

An Economic Guide to State Wildlife Management

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Introduction

In each state, wildlife agencies, long known as game departments, oversee the management of wildlife. These administrative agencies are facing numerous challenges that are likely to force changes in their structure, funding, and activities. Three challenges dominate:

- Traditionally, funding for wildlife agencies has come from state hunting and fishing licenses and federal taxes on equipment (guns, ammunition, fishing tackle). That funding is being questioned. For example, in 1999 the Izaak Walton League published *Passing the Buck*, a report extolling the need for more general taxpayer funding of state wildlife agencies and less reliance on hunting and fishing sources (Scott, Hansen, and Mosher 1999).
- Pressures are building to grant more authority to landowners so that landowners can increase their revenues from providing wildlife habitat. A number of states have initiated “ranching for wildlife” policies that allocate hunting licenses directly to landowners in return for improvement in wildlife habitat. Other programs (e.g., Montana’s “Block Management”) directly compensate landowners for providing hunting access. Simultaneously, there has been a dramatic increase in the market for hunting rights across the country.
- Demand for nongame wildlife has increased. Coincident with the modern environmental movement, concern has risen for the protection of species and habitat that are not valued specifically for fishing and hunting. Federal protection of endangered species and mandates for agencies to aid in this protection are also recent phenomena.

This paper will offer an economic framework for understanding these agencies today. It will begin by describing the history of game management in the United States, examine the current structure of state wildlife agencies, and present some statistical information highlighting important differences found across the states. Placing these agencies in the context of the economics of bureaucracy points to some implications for the future of wildlife management.

Origins of the Game Laws and Game Departments

The first game laws were passed during colonial times and had two goals: to protect valuable species such as deer from overharvest and to encourage the destruction of undesirable species such as wolves, primarily through bounties.¹ By far, the dominant goal was protection against excessive harvest.

The basic method of protecting wildlife was to close parts of the year to killing (or “taking”). Massachusetts had a closed season for deer in 1694, and by the end of the colonial period all the colonies but Georgia had closed seasons for deer. West of the Mississippi, there were no game laws in any state or territory, other than restrictions on Indian lands, until 1851.² By the 1880s, however, all the 48 continental states (or their respective territories) had approved game legislation, primarily in the form of uniform statewide closed seasons and limits on trade in game and game products.

Season closures are typical in winter when populations are vulnerable and in spring when young are being born and reared. Seasons were sometimes closed year-round for species with extremely low populations such as antelope, bison, elk, moose, and some birds with extremely low or rapidly declining populations. For example, the population of the pronghorn antelope, now a prolific animal, was distressingly low in the early twentieth century. For many years, not a single state had an open season for antelope. Even Wyoming, which now boasts an antelope population of over 250,000, had no season for antelope from 1909 to 1928.

Bag limits soon emerged as a standard method of controlling hunting. A bag limit is a daily or seasonal quota on the number of animals that can be taken during a legal hunting season. Iowa implemented the first bag limit for game birds in 1878 (at 25 birds per day per hunter, it was quite generous by modern standards), and by 1912 all but three states had some bag limits.

States also imposed restrictions on the legal methods of taking game, most of which are still in force today. In 1730, for instance, Maryland prohibited hunting by firelight. All the coastal states had banned this by 1828, and today “spotlighting” (hunting at night with lights) is almost universally prohibited. In 1848, Massachusetts banned the use of nets for pigeons, and New York soon prohibited the killing of pigeons on their nesting grounds. In 1865, Michigan banned the use of “punt guns” (large swivel shotguns for waterfowl). Today,

restrictions include no hunting from highways and from vehicles, no explosives, and no automatic weapons. Taken together, these restrictions increase the marginal cost of taking game, thus reducing the number of animals taken for a given unit of human effort.³

States also developed a system of refuges, where hunting was either prohibited or severely restricted. Wyoming in 1905 and Pennsylvania in 1907 established the first state refuges, and now each state has an extensive system of refuge lands.

Restrictions and prohibitions on the trade of game also became a component of wildlife policy. Although the export of skins was banned in Connecticut as early as 1677, this kind of market restriction did not become common until the late nineteenth century. Arkansas, for example, prohibited market hunting in 1875, and by 1912 all states but Maryland had banned exports of all or some game products.

In 1900 the federal Lacey Act outlawed the sale and transportation of game taken in violation of state laws. Today, the sale of wild game and game products is generally banned except for fur-bearing animals.

When the first game laws were enacted, the local law enforcement authorities were charged with enforcing them. As the laws became more numerous, the burden on local police became larger and a demand arose for specialized and separately funded enforcement. These “game police” became what we now call game wardens or conservation officers (the modern term).

The first state game wardens appeared in Maine, in 1843 for fish and in 1852 for moose.⁴ Since warden positions were created before the formation of game agencies and before the creation of hunting and fishing licenses, they were not salaried agency employees. Rather, they tended to be paid a share of the fines they collected from apprehending and prosecuting game law violators. In 1890, for instance, the state of Washington established an office of game wardens with four-year terms in which wardens kept one-half of the collected fines from their arrests. This type of compensation scheme led to vigorous law enforcement (to say the least) and frequently even violent conflict between game wardens and game law violators (Warren 1997).

The Modern Game Agency

The beginnings of the modern game agency came in 1878 when the first game commissions were established in California and New Hampshire. By 1900, seventeen states had game commissions.⁵ Game commissions were, and still are, the governing bodies of the state game department. Commissioners are usually unpaid appointees of the governor of each state. The commissions have the legislative authority to implement game regulations that will be carried out by the bureaucrats in the agencies.

The first state resident hunting license (\$1) was issued by New York in

1864, as a permit to hunt deer. In 1875, the first nonresident license (\$25) was established in Florida. In 1879 Missouri banned all nonresident hunting. By 1900, roughly twenty states had some form of licensing system. Such a system both limited access to wildlife and generated funds enabling wildlife agencies to enforce the game laws.

Even though just five states had nonresident hunting licenses by 1900, the practice spread rapidly. By 1904, thirty-one states had nonresident fees, and by 1912 forty-six states had such licenses (Chase 1913; Palmer 1912; Reynolds 1896, 1913). From their inception, nonresident licenses have been substantially more expensive than resident licenses. For example, Reynolds (1913) found that the typical resident licenses were \$1 per year; nonresident licenses tended to be at least ten times higher. This discriminatory pricing has been challenged in court many times by nonresidents on the grounds that it violates the privileges and immunities clause of the U.S. Constitution (Art. IV., sec.2.). These challenges have been defeated at all levels, including the Supreme Court. More expensive licenses for nonresidents are found in all states today.⁶

The Federal Role

By the 1930s state game commissions and their agencies were well established and operating in a manner quite similar to what we now observe. Still, one crucial adjustment was on the horizon. In 1937, the Pittman–Robertson Federal Aid in Wildlife Restoration Act directed existing federal excise taxes on guns and ammunition to state agencies for the protection and restoration of wildlife.⁷ This federal revenue was available to states only on the condition that each state dedicate all of its hunting license revenue to state wildlife management programs. Pittman–Robertson allocates federal funds to states (after deducting 8 percent for administration) using a formula based on state land area, state population, and state hunter numbers. In 1950, a law known as the Dingell–Johnson Act similarly allocated federal tax dollars on fishing equipment to states for fisheries programs.⁸

The impact of federal tax support on state wildlife agencies has been huge. First, it consolidated the political constituency for wildlife agencies as one composed of hunting and fishing groups.⁹ As Lund (1980, 86) notes:

Prior to the federal tax act many states diverted game license revenues to programs unrelated to game production, such as the funding of highway agencies or school budgets. . . . Wildlife agency revenues thereafter became proportional to the sale of hunting and fishing licenses and equipment.

