



forests and wildlife. I have published papers in academic journals and received awards and fellowships for my work. A copy of my CV is attached hereto as Exhibit A.

3. I have read the memorandum of law and affidavits supporting the State's motion for summary judgment submitted by Loretta Simon of the New York State ("NYS") Office of the Attorney General and Department of Environmental Conservation ("DEC") staff, including Tate Connor and Peter Frank, and Kathy Regan from the NYS Adirondack Park Agency ("APA"). These affidavits claim that newly constructed Class II Community Connector snowmobile trails (hereafter "connector snowmobile trails") are built in the "character of a foot trail." I have also read the affidavit by Timothy G. Howard in which he claims that the connector snowmobile trails being built by DEC are "mostly improving the fragmentation state of these forests" (Howard Affidavit, page 8).

#### Observations of the Connector Snowmobile Trails

4. I personally walked several of these trails, including ones that were recently constructed and one that was under construction, during the period of August 16-19, 2016. During that week I spent 12 hours in the field observing the conditions on and adjacent to five different stretches of connector snowmobile trail. I visited three sections of the Newcomb-to-North Hudson-to-Minerva connector snowmobile trail, including the 1.3 mile section from Santanoni to Harris Lake, and over 4 miles in the sections from the Tahawus Railroad to the Roosevelt Truck Trail, and from the Hewitt Pond Road south to the end of the Forest Preserve, in the

Santanoni Historic Area, Harris Lake Intensive Use Area, and Vanderwhacker Mountain Wild Forest Area. I also visited the Seventh Lake Mountain Trail and walked the trail from the Moose River Plains Road to the Uncas Road near Eighth Lake in the Moose River Plains Wild Forest Area, over 8 miles.

5. My visits in August provided a good view of the connector snowmobile trails in all stages of construction. I reviewed sections of the Newcomb-to-North Hudson-to-Minerva trail where work was undertaken to cut out and partially grade the trail in 2015 and where other sections were recently cut out in 2016. The sections of the Seventh Lake Mountain Trail I visited were constructed in 2012.

6. During my time on these trails I reviewed them based on my knowledge as a conservation scientist. In my professional judgment, these trails resemble roads far more than foot trails, create a man-made setting, do not have “the character of a foot trail” and negatively impact the surrounding forests (Exhibit B, Photos 1-3). Attached hereto as Exhibit B are numbered copies of photographs of the snowmobile trails that I took during my fieldwork in August 2016.

7. Generally speaking, my impression was that DEC was building small roads (not foot trails) through the forest, to allow for relatively high-speed, two-way snowmobile traffic. These trails were also, by and large, suitable for any off-road or 4x4 vehicle (such as a jeep), except for a few places where the trail was so steep it seemed questionable whether any vehicle could make it up the grade. These trails retained a closed canopy for much of their length, but there were significant canopy openings at regular intervals that appeared to be the direct result of trail construction (Exhibit B, Photos 4-6). The trails also had numerous 12' wide sturdy

wooden bridges across any creeks that happened to be in the path of construction (Exhibit B, Photo 7). These bridges appeared suitable for driving full-size pickup trucks across. The snowmobile trails did not appear to be carefully designed with respect to landscape features or topography. To the contrary, it seemed as though the new trails often traveled directly up-grade on steep hills in many places (Exhibit B, Photos 8-10). In other locations the trails often crossed through areas of wet soil, leading to mud, standing water, and potential for continued erosion (Exhibit B, Photos 11-13).

#### Impacts of the Connector Snowmobile Trails

8. I am familiar with Article 14, Section 1 of the New York State Constitution. I do not believe that these road-like connector snowmobile trails meet the requirement that the Forest Preserve “be forever kept as wild forest lands.” The changes to the Forest Preserve from the construction of these connector snowmobile trails, due to their alterations of the terrain and the forest, are substantial and will be long-lasting. For the following reasons, it is my scientific judgment that the construction of these connector snowmobile trails in the Adirondack Forest Preserve is not consistent with the wild forest character of the Forest Preserve.

9. The impacts of the connector snowmobile trails on the environmental quality and wild forest nature of the Adirondack Forest Preserve can be divided into a few broad categories, including effects on wildlife, forest ecology, air and water quality, and wilderness/solitude. It is also important to consider the cumulative

impacts of these trails, in concert with the existing road and trail network and development infrastructure in the Forest Preserve, so that a proper accounting can be made of the true impacts (both marginal and cumulative) of allowing these trail-building plans to proceed.

