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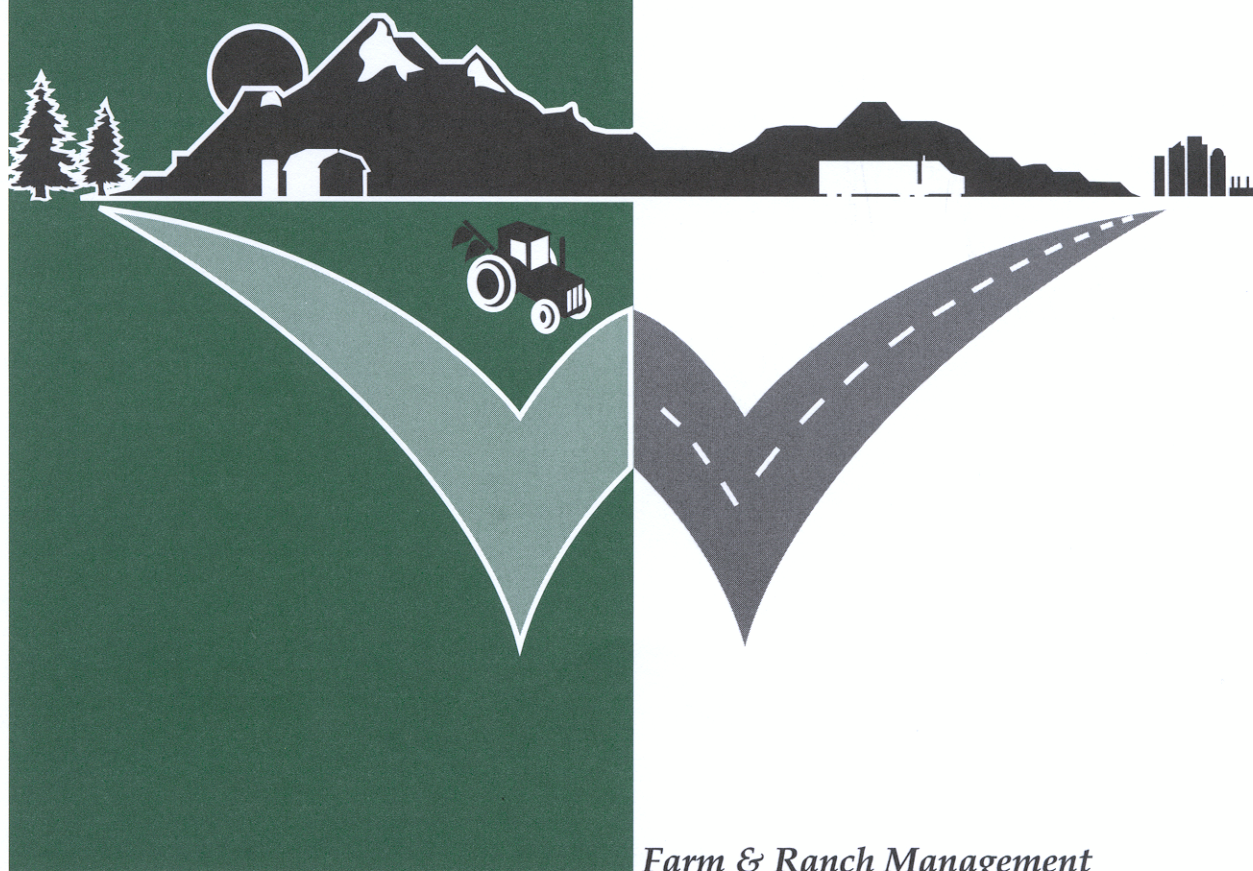
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THE TRANSACTION COSTS TRADEOFFS OF PRIVATE AND PUBLIC WILDLIFE MANAGEMENT

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Introduction

In the U.S., public agencies and some private landowners conduct wildlife management (Messmer et. al. 1998). Old and new challenges complicate their task. First, unfettered wildlife territories do not often coincide with land ownership. Fences that force wildlife to respect property boundaries are costly to erect and reduce how much humans value their existence. Second, recreational and environmental groups, less interested in specific game species, have emerged as important wildlife users. Fulfilling their demands is difficult because the users are dispersed and hard to identify and because the scale of managing a community of species is much larger (see Szaro et. al. 1998).