Second, federal funds have provided a large fraction of state agency revenues, currently around 25 percent of agency budgets. Over \$6 billion in federal

Table 1
History of the Game Laws

State	First Game Law	Resident License System	State Game Warden	Game Commission	First Bag Limit	Export Ban
Alabama	1822	1907	1907	**	1907	1907
Alaska	1902	1908	**	**	1902	1900
Arizona	1887	**	1887	1887	1901	1893
Arkansas	1875	**	**	**	**	1889
California	1852	1907	1878	1878	1901	1895
Colorado	1867	1903	1891	1891	1891	1891
Connecticut	1698	1907	1895	1897	1899	1677
Delaware	1721	**	1879	1911	**	1891
Florida	1828	**	**	**	1895	1893
Georgia	1790	1911	1911	1911	1903	1899
Idaho	1864	1903	1899	**	1899	1899
Illinois	1853	1903	1899	1899	1903	1879
Indiana	1857	1903	1899	1899	1901	1879
Iowa	1857	1909	1897	**	1878	1878
Kansas	1861	1905	1905	**	1905	1876
Kentucky	1861	**	**	**	**	1904
Louisiana	1857	1908	1908	1910	1904	1904
Maine	1830	**	1880	1880	1883	1899
Maryland	1730	**	1896	**	1910	**
Massachusetts	1694	1908	1886	1886	1910	1886
Michigan	1859	1895	1887	**	1895	1881
Minnesota	1858	1899	1887	1891	1891	1871
Mississippi	1803	**	**	**	1906	1906
Missouri	1851	1905	1895	**	1905	1877
Montana	1870	1905	1895	1913	1897	1885
Nebraska	1860	1901	1901	**	1901	1897
Nevada	1861	**	**	**	1901	1899
New Hampshire	1741	1909	1878	1878	1899	1885
New Jersey	1722	1909	1894	1894	1903	1901
New Mexico	1880	1909	1903	**	1903	1895
New York	1705	1908	1888	1895	1886	1900
N Carolina	1738	**	1903	**	1907	1877
N Dakota	1875	1895	1895	**	1887	1887
Ohio	1857	**	1886	1886	1902	1894
Oklahoma	1890	1909	1899	**	1909	1899
Oregon	1872	1905	1893	1911	1898	1905
Pennsylvania	1721	**	1895	1895	1897	1881
Rhode Island	1846	1909	1899	1899	**	1900
S Carolina	1755	**	1905	**	1910	1900
S Dakota	1875	1901	1909	**	1887	1887
Tennessee	1870	1901	1903	1905	1905	1897
Texas	1860	1909	1907	1907	1903	1897
Utah	1872	1907	1897	**	1901	1896
Vermont	1779	1908	1892	1892	1896	1884
Virginia	1699	**	**	**	**	1903
Washington	1865	1901	1890	**	1879	1897
W Virginia	1868	1909	1897	**	1899	1891
Wisconsin	1851	1897	1891	**	1897	1887
Wyoming	1869	1899	1895	1895	1890	1899

Notes: ** denotes after 1912. Data for Hawaii are not available.

Source: Palmer (1912).

dollars have been allocated to the states since the programs began. Annual appropriations to states exceed more than \$350 million today.¹⁰

Table 1 summarizes the history of game departments in the United States. It shows that most of the major legislative and regulatory efforts took place in the late nineteenth and early twentieth centuries.

The Current Structure of State Wildlife Agencies

The days in which game wardens were paid a commission based on the fines they collected are long gone. Like other natural resource agencies, state wildlife agencies are modern hierarchical bureaucracies. The wildlife commissions are composed of political appointees, and the agencies are staffed by career civil servants paid by salaries that are only loosely connected to the “output” or accomplishments of the agency. On average, a state wildlife agency sells 750,000 fishing licenses and 600,000 hunting licenses each year, has an operating budget of \$40 million, and manages thousands of acres of wildlife habitat as refuges (Wildlife Management Institute 1997).

While the earliest laws were uniform statewide restrictions on taking wildlife, the current system is a complex mix of season dates, bag limits, and other regulations. For example, Montana has distinct deer and elk regulations for over 100 “hunting districts,” which vary in season dates, bag limits, and sex and age restrictions on legal game. While the first hunting licenses entitled a person to hunt all legal game within a state, the current system is a complex menu of licenses and permits that vary by species (sometimes sex), regions, and method of allocation. Montana sells bird, deer, and elk licenses over-the-counter to residents, but many licenses are available only by lottery (e.g., resident antelope, bighorn sheep, and all nonresident big game), and a few are even auctioned to the highest bidder (e.g., trophy bighorn sheep). Moreover, the state sells various combinations of licenses (for example, a “sportsman’s” license allows a person to hunt deer, elk, and upland birds) so that Montana has more than twenty types of hunting licenses.

Agency Organization and Jurisdiction

In one form or another all state agencies are involved in the following activities: 1) setting season closures to limit access to wildlife; 2) setting bag limits on daily and seasonal take; 3) administering license sales (with discriminatory prices for nonresidents); 4) restricting the methods by which wildlife can be taken; 5) enforcing the game laws; 6) hiring agency biologists to undertake research programs; 7) managing a system of wildlife refuges; 8) protecting nongame and endangered species; 9) administering education programs that include the publication of a monthly magazine (e.g., *Montana Outdoors*).¹¹

Wildlife agencies can be categorized in terms of organization and jurisdiction. The basic organizational distinction is between independent and subordinate agencies. Independent agencies are those separated from other administrative agencies, while subordinate agencies are part of a larger hierarchical bureaucracy.

Jurisdiction can be narrow or broad. Narrow jurisdiction means the agency has regulatory authority only over wildlife matters; broad jurisdiction means control over other issues such as forests, parks, and environmental quality. The first agencies were independent “game and fish” departments with a narrow jurisdiction over species valued by sportsmen.

While many agencies still retain this organization and jurisdiction, others are part of larger “natural resource” agencies that also have regulatory jurisdiction over state parks, state forests, and environmental policy.¹² Today there are 27 independent agencies but as recently as 1967 there were 32 (Wildlife Management Institute 1997).

Even these distinctions do not include all the possibilities. For example, Pennsylvania still has a game department that is separate from its fisheries department, and a few states (e.g., Maryland) have separate departments for marine fisheries that are often focused on commercial species. Montana’s agency is independent but also has jurisdiction over state parks; hence the name Department of Fish, Wildlife and Parks. All agencies have jurisdiction over the game laws, but there is considerable variation in authority over related issues such as wildlife damage and game farming. In many cases state departments of agriculture administer these policies.

Each state agency is responsible to a commission made up of appointed commissioners.¹³ The commission has the final authority to promulgate regulations (e.g., hunting seasons) but it routinely ratifies the recommendation of the agency on these matters. For its part, the agency is aware of the demands and concerns of the commission and tailors its policy so that the commission ratifies it.

The size of the commission and the requirements for commissioners vary across states. Most states have between five and ten commissioners, but New York has 42. Some states require an even mix of members from the major political parties, and many states require that certain groups be represented on the commission (e.g., landowners, organized sportsmen’s groups). Some states also require that commissioners represent specific regions of the state.

Agency Funding

According to the Wildlife Conservation Fund of America, the total budget for all state agencies in 1996 was over \$2 billion.¹⁴ Most wildlife agencies are rather small when compared with other state agencies. Annual budgets range from less than \$10 million (Connecticut, Delaware, Hawaii, Massachusetts,

Rhode Island, and Vermont) to more than \$100 million (California, Missouri, and Washington). On a per capita basis, states spend from \$1.50 (Massachusetts) to over \$150 (Alaska), with an average of \$15. Even in Alaska, with by far the highest per capita budget, the agency's budget is less than one-half of one percent of the state's gross domestic product (GDP).

The funding for these agencies still comes mostly from hunters and anglers, either directly through licenses or indirectly through taxes on equipment. Nationwide, nearly 35 percent of all wildlife agency funds come from licenses. License revenue has been the primary single source of funding since the establishment of game agencies. Since the passage of Pittman–Robertson in 1937, however, federal funds have become an important source of agency funds. Nationwide, federal funds comprise nearly 30 percent of all agency revenue. Table 2 shows summary statistics for the variables discussed in this and subsequent sections.

Agencies also derive funds from a variety of sources including interest income on deposited funds, tax check-off programs, lotteries (Colorado, Maine), wildlife license plates (Maine, New Jersey, Wisconsin), dedicated taxes (e.g., cigarette taxes whose revenues are exclusively budgeted to a wildlife agency), and miscellaneous fees (e.g., refuge entry fees). In recent years, dedicated taxes have become more common as a source of funds from outside traditional hunting and fishing groups.

