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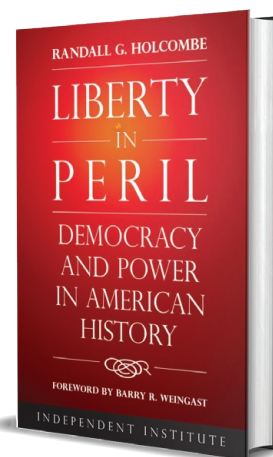
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The Political Economy of Modern Wildlife Management

How Commercialization Could Reduce Game Overabundance

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ROBERT E. WRIGHT

Many North Americans wrongly believe that killing and selling some of the individual members of a wild species will lead inexorably to species extinction because of stories told them about bison and passenger pigeons.¹ In fact, commercialization could maximize the long-term equilibrium number of game species or, less ambitiously, help wildlife managers to better balance the number of game animals with extant habitat and the sometimes conflicting interests of various human constituencies, including agriculturalists, ecotourists, homeowners, hunters, and motorists. To understand how *killing* and *selling* can *save* wild species requires a more extensive knowledge of both economics and ecology than most policy makers and academics possess. This article provides a bare-bones synthesis from the too-often-neglected interdisciplinary perspective afforded by economic history. Specialists

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1. It is customary to provide the scientific names of species, at least at first mention, in scholarly writing. Here, for the sake of exposition and because the focus is on the political economy of wildlife management rather than on the biology of particular species, scientific names are provided only in table 1.

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and others eager for additional details about the natural histories of major species and their management, along with more detailed policy suggestions, are encouraged to consult Wright 2020. Nevertheless, pains have been taken here to cite many of the most important primary and secondary sources for the convenience of readers.

Biases against Using Markets to Restore Ecological Equilibrium

The bias against commercialization is not obviously wrong on its face, but anyone with even a rudimentary knowledge of agriculture, anthropology, ecology, economics, or history should immediately sense it cannot be the entire story. After all, the world's most successful birds and mammals in terms of reproductive success are domesticates, such as cattle and chickens, which suggests that they gain more from human protection than they give up by being consumed by humans (Budiansky 1992). Moreover, humans compete against *other predators* for prey, and all three groups—humans, wild predators, and prey—lived in long-term equilibrium with each other for untold eons.

Many blame technology and population growth for the human ability to cause specie extinction, but thousands of years ago humans already possessed the tools (fire and communication skills) needed to kill scores of mammoth and other large mammals in one short hunting excursion. Yet human responsibility for the disappearance of megafauna remains intensely debated (Wheat, Malde, and Leopold 1972; Baden, Stroup, and Thurman 1981; Fiedel 2001; Kay and Simmons 2002; Koch and Barnosky 2006; Nagaoka, Rick, and Wolverson 2018). For most prey species, habitat, not predation pressure, constitutes the key constraint on population density and range. Habitat quantity and quality are mostly a function of climate and human economic activity, but animals often react to human incursions in surprising ways. Many species, from bats to rats, have learned to live within human structures, and even larger animals, such as deer, foxes, moose, mountain lions, pigeons, raccoons, and squirrels, have become habituated to humans in urban settings (Budiansky 1992, 45–52; Animals and Society Institute 2020).

Not all species cohabit easily with humans, however, and many with restricted ranges have succumbed to agricultural or urban development. Biological characteristics constant, those species least valuable to humans—either because they are not intrinsically economically valuable or because they remain common-pool resources unowned by anyone until harvested—are the most vulnerable to extinction. People interested in saving species, therefore, would do well to ensure that the wild things they want to conserve constitute economic goods rather than bads.² Unfortunately,

2. An economic good is something that people are willing to pay to obtain. An economic bad is something that people will pay to rid themselves of, such as garbage and pests.

certain provisions of the Endangered Species Act (ESA) of 1973 render biologically marginal species bads in the eyes of property owners facing ESA restrictions on their land use (Seasholes 2014).

