

Please **REMEMBER** and take into account the input on
ENVIRONMENTAL FISCAL IMPACT
that you have already received about Toomerfs' proposal
and please acknowledge the expertise of the sources

To: Durham Planning Board / From: Joshua Meyrowitz, 7 Chesley Dr / July 27, 2022

I was startled to read the false claim in the July 21, 2021 letter by Attorneys Phoenix & Kieser (P&K) that forestry experts' evidence was first introduced for the PB on June 8, 2022 and that such input was among what P&K characterize as being deficient in contrast to the Toomerfs' "unrebutted expert evidence." Those comments suggest that the Planning Board has not given visible signs of having received and considered the expert input from foresters John Parry & Richard Hallett, whose letters were submitted many months ago. The record needs to be set straight. Here, I provide a reminder of thus-far ignored fiscal impacts of Toomerfs' project, drawn from [Richard Hallett 3-17-22](#) (bold added).

“I have deliberately confined my comments to areas which fall within my area of expertise.” – Richard Hallett, Ph.D.

The ordinance also states that the Planning Board may commission, at the applicant's expense, an independent analysis of the fiscal impact of the project on the town, **something that must go far beyond changes in assessed values for property taxes.** The independent analysis should:

- Include the cost of the loss of the ecosystem services provided by the forest that will be removed today and over the expected lifespan of the parking lot.
- Consider the increased frequency and severity of storms in the future, especially with respect to the loss of a functioning forest upslope of College Brook which subsequently drains into Great Bay.
- Consider the environmental impacts to the identified wetlands and the water quality of College Brook now and into the future.
- Consider the cost the town would need to incur to mitigate the stormwater that is currently handled by this forest patch, now and in the future.

Although Dr. Hallett specified that he was not writing on behalf of his employer, his professional qualifications are easily found online. He is a **Research Ecologist for the USDA Forest Service**, where he has worked for 28 years, and he has a **B.S. in Forest Science**, an **M.S. in Forestry**, and a **Ph.D. in Natural Resources**. His current research, research objectives, and publications are all listed at: <https://www.nrs.fs.fed.us/people/rhallett>. See excerpts from those on the next pages.

Current Research: My overall goal is to take information gained from plot level studies on forest health, productivity, and ecosystem function and design studies that examine these same issues at a landscape or regional scale.... To accomplish this shift in scale I work to devise, develop, or modify techniques that allow us to expand our studies spatially while maintaining the necessary scientific rigor.

Research Objectives

- Characterize the linkage between forest canopy chemistry and stream water chemistry and map forest canopy level cation concentrations using hyperspectral remote sensing technology to map stream water quality across the landscape.
- Discover the link that biogeochemistry has with sugar maple (and co-occurring species) health and growth across the northeastern United States and develop tools or information that can be used to make land management decisions.
- Determine the role of Ca-oxalate in forested ecosystem plant available Ca supply.
- Develop methodologies for utilizing commercially available hyperspectral remote sensing imagery for early detection of invasive insects and diseases in rural and urban forests.