General state funds vary considerably as a source of money for wildlife agencies. Twenty-one agencies receive no funding from general state budgets and only six obtain more than 30 percent from general state sources. Missouri is a clear outlier, with over 60 percent of the agency budget coming from general tax sources. No other state general fund contributes over 50 percent and only five other states contribute more than 30 percent. Missouri, a relatively small state, also has the third largest agency as measured by the size of the budget. Missouri's constitution has earmarked one-eighth of 1 percent of its sales and use tax for conservation purposes, which goes to its wildlife agency, the Department of Conservation.

Table 2
Summary Statistics for State Wildlife Agencies

Variable	Minimum	Maximum	Mean	Median
Agency Budget				
TOTAL BUDGET (1996 annual budget in millions)	\$5.5 (Rhode Island)	\$119.9 (Washington)	\$40.6	\$30.5 (Wyoming)
PER CAPITA BUDGET (budget divided by total population)	\$1.50 (Massachusetts)	\$158.47 (Alaska)	\$15.13	\$8.97 (Mississippi)
GENERAL FUNDS SHARE (% from general funds)	0% (20 states)	61.9% (Missouri)	9.4%	2.6 (New Mexico)
Agency Behavior				
EMPLOYEES (number of agency employees)	62 (Rhode Island)	1,527 (Alaska)	426	372 (Oklahoma and & Arkansas)
WARDENS (game wardens as % of all employees)	0% (Alaska, Oregon)*	72% (Mississippi)	30%	31% (Louisiana)
LAND MANAGED (acres owned, leased, or in easements)	0 (5 states)	5,343,000 (Florida)	592,000	225,000 (Ohio & Wyoming)
Interest Groups				
HUNTERS (licensed hunters in 1997)	10,000 (Hawaii)	1,173,000 (Pennsylvania)	313,000	254,600 (Alabama & Mississippi)
ANGLERS (fishing licenses sold in 1994)	11,000 (Hawaii)	2,043,000 (California)	604,000	483,500 (Maryland & Utah)
NONRESIDENT HUNTERS (% of out-of-state hunters)	1% (6 states)	37% (Wyoming)	9%	6% (Arizona, New York & Utah)
NONRESIDENT ANGLERS (% of out-of state anglers)	0.9% (Hawaii)	61.1% (Alaska)	20%	17% (6 states)

*Alaska and Oregon give law enforcement authority to biologists and other employees.

Sources: Agency budget data: Wildlife Conservation Fund of America (1997); agency behavior data: Wildlife Management Institute (1997) and agency web sites; interest group data: U.S. Fish and Wildlife Service (1997).

Agency Behavior

State wildlife agencies allocate their budgets in many different ways. Perhaps the most important budget allocation decision is how to staff the agency. Again, most state agencies are relatively small, with only four states having more than 1,000 full-time employees. A further look at agency employment reveals that the makeup of state wildlife employees also varies across states. The original agency employees were game wardens, or what are now often called “conservation officers.” There are more than 5,000 game wardens nationwide; Texas has over 500 wardens while Delaware has only 27. In only five states (Alabama, Indiana, Maine, Mississippi, Rhode Island) do wardens comprise more than one-half of all employees. In Alaska and a few other states, however, biologists also have law enforcement authority like that of a warden.

Since the early 1900s, these agencies have been managing wildlife habitat. Agencies own some land outright and also lease land and use conservation easements to protect habitat and valued animal populations.

Specific hunting and fishing regulations vary widely across states because of habitat differences as well as differences in the economic value of various animal populations. For example, northern states where furs are more valuable tend to protect such fur-bearing animals as coyotes.¹⁵ And states where dense populations make hunting more dangerous more often require that deer hunters use only shotguns rather than more dangerous high-powered rifles. Indeed, there is so much variation that it is often difficult to make meaningful state comparisons.

Agency Constituents

History shows that landowners and sportsmen—conservationists were the key forces behind the creation of game laws and game agencies (Lund 1980; Tober 1981). Today these constituencies are still dominant but not exclusive, and their importance varies across states. Three states—Michigan, Pennsylvania, and Texas—routinely sell over one million hunting licenses each year, while Hawaii sells only 10,000 licenses annually. Ten states routinely sell more than one million fishing licenses annually. On a per capita basis, hunting and fishing participation also varies widely by state. Resident and nonresident hunters and fishermen can often be usefully distinguished and tend to represent different constituencies. Nonresidents tend to be wealthier, more often use the services of guides, and more often hunt and fish on private rather than public lands. Politically, nonresident sportsmen tend to be aligned with guides and private landowners rather than with resident sportsmen.

In recent years nongame wildlife and endangered species management has also become more important. Environmental groups, whose members are often hostile to hunting (but rarely hostile to fishing), have become more interested in agency policy and relatively more influential.

The Benefits and Costs of a Wildlife Bureaucracy

The need to enforce an ever increasing number of state game laws enacted during the late nineteenth century led to the establishment of state game and fish or wildlife agencies. By the middle of the twentieth century, game departments had become modern hierarchical bureaucracies staffed by civil servants charged with enforcing a myriad of laws and detailed regulations, managing wildlife habitat, conducting scientific research, and developing education programs.

Why did game management take this form in the United States? In England and continental Europe, for instance, game departments have not been established. Instead, most rights to and management authority over wildlife populations rest with those who provide the habitat—the landowners. Landowners, in turn, hire professional “gamekeepers” who fill the role of game department wardens and biologists. Economics can shed light on the rationale for and organization of these agencies and provide insight into the future of wildlife agencies and wildlife management.

Benefits of the Game Department: Closing Open Access

It is indisputable that many wildlife populations in the United States severely plummeted during the nineteenth century when access to wildlife was mostly unrestricted and game markets were widespread.¹⁶ There were no property rights to wild populations and overexploitation was the rule. In the United States, property rights to wild populations were extremely difficult to establish for two major reasons. First, many of the most valuable wild populations in North America had extremely large territorial requirements. Many species of birds annually migrated across the continent, fish populations inhabited rivers that flow for hundreds of miles, and big game species utilized thousands of acres of land. Second, ownership of land was distributed among many small private landowners and large undeveloped government holdings.¹⁷ This was especially true around the turn of the century when private landholdings were quite small and scattered as settlement was still proceeding. Moreover, much land remained in public ownership. Together, these factors made it difficult for landowners (or sportsmen’s groups) to control access to wild populations. In many locations wild populations remained open-access resources for decades.

In this setting the economic rationale for a game department is fairly simple. The game department is an institution that consolidates authority over wildlife access and use, lowering the costs of establishing and enforcing rights to game. By establishing closed seasons, setting bag limits, and limiting trade in game products, the agency largely eliminated the open-access regime. It also coordinated the behavior of landowners without requiring explicit agreement of all landowners (including managers of government land). A game department

also provides a larger scale of operation for wildlife biologists and other specialists to manage habitat and populations.

This management scheme did not develop in Great Britain. Instead, citizens of Great Britain rely on wildlife management by private landowners rather than a game department system. The reason lies in the difference between land ownership and wildlife in Great Britain and the United States. The different wildlife institutions in Great Britain and the United States reflect the disparity between the two countries in the size of privately owned land tracts and wildlife habitat requirements.

In Great Britain nearly all land was and is private and is held in relatively large parcels—large especially when compared with the amount of habitat that its wildlife populations require. England and Scotland simply do not have continental migrations of waterfowl, rivers that flow for hundreds of miles, or big game species that use hundreds of thousands of acres.¹⁸ As a result, there was, and is, simply no demand for a “solution” requiring extensive legislation and an administrative bureaucracy. In the United States, however, sole reliance on rights to wildlife held by private landowners was impractical. Thus, state game laws emerged that were administered by state wildlife agencies staffed with game wardens and other wildlife professionals.¹⁹

Closer scrutiny of the structure of American wildlife management further illustrates the idea that the relationship between landownership and the amount of habitat wildlife requires is an important determining factor in the choice of institutions. Although states have control over most wildlife management decisions, the federal government has long had jurisdiction over migratory waterfowl, and a treaty between Canada, Mexico, and the United States coordinates regulation of these migratory fowl. This level of jurisdiction reflects the continental extent of the birds’ habitat. States also form interstate agreements to manage populations that inhabit border territories. Thus when state jurisdiction is inadequate, larger jurisdictional institutions have emerged.

