

# Chapter 19

## Wildlife Contraception and Political Cuisinarts



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### Introduction

New ideas, particularly in the sciences, often elicit strong responses. These run the gamut from rational to dogmatic. This is true even for ideas that have been proven and validated. A variety of organizations, all with sizable constituencies and bearing burdens founded in culture, politics, economics and bureaucracy often feel threatened by new advances because of possible impact on the agendas that serve their own memberships. While their concerns differ, the approach to discredit the new ideas is boringly similar: undermine the idea with purposeful distortions, out of context arguments, irrelevant comparisons and refusal to accept published science. But the results are always the same. At worst the public pushes back from the advances, and at best it becomes ambivalent.

Prior to human intervention, wildlife populations were controlled by the natural processes causing mortality. When animal populations exceeded the carrying capacity of their environment, the environment degraded and resident species died from starvation and disease. Coincidentally, the high population density led to a decrease in reproductive success because in animals the age of first breeding was delayed, fewer offspring were produced and juvenile mortality increased.

Historically humans have imposed artificial mortality control upon wild populations through regulated hunting, trapping and poisoning. This was accepted as a normal and essential aspect of human survival. It remains a significant part of human culture and continues to be the primary management tool for some species. However, increasing urbanization, the withdrawal of private lands from the public hunting

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domain, regulatory prohibitions on the use of poisons and trapping, low fur prices and changing public attitudes about lethal wildlife control have reduced the effectiveness of human-induced mortality control as a management tool. We presently face exploding populations of some highly adaptable or protected species but without acceptable management tools for protecting associated environment and animals alike. These events and factors are generally recognized as the impetus behind the emergence of the concept of wildlife fertility control (Asa & Porton, 2005; Rutberg, 2013). The question was how to make it a reality. It seemed that the simplest and least controversial approach to solving the new problems of wildlife management would be the application of existing human hormonal contraceptives to wildlife. Well, nothing is so simple, and the scientists who embarked on this journey to develop new technology and begin applying it might just as well have become involved in the global warming, gay marriage, gun control and universal health-care issues.

An almost humorous dimension of this is that those same scientists had entered eagerly into this endeavor simply to solve a societal problem. They knew from the start that this endeavor, successful or not, was not a profit-making venture. It was an effort to face the fact that the ever-expanding human population was compressing wildlife space into limited islands of habitat. The options for quelling this rising tide were three: kill, remove (to where?) or slow down reproduction rates. The first was considered unacceptable, the second would run out of space and the third stood alone as logical (Kirkpatrick & Turner, 1985, 1991).

The pursuit of this arcane science, i.e. wildlife contraception, started with hormonal steroids such as used in human birth control, but the key technological breakthrough occurred about 1990 when vaccine-based contraception replaced traditional steroid-based approaches. Very quickly success with a porcine zona pellucida (PZP)-based vaccine was demonstrated in wild horses (Kirkpatrick, Liu, & Turner 1990), white-tailed deer (McShea et al., 1997; Turner, Liu, & Kirkpatrick, 1992), feral burros (Turner, Liu, & Kirkpatrick, 1996), captive exotic species in zoos (Kirkpatrick, Zimmermann, Kolter, Liu, & Turner, 1995) and a bit later with African elephants (Fayrer-Hosken, Grobler, Van Altena, Kirkpatrick, & Bertschinger, 2000) and bison (Duncan, King, & Kirkpatrick, 2013). To the surprise and chagrin of the researchers, objections were raised. The two species that evoked the loudest cries were wild horses and urban deer.

## Wild Horses

In the case of wild horses, opposition initially arose within wild horse advocacy groups, notably large and politically active organizations. These groups based their objections not on specific scientific arguments, but rather on the wishful thinking that a large, fecund adaptable wild species could be left unmanaged on public lands used for a wide spectrum of purposes, mostly driven by economic interests. A major complicating factor was the passage of the Free-Roaming Wild Horse and Burro Act

of 1971, which imparted almost complete protection to these animals without a hint of effective management.

Predictably, these highly fecund wild horse populations grew from an estimated 17,000 in 1971 to somewhere between 60,000 and 80,000 by the early 1980s. With a myopic view of reality, the interest groups argued for no management under the delusion of self-regulation (which translates into range destruction and starvation), or by predation (despite the absence of effective predation on wild horses in most horse ranges). They also argued that if the economically valuable cattle and sheep were removed from public lands, there would be more habitat for wild horses. However, despite horses representing less than 10% of mouths grazing public land, their lack of economic value made them a ready target.

