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Ecological Assessment of Deer Impact on Hillside Park and Forest

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The following is a subjective assessment of the ecological impact of white-tailed deer on forest resources in Hillside Park and Forest, based on the walk-through that was part of the effort to obtain expert opinion on the health of the forested area. The assumption basic to this report is that the remaining forested areas not visited exhibit similar levels of deer impact. Obtaining a more representative sample would provide a more objective characterization of deer impact on forest health.

Vegetation

Hillside Park and Forest lie within the hemlock-white pine-northern hardwood forest type intermixed with the oak-chestnut type. As such, overstory tree species should include white pine, hemlock, beech,, red and sugar maples, sweet and yellow birches, black cherry, red and white oak, and possibly white cedar. I was able to identify red and white oak, beech, black cherry, and sweet birch overstory trees. Of all these, beech is these least preferred, and the only seedlings we saw were severely browsed beech—there were no seedlings of other tree species present as should have occurred in a healthy forest.

Other understory vegetation we saw included the exotic barberry shrub and exotic forb garlic mustard, and New York fern, a native species. None of these species is eaten by deer (unless there is nothing else left to eat), and all tend to dominate the understory in ecosystems with overabundant deer.

We saw almost no forbs (vascular plants-wildflowers- like trout lily, Indian cucumberroot, Canada mayflower, Trillium, oxalis, jack-in-the-pulpit) because these are highly preferred by deer, are always within reach of browsing, and spread by seed very slowly (dispersed by ants). We did see a few trout lily, but they were stunted in growth, had few and small leaves, and were not flowering (all indicators of heavy deer browsing), and skunk cabbage which deer do not eat.

There was virtually no ground cover (plants under 2 feet in height) and no shrub cover (vegetation 2-10 feet above ground) except for a few scattered barberry plants and another exotic shrub with white flowers. There was also almost no leaf litter on the ground, with bare ground showing in many places.

Wildlife

Because wildlife are mobile, and avoid humans, it was not unusual to see few if any. We did hear a barred owl on the woods walk. However, the lack of habitat provided by leaf litter, ground cover, and shrub cover means that ground and shrub-nesting birds, such as ovenbirds, black- throated blue and hooded warblers and wood and hermit thrushes would be absent, there would be few if any salamanders because of lack of a deep leaf litter habitat that provides cover and food (the small insects that break down and eat leaf litter), and there would be few if any varying hares or New England cottontail rabbits or even voles, mice, and shrews. Even overstory forest songbirds would be few and far between because much of the insect life they prey on to feed their nestlings would be of low availability based on virtually no habitat for these insects.

Deer browsing in the understory at Hillside Woods/Park has created the worst ecological “deer desert” that I have seen in 47 years of deer and forest research.

