Pennsylvania Deer Wars - Twenty Years Later

The first major battle in the Pennsylvania Deer Wars was contested in the 1990s on multiple fronts. White-tailed deer were accused of numerous grave sins including: 1) the failure of the forest to regenerate, 2) the failure of family farms due to crop damage, and 3) the death of dozens of Pennsylvanians from deer-vehicle collisions and Lyme disease.

Meanwhile, generations of avid deer hunters revered the first day of the Pennsylvania buck firearm season as the largest sporting event in the world with over one million participants while providing billions of dollars in annual contributions to state and local economies. Many Pennsylvania families celebrate a hunter's first deer as a rite of passage into adulthood.

Nearly every theory, fact, and figure was debated during the 1990s. Numerous research papers documented the issues of the day; several books were published. Although many of the contested issues would not stand the test of time, a number continue to persist in reoccurring skirmishes. An update on the contentious issues after 20 years:

1 - Politics of deer management - deer management decisions in Pennsylvania remain a political process intermittently contaminated with incorrect, misleading, or withheld information (often intentional). The politics of deer management is intensely driven by personalities and ideology, best described as more art than science. As the leadership of the Pennsylvania Game Commission (PGC) is appointed by the state's political leadership, they are able to avoid direct accountability to the stakeholders in deer management issues.

Although we have an enduring heritage, the simple reality is hunters are now a small fraction of the residents of Pennsylvania. Our hunting traditions are at the mercy of the masses vulnerable to incorrect, misleading information from the advocates of overabundance. With the best of intentions, our fellow hunters may accept the unverified opinions of the advocates as evidence of proof.

By far the most notable example of withholding critical information was (and continues to be) the reluctance to acknowledge and explain the costs/benefits of the shift to Maximum Sustained Yield (MSY). During the height of the Pennsylvania Deer Wars in the 1990s, the PGC refused to release their deer population model (intentional withholding of information). Eventually, the model was provided and revealed the PGC was already managing deer (since the early 1980s) at one-half of carrying capacity to achieve maximum sustained yield.

As expected, the advocates of overabundance were in total disarray. The harsh reality was the experts (who declared deer were eating themselves out of house and home) could not recognize the difference between a statewide population at 100 percent of carrying capacity (fully stocked) versus the existing population at one-half. The portrayal as a minor oversight was disrespectful to all citizens of Pennsylvania.

After the PGC disclosed the deer population was being managed at one-half of carrying capacity, the advocates of overabundance devised a new theory. They insisted deer in protected areas at 100 percent of carrying capacity would move if the deer populations in huntable areas are further reduced. Even today, the PGC is using the same flawed logic to combat Chronic Wasting Disease (CWD).

For over three decades (1990s, 2000s, and 2010s) the advocates of overabundance weaponized the politics of deer management with incorrect, misleading information. As a result, a large number of Pennsylvanians continue to believe hunters should be vilified and declared

irresponsible for supporting high deer populations in the past, and remain convinced current deer populations are destroying the environment.

The motivations of the credible researchers to remain silent for decades are confounding given the demand for transparency in other deer management issues. Among the regrettable casualties of the Pennsylvania Deer Wars is the current generation of deer researchers who have been educated to accept and employ incorrect, misleading information in deer management decisions.

Regrettably, the past (and continuing) behavior of the advocates of overabundance will likely negate their desire to assist in addressing future wildlife challenges. The acknowledgement that, "Mistakes were made in the past." will not likely appease generations of Pennsylvania hunters - from father to son to grandson.

2 - Carrying capacity is defined as the maximum sustainable number of animals the available habitat can support. Every living creature requires suitable habitat to survive, defined as an arrangement of food, water, shelter, and living space. The definition is simple and widely accepted by the scientific community which does not leave flexibility for interpretation. There is only one definition for carrying capacity.

Nevertheless, the definition of carrying capacity became vulnerable to exploitation and confusion by the advocates of overabundance with hidden agendas. The term was improperly broadened with prefixes motivated by the views of the advocate to rationalize their preferred population density for a wildlife species, in effect, creating completely novel (and different) descriptions for carrying capacity.