The opening barrage of opposition to horse population management was not very successful from a legislative standpoint, but litigation and a variety of legal actions became the norm and consequently stalled progress in contraceptive management. The federal government, largely represented by the Bureau of Land Management, installed in 1973 a management system known as Adopt-A-Horse, in which large numbers of horses were captured through helicopter round-up and then removed from the range for adoption of younger ones by the public. Horse injury and mortality were common, and tensions grew between the government and advocacy groups, fueling more litigation. Aside from the questionable humane aspects of this approach, it was neither logistically nor economically successful in keeping up with reproduction on the range (Bartholow, 2008). Lagging adoptions resulted in “surplus” horses that had to be quartered, fed and cared for, and currently there are more than 60,000 wild horses in long-term holding facilities. The annual cost to the taxpayer was more than \$75 million in 2013 (De Seve & Boyles-Griffin, 2013) and has continued to rapidly rise to the present.

This management inadequacy combined with encouragement for population control by the National Academy of Sciences provoked some moderate interest by the BLM in fertility control. Between 1977 and the present, the agency has provided varying levels of financial support for the advancement and application of contraceptive technology. However, as time went by, outside demands to expand the application of fertility control became more strident. Intransigence and even opposition to fertility control grew within the agency (National Academy of Science Reports, 1980 and 2013). In fact, despite a clear statement in the 2013 NAS Report that the BLM needed to apply contraception intensively, little change in application rate has occurred to date.

In order to understand the lack of an organized front in moving to a new BLM management paradigm, one has to examine the administrative structure of BLM. Each of the ten western states with wild horses has a state office under the administration of a politically appointed state director. Quite often these directors are appointed for their ability to manage (facilitate) economic uses of public lands (e.g., livestock grazing, mining, energy development and a plethora of recreational uses). Also, each state director is more or less a free agent, and unless their policies are outright illegal, no one in Washington can challenge them. Some state directors

were open-minded and sympathetic to the wild horse plight and some were not, thus there was no coordinated forward movement across the west.

Within each state there are numerous herd management areas (HMAs), each with its own personnel with the responsibility for managing the horses in their HMA. Often consensus on this subject did not exist across HMAs, even within a particular state. Some opposition came from the HMA field managers and was culturally based. A spoken theme delivered to the scientists on numerous occasions by these field managers and crew explained that “we don’t do it that way out here; we do it with saddle-horses and ropes.” They failed to mention the helicopters that were central to round ups, but their point was clear. This cultural perspective impeded progress.

The Washington and Reno offices of the BLM, which ostensibly oversee all dimensions of the wild horse program, were more or less detached from the realities of the field operations. They too had their conflicts with which to deal. For example, several ranching families throughout the west made millions of dollars annually rounding up wild horses under contract to the BLM. These contracted operations merely mocked the fertility control approach in the early years, but as its application spread, they became vocal opponents. Fertility control was an approach that might cut into the considerable public dollars flowing into their businesses. Some published newsletters complaining about fertility control, and in the Washington (DC) and Reno offices there were those who were sympathetic to keeping the contracted services happy.

As the horse number grew, few state BLM offices paid much attention to the DC/Reno oversight of the program. In 2009 the Washington office sent out a memo to all state offices and HMAs making it clear that when a round-up occurred, any horses to be returned to the range were to be treated with a contraceptive vaccine. A week after the memo went out, an HMA in one western state simply went on the electronic media to declare that this approach did not work, and they would not use it.

Additional cultural and political resistance developed in the central offices. By 2012 one very effective contraceptive vaccine (PZP) was federally approved by EPA and the registration was held by the world’s largest animal welfare organization. This particular organization had a history of conflict with the BLM (including instances of litigation), and old wounds were opened. Thus, the DC/Reno offices began to reject fertility control or at least make it difficult to apply, largely because they were disaffected with the organization that held the vaccine registration. One excuse was that BLM did not have the money with which to train BLM personnel to use the vaccine, as required by EPA. Another was that they had problems storing and preparing the vaccine, despite the routine nature of that. A third argument was that too much federal paperwork was required for site-specific permission to use it.