This article frames these challenges as transaction costs. It extends the analysis of Lueck (1989; 1991) who views the wildlife department as an institution that mitigates the transaction costs of managing transient wildlife. While Lueck focuses on the contracting costs facing landowners wishing to profit from fee-hunting, his hypothesis is relevant in the case of nongame management. Wildlife agencies, however, are not immune to the transaction costs of satisfying nongame demands, especially because bureaucratic incentives and constraints conducive to managing game are unlikely to be conducive for nongame management. This article describes variation in the organization of wildlife agencies and variation in landowner contracting costs and their effects on agency effort and emphasis on nongame management.

The Wildlife Management Problem

The economic problem of managing wildlife is one of meeting the demands of those willing to pay, while taking into account the costs of wildlife management effort, the value of alternative resource use, and damages related to abundant wildlife stocks.

Wildlife species are no longer valued primarily for the meat and fur their carcass provides. Today, recreational demand from hunters and nongame users dominates (USFWS 2001). Hunters are a small group of relatively high value users generally interested in big game species such as elk, deer, and antelope. Nongame users are a larger group of relatively low value users. They enjoy watching and photographing wildlife as a primary or complementary activity to a related outdoor experience. Nongame users may enjoy a single high profile species such as wolves or grizzly bears, or they may enjoy a community of low profile species such as songbirds and amphibians. A few indicators show that nongame demand is growing in prevalence. Participation in bird-watching and membership in groups such as Defenders of Wildlife and Audubon Society have grown tremendously since the mid 1980's, but the total number of individual hunting license holders peaked in 1982 (USFWS 2001; Richie 1999; Parker 2001).

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Managers can maintain abundant, sustained populations of wildlife in order to fulfill user demands. To do so, they need to mitigate resource use that competes with wildlife such as shopping malls and certain types of agriculture. Managers may also need to conduct research, manipulate habitat, and establish and enforce poaching laws. Maintaining wildlife populations, then, generates opportunity costs and management effort costs. Wildlife populations also impose direct costs on other resources. Deer damage crops and suburban gardens and cause traffic accidents. Wolves kill sheep and cattle. Coyotes and foxes raid chicken coops. Bats transmit diseases. Other species can be a general nuisance to property, people, and pets.

One can imagine a first-best level of resources devoted to wildlife. A tract of land, for example, would be used to sustain a wolf pack if the willingness-to-pay of wolf advocates outweighed the costs of less development and livestock losses. In order for this first-best outcome to occur, however, wildlife managers would need a costless mechanism that enabled them to capture all use and existence values attributed to wolves and to perfectly compensate those who suffer losses.

Management Institutions and Transaction Costs

Such a mechanism would exist only in a world of zero transaction costs (Coase 1960). Ownership of wildlife would be perfectly defined. Rights would be enforced at zero costs. Those who value wildlife would be excluded from consumption unless they paid market prices. These conditions do not hold, of course, and the transient nature of wildlife means that the transaction costs needed to sustain wildlife populations are potentially high. Private landowners and wildlife agencies must overcome a unique set of transaction costs in order to increase the net value of wildlife.

Landowner Contracting Costs

Landowners have incentives to accommodate wildlife if they are residual claimants to its value. Because wildlife species typically require larger tracts of land for habitat than a single landowner can accommodate, however, landowners must contract with each other in order to capture their value. Consider Western landowners wishing to profit from elk hunting. Neighbors with small landholdings would need to form a cooperative of sorts, agreeing to limit livestock grazing, regulate hunting, and perhaps manipulate habitat. Once cooperative terms were established, however, each landowner would have incentives to cheat, perhaps by allowing more hunting than agreed upon or by shirking on livestock grazing restrictions. Because of these incentives created by divided ownership, landowners would expend resources to monitor and enforce the terms of the contract (see Barzel 1997; Lueck 1989).

These contracting costs are not necessarily prohibitive. Anderson (1998) lists examples of how they have been privately mitigated by innovative contracts, property right technologies, and consolidated ownership of land. Yet the costs will be higher, *ceteris paribus*, when land use is heterogeneous, single landholdings are small, and when public land is interspersed among private landholdings. When land use is heterogeneous, it will be costly for the separate landowners to measure the relative contribution of their land to successful wildlife propagation. Knowing this, neighbors will have incentives to shirk on contractual arrangements. When private landholdings are small, landowners must contract with several parties in order to secure a tract large enough to encompass a stock of wildlife. The expected costs of monitoring and enforcing contracts will rise with the number of parties involved. Finally, in the unlikely event that politicians overseeing public land agencies agree to contract with private landowners, the

attendant transaction costs could be prohibitive. Contracts with public agencies are likely to be inflexible devices that require the approval of numerous interested parties.

