < 1 inch), they counter the claim by Signell that saplings have more important biological functionality than seedlings but instead suggest that seedlings (as defined by FIA) have just as important biological functionality as saplings, based on the argument of size-age relationships.

14. For another point of evidence that a seedling has low ‘biological functionality’ the Signell Affidavit uses a forest ecology text book (Barnes, Zak, Denton, Spurr, 1998. Forest Ecology, 4th edition, Wiley) to support the contention that seedlings are relatively ephemeral in nature (and therefore should not be counted as trees). I believe the relevant quote from this text book is as follows (page 108-109):

Because great numbers of seedlings perish soon after germination, the few seedlings that survive and exhibit vigorous growth are regarded as established. The period of establishment typically lasts for one to five years or more depending on the species and site conditions.

The problem is that this pattern is a continuum, with seedlings, then saplings, then trees continuing to compete for resources and die if they don’t do as well as their neighbors. This is explained on page 391 of Barnes et al. as follows:

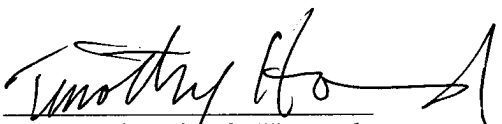
“Mortality is greatest in the seedling stage when the number of seedlings per unit area is highest.” ... “Hett (1971) followed up this work and found that the mortality rate is relatively independent of age in the early years but declines as the

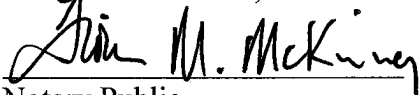
seedlings mature. As plants die, the remaining individuals become larger; the smaller plants are continually eliminated from the population.”

The primary point is that trees die at all ages, not just the young seedlings, and that the FIA definition of seedling (less than 1 inch DBH) does not help us distinguish between a group of ‘ephemeral trees’ versus ‘more lasting trees.’

15. Finally, biological functionality is a difficult term to define and a difficult thing to measure. Some of the things that could be measured that one might use in defining biological functionality of trees include: uptake of carbon dioxide, release of oxygen, carbon storage, transpiration (uptake and release of water), the amount of food provided for insects and other animals (such as leaves or bark), the amount of hiding places provided for insects, the ability to house insects to feed birds and other animals (such as nuthatches, woodpeckers, etc.), the number of nesting locations for birds and other animals (squirrels, etc.), the amount of reproduction (e.g. number of seeds produced), the amount of soil retention by the roots, the biomass of fungi hosted on the roots and the amount of soil decomposition supported, and the amount of shade provided to plants and animals living on the forest floor. All of these measurable functions increase with the size of the tree. Larger trees release more oxygen when photosynthesizing, provide more leaves for insects to eat, more branches for birds to nest on, and more trunk for woodpeckers to peck. While *all* participants in the forest ecosystem support ecosystem processes and help maintain the condition, resiliency, and full function of the forest, I see no divide in relative biological functionality between tree seedlings and saplings. Again, the argument to count saplings as ‘trees’ but not seedlings does not hold merit when considering these components of biological functionality. Simply put, the relative influence in function increases with the size of the organism, along the full continuum of size.

16. In conclusion, I recognize the difficulty in determining the appropriate stem diameter size for classifying a tree as a tree under this lawsuit. I argue that the FIA protocols and reporting methods actually use 5 inches DBH as their definition of tree, with smaller individuals being defined as saplings and seedlings. The options, if deferring to FIA, then becomes to use the botanical definition encompassing all three groups (seedling, sapling, tree) or only the largest group (tree). Alternative ways of determining how to make the size cutoff, such as tree age or contribution to ecosystem function do not help very much as very small trees (e.g. FIA-defined “seedlings”) can be decades old and saplings (and even understory trees) contribute far less biological functionality than large overstory trees.


Timothy G. Howard

Sworn to before me this 26th day
of October, 2016

Notary Public

Fiona M. McKinney
Notary Public, State of New York
01MC6122742
Qualified in Albany County
My Commission Expires February 22, 2017