For white-tailed deer, the carrying capacity (normally expressed in deer per square mile) continues to increase due to human encroachment. In a similar manner as the Native Americans created excellent deer habitat by clearing large openings in the dense forest, we have created additional deer habitat by clearing large openings in wooded areas for houses and roads. Creation of edge areas (where deer thrive) has expanded the abundance of habitat in both quantity and quality. Pennsylvania is blessed with an increasing abundance of quality deer habitat.

As a reality check, the ability of the habitat to support local deer populations in Pennsylvania has huge variations from five deer per square mile in pole timber to 200 deer per square mile in mixed woodlots.

3 - Maximum Sustained Yield (MSY) - the definitions for carrying capacity and maximum sustained yield are vulnerable to exploitation by the advocates of overabundance.

Carrying capacity is the *maximum sustainable* number of animals

whereas,

Maximum sustained yield produces the *maximum* number of fawns

As the words *maximum* and *sustain* appear in both, the advocates may attempt to improperly conflate the two entirely different concepts. For comparison, maximum sustained yield is normally achieved at about one-half the carrying capacity.

In the early 1980s, the professional staff of the PGC (led by a small group of deer biologists) lowered deer densities to 50 percent of carrying capacity. The shift to maximum sustained yield was implemented by increasing antlerless license quotas over several years by reducing the deer density goal for forest habitat by one-half. After one decade, the reported harvest increased by 50

percent from 1980 (135,000) to 1990 (205,000). Both the antlered and antlerless harvests benefited from the dramatic increases in fawn production.

Nevertheless the hunters of Pennsylvania were widely vilified and declared irresponsible by the advocates of overabundance for supporting a high (and ever increasing) deer population, even though the actual sightings of adult females by hunters were only one-half of what they were in the 1960s and 1970s.

In nearly every analysis, the shift to maximum sustained yield for white-tailed deer management in North America has been recognized as the most significant development in wildlife management during the last 50 years, only exceeded by the overwhelming success story for the recovery of white-tailed deer populations in the last century.

Even today, the deer experts in Pennsylvania (who claim only they are qualified to manage deer) continue to vilify anyone who suggests maximum sustained yield was an overwhelming success. The advocates of overabundance continue to demand the PGC staff "Keep it Simple" and not even acknowledge the existence of maximum sustained yield.

For the typical deer manager, the double blessing of a population at maximum sustained yield resolves the contentious issues as most parties are relatively happy (or at least accepting) of higher harvests with fewer deer. The need for action (or compromise) to adjudicate a settlement is easy when the deer population is already at 50 percent of carrying capacity.

Understanding the costs and benefits of maximum sustained yield generates complex issues unknown to previous generations of deer managers. A deer population at one-half the carrying capacity responds differently than a population at the carrying capacity. Several responses are interrelated with multiple feedback loops requiring a decade or more to achieve stability.

The responses may be viewed by different stakeholders as either a cost or a benefit (disadvantage or advantage). Several changes result in unintended consequences, not desired by either party. Most important, the deer herd observed by Pennsylvania hunters in the field today is much different than in the 1960s and 1970s.

Deer health - the overall health of the deer population improves as the consumption of high quality, protein-rich food consumed by a deer herd at 100 percent of carrying capacity is redirected to improve the health of the remaining population (both males and females). As the post-season population is reduced, the reproductive rate (fawns per female) increases with the health of females. Twins and triplets are possible for adult females, and fawn does begin to reproduce. With better nutrition, the average weight and antler size improve for bucks of all age classes.

Habitat recovery - the habitat benefits from the reduction in the amount of vegetation consumed by a deer population at 50 percent of the carrying capacity. After the shift to maximum sustained yield, decades may be required to observe the slow steady response of the habitat from fewer deer. As the habitat recovers, the carrying capacity continues to increase thereby supporting a higher deer population.