Similarly, within many states there are great differences in wildlife habitat and human activities, so state regulations often vary widely within a state’s borders. For example, upstate New York has substantially different hunting seasons and restrictions than does the area surrounding New York City. Finally, many differences in state regulatory policies reflect the differential benefits and costs across states.²⁰

In many respects, the initial goals of the state agencies have been met. Many of the species whose numbers were depleted in the late nineteenth century have now recovered. For example, whitetail deer, estimated at 25 to 50 million in colonial America, fell to just a half million by 1890, but are now estimated at 15 to 25 million and growing. The pronghorn antelope, seen throughout the Great Plains during the Lewis and Clark expedition, had been reduced to 26,600 in the United States (30,320 in Canada) in 1924. By 1964, just forty years later, populations had increased more than tenfold in both the United States and

Canada. In the United States alone they are approaching 600,000 in number (Van Wormer 1969; Gordon, Lacy, and Streeter 1997), and the North American total is between 750,000 and one million. Similar recoveries have occurred for bison, bighorn sheep, and elk and for many bird species (Gordon, Lacey, and Streeter 1997).

The Costs of the Game Department: Bureaucratic Inefficiencies

In principle, a game department can solve the problem of open access to wildlife through a well-designed and enforced system of seasons, bag limits, and other restrictions on human behavior. In practice, however, the political and bureaucratic characteristics that make a state game agency a viable institution also limit its performance. The most important of these characteristics is the fact that full agreement among all landowners and other related parties is not required for binding game management policy. This poses limitations on the effectiveness of the agency for several reasons.

First, individual agency personnel will not act simply to maximize the value of the wildlife or its habitat, as they would if they were owners.²¹ Game wardens, refuge managers, and research biologists are salaried employees whose compensation does not closely depend on their day-to-day behavior. Second, interest groups may be able to influence agency behavior in ways that will tend not to maximize the value of the wildlife. For example, hunters might successfully push for regulations that adversely impact nongame species, or landowners might obtain regulations that limit valuable game populations but reduce damage to crops. Third, because the agency does not usually own or lease substantial amounts of land,²² it will not be able to directly control agricultural and other uses that can affect the land's value as wildlife habitat. Unless it is involved directly in the real estate market, a wildlife agency will always have "loose" control over wildlife. For example, it cannot normally prevent farmers from draining marshes and sloughs (ideal waterfowl habitat) in order to increase agricultural production.

If state policies are uniform across the state, there will be inefficiencies that arise because locally specific costs and benefits are not accounted for. For example, deer may be plentiful in some regions and scarce in others, so uniform season and bag regulations would lead to excessive harvest in one area and to too little harvest in another. If, instead, the agency implements diverse, regionally tailored regulations, these regulations require greater effort in the collection of information and in their enforcement. Salaried game agents have limited ability to collect detailed population data (the agencies do not own much land and cannot effectively monitor private land), and they have limited incentive to collect it even when able, because they are not residual claimants to their decisions. All policies are imperfect to some extent because of the bureaucrat's incentives and because of enforcement costs.

Agency Economics and Wildlife Management

Recognizing that game departments are an imperfect solution to the difficult problem of establishing property rights to wildlife still leaves many important economic questions unanswered. What determines the size (e.g., budget, number of employees) of an agency and its organizational structure? What determines season and bag limits for fish and game? What determines the prices of licenses for residents and nonresidents? What determines the number of game wardens?

The Basic Economics of Bureaucracy

Economists study bureaucracy by examining the incentives of individual bureaucrats within an agency. These incentives depend on the organization of the agency and on the ability of the legislature and citizens to influence and monitor the agency. In this general way, studying bureaucracy is no different from studying business firms and consumers. In practice, however, the study of bureaucracy by economists has been an elusive search for a coherent analytical framework. An analytical impediment persists because of the difficulty of defining, and then pursuing, an objective function for the agency; that is, knowing the actual goals of the agency and its bureaucrats.

Two of the earliest approaches solved this difficulty by proposing clear but simple objectives for an agency.²³ The first clear economic model of bureaucracy was Niskanen's (1971) "budget maximizing" bureau. In this model, a bureaucracy is conceived as a "firm" that does not generate its own revenue directly from selling a product but receives grants (a budget) from a legislature for the production of a good demanded by the public. If the goal of the agency and its bureaucrats is to simply get the largest "grant" from the legislature, then two general implications follow. First, the agency is always pressing for a larger budget and threatening to shut down its most essential services. Second, the agency is constantly pressing for an expanded agenda in order to justify its request for a larger budget.²⁴

A second, simple approach is to assume that the agency is a monopoly or a cartel operated for the benefit of a single interest group (Stigler 1971).²⁵ In this model, the agency acts to restrict competition and industry output in order to maximize industry profits. This model best fits the case in which there is a single interest group that dominates the political life of the agency, strongly influencing its budget and its agenda.

The budget maximization and monopoly-cartel models are straightforward, but most scholars consider them misleading as a guide to understanding real bureaucracies because they ignore several important features of real agencies. First, these models have no role for the legislature or the judiciary in designing the agency and overseeing its performance (McCubbins, Noll, and Weingast

1987). Yet in practice legislatures monitor, punish, and limit the authority of agencies.²⁶ Game commissions also oversee the agencies and these commissioners are closely tied to the legislature and the electorate. Second, these models ignore the incentives of career civil servants, who may not care much about the agency budget (or benefits to interest groups) because they are protected from termination (Johnson and Libecap 1994). Civil servants may have differential incentives depending on whether they are agency executives, rank-and-file employees, or belonging to a profession (Knoeber 1982; Wilson 1989). Third, these models also fail to consider the fact that competing interest groups will lobby the legislature and thus indirectly influence the budget and policies of the agency (Becker 1983; Peltzman 1976). Fourth, these models do not consider how the organization of agencies influences the incentives of agencies.

Together, these criticisms suggest a framework that recognizes the institutional framework governing the agency and incorporates the behavior of the affected interest groups. Thus, in modern terms, the appropriate economic model is a principal–agent model (Laffont and Tirole 1993; Spiller 1990) or a transaction cost framework (Williamson 1999) that focuses on the incentives of all the parties involved in determining an agency's behavior. Even with these recent considerations, however, there is still little consensus among economists on the economics of bureaucracies.²⁷

Still it is fruitful to use this framework and think of the public, through interest groups and legislators, as the principal and the wildlife agency as the agent. The principal maximizes its welfare utility subject to the constraints of the agent's incentives, which depend upon the organization of the agency and its relationship to the legislature. In turn, the legislature's behavior depends on competition among interest groups. To implement this approach, one needs to know the basic economic benefits and costs of the agency decisions or policies, the interests of the relevant constituents, and the organizational constraints facing the agency. These facets will vary across the states and have varied over time as well.

Economic Factors

The economic logic of wildlife agencies (Lueck 1989) can be used to identify what might be called pure economic considerations. The demand for wildlife is one obvious component. The cost of wildlife, in terms of alternative land uses for nonwildlife activities, is another. Thus, states where the demand for wildlife is high and the cost of providing it is low should have larger agencies, holding other factors constant.²⁸ In addition, states with relatively large public land holdings should have larger agencies because a private contractual solution to wildlife management will necessarily be less effective. Similarly, states with greater proportions of private land should have smaller wildlife agencies

because of the greater proportion of private wildlife management.²⁹ Depending on how the demand for wildlife changes as people get richer, wealthier states may have larger or smaller agencies.

Interest Group Factors

The interest groups most directly affected by agency decisions include resident hunters and anglers (jointly called sportsmen), private landowners, nonresident sportsmen, and guides and outfitters. Other groups that are often, and increasingly, involved are public land managers and nongame wildlife groups (primarily environmentalists). Even the wildlife agency employees may be considered an interest group.³⁰ Increases in the strengths of these groups will lead to changes in agency size, policies, and behavior.³¹

The interests of these groups can be summarized as follows. Resident sportsmen will prefer higher nonresident fees in order to limit competition for scarce hunting and fishing locations.³² Landowners engaged in fee hunting operations will prefer lower license fees for nonresidents in order to increase the derived demand for their property. Those landowners will be expected to exert pressure for greater control over bag limits and seasons, in order to be able to tailor their hunting business to local conditions. Guides and outfitters will be aligned with the private landowners on this issue. Nongame wildlife groups will exert pressure to allocate agency resources toward the management of species not pursued by anglers and hunters. They will have limited interest in increasing license revenue unless they can capture a share of it. Most likely they will be advocates of general state funding of the agency.

