

Federal Lands, Opportunity Costs, and the Administrative State

Gary D. Libecap, UCSB, NBER, Hoover Institute, Stanford

April 23, 2018

Abstract

The federal government owns and administers 472, 892,659 acres or 21% of the land area of the lower US, making it both the country's largest land owner and the largest land owner by a central government among western democracies. This condition is surprising, given that the US generally is viewed as more oriented toward private property rights and markets. The land largely is managed by the US Forest Service and the Bureau of Land Management, staffed by unelected, career civil servants who hold tenure to their positions. Access and use regulations are administered by agency officials who have wide latitude under all-purpose legislation passed by Congress. Their actions are influenced by bureaucratic incentives and by lobby groups seeking to influence federal land policy. General citizens have little information about how policies are determined and only costly recourse to challenge them. Other than the comparatively small, 27,400,000 acres in National Parks, most of the land has no important amenity values nor apparent major externalities associated with use. These lands were to be transferred to private claimants under 19th century land laws. This paper examines how this vast area came to be withheld by the federal government and the role of the environmental movement in the process. Market failure and externalities were asserted justifications, but there is no strong supportive evidence. Although externalities were possible, the most obvious solution was to define property rights more completely. This option was and remains rejected by agency officials and environmentalists who sought permanent management and control for philosophical, not economic reasons. Sustained-yield was an overarching objective, but it is a biological and not an economic concept and the human welfare costs may be large.

Prepared for "Regulation and Rule of Law Workshop," Hoover Institution, Stanford, University, April 13, 2018.

Introduction.

American economic, political, and social development has been molded by widespread ownership of land. From the colonial period through around 1900, land was the major resource in a largely rural, agricultural economy. The Jeffersonian ideal, enshrined in federal land laws, was to transfer the federal government's land estate as quickly possible to private claimants. This was viewed as in the public interest. Easy access to land facilitated economic advance, a position in politics, and a stake in the society. It shaped individual expectations, practices, and wellbeing. Land ownership and trade reallocated land and generated capital gains that helped to fund the growth of financial and other asset markets. The rapid transfer of federal government lands to private claimants was made possible through numerous land laws, such as the Homestead Act of 1862 that allocated 160-acre plots to individuals. These were enacted by a stable political coalition representing potential actual settlers, developers, railroads, and an almost universal participation among US citizens in land acquisition and sale.

This enabling political coalition ended in the late 19th century, and federal land policy shifted from virtually free access to retention and permanent management by the administrative state. Urbanization and industrialization by that time meant that fewer citizens were directly tied to land ownership. Further, at the same time, the settlement frontier was moving beyond the 98th meridian and encountering far different conditions from those that had supported the small-farm distribution policies of the earlier land laws. The land in the western US generally was more rugged and within a semi-arid climate, where small farms were less economically viable than in the wetter, flatter East and Midwest. Indeed, the resource endowments of the West were better suited for logging, ranching, and mineral production than for small-farm agriculture. The land laws could have been modified to provide for larger allocations of timber, range, mineral, and farm lands to fit the region. But they were not. Small dryland homesteads failed and ranchers and timber companies circumvented the size restrictions of the land laws through the use of numerous homestead claims, often never designed for farming, adopted local informal property rights, or exploited the land as open access.

Potential homesteaders and their political and administrative supporters knew too little about the limits of the region's semi-arid climate to back much larger land allocations that seemed to limit opportunities for further land ownership. Moreover, ranching and lumbering had economies of scale, requiring much greater plot sizes, that also seemed inconsistent with the Homestead ideal. While these barriers were being encountered, a new group of land claimants appeared as part of the Progressive

Movement of the late 19th and early 20th centuries, early conservationists. These individuals were professionally-trained biologists and engineers who sought to manage the remaining federal estate, rather than to distribute it to private parties. They believed in the objective of sustained-yield management whereby harvest rates would equal the rate of growth.

Sustained yield was (and is) a biological/engineering concept and not an economic one. Adherence to it would be consistent with maximizing general welfare for current and future generations only under very limited conditions. Most resource users, especially timber companies and ranchers who had incomplete and insecure property rights, did not follow sustained-yield practices. Private property rights and exploitation were discredited by early environmentalists as being driven by short-run profits, leading to rapid depletion and waste. Retention of remaining federal lands and their permanent supervision under sustained-yield, scientific management was the remedy. The land laws gradually were repealed, with the government retaining 472,892,659 acres or 21% of the land area of the continental US today. Where before private property rights to land were viewed as essential for the public interest, government ownership and management, instead, were asserted to be necessary for the public good, a message that is retained in contemporary federal lands discussions.

The same advocates for retention of federal lands became leaders of the bureaucratic agencies that managed them. They were joined in their efforts by other professionals with discipline-based training in engineering and forest and range management, and plant biology who staffed the growing merit-based federal bureaucracy. Private property rights and unconstrained decision-making did not fit within their regulatory plans that called instead for rational, scientific management that seemed to them to be impossible under private property rights. Further justification for government ownership and supervision also came at about the same time from welfare economics, where market failure was highlighted as generating externalities that were correctable by government intervention, such as through taxes and regulation of access and use. Progressive Era politicians who sought a wider range for their leadership and corresponding government involvement in the economy echoed the claims of environmentalists and supported retention of federal lands. Absent a strong political counter, there was no effective resistance to the proposed administrative state, which has endured and grown. Further, the general citizenry had then and today, little access to the information needed to question whether or not government ownership of so vast an area was (or is) in the public interest. The justifications for regulation made by early conservationists and the management plans they implemented over time on federal lands

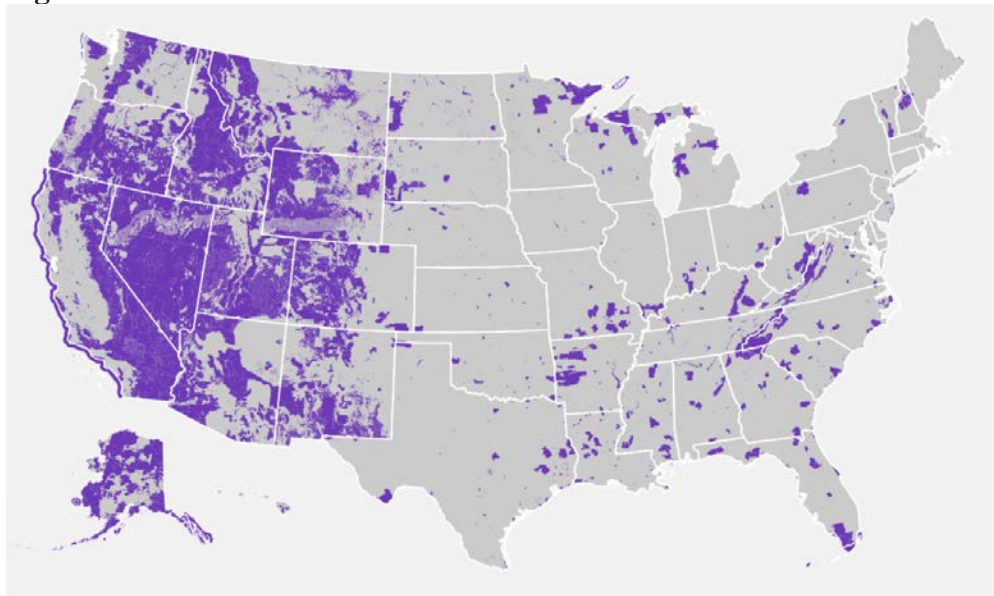
became templates for the subsequent, more extensive regulation after 1960 that restricts production in the name of preservation. The federal lands today are advertised as “the Public Lands” to emphasize the public goods said to be provided by government ownership and oversight.

The historical record regarding federal lands is clear that the inability to acquire property rights under the land laws to the remaining federal estate was a major problem. Although there can be externalities and market failure associated with private decision-making when property rights are incomplete, the direct remedy would be to make the property rights more complete, and not necessarily a resort to government ownership, regulation, or taxes. Externalities are more likely to occur with difficult to bound-and-observe resources, such as the atmosphere or groundwater, rather than surface land. Yet, withholding and managing federal land was the focus of early environmentalists. Despite all of this, there is no compelling empirical evidence to support their arguments regarding resource use decisions when rights were complete. Their assertions of inherent short-term biases and stock depletion by private parties were based on philosophical views of the benefits of sustained-yield management. To build a broader political coalition for retention, potential claimants of federal land were co-opted with promises of long-term access and subsidized use. Later, as political coalitions shifted and regulatory agency interests changed, these promises were broken as new parties—recreationalists, environmentalists and preservationists--were granted access under the notion of multiple use. Multiple use grants discretion to the bureaucracy in allocation and regulatory decisions in a manner that promotes the agency and its favored lobby groups, but does not necessarily advance broad public welfare.