The North American Wildlife Conservation Model (NAWCM), by contrast, partially turns game animals into economic goods. Unlike the ESA, the NAWCM is not a single piece of federal legislation but rather an organic set of international, national, and state wildlife policies developed piecemeal in the late nineteenth and early twentieth centuries in response to declining wild-game populations. Not until the 1990s did scholars explicate the model, the canonical version of which contains seven interrelated policies, sometimes referred to as the “Seven Sisters” (Prukop and Regan 2005, 374; Organ, Decker, and Lama 2016, 10–12; Feldpausch-Parker, Parker, and Vidon 2017, 33–35):

1. The state holds wildlife as a trustee for the people, a.k.a. the public-trust doctrine.
2. Markets for wildlife, especially game meat, must be banned or heavily restricted.
3. Allocation of surplus wildlife occurs according to law.
4. Wildlife can be killed only for legitimate purposes, such as food or fur.
5. Wildlife is an international resource, so the wildlife management of migratory waterfowl, mammals, and marine life must be coordinated internationally.
6. Science, not politics, should drive wildlife-management decisions (scientific wildlife management).
7. Hunting must be democratic.

Since the evolution of the NAWCM, no major game species has gone extinct, and several now suffer from *overpopulation* in parts of their ranges.³ Few doubt the conservation power of the model, but, contrary to common understanding, the key to the model’s success is the value it places on wild game, not its ban on the commercialization of wild-game meat, which, as explained in the next section, played an important role only in the transition that occurred around the turn of the twentieth century from the traditional common-pool era to the modern public-trust-doctrine period (Anderson 1998, 259; Peterson, Peterson, and Peterson 2016, 430).

3. Biological overpopulation occurs when growth in the number of members of a species, usually due to the reduction of nonhuman or human predators, exceeds the carrying capacity of the land, causing members of the species to die of disease-starvation instead of predation-superannuation. Biological overpopulation can also cause members of the species to spread into new geographical areas (range increase) and/or ecological niches (e.g., eating new things), both of which often negatively affect other species. Management overpopulation occurs when numbers exceed the target levels established by wildlife managers attempting to balance the quality of life of individual members of the managed species (minimizing the number that die of disease-starvation) with the goals of human interest groups, including extractive users (fishers, hunters, trappers), amenity seekers (e.g., ecotourists), and those who suffer negative externalities (farmers, homeowners, motorists) when population levels exceed targets.

Reasons Why the NAWCM Succeeded

Before the North American Wildlife Conservation Model, a common-pool problem or “tragedy of the commons” pressured many of North America’s wild-game species, the total populations and ranges of which were shrinking not due to improved hunting technologies or increased human population per se but because everyone had an incentive to kill and consume them before somebody else did. As Elinor Ostrom (1990, 1992) explains, private, public, or club entities (individuals, governments, associations) control access to resources except those still considered part of the commons, which belong to nobody in particular until specific individuals or groups harvest or consume them.

Because nobody controlled access to valuable wild animals until they were harvested, North Americans had incentives to kill as many as they could, whenever and however they could, in order to obtain ownership of them before others did. They measured their harvests in the hundreds or thousands of animals and even by *the ton*. Their ancestors had come to the New World to exercise their liberty, part of which meant freeing themselves from harsh European game and trespass laws. Hunters asserted they could traverse and even camp on private land without permission whenever in search of their God-given quarry, further exacerbating the common-pool problem by leaving prey with no safe refuge (Lueck 1995, 3; Smalley 2016, 308–9).

Modern rifles increased take rates, but the percentage of hunters within the population fell over the course of the nineteenth century, so the real problem was the fact that North Americans believed they had a natural right to shoot any wild animal on sight for any reason, including to sell the animal’s antlers, bones, claws, feathers, hides, teeth, and especially flesh in the continent’s ubiquitous wildlife markets. Commercial “pot” hunters supplied those markets and the fancy hotel restaurant trade, while increasing numbers of urban men turned to hunting for the “sport” rather than the protein, which was increasingly cheap due to agricultural-efficiency improvements (Olmstead and Rhode 2008). Tensions between commercial and sport hunters mounted over time, making it difficult to enforce hunting regulations as everyone competed to harvest game animals such as deer, moose, and wapiti before others did (Eddy 1924).

Entrepreneurial innovation helped to break the impasse as some pot hunters became guides and outfitters, earning a living by helping sport hunters to find their quarry instead of by killing anything that moved. At the same time, agriculturalists began to supply high-end hotels, restaurants, and clothiers with farmed furbearers, deer, ducks, geese, and turkeys that proved cheaper, more uniform in size and taste, and safer to eat (no lead shot) (Wright 2020).

State officials then began to enforce seasons and to ban certain hunting techniques, such as night hunting with lights, that made it cheap/easy to harvest animals. They paid “game wardens” out of license fees, a type of use tax, rather than from general revenues, which cloistered wildlife managers from politics to a large extent.