Deer sightings - a reduction in the population of adult females by one-half over large areas is enormous with a corresponding reduction in the number of adult female sightings by hunters. The concern of hunters may be further aggravated when they compare the number of sightings in urban areas, suburban areas, and protected parks (populations at 100 percent of the carrying capacity).

While high harvests provide satisfaction for successful hunters, the lower number of deer sightings reduces satisfaction for other hunters. The tradeoff between the benefit (higher harvest

success) to the cost (fewer deer sightings) depends on the prospective of each hunter. For understanding, a scientific survey found hunters value deer sightings (72 percent) over harvest success (27 percent). Likewise, deer sightings are important to retain the interest of young hunters and aging seniors.

Seasons and bag limits - higher harvests are required to offset the higher number of fawns to maintain a deer population at 50 percent of carrying capacity. Longer seasons with higher bag limits for female deer are required. Maximum sustained yield requires the higher hunting pressure to be sustained year after year. Otherwise, the deer population would revert back to 100 percent of the carrying capacity. Higher reproduction provides the option for hunters to harvest multiple deer per year.

Sex-age structure - unnoticed by most Pennsylvania hunters, maximum sustained yield alters the structure of the deer herd in huntable areas, both in abundance and sex-age distribution. Given the older hunters from the 1960s and 1970s hunt today in the same type of habitat, they should expect to see about half the number of adult females than they spotted in the 1960s and 1970s. In addition to the reduction in deer density, the average age of the population is younger as fawns comprise a larger portion (40 to 60 percent) of the pre-season population.

Female-to-male ratio is often cited as an overall measure for the health of a deer population. The metric is the ratio of the pre-season female (doe) to male (buck) of the breeding population. Maximum sustained yield results in lower female-to-male ratios as adult females are replaced in the post-season population by fawns (male and female). Under maximum sustained yield, the female-to-male ratio typically varies from 1.5 to 2.2. The range of ratios allows every available female to be bred. A number of advocates continue to distort the ratio by citing the ratio for the post-season (vice pre-season) or to generalize the ratio as the antlerless to antlered ratio. Neither variation is correct.

Deer population models - the accuracy of models based on harvest statistics is seriously diminished. That is, the ability to correlate harvest data with population size *does not apply* for populations managed for maximum sustained yield. Specifically, harvest data before, during, and after the shift to maximum sustained yield cannot be used to reconstruct the actual size of a deer population without precise knowledge of the reproductive rate (fawns per female), non-hunting mortality, and hunter effort for each local deer population. A census of live deer is the most accurate measure of the post-season population. Deer drives in the early spring are the most reliable.

During the 1990s, there was considerable debate concerning the accuracy (and precision) of the estimates for the annual deer harvest and the post-season deer population. The numbers were not believable as the deer population would be depleted within a few years given the high annual hunting harvests. Furthermore, other losses from wounding and non-hunting mortality (disease, parasites, starvation, weather, accidents, and predators) were not included in the statistics.

Nevertheless, based on the mistaken assessment of a large (and increasing) deer population from the harvest data, the leadership of the Pennsylvania Game Commission (unaware of the shift to maximum sustained yield) enacted aggressive herd reduction policies to correct the perceived overabundance. To this day, the Pennsylvania hunters continued to be belittled for triggering severe environmental damage from deer overabundance vice being commended for providing a valuable ecological service to the citizens of the state by restraining the population at one-half the carrying capacity.

4 - Public versus private property - while differences in hunting success on property accessible to public hunters versus posted private property were acknowledged in the 1990s, no actions (such as private land antlerless tags) were retained to compensate for the differences. Accordingly, the aggressive herd reduction policies disproportionality affected the deer densities on public property and open private property. Furthermore given the prior differences in deer densities, the responses to maximum sustained yield were different in time and duration. Likewise, the different properties experienced (and continue to observe) different results with antler restrictions.

The public versus private debate is entrenched in the political arena. A number of hunters believe the issue would quickly resolve if each of the PGC Commissioners and PGC Staff would be required for one year (a pledge) to only hunt deer on public property and open private property.