As described below, natural resource-based production from federal lands is declining, both absolutely and relative to private lands. More of the federal estate is set aside for preservation, environmental, and recreational use. The opportunity costs of this allocation may be very large, but resource users as well as general citizens have little access to the bureaucratic process involved in a transparent manner. Costs and benefits are not clearly weighed, certainly not on the margin. While some preservation may be warranted, how much is in the public interest, relative to the opportunity costs of resources not used for production? Agency officials and the lobbyists who support them do not bear direct costs, generating a clear bias in decision making over such an enormous resource base. Those costs are internalized by overall society, reducing general welfare.

Figure 1 shows the extent of federal government lands in the US. This vast area of central government ownership exceeds that of other western democracies. In Germany and the UK, the federal government owns approximately 3% and 4% of the land (German Federal Ministry of Food, Agriculture, and Consumer Protection, 2011; Shrubsole, Powell-Smith, 2017). Even in Canada, the federal government owns a smaller portion of the land outside of the Yukon and Northwest Territories. Only 4% of provincial land is federally owned. Larger amounts are held by the individual provinces and policies vary across them, unlike the US where centralized management occurs under the Departments of Agriculture and the Interior (Neimanis, 2011).

Figure 1: Federal Lands



Source: USGS as adapted in <http://meridianintl.co/us-government-land-map.html>

The paper proceeds as follows. Section II describes initial transfer of government land to private individuals from colonial times to the end of the 19th century. It presents the rise of the conservation movement that halted the land transfer process and critically examines the evidence behind it. Section III discusses sustained-yield management and details the strict conditions under which it would be consistent with maximizing economic rents or the economic contribution of federal lands for general citizens. Examples of the opportunity costs of sustained-yield objectives and increased preservation are provided in Section IV. Section V concludes with remarks about the role of the administrative state in natural resource regulation.

II. The Transfer, then Retention of Federal Lands.

The Transfer of Federal Lands to Private Claimants.

Claire Priest (forthcoming, 2019) summarizes much of the early literature and key elements of US colonial and early federal land law. William Blackstone commented in 1766 on the implications of private ownership of land: “There is nothing which so generally strikes the imagination, and engages the affections of mankind, as the right of property; or that sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual in the universe” (quoted in Ellickson, 1993, 1317). English colonization and migration to North America were driven by these ideals (Ely 2008, 13). Those who migrated to and occupied land eventually held it in fee simple as independent owners and not as a dependent peasantry that generally characterized Latin American settlement (Supreme Court Justice, Story, 1858, 160).

Because land was the most basic resource, its widespread ownership became the catalyst for colonial and subsequent US economic and political development. The ownership of property made individuals special stakeholders in the society and dispersed political and economic power from elites. Dynamic, open land markets became an essential ingredient for the credit system and its ability to support growth of a middle class as well as to spur investment and innovation throughout the economy (Priest, forthcoming 2019, Chapter 1, 7). The irony, as described later, is that active involvement in land markets, speculation, and capital gains so appreciated in early discussions of colonial and US land policies, become negatives for advocates of government intervention by the end of the 19th century. These wealth-creating, reallocation activities instead were asserted as evidence of a lack of sustainable, long-term scientific management deemed essential by conservationists in lobbying for retention of state ownership.

Perhaps the most famous advocate of extensive private ownership of land in small plots was Thomas Jefferson, who saw a nation of numerous, small freeholders not only as good economics, but good politics. The seemingly endless abundance of land in North America provided the perfect opportunity to create a society composed of small, independent, freeholding farmers that could support a republican form of government. Such citizens with an attachment to the land and to the country had virtue and a common interest in political stability and social cooperation. He notably stated that: “The earth is given as a common stock for man to labor and live on... The small landholders are the most precious part of a state” (quoted in Katz, 1976).

Even later in the 19th century, the US Public Lands Commission endorsed the small-farm, homestead principle: “The maxim that He who tills the soil should own the soil is accepted as a fundamental principle of political economy... Small holdings distributed severally among the tillers of the soil is believed to be a fundamental condition for the prosperity and happiness of an agricultural population” (US Public Lands Commission, 1880, xxii). Frederick Jackson Turner in 1893 in his well-known thesis about the role of the frontier in US political and social development went further, claiming that America ultimately was shaped by small-farm frontier settlement as the underpinning for democracy, an independent citizenry, and generalized economic wellbeing (Turner, 1893, 203).

There were a series of land laws enacted by Congress after the colonial period to distribute property rights to land and minerals on the frontier, all of which lowered the costs of acquisition. The demand for free small freeholds was incorporated into policy, beginning with the Preemption Act of 1830 and its many amendments (Kanazawa, 1996) to accommodate and legally recognize squatter claims and on through the Homestead Act of 1862 and its adjustments. The Homestead Act effectively was ended by Congress in 1934 with enactment of the Taylor Grazing Act that removed relatively flat rangeland from entry and claiming and formally in 1976 with the Federal Land Policy and Management Act (see Table 1). Both of those laws underscored the prevailing shift toward government ownership and management of land and other resources rather than distribution to citizens as had been the principal aim previously.

Under all early transfer laws, property rights to agricultural land were given out piecemeal in plots of 40 to 160 acres (later in some limited cases, up to 640 acres) with the requirement of occupancy and beneficial use (Hibbard, 1924; Robbins, 1942; Gates, 1968, 394). Through these land allocation laws, immense amounts were placed under private ownership. Under the Homestead Act, for example, some 2,758,818 original entries were made between 1863 and 1920 for 437,932,183 acres, an area larger than Alaska (Gates 1968, 799-800).

All in all, the settlement of the agricultural frontier through the rapid assignment of private property rights to land was a positive for social welfare and the economic development of the US. A vast migration was absorbed from eastern states and Europe; stable, prosperous communities were established; and agricultural production grew. There is no discussion, even in revisionist histories, of major environmental externalities until late in the 19th century with the advent of the conservation movement.

Problems with the federal land laws were encountered when the frontier reached the drier, more rugged region west of the 98th meridian, as shown by John Wesley Powell's report to Congress in 1879 and in Figure 2. It is worth summarizing the problems faced by various potential claimants to federal lands in the region and how the difficulty in obtaining clear property rights to land fed directly into the conservationist paradigm of the Progressive Era.

Figure 2: The Semi-Arid, Rough Region West of the 98th Meridian



Source: Powell, 1879, frontispiece, reprinted in Worster (2001, 349).

Potential Claimants: Homesteaders.

By 1870 as homesteaders moved into the region beyond the 98th meridian, neither the climate nor the terrain allowed for feasible small farms in 160 parcels. Claims made during wet periods failed during dry ones and farms were abandoned. If the homestead had been fulfilled as required by the land laws and the party had title, then the failing farm could be sold. Larger, consolidated farms took their place. If the homestead had not been completed and the farmer lacked title, then the land reverted back to federal ownership (Libecap and Hansen, 2002). In his *Report on the Arid Lands of North America* made to Congress in 1879, John Wesley Powell called for minimum 2,560 acre homesteads, 16 times greater than the size of standard homestead allotments to address the problem, but nothing came of it. There were only small adjustments in allotments to 320 and 640-acre sizes authorized for some areas.

As Libecap and Hansen (2002) and Hansen and Libecap (2004) show, in the late 19th century there was no conclusive evidence that small farms were not appropriate for the region, especially if settlement actually increased rainfall, “rain follows the plow,” if new dry farming techniques could offset aridity, or if sufficient irrigation networks could be developed. In light of this, there was no concerted action by the homestead lobby for relaxation of the small homestead requirement. The homestead lobby was made up of potential claimants, existing land owners who sought to speculate in new lands, land and town developers who also wanted access to federal land for subsequent sale, brokers who specialized in linking potential buyers with newly available homestead land, and the railroads that desired dense settlement to raise demand for transportation and to populate the town sites that they owned. It also included local politicians who sought greater population to justify movement from territory to statehood and thereby open new political opportunities, as well as the General Land Office in the Department of the Interior whose mandate was to process homestead claims (Hansen and Libecap, 2004). Adjustments in the land laws would only have reduced the amount of land available for new homesteads. Overall, there was a strong sentiment for maintaining the Homestead Act in its traditional form as illustrated by Representative George W. Julian of Indiana:

“If our institutions are to be preserved, we must insist upon the policy of small farms, thrifty villages, compact settlements, free schools, and equity of political rights, instead of large estates, slovenly agriculture, wide-scattered settlements, popular ignorance, and a pampered aristocracy lording it over the people.” (quoted in Hansen and Libecap, 2004, 107).