With the Pittman-Robertson Act of 1937 and the Dingell-Johnson Act of 1950, the federal government also effectively created a use tax by earmarking excise taxes on outdoor equipment (ammunition, guns, fishing rods, etc.) only for wildlife-conservation purposes (Lueck 1995, 4).

More-effective enforcement of trespass laws also helped by raising costs for hunters accustomed to treating the entire countryside, including private property, as a commons (Sawers 2015). In addition, *Geer v. Connecticut* (161 U.S. 519 [1896]) helped to establish the notion that even if the government does not technically “own” wildlife, it is their steward, thereby endowing states with a credible property right that helped to convince sport and commercial hunters that states were serious about enforcing new harvest regulations.

Policy makers and the public also mistakenly but understandably believed that human population growth combined with commercial hunting per se, rather than habitat loss and total mortality, was the root cause of declining game numbers. So in the Lacey Act of 1900, the federal government bolstered various state bans on intrastate wild-game markets by outlawing the interstate sale of wild meat harvested or sold unlawfully in any state or foreign country (U.S. Fish and Wildlife Service 2020). What the ban accomplished was not so much a reduction in harvest totals as an incentive reset that convinced sport hunters that following wildlife regulations was in their self-interest and not the altruistic act of simply leaving game animals for harvest by pot hunters. (Continued low levels of poaching by desperate people and scofflaws were easily built into game-harvest models.) Acceptance of regulations remained widespread because wildlife commissions usually responded rationally to sport hunters’ input in order to maintain the license and excise revenues upon which their departments relied.

Rather than doubt the overall effectiveness of the NAWCM, scholars in other areas of political economy and regulation would do well to consider the reasons for its success. Most importantly, it met a genuine need. As table 1 shows, many big-game species were indeed under population stress in the late nineteenth century, but nobody saw a reason to emulate bison-eradication policy, which was animated in large part by the desire to destroy the military threat posed by the Lakota and other Plains tribes (Isenberg 2000).

The NAWCM also worked because it was more a decentralized Ostrom-like solution to the common-pool problem than a conscious, top-down regulatory plan that commercial hunters could have lobbied against or turned to their advantage. Once convinced that commercial hunting was doomed, most commercial hunters concentrated on transitioning into guiding and outfitting sport hunters (Thomas 1906, 117–18; W. Burroughs 1915; Rockwell 1922, 12).

The third key was keeping the proverbial “power of the purse” in the hands of the wildlife community—that is, extractive users and their regulators, most of whom were themselves extractive users (Braverman 2015, 145)—through reliance on user fees and earmarked excise taxes rather than through general tax revenues.

Table 1
 Summary of the Natural History of Major North American Game Animals

Common Name	Scientific Name	Commercialization	Long-Term Trend	Current Status
alligators	<i>Alligator mississippiensis</i>	Skins, eggs, and meat	Stressed under open-access regime but never endangered	Thriving and local nuisance
beaver	<i>Castor canadensis</i>	Pelts and meat	Local extirpations but never endangered	Thriving and local nuisance
other furbearers	e.g., <i>Lutrae</i> sp., <i>Mephitis mephitis</i> , <i>Mustela putorius</i> , <i>Vulpes vulpes</i> , <i>Neovison vison</i> , <i>Procyon lotor</i>	Pelts and meat	Range changes, but most never endangered	Generally thriving
small game	e.g. <i>Sciuridae</i> sp., <i>Zenaidura macroura</i> , <i>Bonasa umbellus</i>	Meat and pelts	Range changes, but most never endangered	Generally thriving
whales	Cetaceans, e.g., <i>Eubalaena</i> sp., <i>Eschrichtius robustus</i>	Meat, blubber, oils, other products	Near extinction due to international tragedy of the commons	Rebounding due to bans and pressure from environmental groups
whitetail deer	<i>Odocoileus virginianus</i>	Hides, meat, antlers	Greatly reduced numbers due in large part to habitat destruction and tragedy of the commons	Pre-Columbian population levels achieved; widespread instances of local overabundance
turkeys	<i>Meleagris gallopavo</i>	Meat	Reduced range and numbers due to habitat destruction and common-pool problem	Thriving over reexpanded range; local nuisance in some areas
bears	<i>Ursus</i> sp.	Hides and meat (primarily black bear)	Range reduction	Generally thriving and some local nuisance issues
large ungulates	<i>Alces alces</i> , <i>Cervus</i> sp. <i>Rangifer tangiferus</i>	Meat and hides	Range reduction due to habitat destruction and common-pool problem	Elk, moose, caribou steady to thriving but possibly some issues due to global climate change