Agency Organization Factors

Even though there is variation among wildlife agencies, they also have a common set of features. All state wildlife agencies generate substantial revenues by selling hunting and fishing licenses and are heavily dependent on federal taxes from equipment related to these activities. This alone distinguishes wildlife agencies from a pure Niskanen-type bureau, which has no internal revenue source.

Three identifiable organizational issues vary dramatically across states and are expected to shape incentives and behavior: agency independence, agency jurisdiction, and agency reliance on state general funding.³³ Independent agencies with narrow jurisdictions may behave in ways more conforming to Stigler's capture model in which a dominant interest group controls the actions of an agency. However, when a game department is subordinate to a larger agency and has jurisdiction over state parks and other natural resource issues, political pressure from constituencies beyond those associated with hunting and fishing will have an impact on the agency. Thus, it is likely that independent

agencies will devote relatively more resources to the management of game species and the enforcement of laws affecting game species.

The structure of agency funding has similar effects. The more traditional agency, with no general fund support, will cater entirely to the desires of the hunting and fishing groups. Agencies with substantial general funding will face demands from nongame wildlife interests. The potential for more funds and larger budgets might seem intoxicating to an agency, but Wilson (1989) argues that agencies often resist expanded agendas even when larger budgets come with it. Wilson argues that this resistance exists because agents also value autonomy, perhaps because their human capital investments are protected by it.

Table 3 shows the mean values of agency budgets when agencies are broken into three organizational categories. The table shows that independent agencies have larger budgets than subordinate agencies; that agencies with narrow jurisdictions have larger budgets than those with broad jurisdictions; and agencies with access to general state funds have larger budgets than those without such access.

Table 3
Budgets and Agency Organization

Organizational Feature	States	1996 Mean Annual Budget
Independent agency	27	\$ 44,203,703
Subordinate agency	23	\$ 36,365,217
No general funds allowed	20	\$ 34,490,000
General funds used	30	\$ 44,670,000
Narrow jurisdiction	40	\$ 41,662,500
Broad jurisdiction	10	\$ 36,340,000

Note: All *t*-values support the hypothesis that the means are significantly different at the 10 percent level.

Some Evidence on Agency Budgets

As noted above, the size of state wildlife agencies in terms of annual budget varies widely.³⁴ The average state budget was over \$40 million in 1996, but the budgets ranged from \$5.5 million in Rhode Island to \$119.9 million in Washington. While some factors affecting budget size are suggested in Table 3, these comparisons do not control for competing factors and thus offer limited information about which factors determine the size of an agency's budget. Regression analysis can be used to estimate the effect of multiple factors on state agency budgets.

Table 4 presents the results of such an analysis. It reports the coefficient estimates for ordinary least squares regressions of the following equation:

$$\text{AGENCY BUDGET} = a + b \cdot \text{ECONOMIC} + c \cdot \text{ORGANIZATION} + d \cdot \text{INTEREST GROUP} + e.$$

In this equation, the budget is hypothesized to be a linear function of three categories of exogenous variables: ECONOMIC variables, agency ORGANIZATION variables, and INTEREST GROUP variables. The symbols b, c, and d are the estimated coefficients presented in Table 4. Positive signs on these coefficients indicate a positive correlation, holding constant other variables in the equation, between the variable and the agency's budget. The table shows the coefficient estimates for four different specifications of the equation using different combinations of the exogenous variables. The estimates are quite consistent across the specifications and have strong overall explanatory power.

The results can be readily summarized, beginning with the ECONOMIC variables: POPULATION, AREA, PER CAPITA GDP, and PUBLIC LAND. State population has a negative effect on an agency's budget (that is, the smaller the state's population, the larger the agency's budget), although this effect is only marginally statistically significant. States that are larger in area and states that have relatively more public land have agencies with larger budgets. These findings are expected, since such states have greater wildlife values but at the same time private game management is more costly. Increases in wealth, measured by per capita GDP, have no effect on agency size.

Second, consider the agency ORGANIZATION variables: INDEPENDENT AGENCY, NARROW JURISDICTION, and GENERAL FUNDS SHARE. Independent agencies and agencies with narrow jurisdictions have larger budgets. States with larger shares of agency budgets coming from general funding have larger budgets.³⁵ These findings indicate that the public is more willing to fund agencies that have more narrowly focused agendas, perhaps because they can be more easily monitored and thus perform more effectively.

Third, consider the INTEREST GROUP variables: HUNTERS, ANGLERS, SPORTSMEN, NONRESIDENT HUNTERS, and NONRESIDENT ANGLERS. Increases in the number of anglers are strongly correlated with larger budgets, but increases in hunters are not. It is not clear why this is the case, but it does suggest that fishing demand is more important to modern wildlife agencies than hunting demand. States with a larger fraction of nonresident hunters have larger budgets, but states with a larger fraction of nonresident anglers have smaller budgets. Again, this finding is hard to interpret but suggests that nonresident hunting demand is of greater importance than nonresident fishing demand.

Taken together, the estimates in Table 4 show that economic factors as well as factors controlling for agency organization and potential interest groups all influence the size of an agency. Future analysis should examine alternative variables that measure the importance of other interest groups such as environmental organizations and outfitters or guides.

Table 4
Ordinary Least Squares Estimates of a Wildlife Agency Budget

Exogenous Variables	Specifications			
	1	2	3	4
CONSTANT	-22.99 (3.35)**	-23.33 (3.46)**	-22.16 (3.14)**	-22.58 (3.26)**
Economic Variables				
POPULATION (for state, 1997)	-6.62E-07 (1.23)	-5.81E-05 (1.12)	-6.83E-07 (1.25)	-5.93E-07 (1.17)
AREA (square miles)	4.27E-05 (1.60)	4.25E-05 (1.61)	4.54E-05 (1.67)	4.51E-05 (1.68)*
PER CAPITA GDP (1997)	—	—	-32.58 (-0.61)	-30.75 (0.58)
PUBLIC LAND (fraction of all land)	0.38 (3.28)**	0.39 (3.54)**	0.37 (3.21)**	0.39 (3.48)**
Agency Organization Variables				
INDEPENDENT AGENCY (= 1 if independent)	15.81 (3.97)**	15.58 (3.98)**	16.18 (3.98)**	15.91 (3.99)**
NARROW JURISDICTION (=1 if narrow)	7.76 (1.63)	7.73 (1.64)	8.35 (1.71)*	8.28 (1.71)*
GENERAL FUNDS SHARE (fraction of budget from general funds)	80.98 (6.35)**	81.74 (6.53)**	80.40 (6.24)**	81.25 (6.43)**
Interest Group Variables				
HUNTERS	-0.006 (0.44)	—	-0.007 (0.48)	—
ANGLERS	6.60E-05 (6.12)**	—	6.06E-05 (6.07)**	—
SPORTSMEN (hunters and anglers)	—	5.73E-05 (8.96)**	—	5.69E-05 (8.80)**
NONRESIDENT HUNTERS (fraction of out-of-state hunters)	0.11 (3.10)**	0.11 (3.10)**	0.11 (3.13)**	0.11 (3.13)**
NONRESIDENT ANGLERS (fraction of out-of-state anglers)	-43.61 (2.04)**	-42.98 (2.04)**	-47.14 (-2.11)**	-46.26 (2.10)**
Goodness-of-Fit				
Adjusted R ²	0.84	0.84	0.83	0.84
F-statistic	25.87	29.31	23.17	25.98
Observations	50	50	50	50

Notes: Dependent variable = total 1996 budget for state wildlife agency. Absolute values of *t*-statistics in parentheses. * significant at the 10% level; ** significant at the 5% level.