#### Impacts of Increased Human Activity

10. The greatest impact on wildlife of the snowmobile trails will likely be the intrusion of humans and motorized vehicles into areas that previously were rarely and infrequently traversed by humans and even then, only on foot. During the winter months, the trails will be used primarily by snowmobiles, a winter recreation activity that has been shown to directly disturb and displace wildlife (e.g. Colescott and Gillingham 1998; Borkowski et al. 2006; Shanley and Pyare 2011; Laurian et al. 2012; Harris et al. 2014). The full citations to the scientific articles or studies cited in this affidavit are given in Exhibit C hereto. There is also evidence that snowmobile traffic leads to buildup of stress hormones in elk and gray wolves, (Creel et al. 2002) and similar impacts may be predicted for similar native mammal species in the Adirondacks. Displacement of wildlife by snowmobile traffic is likely to be generally only temporary, but may in some cases result in permanent relocation of sensitive animals (Seip et al. 2007). Even temporary displacement during the winter months can have severe effects, especially if snowmobile traffic causes animals to abandon den sites during the birthing season (e.g. Goldstein et al. 2010). There are also energy costs (i.e. calories burned) associated with fleeing snowmobile and skier traffic on a regular basis, and in areas with severe winter conditions, such as the

Adirondacks, these energy costs may significantly affect the survival of individual animals (Canfield et al. 1999).

11. Opening up new areas to trails also will almost inevitably increase the hunting and trapping pressure on wildlife in those areas. Studies around the world have demonstrated direct connections between road construction and human hunting (e.g. Espinosa et al. 2014, Constantino et al. 2016). While the Adirondack Park is not quite the same subsistence hunting situation as many parts of the humid tropics, it is true that being able to conveniently access new sites by snowmobile (and on foot or by skis) will make it easier for more people to hunt or trap there. Trapping is generally conducted in the winter months, and so snowmobile access will make it particularly easy to route new traplines along these new trails, adding trapping pressure to areas where none likely existed before. This could impact populations of many carnivores that could be targeted (or killed incidentally) by trappers, including bobcat, lynx, coyote, mink, otter, fisher, and marten.

12. I observed coyote tracks on one of the trails in the Moose River Plains near Seventh Lake Mountain, an area that I would categorize as an interior and remote Forest Preserve location, and it is likely the area will be frequently used by coyotes during the winter months as well (Bunnell et al. 2006, Dowd et al. 2014). White-tailed deer can use these trails too, and intrusion by them into snowy wilderness habitats may cause greater competition with moose, a species that is found in the Adirondack Park and which is thought to be sensitive to diseases and parasites carried by white-tailed deer (Garner and Porter 1991, Snaith and Beazley 2002).

### Impacts on Forest Vegetation and the Tree Canopy

13. Constructing these road-like trails through forests in the Forest Preserve will have considerable impacts on the vegetation. Most obvious, of course, is the significant direct loss of trees that are being cut to make way for the trails. I made an attempt to document larger stumps along the routes we walked, and there were quite a few large trees that had been cut (Exhibit B, Photos 14-16). In some areas, particularly on the trail that was still being built, there were signs that numerous small trees and saplings were also cut down to make room for the snowmobile trail.

14. Walking along the trails, I witnessed numerous areas where the canopy had been opened up by the trail construction process (Exhibit B, Photos 4-6). In some cases this was due to large trees being cut down directly, and in other places the canopy was open because trees along the new trail had died post-construction and lost their leaves. Either way, there was a stark vegetative difference between the open sunny areas along the trail (covered in grass and ferns, Exhibit B, Photos 17-18) and the closed canopy conditions (much less ground cover). There was also a stark difference between the ground-layer vegetation under the tree canopy on either side of the trail (often lush and dominated by dog-hobble and various species of Lycopodium and wildflowers, Exhibit B, Photo 19) and what remained on the trail in closed canopy conditions (not much, indicating poor regrowth). When we visited the much older Seventh Lake Mountain Trail in the Moose River Plains on August 19, these trends appeared to be persistent, with poor vegetative recovery in shaded areas along the trail, vs. dense sun-loving ferns and grasses in the open sunny areas

where the canopy remained broken. Edge effects such as increased wind and desiccation are thought to continue to inflict higher levels of tree mortality, and that is consistent with what I observed along the trails (e.g. Exhibit B, Photo 5).