(continued)

Table 1 (Continued)

Common Name	Scientific Name	Commercialization	Long-Term Trend	Current Status
bison	<i>Bison bison</i>	Hides and meat	Near extinction caused by common-pool problem, herding behavior, government policy on Native Americans, and desire to free up grasslands for domesticated cattle	Thriving public and private herds but far from historical population levels or range
passenger pigeon	<i>Ectopistes migratorius</i>	Entire bird	Extinction caused by common-pool problem and flocking behavior	Close substitutes and difficulty breeding in captivity meant they were never domesticated
carolina parakeet	<i>Conuropsis carolinensis</i>	Feathers	Extinction possibly caused by pathogen	Unexpectedly rapid decline meant domestication efforts came too late

Source: Wright 2020.

Much the same result could have been obtained by converting the nation's wildlands into private hunting preserves accessed through membership in hunting clubs (i.e., wildlife there would be club goods instead of public goods), an institution that late nineteenth-century Americans also turned to with great avidity (Williams 1889; Crossways 1896; R. Burroughs 1937, 21; Palmer 1939, 17).

In fact, the NAWCM did not fully monopolize game regulations or access to game. Many state wildlife managers allowed private landowners and clubs substantial leeway to manage game populations on their own properties. Texas became the most lenient in almost all aspects of hunting, but other states, including South Dakota, also allow preserves and clubs to establish their own hunting seasons and tag and bag limits within very broad guidelines (Wright 2015). American Indian tribes also enjoy broad discretion to establish fishing, hunting, and trapping regulations on their respective reservations under the assumption that landowners have the strongest incentives to maximize wildlife populations on their property (Huffman 1995, 34; Gooden and 't Sas-Rolfes 2020). The White Mountain Apache in Arizona, for example, sell trophy wapiti, whitetail, and mule deer hunts (White Mountain Apache Tribe Game and Fish Department 2013).

To varying degrees, competing wildlife managers test innovative management policies and publicize successful ones for potential public or private adoption elsewhere, leading to a vibrant guided hunting industry (Wright 2015, 2020). In North America, however, experiments with commercial hunting cannot be directly conducted due to the hoary ban on wild-game markets erroneously thought to underpin the NAWCM's success.

Efficiently Reducing Overabundant Game

None of this is to say, of course, that North American hunters and wildlife live in the best of all possible worlds. In fact, the NAWCM is under pressure in some places due to its own success and rigidity. In many parts of the United States, white-tail deer, turkeys, wild hogs, and even bears are too numerous because hunters do not harvest enough of them due to the secular decline in the number of hunters that has occurred over the past few decades (Winkler and Warnke 2013, 460–61; Schorr, Lukacs, and Gude 2014, 944). Overabundant wildlife—which is almost entirely a problem stemming from publicly managed game stocks located on public and unharvested or underharvested private land—live short, stunted lives; injure motorists; damage automobiles, flower beds, and agricultural fields; and otherwise render themselves pests (bads) instead of valuable resources (Dickinson 1993, 28–30, 67; Jonker et al. 2006, 1009–10; Hristienko and McDonald 2007, 72–73; Vercauteren et al. 2011, 186–87). In many areas, automobile collisions now kill more deer than hunters or other predators do and at far higher social cost (Schwabe and Schuhmann 2002, 609; Grovenburg et al. 2011; Braverman 2015, 172).

Wildlife management is as much art as science. Training in biology can help in some circumstances, but the most important part of it is putting in the time and effort to understand the number and condition of animals on a given parcel of land, be it public or private. The quantity and quality of animals can be ascertained, with some effort, through the traditional reading of signs (tracks, spoor, beds and wallows, the condition of food sources, spotting), the use of modern technology such as trail cameras, and the physical inspection of harvested animals. The existence of numerous mature male deer with small antlers, for example, indicates population stress, which can be alleviated by harvesting more female deer and identifying and reducing habitat constraints by, for example, planting more winter browse. Increases in automobile collisions and complaints from agriculturalists and homeowners can also indicate population stress. Developing a good management plan generally is more about putting in the work than about possessing specialized knowledge, so it is quite amenable to private efforts (Dickinson 1993).