Later, by the turn of the 20th century and major droughts in the northern Great Plains, the evidence became clearer that neither the climate would change nor would dry farming techniques save small farms (Libecap and Hansen, 2002; Hansen and Libecap, 2004). Irrigation, however, could. Provision of federally-subsidized irrigation became the favored alternative, not revision of the land laws for both homesteaders and environmentalists desiring to withdraw other federal lands from private claiming.

Potential Claimants: Ranchers.

Livestock owners also moved into the region beyond the 98th meridian, often ahead of homesteaders. The open range was ideal for livestock, and internal and export demands were growing (Libecap, 1992). There was, however, no provision in the land laws for ranch or livestock-raising claims (Libecap, 2007). All homestead allotments were far too small for a viable ranching operation in a semi-arid region where 25 acres or more were required annually to support one cow. One homestead would support 6 cows, when herds were in the thousands, often requiring ranches of 10,000 acres or more for an

economically-viable operation. Although the 1880 Public Lands Commission recommended revision of the land laws to allow for larger grazing homesteads of 2,560 acres and cash sales of rangeland at \$.125/acre, no action on the recommendation by Congress took place. Grazing homesteads would reduce land available for homesteading. Other than two minor adjustments made much later, in 1909 and 1916 to allow homesteads of 320 and 640 acres, there was no legal way for ranchers to obtain formal title to the land they used. They fenced illegally and the fences were removed by the General Land Office (Libecap, 1981a, 151; 1981b). Fence removal, of course, undermined efforts to define property rights and to protect the resource stock from excessive entry. The other method of limiting entry was to overgraze to make their informal claims less attractive (Libecap, 2007, 273). Overstocking due the lack of property rights and drought led to depletion of the range resource. This depletion subsequently was cited by environmentalists as evidence of the wastes of private exploitation and the need for sustained-yield administrative management.

Potential Claimants: Timber Companies.

A final group that could not obtain property rights to the lands they used were timber companies or lumber operators. Successful lumbering operations also required larger areas than those allowed for small farms under the land laws. To circumvent the restrictions, in the Pacific Northwest in the 1880s through the turn of the 20th century, timber operators hired entrymen to act as homesteaders and then to file for claims and to purchase them under the Timber and Stone Act and other land laws. As with range lands, the Public Lands Commission (1880) called for more liberal property rights provisions for non-agricultural, timber lands. This recommendation was not followed, but rather the forest lands were gradually removed from private claiming and placed under the forest reserves.

Alleged Market Failure and the Retention of Federal Lands.

The withdrawal of federal lands from private claiming in the late 19th and early 20th centuries was spear headed by the first environmental or conservation movement (Hayes, 1959). Early conservationists and their political and bureaucratic patrons challenged the long-standing notion that private property rights and markets were key elements in the development of the American state, economy, and society. Whereas earlier potential land claimants, traders, developers, and associated politicians played key roles in molding colonial and 19th century land laws, members of the conservation movement were quite different. They were urban political and economic elites, trained professionally to manage land, not operate farms, ranches, or timber operations. They

were skeptical of the efficacy of private property rights, which in any event, would constrain their managerial latitude and administrative objectives. They saw private markets as inherently wasteful without the remedy of government regulation. The remaining federal lands by 1890 were the ultimate opportunity because private ownership had not yet taken place and jurisdiction remained with the federal government, if the land laws were revised.

The conservation/environmental crusade was part of the Progressive Movement, 1870-1920, that ushered widespread government intervention, ranging from antitrust, pure food and drugs, and conservation. They were driven by philosophical views that were fundamentally different from those of the early founders of the republic and drafters of the land laws. Nevertheless, Progressive Era reformers were well organized, they assembled a coalition of professional groups in support of their plans, and they were supported by key politicians who also sought to advance political agendas. Progressive Era leaders were not only advocates, but became bureaucratic agency heads in administering administrative reform. The claims of market failure associated with private land use not only justified the withholding of federal lands from further private claiming through the mid-20th century, but established the framework for subsequent 20th and 21st century government environmental regulation.

The rise of the Progressive Era coincided with a shift from a rural, agrarian economy to an urban, more industrial one. The urban share of the population, which had been about 26% in 1870, was 40% by 1900 and over half by 1920 (US Census Bureau). Per-capita incomes had risen generally at about 2% annually in real terms throughout American economic development, so that by 1900 the country was not only more urban, but wealthier, demanding a larger array of more complex consumer goods and recreational opportunities. Most of the population did not depend on access to land for production and income. New production processes and technologies required professionals with training in civil, mechanical, and electrical engineering, chemistry, botany, and biology. These demands led to expansion of academic and professional study and the formation of professional societies, many founded during the 1870s and 1880s along with other organizations--the American Association of Civil Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Chemical Society, and American Forestry Association. Increasingly many of these professionals were employed by the federal government as both the size and scope of the federal role in the economy expanded. Federal civilian employment was 131,208 in 1885, but had grown by 258% to 469,879 by 1913. A growing share of this employment was in the professional, merit-based civil service that gradually developed

an independent agenda from their political sponsors for expanded regulatory mandates, salary growth, and provision of job tenure (Johnson and Libecap, 1994).

Bernhard Fernow, head of the Division of Forestry in the US Department of Agriculture from 1886-1898, and followed by Gifford Pinchot who became first Chief of the US Forest Service, 1905-1910, were major leaders in the effort to create the National Forest Reserves, later the National Forests. They were assisted by professional groups, including the Society of American Foresters, the American Forestry Association, National Forest Congress, National Board of Trade, National Irrigation Congress (Hayes, 1959, 30-39). Through their efforts and the backing of Presidents William Harrison, Grover Cleveland, William McKinley, and Theodore Roosevelt, the Forest Reserve Act was passed in 1891, the Forest Management Act of 1897, and the 1905 National Forest Transfer Act that moved the forest reserves from the Department of the Interior to the US Department of Agriculture. Under Roosevelt, the National Forests were expanded to include 150,832,665 acres in 59 National Forests (Hayes, 1959, 39-47). Creation of permanent forest reserves was a major reversal from early US land policy. Earlier, the US Public Lands Commission Report (1880, xxxi) called for changes in the land laws to allow for private property rights on timber lands, but this was not the path desired for government management under the new administrative state. Professionally-trained resource managers were not the land clerks of the General Land Office that had dominated federal land policies prior to the late 19th century. They had more ambitious plans, driven by sustained-yield management.

Bernhard Fernow and Gifford Pinchot were educated in Germany and France and Gifford returned later to endow along with his father, the Yale School of Forestry. Both advocated “scientific” forest management, whereby harvest rates were equal to growth rates. By the late 19th century when both studied in Europe, old-growth timber had long been cut. Most forest lands were on large landed estates. Property rights were established. Forests were planted and harvested on a rotational basis whereby different rotations were planted and harvested at different times to maintain an overall stock and the economic returns from exploiting it. They were never to be locked up for future generations.

The conditions underlying this “rational” management of European forests could not have more different from those of frontier North America. Scale was one factor. The US was vast and its population was growing rapidly, generating demand for lumber for homes and businesses in newly-emerging towns and cities, as well as railroad ties for an expanding railroad network and ship construction (Gates, 1968, 534-535; Olson, 1971). These demand conditions drove rising lumber and timber (stumpage) prices. Supply

conditions were another factor of crucial difference. By the latter half of the 19th century, the US was endowed with three major commercial timber stands—the white pine forests of the upper Midwest or Great Lakes, the yellow pine forests of the South, and the Douglas Fir forests of the Pacific Northwest and Northern Rockies. The latter two generally were inaccessible until the railroads moved into the region, largely by the 1880s, tying forest lands to eastern markets. Southern forests on government lands were tied up with the Southern Homestead Act of 1865 that reserved land for freed blacks and loyal whites in plots of 80 to 160 acres. Accordingly, these forests could not be easily accessed for lumber production until the Act was repealed in 1876. For these reasons, the major source of timber and lumber supply to meet new national demands was the upper Great Lakes white pine forests. The lumber market was a national one and there was little international trade in exports or imports of timber or lumber given the huge size of the growing American market, the vast sources of domestic supply, and the high cost of ocean shipping of heavy timber and lumber. Western Canadian exports came later. The rapid harvests in the US at the end of the 19th century to meet growing demand and shifting domestic supplies were instrumental in shaping the views of early advocates of sustained-yield management and of subsequent retention of government forest lands.