Featured Publications & Products

- Hallett, Richard; Johnson, Michelle L.; Sonti, Nancy F. 2018. [Assessing the tree health impacts of salt water flooding in coastal cities: A case study in New York City](#). Landscape and Urban Planning
- Hallett, Richard ; Hallett, Tanner. 2018. [Citizen science and tree health assessment: How useful are the data?](#). Arboriculture & Urban Forestry. 44(6): 236-247.
- Zukswert, Jenna M.; Hallett, Richard ; Bailey, Scott W.; Sonti, Nancy F. 2021. [Using regional forest nutrition data to inform urban tree management in the northeastern United States](#). Urban Forestry & Urban Greening
- Pregitzer, Clara C.; Charlop-Powers, Sarah ; Bibbo, Silvia ; Forgione, Helen M.; Gunther, Bram ; Hallett, Richard A.; Bradford, Mark A. 2019. [A city-scale assessment reveals that native forest types and overstory species dominate New York City forests](#). Ecological Applications
- Pontius, Jennifer; Hanavan, Ryan P.; Hallett, Richard A.; Cook, Bruce D.; Corp, Lawrence A. 2017. [High spatial resolution spectral unmixing for mapping ash species across a complex urban environment](#). Remote Sensing of Environment
- Zalesny, Ronald S.; Casler, Michael D.; Hallett, Richard ; Lin, Chung-Ho ; Pilipovic, Andrej. 2021. [Bioremediation and soils](#). In: Stanturf, John A.; Callahan, Mac A., eds. Soils and Landscape Restoration. London: Academic Press: 237-273. Chapter 9.
- Doroski, Danica A.; Felson, Alexander J.; Bradford, Mark A.; Ashton, Mark P.; Oldfield, Emily E.; Hallett, Richard A.; Kuebbing, Sara E. 2018. [Factors driving natural regeneration beneath a planted urban forest](#). Urban Forestry & Urban Greening
- Pregitzer, Clara C.; Sonti, Nancy F.; Hallett, Richard A. 2016. [Variability in urban soils influences the health and growth of native tree seedlings](#). Ecological Restoration. 34(2): 106-116.

- Simmons, Brady L.; Hallett, Richard A.; Sonti, Nancy Falxa; Auyeung, D. S. N.; Lu, Jacqueline W. T. 2016. [Long-term outcomes of forest restoration in an urban park](#). Restoration Ecology. 24(1): 109-118.
- Hallett, Richard A.; Bailey, Scott W.; Horsley, Stephen B.; Long, Robert P. 2006. [Influence of nutrition and stress on sugar maple at a regional scale](#). Canadian Journal of Forest Research 36(9):2235-2246

Publications & Products

- Sonti, Nancy F.; Pregitzer, Clara C.; Hallett, Richard A. 2022. [Native tree seedling growth and physiology responds to variable soil conditions of urban natural areas](#). Restoration Ecology
- Piana, Max R.; Hallett, Richard A.; Aronson, Myla F. J.; Conway, Emily ; Handel, Steven N. 2021. [Natural regeneration in urban forests is limited by early-establishment dynamics: implications for management](#). Ecological Applications