Public wildlife managers quickly learn of wildlife overabundance in their districts, and many have taken steps to mitigate the problem within the parameters of the NAWCM as it is currently understood. Foremost, they have relaxed hunting regulations in various ways to try to lure more hunters into the field. Longer seasons, more-generous bag limits, cheaper tags, authorization of the use of more-powerful “primitive” weapons,⁴ easier access to hunting land, and so forth have worked at some, but hardly all, margins (Cable 1991, 48–51; Lebel et al. 2012).

Nonhunting methods for reducing wild-game populations have also been attempted but appear inefficient. Reintroducing natural predators could help to manage game numbers, but ranchers fear livestock predation, and programs to compensate them, long advocated by market environmentalist groups such as the Property and Environment Research Center (e.g., Anderson and Leal 2001, 172–73; Fischer 2001), have encountered practical difficulties, such as accurately confirming kills (Dickie 2018), just as Terry Anderson warned they would (1998, 266). Fund-raising is difficult because the human beneficiaries of wolf reintroduction are diffuse (Reid and Nsoh 2016, 3). Moreover, any sentiments in favor of allowing wolf packs to roam suburban Philadelphia, Chicago, Boston, and other cities overrun with deer will certainly evaporate after wolves begin to prey upon children and pets (Braverman 2015, 170).

Nonlethal deterrents and translocation can help to protect specific resources, but they, of course, just push the problem down the road, literally or temporally, because they do not address the core overpopulation problem (Vercauteren et al. 2011, 187).

Similarly, sterilizing wild animals is wildly expensive (Hristienko and McDonald 2007, 83; Braverman 2015, 163–69), as is culling them by professional sniper or

4. For instance, hunters can be allowed to use crossbows that can shoot accurately up to one hundred yards with minimal practice instead of limiting hunters to vertical bows with an effective range of only thirty to forty yards that is earned only through extensive practice.

professional beaver/rodent exterminator (Jonker et al. 2006, 1019; Lebel et al. 2012, 1431). Sharpshooting over bait at night worked to reduce deer densities and vehicular collisions in suburban Minneapolis, for example, but cost \$100 to \$200 per cull, which can mean many thousands of dollars in annual expenditures to keep populations near management targets (Doerr, McAninch, and Wiggers 2001). Cull costs are high because under the NAWCM model, as it is currently understood, the meat of culled deer must be donated to food banks rather than sold to pay the sniper.

Commercialization Considered

The most obvious solution to the wild-game overpopulation problem, commercial harvest, runs afoul of current understandings of the North American Wildlife Conservation Model, in particular the long-standing ban on wild-game markets and the common notion that commercialization will lead inexorably to extinction (Vercauteren et al. 2011). As table 1 documents, however, commercialization was not the primary cause of game-animal population stress or range reduction. The near extinction of the bison was aided by the government's desire to colonize the middle of the continent and abetted by the creature's habit of congregating in large numbers in the open (Speck and Eiseley 1942, 220; Isenberg 2000). As soon as remnant populations of bison became valuable enough, entrepreneurs privatized and thus saved them even while the commercialization of their flesh and unique mystique continued (Hill 2014).

Passenger pigeons likewise congregated in huge, easily observed flocks and, like bison, were decimated *before* the NAWCM took hold. Moreover, the existence of close substitutes meant no one had a strong incentive to figure out how to breed passenger pigeons in captivity or even, some now claim, to feed them the right food (Neumann 1985). In other words, a *lack* of commercial interest doomed the passenger pigeon.

The Carolina parakeet, prized by milliners for their feathers, apparently succumbed to a pathogen rather than to hunting pressure. The cause of the bird's rapid demise was little understood and occurred before commercial interests, which were not large, could intervene (Hairr 2011).

Other evidence abounds that commercialization is not a sufficient cause of extinction. Markets for wild game flourished in England after game meat was privatized there in the nineteenth century and continue to do so (Lueck 1995, 19). In Sweden and many other European countries, retail sale of wild-game meat has also been allowed essentially continuously without adversely affecting scientifically managed wildlife populations (Ljung et al. 2012, 669).