Sources: Agency budget data: Wildlife Conservation Fund of America (1997); agency behavior data: Wildlife Management Institute (1997) and agency websites; interest groups data: U.S. Fish and Wildlife Service (1997).

Conclusion

Economic analysis cannot generate explicit answers to pressing questions of public policy, but it does provide a framework that clarifies the tradeoffs and the incentives inherent in wildlife management by bureaucrats. This study has provided the historical background and a framework for posing some of the most important questions currently facing wildlife managers. It has also presented some preliminary statistical analysis of state agency budgets that suggesting that both economic and political forces determine the size of the budget.

Although the economics of bureaucracy is far from complete, it has moved beyond the simplest models that developed in the 1970s. The modern models that focus on the varying incentives of agency personnel, the legislature, the judiciary, and interest groups help to illuminate the behavior of wildlife agencies. In particular they give insight into what the future of state wildlife agencies might look like as nongame wildlife becomes more valuable and private landowners invest more in wildlife management. For example:

- The current call among environmentalists and nongame groups to alter the funding and structure of wildlife agencies is consistent with an increase in public demand for nongame wildlife. It would follow that this group should contribute more to the budget of the agency charged with the management of wildlife. Some game-oriented wildlife groups have supported such changes in the hope of larger budgets. However, if increased budgets come to agencies at the expense of added interest group pressures, traditional wildlife groups may find themselves worse off if they are not able to maintain current game-based programs.³⁶
- Changes in land use and landownership are also changing the incentives of wildlife agencies. Farms and ranches are getting larger, enabling more landowners to establish fee hunting and fishing programs.³⁷ As they do, wildlife becomes increasingly governed by private management plans. As the gains from fee operations have increased, landowners have lobbied for more liberal game regulations that allow them greater control of season and bag limits for the wildlife that inhabit their land.³⁸ States like Texas and New Mexico have long granted extensive management authority to landowners, but in recent years more states have implemented policies toward this end. Leal and Grewell (1999) have documented the growth in “ranching for wildlife” programs. These programs give landowners regulatory flexibility which they can convert into more revenue from fee hunting. In return, the agency gets the opportunity to extend its habitat management to private land over which it previously had no control. The growth of these programs indicates a slow shift toward private management of game populations.

- Federal endangered species law can impose wildlife policies on a state and alter the agency's agenda. For example, a state might have to change its hunting or fishing regulations to accommodate a federally endangered species that might inadvertently be taken. Also, these federal policies may require state agencies to study and monitor endangered populations. If the agencies become constrained by federal legislation, they may experience decreased support from traditional constituencies.

In some ways the game department is an “evolutionary ghost.”³⁹ It emerged at a time when vesting ownership of wildlife in landowners was prohibitively costly. It evolved during an era when nongame wildlife had little value. Since then, the private management of wildlife has become increasingly important and the value of nongame wildlife has also grown. Similarly, our knowledge of successful and unsuccessful wildlife policy and wildlife biology has increased tremendously. And no longer do professionals dispute the importance of incentives for landowners in providing habitat.⁴⁰

The game department successfully mitigates the large problem of open access but it does so in a cumbersome manner because of inherent bureaucratic incentives. The recent trend toward more nongame management (often associated with more general funding), coupled with the increase in private wildlife management, is important. Perhaps a regime in which nongame wildlife is left to state agencies and game are left to private landowners looms on the (possibly distant) horizon.

Notes

1. Key sources are Palmer (1912), Chase (1913), Lund (1980), and Reynolds (1896, 1913).
2. There were also numerous local laws during the colonial period, and sometimes the first state game law only applied to a small locale. For example, Texas' first closed season was for quail on Galveston Island in 1860.
3. More than ten states still prohibit hunting on Sundays.
4. Palmer (1912) also reports deer wardens in Massachusetts in 1739 for the state deer reserve.
5. In 1865 Massachusetts and New Hampshire established separate fish commissions. Fish and game commissions tended to be separate bodies in most states at the turn of the century. Most were consolidated by 1950. Fishing licenses tended to come later than hunting licenses.
6. The final case upholding this practice was *Baldwin v. Fish and Game Commission* 436, U.S. 371 (1978).
7. 16 U.S.C. § 669.
8. Federal Aid in Fish Restoration and Management Projects Act, 16 U.S.C. § 777. This program was expanded in 1984 by the Wallop–Breux Amendments.
9. In modern parlance these groups are often known as “cast and blast” or “bullet and hook.” O’Toole (1995) claims that under the Pittman–Robertson Act, states quickly stopped giving general funds to agencies but Lund (1980) and Warren (1997) argue that license-based funding was already well established by the time the law was passed.
10. States also receive federal funds from the sale of federal duck stamps, which allow a person to hunt migratory waterfowl. This system developed as a result of the Migratory Bird Treaty Act of 1918.
11. These publications are directly linked to Pittman–Robertson funds.
12. A Wildlife Management Institute (1997) report identified four basic types: an independent agency (20); an independent agency with state parks (7); an agency in the second tier of a bigger agency (20); and an agency in the third tier of a bigger agency (4).
13. Many states also have advisory boards that make policy recommendations.
14. This and other budget data come from Wildlife Conservation Fund of America (1997).
15. See Lueck (1991) for an analysis of differences in state laws and regulations.
16. This section draws on Lueck (1989).
17. It is also true that states often made open access hunting legal on undeveloped lands, and in many regions landowners customarily made their lands open to all.
18. Roman and pre-Norman extinctions of many large and wide-ranging species made private ownership of wildlife relatively easy in Great Britain.

19. Canada's system is also American rather than British, despite even closer ties to Britain and its legal system.

20. Lueck (1991), finds that variation in several state hunting regulations is explained by state differences in landowners and wildlife values.

21. Knoeber (1982) examines how the performance of public officials depends on their compensation method.

22. Even though agencies do own and lease habitat for refuges, the vast majority of wildlife populations inhabit private land.

23. There is an even simpler, public interest model, which assumes that the agency perfectly maximizes the total net value of the wildlife. This model also assumes the equivalent of perfect agency monitoring by citizens.

24. This model also implies the agency is "too big" compared to its ideal size. Of course, such an implication cannot be empirically tested. One bit of evidence consistent with the Niskanen model (and others, too) is that wildlife agencies routinely clamor for increased budgets (Wildlife Management Institute 1997; Scott, Hansen, and Mosher 1999).

25. It is tempting to model the agency as a price discriminating monopolist that sets higher prices to nonresidents with relatively inelastic demand but, in fact, wildlife agencies have minimal authority to set license fees. Only four states give the wildlife commission authority to set fees and no state gives such authority directly to the agency (Wildlife Management Institute 1997). In 46 states the power is held by the legislatures. Also, since bureaucrats do not own revenues, the rationale for such a model must lie with a Niskanen-type link between agency size and bureaucrat utility.

26. For state wildlife agencies, the Pittman–Robertson Act limits state discretion with license revenue but also creates incentives for selling more licenses. Because this legislation allocates federal tax revenues according to a formula based on state hunter numbers, each agency has an incentive to increase these numbers. Second, because of Pittman–Robertson and Dingell–Johnson legislation, all state license revenue must be used for game and sports fisheries management activities. This severely limits an agency's discretion in allocating its resources and it limits the incentives for other constituencies to lobby an agency, unless the funding system can be altered.

27. The lack of consensus on the appropriate economic model is noted in the diversity of views among participants in a recent conference on bureaucracy published in the *Journal of Law, Economics, and Organization* (April 1999). The lack of empirical analysis is also striking, especially for state agencies.

28. Hunting and fishing demand, in turn, will depend in part on the agency's success in fostering thriving populations of wildlife. For example, a long-term policy of low license fees and relative overhunting might ultimately reduce the demand for hunting licenses. The "endogeneity" makes a complete empirical analysis difficult and is not controlled for here.

29. Although private wildlife management is important, there is no source of data on its extent or details across states.

30. The International Association of Fish and Wildlife Agencies (IAFWA),

established in 1902, has been an active interest group for nearly a century.

31. These groups, of course, are intimately linked to basic demand and cost considerations. But because group organization is costly and there are incentives to free-ride (Peltzman 1976), some groups will be more influential than others.