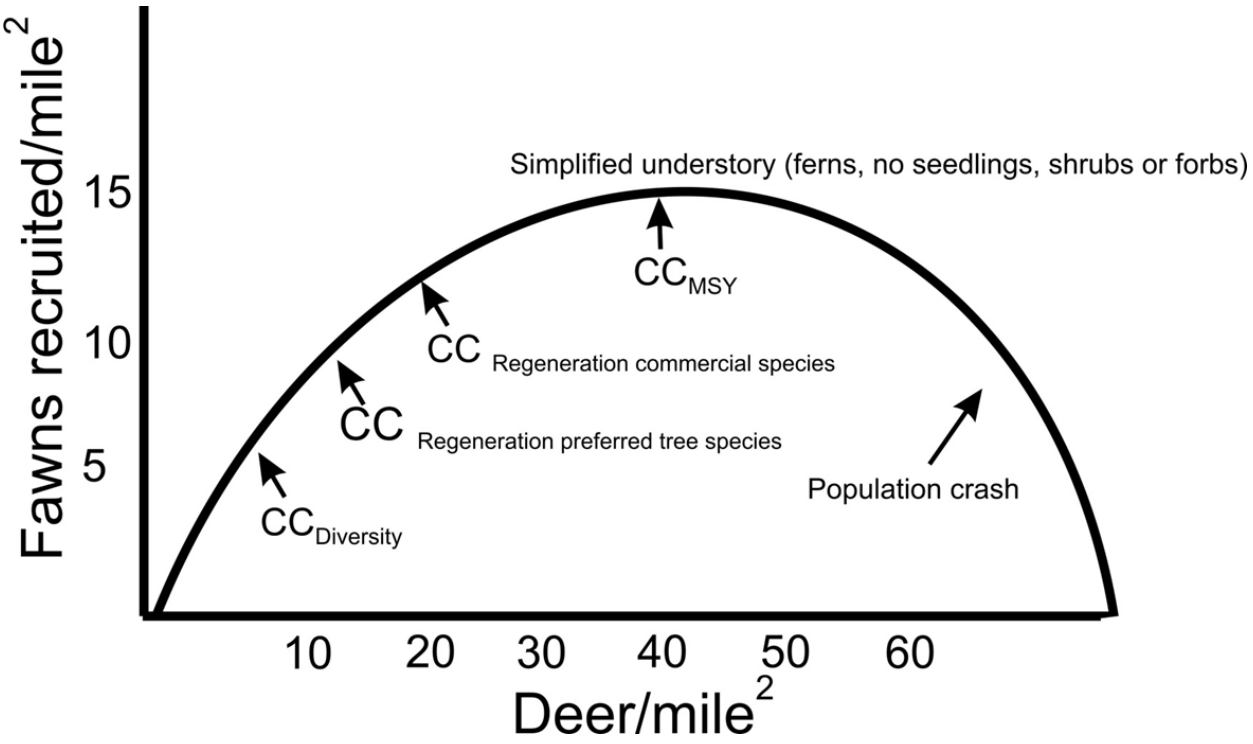
What Will the Forest Look Like in the Future?

One of the questions raised by a participant in the evening session was, “What will the woods look like in the future if nothing is done?” If the overabundant deer herd remains, in the next 5 years there probably will be little difference, excepting that there will be more garlic mustard, New York fern, and Japanese barberry in the

understory. I anticipate that by 10 years the overstory will still be much the same, and that the understory will be completely dominated and covered by garlic mustard, New York fern, and barberry. After the overstory trees begin to die and fall out because of natural mortality over the next 50-75 years, the opened overstory will stimulate higher growth of garlic mustard and New York fern but because there will be no tree saplings to progress to larger, more mature trees (because deer will have suppressed growth of all and every tree species from seedlings to taller trees—even beech seedlings, which are not preferred as deer forage, are so heavily browsed that they will never escape deer browsing to grow up into the overstory), the overstory will gradually disappear. This truncation of vertical vegetative structure has already begun, as evidenced by virtually nothing growing under 6-8 feet above ground. The associated wildlife community will likely be constricted to deer and perhaps deer mice. With no nesting or foraging habitat there will be few bird or amphibian species which will be far less abundant, if present at all.

What About the Deer?

As discussed at the evening session, the deer herd currently is a density level above the Maximum Sustained Yield. It is useful to repeat the discussion of deer carrying capacity provided during the evening discussion.



The graph above displays the relationships between deer density, recruitment of fawns, and impact on forest resources. As deer density increases (X-axis along bottom displaying deer per square mile) number of fawns "recruited" (survive to become adult deer the following winter) increases until the carrying capacity for Maximum Sustained Yield (CC_{MSY}) is reached. Beyond this point (deer density of about 40/square mile) forage is of low abundance and quality and does have fewer fawns that survive to be recruited into the population.

At diversity carrying capacity ($CC_{Diversity}$) deer density is sufficiently low (less than 10 deer/square mile) that species and vertical structure of forest vegetation are at maximum value: there is a full complement of forbs such as wildflowers, shrubs, tree seedlings with associated optimal habitat to carry the full species list and abundance of wildlife species, including birds, mammals, and amphibians and reptiles.

Once deer density elevates into the 10-18 deer/square mile abundance and number of shrubs and wildflowers decline, as does abundance and number of wildlife species requiring ground and shrub habitat. Tree seedlings of species highly preferred by deer, such as American yew, or the shrub hobble bush drop out of the ecosystem. Forest health is in decline at deer densities above 10 deer/square mile.