- Piana, Max R.; Pregitzer, Clara C.; Hallett, Richard A. 2021. [Advancing management of urban forested natural areas: toward an urban silviculture?](#). Frontiers in Ecology and the Environment
- Pilipović, Andrej ; Zalesny, Ronald S.; Rogers, Elizabeth R.; McMahon, Bernard G.; Nelson, Neil D.; Burken, Joel G.; Hallett, Richard A.; Lin, Chung-Ho. 2021. [Establishment of Regional Phytoremediation Buffer Systems for Ecological Restoration in the Great Lakes Basin, USA. II](#). Forests
- Roman, Lara A.; Hallett, Richard ; Brandt, Leslie ; Rutledge, Annamarie ; Rodbell, Phillip. 2021. [Growing Resilience in Our Urban and Community Forests](#). City Trees: Journal of the Society of Municipal Arborists
- Sonti, Nancy Falxa; Griffin, Kevin L.; Hallett, Richard A.; Sullivan, Joe H. 2021. [Photosynthesis, fluorescence, and biomass responses of white oak seedlings to urban soil and air temperature effects](#). Physiologia Plantarum
- Zalesny, Ronald S.; Pilipović, Andrej ; Rogers, Elizabeth R.; Burken, Joel G.; Hallett, Richard A.; Lin, Chung-Ho ; McMahon, Bernard G.; Nelson, Neil D.; Wiese, Adam H.; Bauer, Edmund O.; Buechel, Larry ; DeBauche, Brent S.; Peterson, Mike ; Seegers, Ray ; Vinhal, Ryan A. 2021. [Establishment of Regional Phytoremediation Buffer Systems for Ecological Restoration in the Great Lakes Basin, USA. I. Genotype x Environment Interactions](#). Forests
- Roman, Lara A.; van Doorn, Natalie S.; McPherson, E. Gregory; Scharenbroch, Bryant C.; Henning, Jason G.; Östberg, Johan P.A.; Mueller, Lee S.; Koeser, Andrew K.; Mills, John R.; Hallett, Richard A.; Sanders, John E.; Battles, John J.; Boyer, Deborah J.; Fristensky, Jason P.; Mincey, Sarah K.; Peper, Paula J.; Vogt, Jess. 2020. [Urban tree monitoring: a field guide](#). Gen. Tech. Rep. NRS-194. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 48 p.
- Smith, Jason ; Hallett, Richard ; Groffman, Peter M. 2020. [The state factor model and urban forest restoration](#). Journal of Urban Ecology
- Sonti, Nancy ; Hallett, Richard ; Griffin, Kevin ; Trammell, Tara ; Sullivan, Joe H. 2020. [Chlorophyll fluorescence parameters, leaf traits and foliar chemistry of white oak and red maple trees in urban forest patches](#). Tree Physiology
- van Doorn, Natalie S.; Roman, Lara A.; McPherson, E. Gregory; Scharenbroch, Bryant C.; Henning, Jason G.; Östberg, Johan P.A.; Mueller, Lee S.; Koeser, Andrew K.; Mills, John R.; Hallett, Richard A.; Sanders, John E.; Battles, John ; Boyer, Debra J.; Fristensky, Jason P.; Mincey, Sarah K.; Peper, Paula J.; Vogt, Jessica M. 2020. [Urban tree monitoring: a resource guide](#). Gen. Tech. Rep. PSW-GTR-266. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 132 p.
- Johnson, Michelle L.; Novem Auyeung, D.S. ; Sonti, Nancy F.; Pregitzer, Clara C.; McMillen, Heather L.; Hallett, Richard ; Campbell, Lindsay K.; Forgione, Helen M.; Kim, Mina ; Charlop-Powers, Sarah ; Svendsen, Erika S.