15. Edge-effect tree mortality may eventually be mitigated by growth of new saplings along the open conditions on the sides of the trails. However, studies have shown high levels of damage caused by snowmobiles to young trees (Neumann and Merriam 1972; Stangl 1999) and so the regrowth that would otherwise be expected may be delayed or may not occur.

16. The open sunny conditions, along with the soil disturbed by trail construction, created ideal conditions for the spread of invasive plant species (Watkins et al. 2003; Dawson et al. 2015). Increased human traffic (on foot or by snowmobile/ATV) would also tend to increase the rate of spread of invasive plant and animal species. In some cases the trail construction and maintenance crews may intentionally spread non-native plants (e.g. non-native grass seed mix that may also be contaminated with non-native "weeds") along the trails as an erosion control measure (e.g. Exhibit B, Photo 1).

17. One of the trails in particular was striking in the degree to which it penetrated what appeared to me to be an old-growth forest along the Seventh Lake Mountain Trail (the Steven Signell affidavits also identify this area as old growth forest), a stretch of woods that, if it was in another place, would almost certainly be protected for the sheer size and beauty of the trees it contained (Exhibit B, Photo 20). Given how little old growth forest remains globally (Lindenmayer and Laurance 2016), it seems inappropriate and rather tragic for DEC to be building a new



snowmobiling trail right through the middle of this tract. There were numerous signs that some of the older trees were being killed by motor vehicles using the new trail (stumps, cut roots, scraped bark, etc.; Exhibit B, Photos 21-23) and there was even a section of bedrock on the trail that had been defaced by the trail building process (Exhibit B, Photo 24). This rare community type certainly was not deserving of an intensive and poorly planned snowmobile trail construction process, with the trail going straight up and down steep slopes and running right next to massive trees of various species. This particular tract of forest should have been maintained in its pristine condition, and reserved for less damaging modes of outdoor recreation, such as hiking.

#### Increased Air, Water and Noise Pollution

18. Adding motorized use through new areas of the Forest Preserve will also necessarily increase the levels of air, water, and noise pollution. Snowmobiles are notoriously loud and notoriously polluting (Musselman and Korfmacher 2007; Reimann et al. 2009). The machines destroy large expanses of quiet wilderness-quality soundscapes, reducing recreational opportunities for human users that enjoy solitude and quiet, and in some cases possibly even damaging the hearing of sensitive animal species not prepared for such noise.

19. Building new trails to promote mechanized use will increase the consumption of fossil fuels and increase the exhaust rate of carbon dioxide into the atmosphere. Given that New York State is committed in various ways to mitigating climate change (e.g. the State has a goal of reducing carbon emissions 40% from

1990 levels by 2030; NYS DEC 2016), and given that many recreational and cultural uses of the Adirondacks are directly threatened by the loss of winter snowpack due to global warming, it seems strange that the DEC would want to be in a position of advocating for more carbon-intensive mechanized use of the Adirondack Forest Preserve.

20. Based on what I observed while hiking these trails, it seems clear that the trails will increase the rate of sediment pollution into nearby creeks and rivers. As noted above, the trails were poorly planned and ran straight up and down numerous hillsides at steep angles. This design will lead to erosion in the winter time when snowmobiles spin their tracks on the hill slopes trying to make it up the grade, and in the summer time any areas of exposed soil will continue to erode. We observed several areas where the trail had already lost soil cover down to bedrock (Exhibit B, Photo 25). I also saw a few places where the trails were "pirating" the flow of water from adjacent creeks and rivulets, and this process will lead to significant erosion as more and more water flows down the steep trail grades (Exhibit B, Photo 26).

21. It also appeared that the trails were often cut sharply into the existing terrain, leaving "bench cut" scars on the sides of the trail that will continue to erode for many years (Exhibit B, Photos 27-28). At the oldest of the snowmobile trails we visited, the Seventh Lake Mountain Trail, the bench cuts were continuing to erode from the bottom, and that soil will end up in the creeks and rivers downhill.