Nineteenth century America provides a good example of high landowner transaction costs. Land ownership, at that time, consisted primarily of small privately held parcels amidst large tracts of un-owned or public land. The territorial requirements of many species were simply larger than most single landholdings could accommodate. Many species of migratory birds annually migrated across the continent, fish populations inhabited rivers that flowed for hundreds of miles, and big game species required thousands of acres to roam. In such an environment contracting between several parties (private and governmental) was prohibitively costly. Lueck (1989) argues that the game department emerged as an institution that lowered the cost of establishing and enforcing property rights to wildlife. Under such a regime, rights to wildlife may be enforced at a lower cost because explicit agreement among all landowners is not required for the agency to act.

Public Agency Constraints

Wildlife agencies, however, are an imperfect solution to the landowner contracting problem. Their ability to maximize the net value of wildlife is limited by three categories of constraints. First, politicians that oversee agencies have incentives to cater to powerful interest groups (Peltzman 1976; Becker 1983). Resident hunting groups, for example, pressure politicians (and therefore agencies) into keeping resident license fees low. Second, agencies are generally not motivated to maximize the difference between wildlife benefits and costs. Instead they are more likely to seek some combination of larger budgets (Niskanen 1971), autonomy (Wilson 1989), and tasks that allow them to increase their human capital (Wilson 1989; Dewatripont et. al. 1999). Third, even if bureaucrats are (temporarily) rewarded for wealth-maximizing behavior, long-standing procedural rules constrain their ability to respond quickly and effectively to changes in demand and costs.

These constraints portray the wildlife department as a political beast beleaguered by self-interested behavior and “red-tape.” Yet wildlife departments are probably more market oriented than most modern bureaucracies. Hunting, fishing, and other user fees still account for the majority of agency revenues in most states (WCFA 2001). In addition, most wildlife departments have well-defined missions and are designed to serve a narrow, well-defined constituency. Because of these factors, the principle-agent link between wildlife users and managers is probably clearer than that of other natural resource agencies such as the U.S. Forest Service and state environmental protection departments.

In recent years, however, the link between wildlife user and manager may be eroding. The percentage of agency revenues derived from license sales has been declining for over twenty years. Many wildlife agencies now receive a substantial proportion of their revenue from state general tax dollars (funds derived from sources unrelated to wildlife use) (WCFA 2001). In addition, many wildlife departments have been subordinated beneath larger natural resource or environmental protection agencies on state governmental hierarchies (Lueck and Parker 2003). These wildlife agencies are governed by a much broader mission and a broader range of constituents are involved in decision-making.

Institutional Tradeoffs

The efficacy of private and public wildlife management institutions will depend on the severity of landowner contracting costs relative to bureaucratic management constraints and

vice versa. The efficacy of each institution may also depend on whether hunting or nongame wildlife demand dominates.

If allowed to profit from wildlife, we should expect private management effort to increase when landholdings are large, homogeneous, and held by private parties. These propositions are obviously relevant in determining whether landowners will capture the consumptive value of wildlife – for example, by choosing to grant hunters access for a fee (see Lueck 1991). Although less intuitive, they are also relevant in determining whether landowners will act to capture nongame values. In order to make a profit, however, landowners would need to collect revenues from a largely dispersed group of low value users and somehow limit visual access from those who have not paid. The contracting costs of achieving this arrangement are likely to be higher than those associated with fee hunting.

When landowner contracting costs are high, wildlife agencies have a comparative advantage in establishing and enforcing hunting restrictions (Lueck 1989). This advantage is diminished, however, to the extent that a wildlife agency is not designed to primarily service hunting constituencies. Relative to private landowners, the power of taxation gives public agencies a comparative advantage in controlling those who free-ride on nongame production.² This advantage is amplified to the extent that a wildlife agency is designed to manage communities of species and service nongame constituencies.