Similarly, the reintroduction of lawful markets for wild-game meat in South Africa and other southern African countries sparked a rebound in game populations as ranchers learned that wild animals did not so much compete with domesticated

cattle, sheep, and goats as complement them. Many ranchers now diversify their businesses by raising domestic livestock, providing ecotours, harvesting wild animals for meat, and guiding trophy hunters. In 2003, South Africa alone supported about five thousand game ranches and four thousand mixed domestic–wild ranches. As is the case for many private Texas ranchers working under similar rules, South African ranchers have achieved wild-game numbers not seen in many decades. In both places, wild-game species thrive because they “pay their own way” through their sale to hunters (Carruthers 2008). But only in Africa can ranchers also directly benefit from the commercialization of the flesh of wild game. The knowledge accumulated by professional hunters could be shared with and readily adapted to the local circumstances of commercial hunters in North America (Pack et al. 2014).

Tellingly, some North American wildlife species remain unprotected by the NAWCM and yet continue to flourish (Braverman 2015, 157). In fact, many species are so difficult to hunt or trap and reproduce so rapidly in good habitat that even when labeled “bads” (pests) they still thrive. Bounty programs that create government-funded “markets” for the scalps or tails of so-called nuisance animals, from raccoons to coyotes and prairie dogs to squirrels, failed when the bounties proved insufficient to cover costs, including the opportunity cost of the marginal hunter’s or trapper’s time. Concerted, strenuous efforts to eradicate some species, such as prairie dogs, with poison, fire, and even steam failed (Wright 2020). In economic terms, as the population density of a species declines, the marginal cost of harvesting it increases until marginal extractive users exit. The species can then rebound and spread once again. Many species also rebound from protected reservoirs, such as neighboring jurisdictions, inaccessible backcountry, national parks, and urban enclaves (Laliberte and Ripple 2004; Zink 2014).

Wildlife managers now have a solid empirical understanding of the reproductive cycles of most species and regulate accordingly. Obviously, living creatures harvested only after they have reproduced and died can be commercially exploited without fear of extinction. For example, large markets for Spanish moss, which locals used to stuff mattresses and chair bottoms and to wad their guns, existed in the nineteenth-century South. Because the moss was gathered only after it died, however, it not only survived its commercialization but also covered “whole forests” (Davis 1817, 27–29, 37, 43). Similarly, removing living but reproductively spent animals from populations will generally help the remaining members of the herd by freeing up limited resources for breeders.

Some ocean fisheries subject to the commons problem *and* commercialization, especially in ecologically sensitive areas such as the polar regions, have suffered collapse, but other fisheries claimed by just a few countries have remained stable (Honneland 2013; Couzens, Paterson, and Riley 2017; Liu, Brooks, and Qin 2019). Like game mammals, fish and sharks (National Oceanic and Atmospheric Administration 2020) have been scientifically managed in many of North America’s fresh and coastal saline waters and in many areas thrive despite the inherent uncertainty

of ascertaining fish numbers, especially in the ocean (Biber and Eagle 2015, 787–88, 803). Markets for “catch shares” have largely proven successful, as have other “bottom-up” commons-management solutions (Leal 1998, 284; Huggins 2013, 67–69; Strong and Criddle 2013).⁵

Wildlife managers who would never consider commercial hunting regularly keep the number of nongame “rough” or “trash” fish such as carp in check by licensing commercial fishers, most of whom use netting or hook-and-line techniques that allow them to target specific nongame species without unduly stressing game fish (State of South Carolina 2020). Hunting is not generally considered “catch and release,” but if conducted in daylight, it can be as selective as catch-and-release fishing because hunters can decline to harvest animals that do not meet cull criteria (Waselkov 1978, 18–19).

Tellingly, large numbers of alligators have been commercially harvested in Louisiana because the state successfully transitioned from a common-pool regime to a commercialized variant of the NAWCM (Joanen et al. 1997, 466). Recent years have seen harvests of 35,000 wild gators out of an estimated population of 1.5 million (State of Louisiana 2020), up from harvests of 25,000 out of a population of about 700,000 in the 1990s (Joanen et al. 1997, 469–71, 480). Gators are reptiles, not mammals, but many of their biological parameters (lifespan, size, maturation rate) roughly match those of black bears and other mammalian apex predators (Hristienko and McDonald 2007, 76–78; Seay 2019). Unlike bears and cougars, however, their commercial harvest is fairly indiscriminate as to gender and age because gators are not easily released if caught with a baited hook and line, whereas bears, cougars, and raccoons can be aged, sexed, and left unharvested with some accuracy, especially if baited or treed (Whitney 1931, 38). Alligators produce more offspring than mammals their size, but their young suffer higher rates of predation. Overall, then, their successful management, despite the commercial sale of their flesh, skins, and eggs, bodes well for wildlife managers’ ability to manage the commercial harvest of game mammals (Joanen et al. 1997, 473–74). Like cervids, gators are also being ranched and have been since the late 1980s (Dickerson 1987). If commercial hunting of alligators ends, it will be because of competition from alligator ranching, not from the extermination of the species. Louisiana ranches alone hold 600,000 to 900,000 gators (State of Louisiana 2020).