A different version of discontent came from the ranching community. Once again there was little in the way of agreement in this realm. A large segment of the ranching industry, represented primarily by those who used the public lands for grazing, opposed fertility control because they wanted horse removal rather than stewardship. Some in the ranching community were more sympathetic and supported fertility control. A good example of the former was seen with litigation in

2015 by a group of Nevada ranchers who demanded that all horses rounded up be permanently removed, which would indirectly prevent contraceptive use. Various iterations of this approval have been applied on the basis that federal law provides an upper limit for horse numbers on each herd area.

The law requires that a given population exceeding its assigned appropriate management level (AML) be reduced to that level and maintained there or below it. BLM has attempted to do this almost exclusively by removal of horses and has failed overall. The program-wide horse numbers on the range in 2019 are rapidly approaching 90,000 in the face of an agency goal of 35,000. This situation exists despite BLM's own funding of research yielding significant PZP vaccine improvements (e.g., Turner et al., 2008; Turner, Liu, Flanagan, Bynum, & Rutberg, 2002) and the regular pleas of the science community for the past 25 years to incorporate aggressive program-wide vaccine contraception into wild horse management.

A good example of this was published in 2013 in the widely read journal *Science* (Garrott & Oli, 2013). Unfortunately, and despite such appeals, since 2017 the agency has taken a mantra-like stance of "remove to AML, before any contraception." This position creates a quandary, since AML has been unavailable for many HMA's despite the effort. The fact is that a coincident combination approach of some (e.g., 50%) "catch/removal" and some (e.g., 50%) "catch/contraception/release" is the solution supported by data-based modelling. This information in various forms has been provided to the agency since 2012. At this point the cost either way is monumental.

As a retrospective on how damaging culture and politics can be to scientific progress and outcome application, it is noteworthy that the National Park Service began using vaccine contraception as the lone management tool for the wild horse population on Assateague Island National Seashore in 1994 and has successfully continued this form of management to the present (Kirkpatrick & Turner, 2008). While identical vaccine application eventually occurred in select small wild horse populations in the western United States, it required 8 years of regular pestering. It has been highly successful but has required the concerted effort of a few committed BLM field managers and local citizens. In other words, the BLM is not embracing it.

In deference to the agency, many herd areas (HMAs) contain horse numbers in the many hundreds that are not readily accessible by darting. However, the BLM has known since 2004 (because BLM funded the research) that a one-injection vaccine with 1–2 years of effectiveness was available for treating the many gathered mares that were returned to the range, thus preventing thousands of foals. BLM instead treated only as a small percentage, expressing various "reasons" but again not embracing contraception. The long delay in BLM approval and the continued limited acceptance of contraception in DC and Reno again have reflected the power of misinformation and personal, cultural and political bias.

It is worth noting that the relative autonomy at the local and state level of the agency has more enabled status quo rather than progress in horse population management. On the other hand it is not fair to fault the many employees who are doing the best they can in the face of the local realities they deal with, i.e., ranchers, horse advocates, habitat advocates, recreationists, anti-government souls, loonies and the

paperwork and logistics of multi-tasking land stewardship. As with any organization, some folks are dedicated and some are just seeing a job. However, the byzantine nature of the agency does not foster timely progress. As is the case with most giant organizations, bureaucracy is the gun with which the agency shoots itself in the foot.

Going back to the subject of logic regarding wild horse control, it is ironic that with only a few exceptions, the wild horse advocacy groups reversed track by 2010 and began to support fertility control. This reversal was based on their realizing that the only three choices were (1) range destruction/starvation, (2) round up and removal or (3) fertility control. Predation, self-regulation and disappearance of livestock were simply never going to happen. Thus, they embraced fertility control by default. That reversal, while friendly to the fertility control paradigm, only seemed to increase the polarization with the larger BLM (if the advocates like it, we do not!)

The optimistic beginning to a perceived solution for regulating wild horse populations by a small group of scientists trying to find a better and more humane future for innocent animals morphed into a cultural and political nightmare. No one was prepared for the firestorm that came from their efforts, and to date the solution remains within reach but unrealized. In April 2019 a document focused on “A Path Forward for Management of BLM’s Wild Horses and Burros” was put forth by a coalition of 12 organizations of varying purpose to provide Congress and BLM with a clear picture of issues, approaches and a long-term view for addressing this crisis. Thus, the effort continues.

## Urban Deer

The controversy surrounding urban deer fertility control is less convoluted than with horses but far more intense. Again, it caught the scientists by surprise. What could possibly be controversial about inhibiting reproduction in urban deer that are eating shrubbery, causing car accidents and damaging the remaining urban woodlands?