Private property rights, markets, and profit-maximizing timber harvest rates on private lands were never understood by early conservationists, nor for that matter, by contemporary historians or government agency officials. Private property rights to large tracks appeared to be un-egalitarian and inconsistent with the objectives of the federal land laws, which they were. But small farms that worked so well in the Midwest would not in prime forest regions. Further, and perhaps more important, private ownership assigned decision making over natural resources to private parties and not government managers. The latter believed that they could best provide for the public interest, as evidenced by the asserted overharvest of Great Lakes white pine stands. If uncorrected, such harvests would lead to a timber famine (Hayes, 1959, 37; Johnson and Libecap, 1980). This was a powerful argument that fit with broader concerns about depletion and upcoming shortages of key resources, such as lumber and coal, that were subject to Congressional hearings in the early 20th century (Sherry Olson, 1971).

The appeal of sustained-yield management to early conservationists and later government managers lies in the objective of holding harvest or extraction rates to the rate of growth of the stock. The massive government forests of the frontier US offered a major opportunity for kinds of scientific, rational, administrative management learned by Fernow and others in Europe. Consider the quotes below by Bernhard Fernow and Gifford Pinchot:

“...the forest resource is one which, under the active competition of private enterprise, is apt to deteriorate...that the maintenance of continued supplies as well as of favorable conditions is possible only under the supervision of permanent institutions with whom present profit is not the only motive. *It calls preeminently of the state to counteract the destructive tendencies of private exploitation*” [italics added] Bernhard E. Furnow, drafter of 1891 legislation that established the National Forest Reserves, Chief, Division of Forestry, U.S. Department of Agriculture, 1886 (*Economics of Forestry*, NY: Crowell and Company, 1902, 20, quoted in Johnson and Libecap, 1980, 372).

“Government control of cutting on all timberland, *private as well as public*, [italics added] is still today, as it was then, the one most indispensable step toward assuring a supply of forest products for the future of the United States.” Gifford Pinchot, Chief of the U.S. Forest Service 1890-1910, (*120*, New York, 1947, reprint, Seattle, 1972, p. 120, quoted in Libecap and Johnson, 1979,129).

Imagine what the frontier settlement process might have looked like had the eastern hardwood forests been managed under sustained yield. These forests were cut to make way for agriculture and the formation of small farms and communities, following the Jeffersonian ideal, at least in the north. Later, as these farms proved uncompetitive with those of the Midwest, and were abandoned, the forests rapidly returned and today in rural areas cover as much as they did in earlier times. Sustained-yield management if implemented in the early 19th century would have made the whole migration and settlement process far more limited with negative welfare effects.

Sustained yield has and continues to have strong logical appeal among engineers, natural scientists, government regulatory officials, and non-government advocacy groups. None of these groups bear the opportunity costs sustained yield imposes, while property owners and consumers do. When it is economically justified, deviation from sustained yield results in economic loss internalized by owners. Adherence to sustained yield, when it is not economically justified, however, also results in economic loss internalized by society. Bureaucratic officials with tenure and guaranteed salaries, however, do not internalize such costs. General consumers face high information and organization costs to counter, and if sustained-yield management is advertised as providing public goods, the information costs for critical evaluation rise. Competitive interest groups are required to effectively challenge such claims, but as shown below, early conservationists co-opted the parties that might have organized against it. Accordingly, sustained yield was and remains a driving factor in government resource management and it underlies the popular concept of sustainability.

A related justification for greater government intervention in land use was the notion of externality and market failure that also developed in the late Progressive Era (Pigou 1920). Welfare economics, externalities, and government remedies are found in Pigou, Baumol (1972), and Meade (1973). Although there are a variety of market failures addressed in the literature, sustained yield is justified by the argument that private agents systematically discount future returns, ignore current social costs, and overestimate future supplies, all leading to over production and resource rent dissipation. Sustained-yield management was presented as antidote to market failure. Coase (1960) and Cheung (1972) argued for alternative approaches for addressing social cost involving the assignment of property rights. These views, however, would be inconsistent with administrative management and agendas.

Empirical Examination of Conservationist Allegations of Market Failure.

Johnson and Libecap (1980) test the claim that private timber companies were harvesting too rapidly, ignorant of future supplies. They assemble US lumber prices from 1870-1932 and stumpage prices from 1890-1934. They analyze price patterns to see if major adjustments or shocks are observed once more accurate timber supply information became available, causing re-evaluation by timber companies of their previous myopic price expectations. The hypothesis is that had private companies initially harvested too rapidly, overestimating supply (in the historical literature, “the legend of inexhaustibility”), then once actual timber supply conditions became apparent, prevailing prices that had been too low previously would jump as timber companies sharply cut back harvest.

Figure 3 plots time series data for lumber prices and the data do not reveal that stumpage had been underpriced during the period, 1870-1910 when the Great Lakes was being heavily logged and conservationists were so critical. Prices gradually rise through 1915 as domestic demand grew. The sharp rise in nominal prices between 1915-1921, after the Great Lakes harvest largely had ended and most lumbering had moved to the West and South, is associated with unprecedented WWI demand and subsequent, painful macro-economic contraction after the end of the war. In real terms, however, the overall price pattern over the entire period is much smoother, revealing no major shocks to lumber prices in the national market that would have occurred had lumber been underpriced because of overestimated supply by timber companies.

Figure 3: US Lumber Prices



Source: Johnson and Libecap, 1980, 379.

To further examine the pattern of prices to see if there is evidence of overharvest by private companies, Johnson and Libecap also examine stumpage (timber stocks) prices, using western Washington data where old-growth timber dominated and stocks remained relatively homogeneous during the time period examined, 1890-1934. As pointed out above, there was a national timber market with Great Lakes white pine, southern yellow pine, and Pacific Northwest Douglas fir competing directly.

Figure 4 provides a plot of one-period real rates of return for stumpage prices by calculating the annual change in real prices divided by the initial price. Had private timber companies been systematically overharvesting, neglecting long-term supply conditions as conservationists argued, then stumpage prices would have adjusted sharply once actual supply conditions became clear to them. The annual change in price at that time and the associated one-period real rate of return would have been greater than before. Moreover, lumber production would have been reduced as companies lowered timber harvest in order to save their now-more-valuable timber stands.

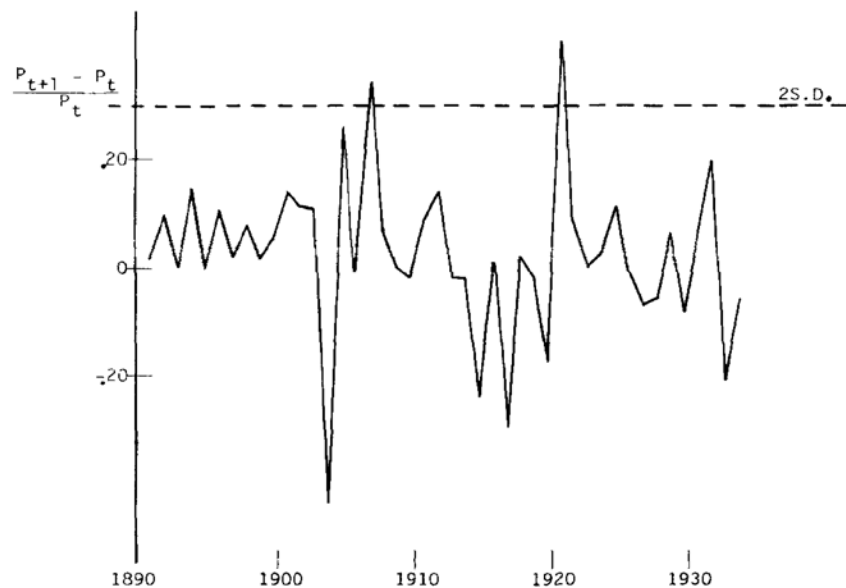
The data in Figure 4, however, do not show such rate-of-return patterns. For the most part, one period price changes are well below 2 standard deviations from the series mean. There are two spikes, 1906-1907 and 1920-1921. The first coincides with rising lumber demand and production, not a reduction in output as would be the case had supply been overestimated. The second spike is due to deflating by the wholesale price series during a time when the series took one of its greatest falls in US economic history following the end of WWI. Further, Johnson and Libecap find that one-period nominal

rates of return averaged 4.3%, comparable to observe rates of return on railroad bonds and other securities at the time.