Some Empirical Evidence

To examine some of these tradeoffs empirically, one might regress landowner contracting costs and agency organization against private and public game and nongame management effort. While proxies for private management effort are unavailable, wildlife agency revenue and nongame spending data for each state are available for certain years in the 1980s and 1990s. For years corresponding with the dependent variables, separate cross data sets were assembled. For each state, the data include information about the average farm size and the percent of land in federal and state ownership. These variables proxy landowner contracting costs. Bureaucratic organization variables indicate the proportion of revenues that came from state general funds and whether the wildlife department was subordinate to a larger natural resource agency. Additional variables control for game and nongame demand and other economic and political factors.³ Preliminary findings are summarized in Table 1.

Agency Revenue

Wildlife agency revenue comes from various sources including hunting, fishing, and trapping license sales, wildlife license plate fees, wildlife-related merchandise sales, taxes on sporting equipment, private donations, and state general funds. For each year, regression analysis shows that the relationship between total agency revenue and average farm size was negative. Regression results also show that the relationship between agency revenue and the percent of public land was positive. Considered together, the above results imply that demand for agency management is greater when landowner contracting costs are high and when more habitat is in public ownership.

² With case study examples, Anderson (1998) shows that private organizations can also effectively control free riders.

³ For more details, see Lueck and Parker (2003).

For each year, regression analysis shows a negative relationship between revenue and subordinate placement. Because general funds are endogenous to agency revenues, I could not infer the effect of general funds on agency demand by regressing general fund dollars against total revenues. Separate empirical tests, however, indicate a fairly robust negative relationship between the amount of general funds received by an agency and revenues from license sales. Taken together, the above results imply that agencies more constrained by procedural rules and subjected to a wider range of constituent pressures will have trouble generating revenue - especially from user fee related sources.

Table 1: Summary of Preliminary Regression Results

| | Effect on total agency revenue | Effect on percentage of revenue spent on nongame |
|---------------------------------------|---------------------------------------|---|
| Increase in average farm size | - | + |
| Increase in percentage of public land | + | 0 |
| Agency is subordinate | - | + |
| Increase in reliance on general funds | na | + |

Spending on Nongame Species

Most wildlife agencies established a program funded specifically for nongame (species not taken for food, fur, or sport) in the 1970's. All states had such a program by 1989 (Edelson and Curelean 1994). Nongame programs generally began to research a single, high-profile species (Vickerman 1989), but now appear to be more focused on the goal of preventing the decline of all indigenous nongame wildlife (Richie and Holmes 2000). While the percentage of agency revenue spent on nongame programs has increased in most states since 1986, current figures vary significantly across states (Richie and Holmes 2000; WCFA 2001).

Regression analysis shows a positive relationship between average farm size and the percentage of agency revenue spent on nongame. The findings imply that decreases in the landowner costs of managing game species will increase the relative demand for agency management of nongame wildlife. Regression analysis also shows that there is no relationship between the percent of public land in a state and the percentage of revenues spent on nongame. This finding suggests that more public land gives wildlife agencies a comparative advantage in both game and nongame management.

Regression analysis shows a positive relationship between agency reliance on general funds and the percentage of revenue spent on nongame. The analysis also shows a positive relationship between subordinate placement and the percentage of revenue spent on nongame. Considered together, these findings imply that agencies exposed to a broader range of constituent interests expended more of their resources on nongame.

Conclusions

Private landowners with relatively large, contiguous, and homogenous parcels can overcome the contracting costs of managing transient wildlife, thereby reducing the comparative advantage of a wildlife agency. In light of this, state policymakers might think of ways to shift management responsibility (and residual claimancy) to landowners where appropriate. Efforts to do so are underway in many Western States. For example, Leal and Grewell (1999) chronicle

state-landowner partnerships that allow landowners to receive market hunting prices for accommodating wildlife.

The problem of efficiently managing wildlife is more complex in the case of nongame species. Values are dispersed among a greater number of not easily identified users. The power of taxation and consolidated ownership of a community of interacting species may give state agencies a comparative advantage in capturing values. Bureaucratic features more conducive to managing nongame, however, may come at the expense of more procedural constraints and vague objectives. Early evidence suggests that these constraints hinder a wildlife agency's ability to generate revenue. Future research should critique this evidence by more explicitly evaluating the transaction costs involved with managing nongame and ecosystems compared with those associated with the traditional management of single game species. Extensions in this direction would necessarily consider agency interaction with the federal government. The updated model will best address the current issues facing private and public wildlife managers.

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