The possible application of fertility control for controlling urban deer populations via a contraceptive vaccine was first broached in 1988 at a Princeton conference, and reactions by managing agencies ranged from frowns to amusement. The managing entities consisted of state fish and game agencies, which by law are responsible for wildlife management in their respective states. Soon after the conference, several organizations (including a New Jersey arboretum, a public park in Philadelphia and a group of small communities on Long Island, NY) began lobbying for fertility control. The state agencies sobered a bit and began pushing back.

Initially their arguments against urban deer fertility control centered on a list of hypothetical biological consequences and to a lesser extent on the cultural philosophy that hunting was the only solution (Turner, 1997). Based on these objections, states in which projects were proposed (NJ, PA and NY) simply refused to issue permits to conduct any trials. Subsequently, Turner et al. (Turner et al., 1992) demonstrated that the PZP vaccine (same as used in horses) provided excellent contra-

ceptive efficacy in captive white-tailed deer. Captive studies continued, and researchers requested permission to perform field trials in Metro parks where hunting is prohibited.

By this time, an unspoken undercurrent was developing in state wildlife agencies that contraceptive management of deer living in urban communities and city parks could somehow become a threat to recreational hunting. Driving that concern in part were declining hunting-license sales across the United States and the potential further loss of revenue if deer contraception expanded. While the agency revenue loss would be significant, the potential loss of ancillary revenue related to hunting would be enormous. Hunters buy weapons and gear, stay in motels, put gas into their vehicles, dine in restaurants, purchase ammunition, etc. This concern led the commercial facets of the hunting industry to take a stand against fertility control. The state agencies in turn blurred the lines between urban deer and truly wild deer in the forests. Opposition grew, and urban deer kept eating ornamental shrubbery.

However, states do not have jurisdiction over wildlife on federal lands, so the scientists found several federal field sites for testing the idea of managing urban deer without the need for state approval. The first was a trial at the Smithsonian Institute's Conservation and Research Center in Front Royal, VA. The trial was successful and generated useful data (McShea et al., 1997). The second test occurred in a group of small communities on Fire Island National Seashore (FIIS), in NY. This was a National Park Service (NPS) unit and beyond the legal jurisdiction of the state. As plans progressed, however, the state raised strident objections, all based on "biological" issues. By this time, counterparts in PA and NJ had also refused to allow fertility control to move forward and were beginning to coordinate their objections. It was clear that the issue was a powder keg and that other states were going to join in the effort to prevent urban deer fertility control.

Despite this, the project on FIIS went forward because of the federal classification. The New York Department of Environmental Conservation (DEC), realizing that the project seemed inevitable, threatened the NPS with a lawsuit to stop the project. The NPS, through its regional science office, responded with a terse message that challenged NY to see who really did have authority there. Cooler heads prevailed in Albany and the project went forward. To illustrate the degree of threat seen by state agencies, it is notable that the head of the New Jersey fish and game agency threatened to sue New York for allowing the project to get underway. No action was taken, but it indicated the seriousness with which states viewed fertility control as a threat.

The NPS and even the scientists were also soon informed of a possible lawsuit by a collection of hunting groups on Long Island. While nothing came of that, it signaled the entrance of the larger hunting community into the fray. In the end the project went forward and after 17 years of fertility control the deer population in these communities was reduced by 70% without the removal of a single deer (Naugle, Rutberg, Underwood, Turner, & Liu, 2002; Rutberg, Naugle, Turner, Fraker, & Flanagan, 2013, Rutberg, Naugle, & Verret, 2013; Rutberg & Naugle, 2008). The published data were to become a thorn in the side of all the concerned state agencies. By 1993 the state agencies publicly opposed deer contraception. At

the Third International Conference on Fertility Control in Wildlife (Denver, CO), the agencies showed up in force. They were careful to not emphasize the subject of hunting in city parks, instead focusing on modeling (not data-based) with a bias against contraception.

Despite this opposition, a third major project was born at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD. This one also had a rocky start. NIST is a facility of the U. S. Department of Commerce and once again outside the jurisdiction of the state of Maryland. Maryland Department of Natural Resources (DNR) strongly objected and when NIST refused to allow them to have a hunt on the one-square mile, heavily populated (6000 employees) research facility, the Maryland agency went to the Congressional Sportsman's Caucus. NIST officials and the U. S. Department of Commerce refused to give in and petitioned the U. S. Solicitor General's office for a clarification of the law. The results were predictable; Maryland had no wildlife management authority on the NIST campus. The project went forward and more data were forthcoming and published (Rutberg, Naugle, Thiele, & Liu, 2004).