5 - Time lag effects - the impact of a management decision (such as increasing the antlerless quota for the upcoming year) on the deer harvest will lag behind several years. As an example, there is a three-season time lag between the setting of the antlerless quota for the upcoming season and the availability of yearling bucks for harvest three seasons in the future. The buck is an embryo (first year), a fawn buck (second year), and a yearling buck (third year). Therefore, the harvest of the mother doe in the first year or the harvest of the fawn buck in the second year removes the yearling buck from the third year.

Thus, the limited comparison provided annually by the PGC (current year versus previous year) is nearly meaningless. Likewise, the press releases providing an estimate of the deer harvest (accurate and precise) to six significant digits (such as 389,431 for 2019-20) is statistically flawed. In addition, the annual harvest estimate includes deer taken on posted private property. As such, the harvest data may not be representative of most properties open to public hunting.

6 - Antler restrictions do not contribute to the health of the deer population by restoring the breeding ecology. Every antlered buck could be harvested in a deer management area (or entire state) and the population would remain healthy and genetically diverse. In the event all antlered bucks were removed, the remaining fawn bucks would sexually mature before the next season, disperse from their birthplace, and breed the available does (same as the present), thus ensuring the survival of the species year after year.

For historical context, the PGC restricted the harvest of spike bucks in 1925 in the mistaken belief all yearling bucks were spikes. Regrettably, the restriction allowed for the unlimited harvest of yearling bucks (3 total points or more) while prohibiting the harvest of smaller yearling bucks (spikes). Thereby, spike bucks survived to breed and pass on their inferior genetics. The resulting slow decline in antler genetics over decades is called *high grading*, the selective removal from the population of the genetics of yearling bucks with branched antlers. The harvest of spike bucks by hunters in Pennsylvania was prohibited for 28 years (1925 to 1953) resulting in the genetic drift toward inferior antlered bucks.

The lack of biological knowledge in the 1920s had a lasting impact on the deer population. After the restrictions were rescinded in 1953, Pennsylvania hunters became known as spike shooters as generations of inferior genetics had forced the gene pool toward the development of smaller antlers on yearling bucks.

Quality Deer Management (QDM), a term frequently associated with antler restrictions, also employs the principles of maximum sustained yield. Although separate and distinct, antler restrictions were offered as an inducement for Pennsylvania hunters to accept a smaller deer herd in exchange for larger bucks. Maximum sustained yield does not require antler restrictions to be successful. Conversely, maximum sustained yield is an essential component of antler restrictions. In any case, the herd reduction in the 2000s was not necessary as the Pennsylvania deer herd was already being managed at 50 percent of carrying capacity.

7 - Deer Damage Demonstration Areas - Many of the advocates of overabundance mandated the presence of white-tailed deer should have *zero impact* on other species (plant or animal). The claim is scientifically flawed given white-tailed deer (like every animal including humans) must eat to survive. Biologically, deer are classified as herbivores (plant eaters). They graze on vegetation at ground level and browse on the tender shoots of woody bushes and trees.

Over several decades in a play of misdirection, the advocates have shrewdly moved the goalposts from *zero impact* to *zero deer density*. The specific tool chosen to demonstrate the negative impacts of deer to the public is an exclosure (a fence that excludes deer from an area). Thousands of exclosures exist throughout the United States. Many are marked "Deer Damage Demonstration Area" as scientific proof of the negative impacts of deer.

Similarly, nearly every presentation on the forest habitat contains a picture of an exclosure showing a dramatic difference in vegetation growth inside versus outside the fence. A picture is worth a thousand words. How could anyone disagree?

The deception involves the fraud that an exclosure is a valid tool for scientific research. In reality, an exclosure has *zero deer density*, a condition that does not exist in nature. There is a huge difference in the growth of vegetation when comparing an area inside an exclosure with zero deer density and huntable areas with a realistic deer density. Studies by three Pennsylvania state agencies to document the adverse effects of white-tailed deer on forest regeneration states,

> "Exclosures demonstrate plant growth potential in the absence of deer, an uncommon situation in Pennsylvania, and therefore are not representative of the many interrelated factors that affect plant growth in the presence of deer, such as species composition of a forest stand, age and rate of growth of vegetation, tolerance of vegetation to browsing, site quality, deer density, age and sex composition of the deer herd, intensity of browsing, and time of year at which browsing occurs."