All told, there is no evidence, then, that timber companies were overharvesting relative to actual demand and supply conditions, neglecting future stocks, or harvesting in a manner that was not consistent with profit maximization with secure property rights. The two price series indicate that lumber companies were managing their timber supplies aware of actual supply and demand as communicated through prices in a national market for both lumber and timber. There were no unexploited private gains foregone by too rapid cutting associated with a myopic view of supply.

Private timber companies indeed were harvesting more rapidly than sustainable yield would allow, and had they held to that mandate as conservationists argued, then timber stocks would have been held artificially too high, lumber supplies would have been held too low, and as a result, lumber prices would have been pushed higher, making housing and other building stocks costlier for consumers. Given the importance of lumber supplies in a rapidly growing economy and national population, sustained-yield timber management would have reduced real incomes. Such an outcome would not likely have been in the public interest, despite counter assertions by conservationists that government ownership and regulation were required to advance the public interest. More modern techniques are available for analyzing stumpage and lumber price series movements, but they are unlikely to reverse the findings of Johnson and Libecap (1980) that private timber companies harvested with an understanding of supply conditions.

Figure 4: One-Period Real Rates of Return for Western Washington Timber



Source: Johnson and Libecap, 1980, 382.

Additionally, conservationists and subsequent historians have repeatedly pointed to timber theft as evidence of myopic and rapacious behavior of private timber companies (Gates 1968, 534-550; Putter, 1907). Libecap and Johnson (1979, 141) examine timber lands claiming in the Pacific Northwest to see why theft as compared to ownership was so prevalent. Logging was highly capital intensive, requiring non-mobile spur railroad lines and mobile heavy equipment to handle the large logs from the virgin forests of the region. Moreover, economies of scale in logging required holdings in excess of 160 acres as allowed by the land laws. Open access and theft placed all timber companies and their non-mobile capital investments at risk as new entrants could enter at any time and harvest adjacent plots, driving up supplies and lowering prices. Private property rights would seemingly have been preferred by companies, especially if they sought to manage stocks over time to maximize profits.

Libecap and Johnson examine General Land Office Reports from 1875-1903 and the report of the 1905 Public Lands Commission where there were extensive discussions of illegal timber harvest. They focus on six major land offices in the timber regions of Northern California, western Oregon and Washington, where the theft was alleged to be greatest. Timber companies could use three land laws, the Homestead Act, the Preemption Acts and the Timber and Stone Act to acquire lands. The first two required actual occupancy for farming at least for 6 months with improvements. At that time, they could commute the claim and purchase the land for \$1.25/acre, but there was always the threat of disclosure that the lands were not actually being used for farming. Timber companies hired entrymen to act as farmers and constructed pseudo farm buildings to appear to be in compliance with the land laws. The Timber and Stone Act allowed for timber harvest of 160 acres of land to support farming after the land had been acquired for \$2.50 per acre. Successful timber companies would then have to assemble the 160-acre plots into a more viable harvest or management stumpage parcels. In any case, these actions to circumvent the agricultural land laws raised the costs of acquiring property rights to land. Libecap and Johnson calculate that the added costs delayed titling by 6 years or more as timber companies waited for stumpage prices to rise sufficiently to make the acquisition through circumvention of the land laws cost effective. In the meantime, the land remained in open access, encouraging timber theft. The culprit then, was not the inherent selfishness or myopic behavior of private timber companies as alleged by conservationists, but rather the high costs of acquiring property rights to land. This could have been remedied without resort to government retention and management under the National Forests.

Some timber companies, such as Weyerhaeuser, were able to acquire large tracks of forest land in the Pacific Northwest through acquisition of railroad land grant sections. These were alternating or checker-boarded sections and required in-lieu trades for consolidation. Weyerhaeuser acquired 900,000 acres of Northern Pacific lands, among other properties by 1900, and now owns some 3.7 million acres of forest land in Washington, Oregon, and Montana (<http://www.landgrant.org/history.html>; <https://www.weyerhaeuser.com/timberlands/forestry/us-west/>). Historians and environmentalists (Gates, 1968, 565-576) are overwhelming critical of such purchases as inconsistent with the land grant objectives, involving corruption, and as promoting large-scale land holdings. But the property rights acquired allowed for long-term management of forest lands by Weyerhaeuser in economically-viable sizes, beginning in the late 19th century and continuing today.

Arguments made for the retention and management of federal forest lands, rather than having them exploited by private parties were repeated for federal range lands. Consider these statements by Ray Wilbur, Secretary of the Interior and the US Department of Agriculture.

“The adjustment of a people to its environment can take place through a thoughtless struggle in the survival of the fittest, or it can be a planned, quiet, orderly process of human organization” Annual Report, Secretary of the Interior, Ray Wilbur, 1930, 8, quoted in Libecap, 1981, 156).

“There is perhaps no darker chapter nor greater tragedy in the history of land occupancy and use in the United States than the story of the western range...Unexpectedly and almost overnight it became the potential source of great wealth from livestock raising. And thereon lies the key to the story...the major finding of this report...at once the most obvious and obscure is range depletion so nearly universal...” (US Department of Agriculture, *The Western Range*, 74th Cong., 2nd Session, 1936, Senate Document no. 199, 3).

As with federal timber lands, biologists and other range managers criticized overgrazing of the federal lands as further evidence of the wastes of unregulated, private herding and the need for administrative control and management (Hayes, 1959, 50-54; Libecap, 1981a, 1981b). They did not acknowledge the inability of ranchers to secure property rights to sufficient acreage for feasible herds under the land laws. There was competition between the Departments of Agriculture and the Interior over which agency would receive jurisdiction, but ultimately the Taylor Grazing Act of 1934 placed administrative control under the Department of the Interior, General Land Office, which

became the Bureau of Grazing and later, the Bureau of Land Management (Hayes, 1959, 60-67; Libecap, 1981a).

Table 1 lists the new land laws that authorized and broadened government administration and that removed lands from private patenting.

Table 1. Land laws Regarding the Retention and Management of Federal Lands.

Law	Date	Implications
General Revision Act (Forest Reserve Act)	March 3 1891	Repealed the Timber Culture and Preemption Acts, applied stricter rules for claiming under the Desert Land Act, authorized the President to set aside and permanently reserve government forest lands.
Reclamation Act (Newlands Act)	June 17 1902	Dedicated funds from sale and disposal of federal lands in 16 western states and territories for irrigation projects on withdrawn lands, but available at subsidized rates for homesteading if lands irrigated. Created the Federal Reclamation Service, separate from USGS in 1907 and in 1923, the Bureau of Reclamation.
Transfer Act	February 1 1905	Transferred forest reserves and the duties of the Forest Service from the General Land Office in the Department of the Interior to the Department of Agriculture and US Forest Service.
Mineral Leasing Act	February 25 1920	Withheld mineral lands but authorized the Department of the Interior to issue prospecting permits and production leases.
Taylor Grazing Act	June 28 1934	Set aside federal range lands, ending some homestead claiming; established the Grazing Service, created grazing districts, and authorized the Department of Interior to issue grazing permits. Grazing Service and General Land Office form Bureau of Land Management (BLM) in 1946.
Multiple-Use Sustained-Yield Act	June 12 1960	Broadened constituent access and use of National Forests from initial timber production to include outdoor recreation, range, timber, water, and fish and wildlife. Ended possible privatization.
Federal Land Policy and Management Act	October 21 1976	Repealed homesteading and other laws for land disposal enacted in the 19 th century and required multiple use and sustained-yield objectives on BLM and other federal lands.