32. This is a prevalent force in many states. In Montana, for instance, the Montana Wildlife Federation (the state's largest wildlife lobby) is openly hostile to fee hunting and to nonresident anglers and hunters.

33. The issue of bureaucrat compensation is important but there is little identifiable cross-state variation now. Recall that agencies were actually formed to support the first employees—the game wardens. Unlike modern salaried wardens, the earliest wardens kept a share of the fines they collected. The incentive to vigorously search out violators was clear and often led to violence (Warren 1997). Once licenses were established and agencies had funds, warden compensation was converted to a salary system, and the wardens' incentives changed. In other areas of law, "piece rate" compensation for law enforcement officers is rare, most likely because such officers (who are already hard to monitor) have an incentive to use extra-vigorous enforcement techniques. One can only imagine how urban police might behave if they were paid by the arrest or by a share of collected fines.

34. These budget data include all nonwildlife expenditures for those agencies with broad jurisdiction.

35. This effect is also present if one uses a dummy variable indicating the discrete presence or absence of general funding.

36. Madsen (1999) argues exactly this point.

37. On the urban fringe, however, subdivision means that rural holdings are getting smaller, creating more demand for game agency regulation.

38. Landowners have also increasingly limited access to local sportsmen. This is having a political backlash from resident hunters who want free access to private lands. In Montana the state legislature recently (1999) doubled the license fee for nonresident bird hunting in response to heavy lobbying by resident hunters and over the objections of landowners, guides, and the state wildlife agency. It has also recently established a fund (called Block Management) to compensate landowners for allowing hunting access.

39. The term comes from a recent study of pronghorn antelope in which the author argues that the antelope's spectacular speed developed ages ago when large, fast predators roamed North America (Byers 1998). The pronghorn retains its speed, largely as a vestigial characteristic.

40. The extent of private management expenditures is not known but is likely to be substantial, given the extent of fee hunting and fishing businesses. A focus on state agency budgets ignores this aspect of wildlife management.

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Appendix

Four State Case Studies

To better understand the evolution and organization of wildlife agencies, this appendix documents the history of wildlife agencies in four states: Montana, New Mexico, Pennsylvania, and Texas.¹ These states have substantially different characteristics and, as a result, their agencies differ significantly as well.

- Montana is a large, sparsely populated western state that did not experience as severe a decline of game populations in the late nineteenth century as did other states under open-access exploitation. Montana also contains a relatively large fraction (nearly 30 percent of the state) of federal land under the jurisdiction of the Bureau of Land Management, the Forest Service, and the Park Service.
- New Mexico is also a large, relatively sparsely populated western state. Unlike Montana, however, New Mexico was settled much earlier and had a longer period of open-access exploitation. Many wildlife populations in New Mexico were wiped out or nearly wiped out.
- Pennsylvania is a relatively large, heavily populated eastern state. Even though there were some colonial and early game laws, limited enforcement meant that there was near open-access exploitation during the nineteenth century, which led to depopulation of many species. As the game laws began to be enforced during the late nineteenth century, Pennsylvania became the site of classic battles between urban sportsmen and their landowner allies against local market and pot hunters (people hunting for food), who were often poor immigrants.
- Texas is a huge, heavily populated state with a wildlife management system that is almost European in its reliance on private landowner control of wildlife. Texas has trivial amounts of public land, unlike Montana and New Mexico. Table A-1 compares these states and is used as a guide to the cases below.

Montana Department of Fish, Wildlife, and Parks

When Lewis and Clark explored Montana at the start of the nineteenth century, wildlife was abundant in both the eastern prairie grasslands and the mountainous west. Their records describe vast herds of buffalo, elk and antelope. During the next century, access to wildlife was nearly open, since Indian tribes lost control over their territorial rights and white settlers had only small and scattered parcels of private land. Wildlife populations were decimated near mining camps. Buffalo were nearly all killed by 1883, mostly as a result of the hide trade.

In 1869 the territorial legislature passed the first conservation law by closing the season for quail and partridge. In 1872, the year Yellowstone National Park was created, the hunting season for most big game (bison, elk, deer, antelope, sheep, goats) was closed from February 1 to August 15 each year. In 1877, more severe laws were enacted, including prohibition on market hunting for game birds. The first bounties on predators were instituted in 1879.

These early game laws, however, were not enforced by the Territory and therefore mostly ignored by the settlers. In 1895, six years after statehood, the Montana legislature established a Fish and Game Board and implemented the first bag limits. To enforce these laws the governor appointed W. F. Scott as the state's first game warden in 1901. The warden and his eight deputies were the first field employees of the new Fish and Game Department. In 1901, the Legislature also introduced a nonresident license of \$25 for hunting game animals, and two years later a resident hunting license was required at a cost of \$1 per family.

The first state game preserves were established in 1911. The Montana Fish and Game Commission was created in 1913 but did not have the authority to open and close seasons until 1921. In 1921 the current system of five commissioners appointed by the governor was also adopted. In 1926, the commission purchased land for the first time for game management in Beaverhead County. In 1941, the Fish and Game Commission was given the authority to set closed seasons and bag limits and to create game preserves. By 1941, federal funds authorized by Pittman–Robertson Act became available for state game management. Prior to this date funds were almost exclusively from the sale of licenses. The state game management budget was \$90,000 in 1947.

Today, the current budget for the Department of Fish, Wildlife and Parks is over \$50 million, with over \$30 million (60 percent) coming from hunting and fishing license sales and nearly 12 million (25 percent) coming from federal aid programs. In recent years, roughly 65 percent of the license revenue has come from residents and 35 percent from nonresidents. A trivial amount, less than one-half million dollars, comes from state general funds.

Of this annual budget, \$5 million (over 11 percent) is allocated to law enforcement, \$10 million (20 percent) to “wildlife,” \$11 million (nearly 22 percent) to “fisheries,” \$6.7 million (13 percent) to “parks,” and \$9.5 million (18 percent) to management and finance. The agency currently has 250 full-time employees, including 83 game wardens. The commission is still composed of five

members. Currently, a resident may purchase a deer license for just \$13 while a nonresident must pay at least \$248. One mountain sheep permit is auctioned annually to generate funds for mountain sheep research, management, and habitat improvement. In recent years this auction has generated over \$300,000.

New Mexico Department of Game and Fish

From Coronado's expedition in the 1540s until the nineteenth century, the abundance of animal life in New Mexico was described and researched by numerous explorers and biologists. By the end of the nineteenth century, however, buffalo, elk, and bighorn sheep were extinct, and the antelope population was distressingly low.

With these game populations dwindling, predators became an increasing threat to cattle. The first wildlife law, passed in 1867, was a predator bounty law. In 1880 the first game conservation law imposed a uniform closed season, from May 1 to September 1, on all game. In 1895, a new law introduced differentiated closed seasons by type of game. This law also prohibited wanton killing and killing for the fur of game. Penalties ranging from \$25-\$50 and 10 to 30 days imprisonment were provided for violators of the game law. The 1895 act also authorized county commissioners to appoint game wardens. Those wardens were not salaried but received half of the fines they collected instead.

In 1897 new provisions prohibited the sale of game and protected elk, fawn, mountain sheep, mountain goats and beavers against all hunters. In 1901 the law for the first time prohibited the killing of song and insectivorous birds and "all other birds regarded as harmless." The 1901 law prohibited the hunting of deer, elk, mountain sheep, and antelope except by private landowners on their own land. Since large parts of New Mexico were either publicly owned or highly fragmented, the law excluded most people from hunting. According to Warren, the only hunters that were allowed to pursue large game were a few large landowners, their lessees, and associates.

The Office of State Game and Fish Warden was created by the legislature in 1903. The state warden was the head of the Territorial Department of Game and Fish, which was at that time a one-man operation. Appointed by the governor, the state warden was salaried and authorized to appoint deputies throughout the territory. The deputies were still compensated by half of the fines they collected. The 1903 law provided a fine of \$100 to \$250 and removal from office if a deputy failed to act on a violation of the game and fish laws.

After New Mexico was granted statehood in 1912, a license system was introduced for hunting or breeding grounds. New Mexico's laws allowed a "game park" owner to own all animals already on the land when the park was established. By fencing their land and acquiring a \$15 license, landowners could "own" all the game on the land and regulate hunting of these populations. In this manner, New Mexico law gave landowners extensive authority for game management.