When deer density is in the 20-40 deer/square mile range many most if not all shrub and wildflower species are gone or severely limited in abundance and viability. Tree species of commercial value are still present as seedlings but are becoming scarce. Even fewer bird, mammal and amphibian species are present. Deer condition is beginning to decline (they weigh less and may be visibly "skinny" or boney).

When deer density exceeds that at maximum sustained yield (CC_{MSY}) there are no shrubs and few if any wildflowers in the understory which usually is taken over by ferns, garlic mustard and other plants deer do not eat (e.g., Japanese barberry). This represents the maximum number of deer the ecosystem can support without the deer population beginning to decline from reduced reproduction/recruitment. If deer density exceeds MSY, reproduction and recruitment fall even further and deer may begin to die from starvation.

It appears that deer density on Hillside Woods and Park is above MSY. I did not hear of starvation losses, so expect that deer are able to obtain additional forage from vegetation in neighboring residential areas. Likely the deer forage at night in the residential areas and retreat back to the forested Hillside Park and Woods to rest and chew their cud. However, as happens in many other places, deer will still eat ground and shrub vegetation while resting during the day, so they will continue to suppress wildflower, shrub, and tree seedlings.

It is my impression that the combined effects of the chemosterilant program, possible limited predation on fawns by coyotes, less that optimal nutrition for deer, lack of buck deer to impregnate many does, and occasional deer road kills may be suppressing recruitment to the point where there has been no deer starvation die-off—the deer have reached equilibrium with mortality factors and available forage and will maintain their high density and massive impact on forest vegetation within Hillside Park and Woods.

What to Do?

Current mortality factors appear to be only maintaining deer density at the point where the understory is and will continue to be severely depleted, as will the associated dependent wildlife community. To restore species richness and vegetative structure, and associated wildlife community deer impact will have to be severely reduced by taking deer density down to about 10 or fewer deer per square mile. This will be difficult, because if deer are removed from Hillside Woods and/or Park, deer from the surrounding areas will filter in and replace those remove by whatever means used. The only lasting solution to the problem, if the goal is to restore forest health and associated wildlife and vegetative communities, is to enclose the area with a deer-proof fence. Eliminating deer from the area will also have the added benefit of greatly reducing the incidence of deer ticks and associated health issues/concerns with Lyme disease and the now potential for Powassan virus as carried by ticks.

Deer-proof Enclosures

Tom Rawinski suggested erecting deer exclosures to convince doubting Thomases of the pervasive impact of deer on forest vegetation. I second that recommendation, and add the following advice. I would make the exclosures of woven-wire fencing, 8 feet high. I would enclose an area 10 feet X 10 feet. No need to build gates to access the inside, the results will speak for themselves. It will be critical to place at least one exclosure in a recent forest opening, as the increased sunlight will result in the exclosure being revegetated quickly. I would also place at least one exclosure under the closed forest canopy (overstory trees block most of the light) to get a comprehensive look at what protecting vegetation from deer will accomplish. The picture I have attached on the following page demonstrates what exclosures can do.

Convincing the Decision-makers

I and others (e.g. Dan Aitchley) have found it useful to conduct one-day deer density and impact workshops to provide first-hand exposure to the reality of deer impact on forest resources. The Pennsylvania Extension Service developed a one-day workshop that features a morning session on deer ecology and impact. The afternoon session takes students/administrators into the field to collect data on deer density (pellet group counts) and impact from plots along transect lines. The collected data are crunched at the end of data collection and

provide quantifiable estimates of deer density and impact, along with recommendations about what to do. These workshops are quite effective in educating administrators who have to fund and support deer management activities. I am one of the developers of the workshops and can advise you if desired on how to conduct such workshops. Equipment requirements are minimal, all that really is needed is qualified instructors and people able to identify browsed plant species for the field part of the workshop.

Fencing Hillside Woods/Park

If the powers to be decide to build a deer-proof fence to restore the ecosystem, I can provide advice on what kind of fence to build, how to build it and maintain it. There is a local contractor who seems competent and affordable.

Let me know if I can be of further assistance.

Sincerely,

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Typical deer exclosure.