5. Some overstressed commercial fisheries were the result not of markets per se but of the ability of commercial fishers (and whalers [see Peterson 1992]) to induce wildlife managers to relax scientific-management rules and to enlarge quotas when that was not clearly merited by biological indicators such as the age distribution and size of the catch. Like other special-interest groups, commercial fishers have relatively concentrated interests much greater than those of individual consumers, so they often face weak opposition when they try to sway policies in their favor (Biber and Eagle 2015, 806–7, 826–28). Captive cervid ranchers have also been able to pressure wildlife managers into making regulatory changes that benefit them or, as in North Carolina, to change regulators when wildlife regulators proved unflappable (Brown 2016, 22–23). Such rent-seeking behaviors are the antithesis of free-market competition and can be guarded against in some measure by designing policies that align the incentives of all major constituents as closely as possible (Anderson and Hill 1989).

Similarly, bullfrogs were long commercially hunted without endangering the existence of the species. During the Civil War, two men could make \$12 to \$18 a night frogging in the Montezuma swamps west of Syracuse, New York, spearing two hundred to three hundred bullfrogs per night, for which they received \$6 per hundred in Buffalo and Manhattan. In the 1880s, froggers in the swamps near Lake St. Clair in eastern Michigan supplied the Detroit and eastern markets. A pair of hunters with a dozen years' experience could then make \$15 a week apiece jigging or shooting between forty and two hundred bullfrogs a day with a .410 shotgun. Despite commercial hunting pressure, the frogs numbered in the millions and got as big as nine pounds, with seven pounders not uncommon. Philadelphians managed to supply the local market by tapping the Delaware River and adjacent wetlands for frogs, which they sold to a local market for between thirty and fifty cents a dozen, depending on the frogs' size. By the 1880s, old froggers pined for the days when they could catch thirty to forty dozen frogs per outing instead of the eight to twelve dozen that became common. The problem was not hunting pressure, the old froggers lamented, but loss of habitat due to pollution (Wright 2020).

Trappers generally seek furs and pelts rather than meat, but regulation is minimal, typically taking the form of closed or shortened seasons as well as lawful traps and set techniques (Dickinson 1993, 51). Generally, commercial trappers kill as many furbearers as they can during open season, which generally matches the months when the animals' fur is thickest and most valuable. Market conditions naturally regulate trappers, who move into and out of the business with the rise and fall of fur prices and into and out of areas with the success of their traps. Trapping provides perhaps the clearest indication that mammal species can be commercially harvested with minimal management, provided the total economic cost of harvesting them remains high compared to their market prices.

Trapping and commercial alligator hunting also provides some indication of what commercial game-animal markets would likely resemble. Commercial suppliers tend to be avid outdoor types who enjoy the activity and have a relatively low opportunity cost of time. Instead of harvesting a few deer each year for personal consumption and donation, some avid deer hunters will supply the commercial market until the marginal cost of harvesting a deer equals the marginal revenue generated from it. It is difficult to predict market prices, but interest in locally sourced, organic protein has not yet peaked. Rancher elk and whitetail meat currently retails for \$10 to \$45 per pound, depending on quality and cut.⁶ Mature wild whitetail bucks average 180 pounds dressed, with a 40 percent meat yield—that is, 70 pounds (Schmidt 2019) or, conservatively, \$700 retail or \$350 wholesale per buck. Rents would of course be divided between butchers, hunters, landowners, retailers, and state wildlife managers depending on regulatory details such as commercial license fees, allowable commer-

6. See, for example, the website for Grande Natural Meats at <https://www.elkusa.com/>.

cial hunting techniques, market structure, availability of public hunting land, and so forth. Wildlife managers can adjust some of those variables to achieve management goals, raising license fees or eliminating commercial hunting altogether when populations drop below target and decreasing license fees or allowing night sniping over bait if populations remain above target (Wright 2020).