Source: Gates (1968). U.S. Department of the Interior, Bureau of Land Management (editor), 2016. The Federal Land Policy and Management Act of 1976, as amended. U.S. Department of the Interior, Bureau of Land Management, Office of Public Affairs, Washington, DC. 106 pp.

The Absence of a Counter Lobby to the Retention of Federal Lands.

As the federal legislation withdrew lands from private claiming in sharp contrast to a long history of transfer to private citizens, why were there no strong counter lobbyists to resist these actions? The answer is that conservationists co-opted the very interests that would have benefited from more flexible mechanisms for obtaining property rights and might have organized as effective counters. Instead, timber companies, herders, and homesteaders *supported* government reservation and management. Gifford Pinchot called for multiple use of federal lands, rather than preservation. He and other conservation leaders offered timber companies timber leases and later, subsidized access to forest lands. For the first time, those companies could secure legal right of entry to forests through timber harvest leases that they had not been able to secure under the old land laws. They had only to pay for timber harvest leases and not go through the possibly costlier process of securing title. Similarly, herders who had been using federal range land informally, but illegally, were offered renewable grazing permits within newly-created grazing districts. They were granted renewable grazing permits that could attach to any titled land owned and were transferable with such properties should they be sold. Permits were priced low, relative to private lands, although land quality was lower, and subsequently other subsidies in fencing and brush clearing were provided (Libecap, 1981b).

The third group, homesteaders, were redirected, to federally-funded reclamation sites, following enactment of the Reclamation Acts of 1902 and 1906. The National Irrigation Congresses, the American Society of Civil Engineers, others lobbied for the reclamation laws. Federal provision of dams and irrigation networks were argued to provide opportunities for new homesteaders, and indeed, after 1902, both the number of homestead entries and amount of acreage claimed to the new subsidized irrigation projects jumped with totals greater than any earlier period (Gates, 1968, 800). Homestead claims had to adhere to the 160-acre rule for receipt of federally-subsidized irrigation water. Teele (1904) and Coman (1911) argued that there were network externalities that inhibited private irrigation efforts, also justifying federal irrigation intervention. Leonard and Libecap (2018), however, show that collective action problems were solved privately and document that by 1920, \$697,657,328 (\$823,236,000,000 in 2015 \$) had been invested privately in 109,174 canals and ditches, 159,864 miles long, as well as in 7,538 dams and reservoirs with capacity of 21,246,436 acre feet (to scale, in 2016 California's enormous, mostly government-invested surface storage was just under 50,000,000 acre feet). Wahl (1989), Mirghasemi (2015) and others have been critical of the distortions caused by ongoing federal subsidies of water to agriculture, flood control, and power generation.

Even so, all three major potential competitors for federal lands failed to mount political lobbying to keep federal lands open. Rather, they accepted what seemed to be low-cost alternatives and sponsored federal support for their efforts. What timber companies, herders, and later homesteaders failed to anticipate was that later, as new demands for federal lands and subsidies emerged for species preservation, recreation, and other environmental applications, their access, use and subsidies would become less secure and subject continued administrative reallocation and regulation.

III. Sustained-Yield Management

The focus of sustained yield is on preserving the stock of a renewable natural resource, such as timber, rangeland, or fisheries. It is primarily a static concept. Economic considerations, such as harvest costs, economic returns, present and future prices, competitive sources of supply, time, and interest rates are not integral to the concept. Incorporating them results in a different objective of maximum economic yield.

The objective of holding resource stocks at sustainable levels for the future is not obviously beneficial when human factors are considered. Of course, if the goal is to maintain biological stocks for the long term, regardless of human considerations, then the problem remains one of political sustainability. Ultimately the decision to preserve stocks is a political one. The tradeoffs in terms of costs and benefits are not weighed as deciding factors in sustainable-yield determinations by administrative agencies, but they are relevant to populations and the politicians who respond to them. How will populations assess tradeoffs, especially if new information arises as to opportunity costs? If these appear to be large to influential constituents, how will politicians and the bureaucracy react? Further, how will politicians and government officials know how these stocks will be valued by future generations? What constraints will those generations face and what will their demands be? Their welfare can be advanced not only by maintaining resource stocks, but by the wealth created from current harvests and invested in education, health, new knowledge, and infrastructure, all associated with higher levels of per capita income and wealth generated by exploitation.

Even under maximum sustained-yield constraints, profit-maximizing resource harvesters with secure property rights will hold harvests at the point where marginal harvest costs equal marginal growth rates, all else equal. Because marginal costs are always positive, private actors will not generally harvest to the maximum sustained-yield stock levels, where stock growth rates are zero, but rather at a stock level larger than that where growth rates are still positive and commensurate with positive marginal costs.

This point is referred to as maximum economic yield with secure property rights, a notion again not understood by conservationists, nor generally by government managers. The key for such restrained harvest is secure property rights. Without them, open-access prevails and the too rapid harvest claimed by early conservationists would be the norm.

Other economic factors not included in sustained-yield management that affect human populations and resource value include expected future price patterns. If timber prices are expected to fall, perhaps due to the arrival of new sources of supply, as was the case for the upper Great Lakes white forest stands, then it pays to harvest more rapidly as stock values will fall. Indeed, the Great Lakes white pine forests faced the impending arrival of Douglas fir and yellow pine timber from the Pacific Northwest and the South with the arrival of the railroads in the former and the opening of southern forests with the repeal of the Southern Homestead Act in 1876 in the latter. Finally, consider interest rates. Maximum sustainable yield is time independent, implying that interest rates are zero in stock preservation. When they are considered, then future values are lower than contemporary ones, and again speeding harvest rates is consistent with maximizing welfare. Failure to adjust harvest rates in light of such economic factors would ignore the opportunity costs faced by the generations alive in the latter part of the 19th century. Locking up the resources through widespread preservation as sought by conservationists, by contrast, would not have been in the public interest.

IV. Opportunity Costs of Sustained-Yield, Bureaucratic Management of Federal Lands.

A massive resource base in the US is owned and managed by unelected, career government employees who hold tenure to their positions. The resource stock includes 188,240,056 in the National Forests under the US Department of Agriculture and grass lands, for a total of 225,592,659 acres (https://www.fs.fed.us/land/staff/lar/LAR2011/LAR2011_Book_A5.pdf). An even larger amount, 247,300,000 acres, mostly of dry rangeland is administered by the Bureau of Land Management in the Department of the Interior <http://bigthink.com/strange-maps/291-federal-lands-in-the-us>. The National Park Service in the Department of the Interior by contrast administers a comparatively small, 27,400,000 acres. All in all, a total of 472, 892,659 acres or 21% of the land area of lower US is owned and managed by the federal government. Most of the lands have little amenity value and as noted above, were subject to unsuccessful claiming efforts under the land laws.

Valuable lumbering, herding, and mineral production on such an enormous estate suggests that federal lands offer major economic potential for society. Doing so would not preclude the set-aside of smaller tracts of amenity or cultural value. Increasingly, however, under the Multiple Use and Sustained Yield Act of 1960, the National Environmental Policy Act of 1970, Federal Land Policy and Management Act of 1976, and other legislation, more of the federal lands are placed into preservation. Some lands are accessible as wilderness and recreation, but much is off limits to production or to exploration for production only after extensive and time-consuming administrative reviews.