However, Maryland DNR remained persistent. As the project started, they threatened to ring the facility with agency personnel and shoot any deer leaving the grounds, which are surrounded by heavily traveled highways and residential areas (a suburb of Washington, DC). At that point a local animal welfare organization pointed out that this would make a wonderful media opportunity for the evening news. Maryland backed off temporarily.

Approximately 2 years into the project, Maryland DNR asked for a meeting with the research team and NIST officials and asked if they could conduct a test on the health of the deer. It is worth mentioning that when the project went forward, DNR was invited to participate and take blood samples or make any measurements they deemed valuable. They declined. Many questioned why Maryland DNR waited 2 years to seek permission to kill 50 deer and "assess their health." At that point the research-team veterinarian asked the Director of the Maryland DNR if, when he took his dog to the veterinarian, the dog had to be killed to assess its health. Thereafter no further communications of note occurred between NIST and Maryland DNR.

As might be expected, the researchers developing and testing the PZP vaccine were having their own share of frustration in the face of what seemed illogical resistance to its use. Because of the public notoriety of the deer contraception subject, they experienced many interviews and spoke at numerous public community meetings, stressing their purpose that deer fertility control focus was for parks, preserves and communities where hunting was illegal. A reporter at one of these interviews said he was told state agencies were concerned that fertility control is a threat to hunting. Author Kirkpatrick smiled and after a brief pause said "If those folks think that some guys with dart guns can control state wild deer populations, they must be smoking something really good."

Through the 1990s, the attacks directed at urban deer fertility control by state fish and game agencies were largely based on scientific questions. Chief among these questions and almost identical to ones asked by opponents of PZP for horses were

(1) possible passage of the vaccine through the food chain, (2) possible extension of the breeding season with energetic consequences to the females, and (3) possible genetic effects. In no case were data or evidence of any kind offered to support the concerns. Coincidentally, through the three ongoing projects, an extensive database was generated that answered the questions for deer. The vaccine antigen could not survive the digestive tract. Extension of the breeding season was minimal and did not cause notable energetic loss. In fact, the weight of treated deer improved relative to deer that became pregnant and faced a summer of lactation.

Finally, when compared to the genetic effects of hunting, where the largest and most robust animals were selected against (for their antlers), contraception was a bargain. As numerous biological questions were gradually answered by the ongoing research (Kirkpatrick & Turner, 1995), the demand for the fertility control approach grew in the public sector and public meetings on the subject became more strident and were eventually tinged with hostility as people spoke their views. Unfortunately for all involved, the entrance of animal welfare/protection groups on the side of fertility control led to a deep polarization with the state agencies, which continued to selectively quote and ignore science as it suited their goals (Kirkpatrick & Turner, 1997; Rutberg et al., 1997).

Eventually realizing that the attack on the science was failing, the state agencies turned their attention to regulatory issues. Beginning in 1992 the application of PZP vaccine for deer was regulated by the Center for Veterinary Medicine at the Food and Drug Administration (FDA). Application of PZP was authorized by means of an investigational new animal drug exemption (INAD), the equivalent of INDs issued for the use of unapproved human drugs. Thus, the vaccine had official legal federal authorization. Subsequently a coalition of 16 states that disliked the concept of fertility control lobbied their respective Congressional delegations with the message to get the whole business stopped. However, FDA refused to give in to the political pressure. For states, it was “strike two.”

By 2005, the regulation of wildlife contraceptives had been transferred from FDA to the Environmental Protection Agency (EPA). Shortly thereafter a second potential deer contraceptive vaccine was developed by the U. S. Department of Agriculture (USDA). This was a vaccine against gonadotropin-releasing hormone (GnRH) and was named GonaCon®. When USDA applied for registration with EPA, the states descended upon the agency. In the end they could not stop the registration, but they were successful in convincing EPA to place use restrictions on it, e.g., having to capture and tag each deer. The agencies argued that this requirement was to insure that persons harvesting deer would know if it was treated. This was despite the well-established fact that the vaccine was harmless if ingested. However, it did serve its purpose by markedly reducing the practicality of using the vaccine.