By 1970, landowner dominance had only grown stronger. Hunters needed permission to hunt on any private land, and the state often directly allocated licenses to landowners, who could sell them to hunters along with access to their land.

Currently, the New Mexico Department of Game and Fish consists of a State Game Commission with seven members and a director employed by the commission. Today, landowners in New Mexico still have extensive authority over game management, although control over the distribution of licenses was lost in the 1970s when pressure and protests from sportsmen (organized as Sportsmen Concerned for New Mexico) led to a change in legislation. In 1996, the New Mexico agency budget was less than half of the Montana agency budget at \$20.5 million. Only \$0.5 million (2.6 percent) came from general funds. This budget is not indicative of the true level of expenditures on wildlife management, however. Somewhat as in Texas, private landowners extensively manage for wildlife and earn substantial revenues from selling hunting rights.

Pennsylvania Game Commission

Wildlife was abundant when the first European colonists arrived in Pennsylvania in the seventeenth century. In 1683 Colonial Governor William Penn decreed that inhabitants of the province were allowed to hunt upon their own lands and all other lands not enclosed. In the same year, the government offered the first bounties on wolves.

The first game law, enacted in 1721, closed the deer season from January 1 to July 1. A 1760 statute outlawed hunting or trapping on Indian lands. The state constitution adopted in 1776 proclaimed the right for every inhabitant to hunt and fish on owned and unenclosed lands. At this time, local police were responsible for enforcing game laws, since the office of game warden was not yet established.

Increasing pressure on the wildlife populations led to new game laws in the 1840s. By 1848, nine counties restricted or banned the use of dogs for deer hunting. In 1851, two other counties closed deer hunting altogether for five years. The General Assembly set the first statewide game seasons for several bird species and other small game in 1858. Counties could circumvent these seasons by setting their own dates.

In the late 1800s statewide and county-level governments passed more and more restrictions on methods, seasons, trade, and possession, but most legislation was loosely enforced. In 1873 the General Assembly banned all Sunday hunting and set the first statewide bag limit at two wild turkeys a day. The deer population continued to decline and in 1895 the deer season was shortened to two months only. As late as 1890, township constables were still responsible for the enforcement of game laws. Their priorities, however, often lay elsewhere. Thus, enforcement proved to be ineffective.

The legislature created a Board of Game Commissioners in 1895. There would be six commissioners, appointed by the governor, who were authorized to

employ ten salaried game protectors. The commission appointed a secretary, but did not hire any game protectors, due to lack of funding. Instead, the game protectors kept half of the fines.

The new board could merely propose new legislation, and the state legislature largely ignored it until 1897, when it approved several game laws, including daily bag limits for game birds. In 1901 game protectors lost their share of the fines and were paid a salary instead.

Thirty deputy game protectors were appointed by the Game Commission in 1903. Deputy game protectors received no salary but were entitled to half of the fines. In 1901 and 1903 the assembly raised its biennial contribution to \$3000 and \$12,000 respectively. In 1903 the first nonresident hunter's license of \$10 was established.

The new laws and strict enforcement led to numerous attacks on game protectors. In 1906 alone fourteen game protectors were shot at and three were killed. In response to the constant gun battles between game protectors and immigrants, the legislature outlawed gun ownership for un-naturalized foreign-born residents of the state in 1909. This law was repealed in 1967.

In the 1910s and 1920s the Commission was given more authority and became less dependent on the General Assembly. In 1913, just before the \$1 resident hunting license was established, the commission received \$97,400 from the state's general fund. Once the new license system was in place, general funding was abandoned. In 1919 the legislature gave the commission power to purchase land for refuges and hunting grounds.

The commission was given more authority in the establishment of seasons and bag limits in 1937 and its name became current one: the Pennsylvania Game Commission. Since 1939, the eight commissioners must be appointed from eight different districts. The organizational form of the Game Commission has not changed since then. The Game Commission has been accepting donations from any person, firm, corporation and association since 1958.

Since 1905 it has been illegal to trespass on posted private property in Pennsylvania. To provide owners with more incentives to allow hunting on their lands, the General Assembly passed a law exempting landowners from liability for injuries of hunters on their lands in 1961.

Today the commission's annual budget is over \$75 million. It receives no support from general state funds. The department has just 312 full-time employees (not many more than Montana or New Mexico), including 135 game wardens. Though the staff size seems small for a state with 12 million people, the Game Department has no management authority over state fisheries resources, which are governed by a separate agency.

Texas Parks and Wildlife Department

In 1821, when Stephen F. Austin began the successful colonization of Texas, there was game in abundance. As in many states, wildlife populations were severely reduced during the 1800s, and by 1885 the last wild buffalo in Texas was killed near Midland. The first game law was passed in 1860 to protect quail for two years and to set a closed season thereafter. When the state legislature started passing game regulations and closed seasons on several species in 1881, it initiated a revolt among counties. Local laws were far less restrictive than the state laws, and many counties thought that the legislature had no right to interfere with local game laws. Within two years the legislature granted exemptions from all state game laws to 130 counties in the state. This deference to county authorities has also been common in many southern states.

In 1907 a Game Department conditionally joined the state's Fish and Oyster Commissioner's office, which had been founded in 1895, provided the department could pay for its own expenses by selling hunting licenses. Two years later, the department successfully set up a resident license system. Carrying out the regulations of the legislature and administering the license system were the main duties of the Game Department. In 1923 the Game, Fish and Oyster Commission designated for use the entire game fund, consisting solely of hunting license sale revenues. At that time 45 wardens were employed.

In 1951 the Game, Fish and Oyster Commission became the Game and Fish Commission. And in 1963 its name changed again, when the commission merged with the State Parks Board to form the Texas Parks and Wildlife Department. The jurisdiction of the department was expanded by the Wildlife Conservation Act of 1983, which gave the department authority that had been held by many counties.

Currently, Texas has nine commissioners appointed by the governor for six-year terms. Today the department has an annual budget of more than \$80 million (barely twice the size of Montana's budget), none of which comes from state general funds. The department has over 1,400 full-time employees, more than 500 of whom are game wardens. The leasing of private hunting rights is extensive and varied. The department charges a nominal annual fee for a "hunting lease license." Counties still have control over season dates and bag limits. Like much of the south and southeast, seasons are quite long and bag limits are liberal, giving much discretion to the landowners who sell or lease their hunting rights.

Note

1. Historical sources for this appendix include Montana: Howell and Mussehl (1971); New Mexico: Barker (1970); Pennsylvania: Kosack (1995); and Texas: Dawson (1949) and Texas Parks and Wildlife (2000). The major source of contemporary information is Wildlife Management Institute (1997) and annual reports of the respective state agencies.

Table A-1
Comparison of Four Case Study States

	Montana	New Mexico	Pennsylvania	Texas
First Game Law	1869	1880	1683	1880
Game Agency Origin	1913	1903	1895	1907
Agency Organization	independent	independent	independent	independent
Agency Jurisdiction	includes state parks	game and fish	game (no fish)	includes state parks
1997 Budget (millions)	\$43.7	\$20.5	\$77.1	\$82.7
General Fund Support	0%	2.6%	0%	0%
Full-time Employees	250	263	312	1,439
Wardens	83	65	135	539
Deer Harvest (1998)	92,615	12,200	377,489	375,661
Deer Season (days)	35	24	13	set by county
Hunting License Holders (1997)	284,700	106,900	1,091,600	942,400
Deer License Price (1999)				
resident	\$13	\$23	\$13	\$19
nonresident	\$78	\$180	\$81	\$250
State Population (1999)	880,000	1,700,000	12,000,000	20,000,000

Note: Prices indicated for Pennsylvania are for an overall adult hunting license package that allows for the hunting of deer as well as other species.

Sources: Game law and agency origin: Palmer (1912); organization and jurisdiction: Wildlife Management Institute (1997) and agency web sites; budget and general fund support (Wildlife Conservation Foundation of America (1997); employee and wardens: Wildlife Management Institute (1997) ; deer harvest, season, and license price (Sports Afield 1999); hunting license holders (U.S. Fish and Wildlife Service (1997); and state population (U.S. Census Bureau 1999).