2019. [Social-ecological research in urban natural areas: an emergent process for integration](#). Urban Ecosystems

- Long, Robert P.; Horsley, Stephen B.; Bailey, Scott W.; Hallett, Richard A.; Hall, Thomas J. 2019. [Sugar maple decline and lessons learned about Allegheny Plateau soils and landscapes](#). In: Stout, Susan L., ed. SILVAH: 50 years of science-management cooperation. Proceedings of the Allegheny Society of American Foresters training session; 2017 Sept. 20-22; Clarion, PA. Gen. Tech. Rep. NRS-P-186. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 80-97.
- Rogers, Elizabeth ; Zalesny, Ronald ; Hallett, Richard ; Headlee, William ; Wiese, Adam. 2019. [Relationships among Root-Shoot Ratio, Early Growth, and Health of Hybrid Poplar and Willow Clones Grown in Different Landfill Soils](#). Forests
- Sonti, Nancy F.; Hallett, Richard A.; Griffin, Kevin L.; Sullivan, Joe H. 2019. [White oak and red maple tree ring analysis reveals enhanced productivity in urban forest patches](#). Forest Ecology and Management
- Nowak, David J.; Bodine, Allison R.; Hoehn, Robert E.; Ellis, Alexis ; Hirabayashi, Satoshi ; Coville, Robert ; Auyeung, D.S. Novem; Sonti, Nancy Falxa; Hallett, Richard A.; Johnson, Michelle L.; Stephan, Emily ; Taggart, Tom ; Endreny, Ted. 2018. [The urban forest of New York City](#). Resource Bulletin NRS-117. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 82 p
- Zalesny Jr., Ronald S.; Stanturf, John A.; Gardiner, Emile S.; Bañuelos, Gary S.; Hallett, Richard A.; Hass, Amir; Stange, Craig M.; Perdue, James H.; Young, Timothy M.; Coyle, David R.; Headlee, William L. 2016. [Environmental technologies of woody crop production systems](#). BioEnergy Research
- Hanavan, Ryan P.; Pontius, Jennifer; Hallett, Richard. 2015. [A 10-Year assessment of hemlock decline in the Catskill Mountain region of New York state using hyperspectral remote sensing techniques](#). Journal of Economic Entomology. 108(1): 339-349.
- Oldfield, Emily E.; Felson, Alexander J.; Auyeung, D. S. Novem; Crowther, Thomas W.; Sonti, Nancy F.; Harada, Yoshiki; Maynard, Daniel S.; Sokol, Noah W.; Ashton, Mark S.; Warren, Robert J.; Hallett, Richard A.; Bradford, Mark A. 2015. [Growing the urban forest: tree performance in response to biotic and abiotic land management](#). Restoration Ecology. 23(5): 707-718.
- Oldfield, Emily E.; Felson, Alexander J.; Wood, Stephen A.; Hallett, Richard A.; Strickland, Michael S.; Bradford, Mark A. 2014. [Positive effects of afforestation efforts on the health of urban soils](#). Forest Ecology and Management. 313: 266-273.
- Pontius, Jennifer; Hallett, Richard. 2014. [Comprehensive methods for earlier detection and monitoring of forest decline](#). Forest Science. 60(6): 1156-1163.
- Zalesny, Ronald S.; Hallett, Richard A.; Falxa-Raymond, Nancy; Wiese, Adam H.; Birr, Bruce A. 2014. [Propagating native Salicaceae for afforestation and restoration in New York City's five boroughs](#). Native Plants Journal. 15(a):29-41.
- Hallett, R.A. 2013. [Planting forests in NYC: Is the goal restoration, reforestation, or afforestation?](#). Urbane Walder. 16: 30-32.
- Hallett, Richard A. 2013. [The value of an urban forest](#). Urbane Walder. 20:22-24.
- Long, Robert P.; Horsley, Stephen B.; Hallett, Richard A.; Bailey, Scott W. 2009. [Sugar maple growth in relation to nutrition and stress in the northeastern United States](#). Ecological Applications. 19(6): 1454-1466.
- Hallett, Richard; Pontius, Jennifer; Martin, Mary; Plourde, Lucie. 2008. [Evaluating the practical utility of hyperspectral remote sensing imagery: an EAB case study](#). In: Gottschalk, Kurt W., ed. Proceedings, 18th U.S. Department of Agriculture interagency research forum on gypsy moth and other invasive species 2007; 2007