In the meantime, two smaller urban deer contraceptive field-research projects were established at the Columbus, OH, Metroparks facility and on Fripp Island, SC. In both cases the respective states approved research permits, which in itself was progress. But after several years of successful application of fertility control and decreases in population growth, both states rescinded their permits on the basis that these sites were actually “managing” deer rather than just doing research. Thus,

the third phase of the states' attack on urban deer fertility control emerged, and it was spectacularly successful. It appeared that the new approach would be to establish state regulations and policies that would prevent fertility control from ever gaining traction. The approach quickly became implemented. State after state established these policies and regulations. Nebraska went so far as to amend its constitution to discourage the use of fertility control.

When GonaCon® was approved by EPA, Pennsylvania was asked to develop a state policy for urban deer fertility control. Carl Roe was then the Executive Director of the Pennsylvania Game Commission and stated publicly: "GonaCon® will never be used by the Game Commission so long as I am director." In 2012 at the Seventh International Conference on Fertility Control in Wildlife, the USDA's John Eiseman provided a list of 17 state policies, of which most were hostile to the concept of fertility control for urban deer management (Eiseman, O'Hare, & Fagerstone, 2013). By 2015 the states had largely won the deer-contraception battle through state regulations/policy.

Despite this success in blocking the application of contraceptives to urban deer management, the states still had to contend with the very impressive successes on the two federal sites, FIIS and NIST. In addition continued research had led to development of a single-injection, multi-year PZP vaccine, which would reduce the access issue and make treatment more practical (Turner et al., 2008). These successes could not be pushed aside or ignored. They kept coming back in the forms of scientific publications, popular media articles and, most importantly, strident public sentiment. Something had to be done to remove this thorn, especially since many communities with deer issues continued to explore fertility control as an option, causing the conflict to fester.

State pressure turned to the National Park Service, the parent agency for FIIS. Strategically this organization had to be reined in because it had two ongoing wild horse fertility control projects and one with wapiti as well as the FIIS project. Even more important was the fact that the NPS was a focal point for many potential fertility control projects. There were additional horses (Mesa Verde NP, Theodore Roosevelt NP), wapiti (Rocky Mountain NP, Point Reyes National Seashore), feral burros (Virgin Islands NP), bison (Yellowstone NP) and mountain goats (Olympic NP) among others, where varying degrees of pressure were being applied for the introduction of fertility control. Even more concerning to the states that were heavily entrenched in opposition to deer contraception were the multitude of potential deer projects (Indiana Dunes, Valley Forge, Gettysburg, Rock Creek Park, in Washington, DC, and several dozen other sites within the NP system).

The irony to this lies in the fact that the NPS has historically been the leading edge for application of fertility control to various wildlife populations. The single largest scientific breakthrough had occurred in an NPS unit (Assateague Island National Seashore) with wild horses, and the application rapidly spread to FIIS for deer, more horses at Cape Lookout National Seashore, wapiti at Point Reyes National Seashore, etc. So, now the states were faced with getting the NPS under control.

The precise strategy, mechanisms and intrigue behind this new effort remain obscure, but the results were soon forthcoming. In 2009, at the urging of several state agencies, the NPS met and established a set of five criteria for deer contraception in NPS units. One criterion was a contraceptive that would have 5 years of efficacy with a single administration. Such a contraceptive did not exist then, and the chances of such a contraceptive being developed are small. Together with the edict that all treated deer have to be ear-tagged (which eliminates remote treatments and increases costs in a significant manner) NPS deer contraception was made virtually impossible. But state pressure on the NPS did not stop there.

The primacy of federal law provides the NPS with all the authority they need to pursue urban/park deer fertility control, yet they deferred to the states. When asked why the NPS did not pursue deer fertility control at Valley Forge where the Pennsylvania Game Commission objected, one regional scientist for the NPS stated “we want to be good neighbors”. In 2010, after 17 years of very successful deer control on a five-community block on FIIS, the NPS terminated the project, because “it had to be studied more.” Eight years later there is no study and no fertility control on FIIS. And finally, in 2012, at the Seventh International Conference on Fertility Control in Wildlife, the NPS issued a policy statement on wildlife fertility control in NPS units (Wild, Powers, Monello, & Leong, 2013). Two critical items were (1) fertility control methods were considered “more acceptable in non-native species, closed populations, and highly manipulated environments” and (2) “early and active engagement with neighboring state and federal management agencies and public stakeholders is crucial for program success.”