22. There also seemed to be significant potential for erosion at the bridge sites along the connector snowmobile trails, due to the bridge construction efforts,

and the need for ramping soil up to the lips of the bridges (Exhibit B, Photos 29-30). The bridges were made out of various types of treated wood, including what appeared to be telephone-pole type timbers that were likely treated with high doses of toxic, biocidal chemicals. Such chemicals can be expected to slowly exude into the adjacent stream over the life of the bridge (after an initial pulse of rapid leaching), creating chemical pollution where none previously existed in these forested and pristine environments (Ingram et al. 1982; Hoffman et al. 1984; Evans 1987; Eisler 1989; Brooks 1996). Concerns about leaching from treated wood have led at least one Canadian province to partially ban the use of treated poles in areas where they would directly affect public drinking water (NL DEC 2001).

#### Cumulative Impacts on the Forest Preserve

23. Many of the impacts described above could be fairly described as localized in the scale of their impact. I would be remiss, however, if I didn't point out the greatest risk of allowing these snowmobile trails to be constructed under the aegis of a plan that apparently only attempts to consider and mitigate local impacts of trail construction. The DEC needs to properly account for the cumulative impacts of all of its trail construction activities, to be able to understand the degree to which the wild forest nature of the Adirondack Forest Preserve is being trampled upon. For many decades, environmental impact analyses of many types have been hamstrung by their insistence on only evaluating site-specific local impacts, which are rarely considered to be significant, due to the small scale of impact of any one trail or development project. However, decision-makers and planners have finally

been made aware of the need to consider cumulative impacts of numerous small activities that combined may serve to erode or even destroy natural resource qualities that agencies are mandated to protect (Johnson et al. 2015, D'Amico et al. 2016).

24. In this case, the noise and wildlife disturbance aspects of the snowmobile trails could be expected to spread up to several miles in either direction from the snowmobile trails (e.g. Burton 2008), especially in terms of the loss of opportunities for quiet solitude and natural soundscape conditions, and in terms of impact on sensitive wildlife, such as moose (Laurian et al. 2012). Such impacts, amplified across multiple miles of new trails, would impact many thousands of acres of "forever wild" Adirondack Forest Preserve. What would be the impacts of all of the "road effect zones" (Formann and Deblinger 2000; Ahmed et al. 2014) from these road-like trails, on the population viability of wildlife species in the Adirondacks? Answering that question would require very detailed analysis of existing wildlife populations, trends, and the trail construction plans. Researchers have demonstrated that even small, low-traffic forest roads can have significant effects on wildlife species such as birds (Ortega and Capen 2002), amphibians (Marsh and Beckman 2004; Semlitsch et al. 2007), and moose (Shanley and Pyare 2011).

25. If these trails are constructed without regard to the broader impacts, then the stage is set for the process to repeat itself as more and more roads, trails and infrastructure improvements are demanded in the name of economic progress. Ironically, as more trails are built and more areas are partially degraded by human

intrusions, this sets the stage for reducing the apparent impacts of future projects, as they would be passing through areas that are now less pristine.

26. Even at the local scale, building high-speed, high-traffic trails for snowmobile use seems entirely inconsistent with keeping the state-owned forests in the Adirondacks in a wild and pristine condition. At the broader scale, if the DEC continues to build more trails without regard to cumulative degradation of the resource base, it will fail in its mandate to protect this incredible Preserve for future generations to enjoy.

#### The State's Fragmentation Analysis is Flawed

27. I have read the affidavit of Timothy Howard of the DEC, which argues that the impacts of the construction of the network of connector trails was mitigated by closing old snowmobile trails in other places. I am also familiar with Steve Signell's work to ground-truth and visit the closed trails in the Moose River Plains that Howard references. In general, I agree with Howard's statements on the detrimental impacts of fragmenting forest systems. I do not, however, agree with Howard that there was a net benefit to the Forest Preserve in the Moose River Plains, as it appears that many of the trails that Howard cites as being closed had been closed long ago and today are already largely overgrown and reclaimed by the forest. Other trails that he cites remain in use for other purposes and will be in existence for a long time.

28. Further, it appears that Howard did not provide a full inventory of all the motorized trail and road routes in the Moose River Plains, some of which penetrate

deep into the interior. From these standpoints, I believe that much of the DEC's work to build the Seventh Lake Mountain Trail, and create a new wide trail for motor vehicles, is additive for the impacts of fragmentation and not a net benefit. It appears that any reduction in trails was often on paper as some of the trails "closed" had been effectively closed for years and were already largely overgrown.