For comparison, an exclosure (a fence that excludes deer from an area) is entirely different than an enclosure (a fence that restricts deer to a confined area). Valid scientific studies with enclosures are designed to replicate a specific desired deer density by placing deer in a predetermined fenced area. As an example to replicate 20 deer per square mile, one deer would be confined to one-twentieth of a square mile (32 acres) or two deer confined to one-tenth of a square mile (64 acres). Valid multiyear studies with enclosures document the impact of high deer densities on the health of the deer herd and the habitat.

Despite the fact exclosures are not valid for scientific research, the advocates defend the manipulation as the "ends justify the means" given that exclosures raise public awareness to protect the habitat.

8 - New forests of Pennsylvania - a review of the history of our forests is instructive. The old settlers claim a squirrel could travel without touching the ground from the Atlantic Ocean to the

Mississippi River. Regrettably, during the late 1800s and early 1900s timber barons marched westward clearcutting the old-growth forests of Pennsylvania from the Delaware River to Lake Erie. Interesting to note that an exclosure (a fence that excludes deer from an area) nearly replicates the conditions present when the timber barons clearcut the old-growth forest. The existing deer population (present after clearcutting) was only about one percent of the original population.

When the forest canopy is removed, the regeneration of the new forest is determined by what remains behind. A number of factors influence the composition of the future forest, including: site preparation, soil conditions (fertility, moisture, temperature, terrain, and compaction), and condition of the seed bank (type, viability, and dispersal).

The new forests (which sprouted after the *timber barons*) do not resemble the old-growth forests. Our Pennsylvania forests are much different now, more valuable and vulnerable than the pre-settlement forests.

As any natural system is disturbed, the force of nature attempts to restore the ecosystem to its original condition. Mother Nature can be unforgiving to impulsive manipulators. Within the last century, she has raised an army of insects and diseases to restore her old-growth forests. Every year our new forests suffer premature death and widespread defoliation events. The economic costs to artificially sustain a different forest can be prohibitive.

9 - Need for hunters - in the strangest twist of fate, the advocates of overabundance need hunters to control deer populations to protect the habitat for plants and other wildlife. Without hunters, the population would stabilize at 100 percent of the carrying capacity. Hunters restrain populations at one-half of the carrying capacity. With no hunters, the advocates would need to install fences around every federal and state property to protect the habitat by excluding a native wildlife species (white-tailed deer) from their native habitat.

10 - Plan of action - After 20 years of confusion and distrust, the following actions are necessary to restore effective deer management in Pennsylvania:

- Continue to expose incorrect, misleading information
- Educate the public on the benefits and costs of maximum sustained yield
- Reduce the size of management units
- Conduct live deer census
- Restore collection of biological data to monitor reproduction
- Manage deer populations differently on public versus posted private property
- Reconsider antler restrictions
- Implement Citizens Task Forces

11 - Summary - while a number of the contested issues continue to persist after 20 years, the primary justification for the Pennsylvania Deer Wars does not, that was, “Deer are eating themselves out of house and home.” Likewise, the battle cry that “Deer hunters want a deer behind every tree” was political babble. Given what we know now, the harm to our hunting heritage and the economies of rural Pennsylvania was unnecessary.

Given the enormous amount of resources available to study white-tailed deer, the motivations of the advocates to resort to academic dishonesty is difficult to justify. While every profession

has persons who are less than forthcoming, the tolerance of the majority for the few is perplexing. The dishonesty erodes the ability of credible researchers to participate in future wildlife conflicts.

Over the years, we have confronted many of the advocates of overabundance with their incorrect, misleading information. Most privately acknowledge their arguments are basically ideological and may be misconstrued by others, but nevertheless continue to exploit the political process as they believe the continued weaponization of the politics is to their benefit. Regrettably, we still remain AT WAR.