Despite this policy, the NPS actively opposed deer fertility control in “highly manipulated environments” such as Rock Creek Park in Washington, DC, and with what they consider to be “non-native species” such as horses in Mesa Verde National Park as well as on other sites. Interestingly the question of whether the horses are a native or non-native species is in itself contentious (Kirkpatrick & Fazio, 2010).

## Conclusion

By 2018, wildlife fertility control was actively being applied to wild horses in more than 35 U.S. sites, including units of the NPS, BLM, U.S. Forest Service, several Indian reservations, a dozen wild horse sanctuaries, the Canadian Province of Alberta and in Hungary and Romania. Nonetheless, only a few of these are actively managing horse numbers in ongoing fashion. The technology has also spread to African elephants, where 20 game parks in South Africa are successfully managing their animals with fertility control and culling is off the Table. A herd of feral sheep in England is also being managed with a contraceptive vaccine. Two different U.S. bison populations have been treated with a contraceptive vaccine, with one realizing zero population growth in a single year. Currently, 4 deer fertility control projects are ongoing, and several have been completed in various communities. More than 200 zoos worldwide are using the same contraceptive technology for the

management of more than 85 species in order to reduce or eliminate “surplus” animals, since disposition is difficult and fraught with controversy.

On the other hand, during this period the NPS sanctioned the culling of deer in Valley Forge, Rock Creek Park and several national historic sites. Yellowstone Park sent between 500 and 900 bison off to slaughter in 2014–15 in order to meet population goals. Mesa Verde National Park refused to even discuss wild horse management by fertility control, while at the same time fencing the horses out from the few available water supplies. Point Reyes National Seashore wrings its hands over a growing and damaging wapiti herd in the face of earlier demonstration that fertility control was a viable option. Hundreds of communities across the U.S. spend hundreds of thousands of dollars to have commercial “sharpshooters” come into their towns and parks and shoot urban deer. In the horse realm the Bureau of Land Management continues to remove and warehouse horses at immense expense to the taxpayer and with associated detriment to quality of life for thousands of horses. Furthermore, the inertia of insignificant use of proven PZP-based contraception continues 2 years after publication of strong evidence that it is an effective long-term contraceptive (5–6 years of infertility across 7 years) and that it really does limit population growth (Rutberg, Grams, Turner, & Hopkin, 2017).

The science of wildlife contraception has been thoroughly vetted within the scientific community through numerous publications in peer-reviewed journals and eight international conferences on the subject. At the field level the actual application of fertility control to free-ranging wildlife is not without its difficulties. The approach is labor intensive compared to other management paradigms, and not all populations will lend themselves to effective treatment and management because of differences in population sizes and habitat. Nevertheless, wildlife fertility control has proven itself a useful management tool. A more detailed discussion of field aspects of wildlife contraception is provided by Turner and Rutberg (2013).

A key consideration for the future of wildlife fertility control is the need for greater crossover of information into the public sector and to Congress about the curative capabilities of wildlife contraception for species in the dilemma of overpopulation. However, even with that accomplishment a crucial obstacle to moving forward is human nature. The desire to defend one view and attack the opposite is hard wired. While some individuals can think their way through to compromise, others cannot or will not. When individuals of the latter case are in positions of control and have decision-making power, ego and defensiveness will rule, and education toward compromise will not readily occur. Therefore, it is important to persist. The long journey continues, sustained in part by concern for pressed species and their environments and in part by those believing that fact and logic will eventually shine through the cloud cover of political agendas, cultural inertia and egocentric bias.

Every spring another cycle of birth plays out for wild horses, deer and many other species. This insurance for species preservation is strong. Across many generations species and habitats will flourish and decline. Human impacts are now figuring heavily into these patterns as part of the cost of human accomplishments.

Perhaps we as a global community can evolve sufficiently to prevent the environmental chaos that can result from continued lack of attention to these patterns. Certainly, focused local attention and action is a realistic goal. However, to accomplish this we must remove the slavery of personal bias and self-serving that derive from cultural and political indoctrinations infused across our own (human) generations. We need to think cleanly and seek the long view. Can we actually accomplish that? Yes, because knowledge and education are great vehicles of science. A positive information/education program focused on compromise and means of resolution can pave the way. Remember, humanity once believed that the world is flat. Some still do.

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