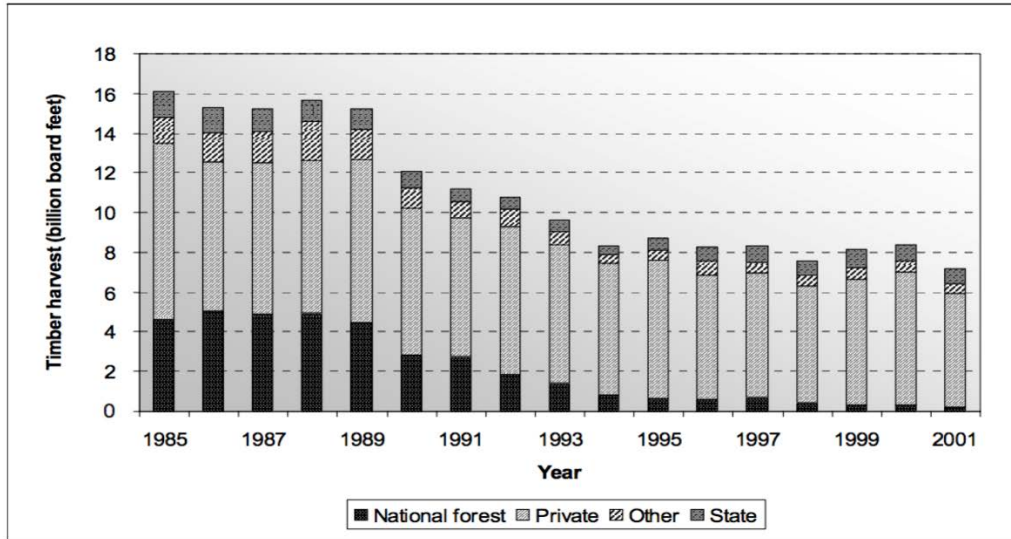
Multiple constituent groups, including environmental and recreational organizations, along with traditional extractive users, appear before the agencies and Congressional hearings to lobby for their favored policies. Agencies have long-term interests in management policies, longer than elected politicians who last only one or two electoral cycles. Most actual management is delegated to the administrative state. Cost-benefit analysis either is not required to assess the opportunity costs of agency decisions or the process is not transparent, particularly for general citizens to assess. Marginal analysis typically does not take place. Although preservation of critical sites can be in the national interest, how much preservation? Answering this and related questions requires a comparison on marginal benefits and costs in a way that private rights would engage in, but that government officials do not. Accordingly, allocative and management decisions on so large a resource base may inflict important welfare costs on society.

To give a sense of what might be at stake, consider the decision to withhold oil and gas exploration and production in the Arctic National Wildlife Reserve (ANWR) in Alaska. Beginning in 1977 there has been ongoing political debate over whether to allow restricted development of the remote region, which is thought to hold large amounts of economically-recoverable oil reserves as well as to have important ecological value. Kotchen and Berger (2007) decompose the potential social benefits of oil production among firm profits and federal and state tax revenues, less production and distribution costs. With reserves of 7.06 billion barrels of oil, priced at \$50/barrel, they estimate opportunity costs of \$ 251 billion. Divided among general adult citizens, they estimate a per-capita opportunity cost of \$1,141 of not producing. ANWR, of course, is very small at 19,300,000 acres, relative overall federal lands, but this estimate alone indicates that significant economic value may be lost under current administrative management, where costs and benefits are not considered explicitly. Decisions instead are made through political lobbying and internal agency deliberations.

Humphries (2016) examines oil and natural gas production on private and federal lands over the past 10 years. While output has jumped dramatically on private lands, partly due to better extraction technology, favorable geology, and the ease of leasing, more than doubling daily production between fiscal year 2006 and fiscal year 2015, the federal share has declined. Natural gas production in the US has increased each year since 2006, while in contrast, production on federal lands declined each year from fiscal 2007 through fiscal 2014. These declines are not due to differences in reserves because federal holdings are thought to have significant, untapped potential. Rather, it is largely due to the high costs for companies to secure applications for permits to drill (APDs), which averaged 307 days for the Bureau of Land Management (BLM) to process (approve or deny) on-shore applications in fiscal 2011. Even after approval, court challenges by other advocacy groups can cause permits to be reviewed again, delaying exploration and development and the economic appeal of such investment.

Similarly, timber production from National Forests has fallen sharply since 1989 to levels not observed since the 1930s, in part due to Endangered Species Act listings for the spotted owl and other species (<http://ecowest.org/2013/05/28/timber-harvest-falls-in-national-forests/>). At the same time, lumber costs are rising, contributing the higher housing costs. The negative economic and social effects on lumbering communities are readily observable, especially in the Pacific Northwest where outmigration has left collapsed property values and limited economic opportunities for local populations, especially among the young. Figure 5 details the fall in lumbering on national forests in Washington and Oregon relative to private and state lands where lobby group litigation and agency regulations are less restrictive.

Figure 5 Logging in Washington and Oregon by Owner Type



Source: United States Department of Agriculture Forest Service Pacific Northwest Research Station General Technical Report PNW-GTR-624 (Daniels, 2005, 41).

Similarly, due to court challenges from environmental groups that seek to insure that the federal forests remain in a natural state, it is also difficult to thin forests or to remove burned and damaged timber after forest fires. This condition contributes to further wildfires and their growing negative effects on communities and the environment, costs of which are not born by the advocates involved or directly by agency officials.

Finally, consider grazing which had been the major use of BLM lands that cover 85% of Nevada, 57% of Utah, 48% of Arizona, 42% of New Mexico, and large, although smaller portions of other western states. Grazing on BLM-administered lands decreased, beginning in the late 1950s and fell from nearly 13 million AUMs (animal unit months) in fiscal 1970 to less than 9 million by fiscal 2012. The number of BLM grazing leases and permits has also declined from about 31,000 in 1949 to about 18,700 in 2011 (<https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/Chapter-8-FY2012-Econ-Report.pdf>). As with lumbering communities, the economic vibrancy of ranching areas has fallen. Most western ranches have small portions of titled land, often homesteads, surrounded by government property that historically had been leased for grazing. When those lands are not available, then ranching no longer can take place. Further, the uncertainty associated with renewal of grazing leases lowers the economic value of ranching properties and private returns to investment in the resource stock, a factor also not considered by those groups critical of historical grazing on BLM lands.

Overall, timber, minerals, oil and gas, livestock production from federal lands has fallen relative private and even state lands as more of the huge federally-owned area is placed into various types of preservation. Society bears the opportunity costs, which as the Kotchen and Berger (2007) study for the far-smaller ANWR set aside imply could be very large on a per capita basis. Yet, individual citizens have little access to information about the tradeoffs made by agency officials or the costs they might bear. Further, they would bear significant collective action challenges when the returns to organizing others are unclear. On the other hand, lobby groups favoring preservation and agency officials generally predisposed to sustained yield and sustainability have their preferences met, while bearing only their per capita share of the broader net social losses. This is not to say that some areas would be preserved in the public interest. The point is that the vast amount of lands gradually reserved would not meet most economic criteria for preservation and would contribute more to social welfare in resource-based production.

V. Conclusion: Bureaucratic Management of Federal Lands.

The withdrawal of federal lands from private claiming and titling began with the General Revision Act of 1891 and continued with the Taylor Grazing Act of 1930 and subsequent legislation. These laws assign access and use control to federal bureaucracies. They represent a fundamental shift in the roles of private property rights and the state. With the founding of the republic reliance was placed on individual decisions regarding land use and allocation, decentralization, and a minimal role of the state. With the reservation of vast amounts of land by the federal government and permanent administrative management, reliance was transferred to an unelected, professional, and tenured bureaucracy with centralized decision-making authority. The state was elevated over the market. The argument made at the time was that market failure required intervention in the public interest. This same argument drives expansion of federal and state environmental regulation of private property rights and land use in the late 20th and early 21st centuries. Beginning with the initial reservations of land for the Forest Service and Bureau of Land Management, the argument does not pass empirical test, although more investigation of the issue would be of great value. Because the primary asset was land and there is a clear historical record of the inability of herders and timber companies to secure clear property rights, the solution to externality claims is straight forward—the more complete definition of property rights. Greater private ownership, however, was inconsistent with an objective to retain federal lands for administrative agency regulatory control with assistance of favored lobby groups.

The assertion of externality is taken at face value and promoted by interest groups and by the agencies that benefit from a greater regulatory role. While early access to forest and range lands, as well as reclamation service projects were aimed at existing timber companies, livestock owners, and homesteaders, new allocations are to a wider range of interests—recreation, preservation, wilderness, watershed, wildlife, and fish, along with traditional uses. The decision-making process in administrative management is not transparent and generally not in the interest of individual citizens to probe deeply. Yet, the aggregate opportunity costs of lost production from so immense a land area are apt to be very high.

Is there a remedy? In a generally wealthy country where interests vary, those parties that favor preservation of enormous areas for a variety of reasons are likely to sustain the current situation. Their objectives generally coincide with those of agency officials whose regulatory mandates are advanced with sustained-yield approaches. Moreover, many agency officials are trained biologists in forestry and range management. They are only tangentially proficient in oil and gas production, minerals output, livestock raising, and timbering. These are economic activities that compete with preservation goals. Private decision making over resource use generally would not coincide with broad bureaucratic discretion. Environmental lobby groups for the most part applaud the existing arrangement. Moreover, those in communities close to federal lands that value low-cost access for hunting, fishing and hiking on federal lands also have their objectives met. This politically-based open access, however, can have predicted negative results for the resource stock. Even so, a coalition of agency officials, environmental lobby groups, and recreation interests is a formidable one, regardless of the aggregate economic and social costs of the status quo. Only if competitive interest groups arise to counter the coalition of bureaucratic agencies and sympathetic lobbyists, can general citizens be made more informed to better weigh whether or not public welfare is advanced or reduced by broader governmental regulation of private property rights and markets in the name of the environment.