January 9-12; Annapolis, MD. Gen. Tech. Rep. NRS-P-28. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 33-35.

- Hallett, Richard; Pontius, Jennifer; Martin, Mary; Plourde, Lucie. 2008. [The practical utility of hyperspectral remote sensing for early detection of emerald ash borer](#). In: Mastro, Victor; Lance, David; Reardon, Richard; Parra, Gregory, comps. Emerald ash borer research and development meeting; 2007 October 23-24; Pittsburgh, PA. FHTET 2008-07. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Forest Health Technology Enterprise Team: 67-68.
- Horsley, Stephen B.; Bailey, Scott W.; Ristau, Todd E.; Long, Robert P.; Hallett, Richard A. 2008. [Linking environmental gradients, species composition, and vegetation indicators of sugar maple health in the northeastern United States](#). Canadian Journal of Forest Research. 38: 1761-1774.
- Pontius, Jennifer; Martin, Mary; Plourde, Lucie; Hallett, Richard. 2008. [Hyperspectral remote sensing for early detection of invasive pests](#). In: Mastro, Victor; Lance, David; Reardon, Richard; Parra, Gregory, comps. Emerald ash borer research and development meeting; 2007 October 23-24; Pittsburgh, PA. FHTET 2008-07. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Forest Health Technology Enterprise Team: 66.
- Pontius, Jennifer; Hallett, Richard; Martin, Mary. 2005. [Using AVIRIS to assess hemlock abundance and early decline in the Catskills, New York](#). Remote Sensing of Environment. 97: 163-173.
- Bailey, S.W.; Horsley, S.B.; Long, R.B.; Hallett, R.A. 2004. [Division S-7 - forest & range soils. Influence of edaphic factors on sugar maple nutrition and health on the Allegheny Plateau](#). Soil Science of America Journal. 68: 243-252.
- Horsley, Stephen B.; Long, Robert P.; Bailey, Scott W.; Hallett, Richard A.; Wargo, Philip M. 2002. [Health of eastern North American sugar maple forests and factors affecting decline](#). Northern Journal of Applied Forestry. 19(2): 34-44.
- Smith, Marie-Louise; Ollinger, Scott V.; Martin, Mary E.; Aber, John D.; Hallett, Richard A.; Goodale, Christine L. 2002. [Direct estimation of aboveground forest productivity through hyperspectral remote sensing of canopy nitrogen](#). Ecological Applications. 12(5): 1286-1302.
- Horsley, Stephen B.; Long, Robert P.; Bailey, Scott W.; Hallett, Richard A.; Hall, Thomas J. 2000. [Factors associated with the decline disease of sugar maple on the Allegheny Plateau](#). Canadian Journal of Forest Research. 30: 1365-1378.
- Bailey, Scott W.; Horsley, Stephen B.; Long, Robert P.; Hallett, Richard A. 1999. [Influence of geologic and pedologic factors on health of sugar maple on the Allegheny Plateau](#). In: Horsley, Stephen B.; Long, Robert P., eds. Sugar maple ecology and health: proceedings of an international symposium; 1998 June 2-4; Warren, PA. Gen. Tech. Rep. NE-261. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station: 63-65.
- Hallett, Richard A.; Horsley, Stephen B.; Long, Robert P.; Bailey, Scott W.; Hall, Thomas J. 1999. [Foliar chemistry of sugar maple: a regional view](#). In: Horsley, Stephen B.; Long, Robert P., eds. Sugar maple ecology and health: proceedings of an international symposium; 1998 June 2-4; Warren, PA. Gen. Tech. Rep. NE-261. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station: 66.
- Horsley, Stephen B.; Long, Robert P.; Bailey, Scott W.; Hallett, Richard A.; Hall, Thomas J. 1999. [Factors contributing to sugar maple decline along topographic gradients on the glaciated and unglaciated Allegheny Plateau](#). In: Horsley, Stephen B.; Long, Robert P., eds. Sugar maple ecology and health: proceedings of an international symposium; 1998 June 2-4; Warren, PA. Gen. Tech. Rep. NE-261. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station: 60-62.

See also: [Communities and Landscapes of the Urban Northeast](#)

Dr. Hallett's educational background, professional experience, decades of studying trees and urban forests, and long list of research publications certainly qualify him as an "expert" whose analyses of Church Hill Woods must be taken seriously. See further excerpts from his March 2022 letter below.

The threatened trees growing on Church Hill, some of them over 80 years old, don't occupy very much land area, only 1.3 acres. This is not about land area or numbers of trees. **It's about where these trees are, in the center of a growing community, that makes them invaluable and irreplaceable. It's the benefits these trees provide and will continue to provide for the next 100 years or more. These benefits aren't in the form of the board feet of lumber they can provide.** I have read Charles Moreno's forest assessment of the site and I agree that in comparison to a forest patch in the midst of the White Mountain National Forest, the forest on this site doesn't seem like much. However, based on my experience studying urban forests in the northeastern U.S., a patch like this in the center of an urban area is priceless, even with all the issues Mr. Moreno correctly documents.

In this particular case, it is worth elaborating on the ability of trees and greenspace to mitigate stormwater. **Currently, cities across the country are spending billions of dollars to install green stormwater infrastructure. Durham has the gift of a small, forested ecosystem that is currently functioning as green stormwater infrastructure perfectly placed in its center.** Its current functionality can't be replicated after the site is altered and paved. Losing this ability to mitigate and filter runoff has implications for downstream water quality including Great Bay.*

* For implications for downstream water quality, see Professor [Wilfred Wollheim 7-7-22](#).

Please also refer back to forestry-expert input from [John Parry 3-21-22](#). Please review [Beth Olshansky 7-25-22](#), who highlights the PB's obligation to "promote health and the general welfare," according to RSA 674:17 and our Zoning Ordinance and Site Plan Regulations.

And see "Durham Site Plan Regulations Are Clear: Environmental protection supersedes tax revenue considerations," [Gail Kelley 5-11-22](#), and "Conditional-Use Projects Are...Subject to Specified Conditions!," [Joshua Meyrowitz 6-21-22](#).