29. The basic type of analysis performed by Howard is limited in its effectiveness as a way to measure fragmentation patterns. Howard used GIS with commonly used statistics like edge-area ratio and size of largest patch. If "wild forest nature" depended only on GIS-based patch characteristics, this would be an appropriate way to judge the impacts. But it doesn't, so this method was not legitimate for the purpose Howard used it for.

30. Howard doesn't appear to consider any key differences between the old trails and the new ones, in terms of their characteristics of width, speed of likely travel, expected amount of snowmobile traffic, and impact on canopy closure due to dead and dying trees, among other factors.

31. Howard also does not appear to consider the differences in terms of the forest habitat and the age of the forest that the trails pass through. He seems to look at all Forest Preserve habitats as being the same. For example, the Seventh Lake Mountain Trail passes through a large area that I consider to be an old growth forest. I counted rings on trees cut to build the trail that were well over 200 years old (e.g. Exhibit B, Photo 21). Where there any trails closed in old growth forests? The new trail certainly does pass through old growth, and ecologically speaking that

impact easily outweighs any minor improvements in coarse fragmentation statistics generated on paper by “closing” other trails that were already abandoned.

32. Another factor not addressed in Howard’s analysis is the differences between the old and new trails in terms of their impact on soil erosion and sediment pollution. The new trails are directly leading to erosion, due to the process of construction and what appears to be questionable routing in places on the Seventh Lake Mountain Trail where the trail was routed straight up hillsides (Exhibit B, Photos 10, 26). If the old trails are still eroding in places (such as at bench cuts and steep slopes), and you build new trails that start eroding as well, there is no mitigation. The net impact will be more and more soil loss for decades.

33. The aerial photo presented by Howard as Exhibit C is inappropriate, as a leaf-off photo of hardwood forest makes it impossible to see the impact of a trail on the forest canopy. You can't tell where the light gaps are, and you can't tell which hardwood trees are already dead. While hiking the trails, I observed numerous canopy gaps, and many of them were caused by a mixture of trees cut down for the trail, and other trees that were next to the trail that had already died since the trail was built.

34. Howard should have used all of the existing trails in his analysis. And he should have added the new trails to the fragmentation scenario, without removing any old trails that were still in use for other purposes. Any trails that were abandoned long ago should have not been included in his baseline calculations. It also would have been more accurate to take into consideration the characteristics of the new trails and the closed trails when judging the change in fragmentation

caused by the new vs. old trails. Howard should also have included an old-growth only analysis to tell what happened to the acreage of un-impacted old-growth forest as the result of building the new trails.

35. Howard's analysis would also have benefited from looking at the cumulative impacts: if there are all of these other trails present that Howard did not take into account, and if even the supposedly "closed" trails are still in use, can the DEC really claim to have an accurate handle on the cumulative impact to the wild forest nature of the Adirondacks from all of the existing trails and roads? If not, how can it argue whether or not the new snowmobile trails have a significant marginal or cumulative impact on wild forests?

36. I find that Howard was far too generous in crediting DEC with removing old trails and thus improving the fragmentation situation. In some cases that credit seems premature, since the trails are still in use. In other cases the credit seems unfair, as the trails were abandoned long ago, and the forest was already healing itself, so the impact of the new trails was purely negative.

37. Moreover, data should have been provided about past management and maintenance on the closed trails prior to their being closed altogether or prior to changing from a snowmobile trail to another use. But even if the old trails were closed on behalf of the new trails, it does take time (decades) for them to heal, and if the new trails are higher speed, higher traffic, wider, more canopy-damaging, and pass through higher-quality, more pristine habitats (e.g. old growth) then it seems mistaken to apply simple metrics of fragment shape and size, without considering the more direct and relevant characteristics of the trails themselves and their



relative degree of impact on the wild nature of the forest. High traffic, high speed trails will be much more of a barrier and disturbance to wildlife and will inflict greater negative impacts to the wild forest character of the affected portions of the Forest Preserve.

38. Even at the local scale, building high-speed, high-traffic trails for snowmobile use seems entirely inconsistent with keeping the state-owned forests in the Adirondacks in a wild and pristine condition. At the broader scale, if the DEC continues to build more trails without regard to cumulative degradation of the resource base, it will fail in its mandate to protect this incredible reserve for future generations to enjoy.

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Ronald W. Sutherland, Ph.D.

Sworn to before me this \_\_\_\_\_  
day of September, 2016.

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