Conclusions and Implications

The key to successful policy evolution is ensuring that decision makers have incentives to find and analyze real-world feedback and make appropriate adjustments when necessary and on the basis of reason, not ideology (Child 2019, 7). It remains to be seen how rational the keepers of the North American Wildlife Conservation Model can be. Extinction and its precursors, such as loss of range, stem from complex interactions between a given species' biology, environmental pressures (including habitat and natural predators), and human incentives to harvest (Laliberte and Ripple 2003). Commercialization affects the final variable, the intensity of human predation, but represents only one factor among several, including the average cost of harvesting biologically optimal culls.

The NAWCM emerged not from a top-down plan but rather from developments across several fronts in response to the population decline and range shrinkage of several game species, including whitetail deer and wapiti, in the wake of the great bison eradication and passenger pigeon extinction. It succeeded by aligning incentives correctly, in part by inducing commercial hunters to transition into guiding instead of resisting game laws through poaching or political pressure. Their exit allowed sport hunters to obey the new rules, which were monitored by game wardens financed by hunter (as well as fisher and trapper) license fees and earmarked excise taxes. Rational regulation resulted because extractive users, professional guides, and game wardens shared the same conservation interests and functioned very much like a club headed by state game commissions.

Those commissions and natural-resource departments, however, are not clubs; they are governmental entities subject to many of the same failures as other government bureaucracies. One such foible is the extreme risk aversion that stems from incentivizing workers to stay employed rather than to innovate. In institutions such as most government bureaucracies where the perceived "failure" of an initiative or innovation can trigger job loss and where "success" will not result in a compensation increase commensurate with the risk of failure, policy conservatism reigns because individuals' incentives to innovate are weak or even negative. This *bureaucratic* risk is of course part of the public-choice critique of government (in)efficiency (Schuck 2015).

Once a governmental authority asserts that people should be forced to do something—say, the Centers for Disease Control requiring them to wear

masks—almost no bureaucrat anywhere in government will resist out of fear of losing his or her job and the generous benefits and pension attached to it. The canonical view of the NAWCM holds “thou shalt not sell,” so wildlife managers are extremely reluctant to experiment with the commercialization of game meat even in areas where innovative practices could lead to Pareto improvements for deer, the driving and gardening public, sport hunters, and those who would like to become commercial hunters.

Bear in mind that whitetail deer in America now number about 30 million: they are again as numerous as they were in pre-Columbian times (Smalley 2016; Swanson 2018). Even if a local commercialization experiment went horribly awry, the species would survive and likely would repopulate the area without human intervention: vide the large populations of deer in unlikely places such as Manhattan, Philadelphia, and Staten Island (Wright 2020).

Tensions between sport and commercial hunters could be minimized by allowing the latter to harvest only after the sport seasons have ended and, of course, only to the extent that sport hunters do not meet the wildlife biologists’ management goals, which is a regular occurrence now in many parts of the country due to a dearth of successful hunters relative to the number of deer. So long as commercial hunters were limited to female deer, even so-called trophy hunters primarily interested in harvesting deer with big antlers would welcome the return of the pot hunter, much as they welcomed sterilization and other expensive culling tactics that promised to improve the biological condition of local herds.

Some people object to hunting on moral grounds, but they can do so only by ignoring “that which is not seen,” the life and death of domesticates. Even vegans kill indirectly because the production of their preferred foodstuffs (fruits, grains, legumes, seeds, and vegetables) entails the displacement of other species. In biological terms, the opportunity cost of a wheat field is the plants that would have grown there instead, plus all of the insects and animals that would have fed on those plants. In short, human existence necessarily entails the destruction of other living creatures in one way or another, and the economic ability of some individuals to destroy them only indirectly does not cede to those individuals the moral high ground.

In sum, experimenting with wildlife commercialization entails little biological, moral, or *political* risk, just some *bureaucratic* risk. It is possible that tensions between commercial and sport hunters could rise over time as the former use their relatively deep pockets and concentrated interests to lobby for more lenient regulations, as commercial fishers have done. So long as deer and other species are not again subject to the tragedy of the commons, however, they will remain valuable goods to one or more groups and hence will remain as safe from extinction as any species of livestock.

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