This is not to say that externalities are not possible, but rather to argue, as Coase (1960) did that solutions involve a variety of options, chief of which is the better definition of property rights to internalize social costs, rather than an immediate leap to regulation, taxes, or ownership by the state. The concept of externality is an elastic one that can be made to justify almost any state intervention. Whether or not such actions are justified requires assessment and evaluation, rather than uncritical acceptance of the call for greater intrusion into the economy and society by an ostensibly benign bureaucracy.

References

- Baumol, W. J. (1972). On Taxation and the Control of Externalities. *American Economic Review* 62(3): 307-322.
- Cheung, S.N (1970). The Structure of a Contract and the Theory of a Non-Exclusive Resource. *Journal of Law and Economics* 13 (1): 49-70.
- Coase, R. (1960). The Problem of Social Cost. *Journal of Law and Economics*. 3: 1-40.
- Coman, K (1911). Some Unsettled Problems of Irrigation. *American Economic Review* 1: 1-19.
- Dana, S.D. (1956). *Forest and Range Policy: Its Development in the United States*, New York: McGraw Hill. United States Department of Agriculture Forest Service Pacific Northwest
- Daniels, J.M. (2005), *The Rise and Fall of the Pacific Northwest Log Export Market*, Washington D.C.: USFS Research Station General Technical Report PNW-GTR-624 February.
- de Tocqueville, A. (1835). *Democracy in America*. Translated by Goldhammer, A. (2004). New York: Penguin Putnam.
- Dixit, A. (2009). Governance Institutions and Economic Activity. *American Economic Review* 99 (1): 3-24.
- Donaldson, T. (1884). *The Public Domain: Its History, with Statistics*. Washington D.C.: Government Publishing Office.
- Ellickson, R.C. (1993). Property in Land. *Yale Law Journal* 102: 1315-1400.
- Ely, J.W., Jr. (2008). *The Guardian of Every Other Right: A Constitutional History of Property Rights*. New York: Oxford University Press, 3rd Edition.
- Fernow, B.E. (1902). *Economics of Forestry*. New York: T.Y. Crowell.
- Franklin, B. (1751/1845). Observations Concerning the Increase of Mankind, Peopling of Countries, etc.,” in *The Literature of Political Economy: A Classified Catalogue of Selected Publications...with Historical, Critical, and Biographical Notices*. McCulloch, J. Boston: Longman, Brown, Green, and Longmans.
- Gates, P. (1968). *History of Public Land Law Development*. Washington D.C.: Public Land Law Review Commission.

- German Federal Ministry of Food, Agriculture, and Consumer Protection (2011), “German Forests”. Accessed March 22, 2018.
http://www.bmel.de/SharedDocs/Downloads/EN/Publications/GermanForests.pdf?__blob=publicationFile.
- Gordon, H. S. (1954). The Economic Theory of a Common-Property Resource: The Fishery. *The Journal of Political Economy* 62 (2): 124-142.
- Gould, L.L (2001). *America in the Progressive Era, 1890-1914*. New York: Routledge.
- Hansen, Z.K. and Libecap, G.D. (2004). The Allocation of Property Rights to Land: US Land Policy and Farm Failure in the Northern Great Plains. *Explorations in Economic History* 41: 103-129.
- Hayes, S.P. (1959). *Conservation and the Gospel of Efficiency*. Cambridge: Harvard University Press.
- Hibbard, B.H. (1924). *A History of the Public Land Policies*. New York: Macmillan.
- Humphries, M. (6/22/2016), “US Crude Oil and Natural Gas Production in Federal and Non Federal Areas,” Washington D.C.: CRS, 7-5700, R42432.
- Johnson, R.N. and Libecap, G.D. (1980). Efficient Markets and Great Lakes Timber: A Conservation Issue Reexamined. *Explorations in Economic History* 17: 372-385.
- Johnson, R.N. and Libecap, G.D. (1994). *The Federal Civil Service System and the Problem of Bureaucracy: The Economics and Politics of Institutional Change*, Chicago: University of Chicago Press and NBER.
- Johnson, R.N. and Libecap, G.D. (1982). Contracting Problems and Regulation: The Case of the Fishery. *American Economic Review* 72 (5): 1005-1022.
- Kanazawa, M. T. (1996). Possession is Nine Points of the Law: The Political Economy of Early Public Land Disposal. *Explorations in Economic History* 33 (2): 227-249.
- Katz, S.N. (1976): Thomas Jefferson and the Right to Property in Revolutionary America. *Journal of Law and Economics*. 19 (3): 467-488.
- Kotchen, M.J. and Berger, N.E. (2007) “Should We Drill in the Arctic National Wildlife Refuge? An Economic Perspective.” *Energy Policy* 35: 4720–4729.
- Law, M.T. and Libecap, G.D. (2006). The Determinants of Progressive Era Reform: The Pure Food and Drugs Act of 1906. In Glaeser, E.L. and Goldin, C. ed. *Corruption and Reform: Lessons from America’s Economic History*. Chicago: University of Chicago Press, NBER.

- Leonard, B. and Libecap, G.D. (2018). Collective Action by Contract: Prior Appropriation and the Development of Irrigation in the Western United States. Working paper.
- Libecap, G.D., (1981a). Bureaucratic Opposition to the Assignment of Property Rights: Overgrazing on the Western Range, *Journal of Economic History*, 41 (1): 151-158.
- Libecap, G.D. (1981b). *Locking Up the Range: Federal Land Use Controls and Grazing*. Cambridge: Ballinger Publishing, Co.
- Libecap, G.D. (1992). The Rise of the Chicago Packers and the Origins of Meat Inspection and Antitrust. *Economic Inquiry*. April: 242-262.
- Libecap, G. D. (2007). The Assignment of Property Rights on the Western Frontier: Lessons for Contemporary Environmental and Resource Policy. *Journal of Economic History* 67 (2): 257-291.
- Libecap, G.D. (2008). Open-Access Losses and Delay in the Assignment of Property Rights. *Arizona Law Review* 50 (2): 379-408.
- Libecap, G.D. (2016) Coasean Bargaining to Address Environmental Externalities. In Bertrand, E. and Menard, C. ed. *The Elgar Companion to Ronald Coase*. Northampton, MA: Edward Elgar: 97-109.
- Libecap, G.D. (2018, forthcoming). Property Rights to Land and Minerals: The Frontier and US Exceptionalism. Diebolt, C. and Hauptert, M. ed. *Handbook of Cliometrics*, 2nd ed.
- Libecap, G.D. and Johnson, R.N., 1979, "Property Rights, Nineteenth-Century Federal Timber Policy, and the Conservation Movement," *Journal of Economic History*, 39(1): 129-142.
- Libecap, G.D. and Hansen, Z.K. (2002). 'Rain Follows the Plow,' Dryfarming Doctrine, and the Climate Information Problem: Homestead Failure on the Upper Great Plains, 1890-1920, *Journal of Economic History*, 62(1): 86-120.
- Mirghasemi, S.S. (2015), "Agriculture, Dams, and Weather," PhD Dissertation, University of Arizona.
- Meade, J. E. (1973). *The Theory of Economic Externalities: The Control of Environmental Pollution*. Geneva: Institut Universitaire de Hautes Etudes Internationales.
- Merrill, T.W. and Smith, H.E. (2010). *Property*. New York: Oxford University Press.

- Neimanis, V.P. (2011). Crown Land. *The Canadian Encyclopedia*. Accessed April 15 2018. <http://www.thecanadianencyclopedia.com/en/article/crown-land/>
- Olson, S.H., 1971, *The Depletion Myth: A History of Railroad Use of Timber*, Cambridge: Harvard University Press.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Peffer, E.L. (1951). *The Closing of the Public Domain: Disposal and Reservation Policies, 1900-1950*, Palo Alto: Stanford University Press.
- Pigou, A. C. (1920). *The Economics of Welfare*. London: Macmillan.
- Pinchot, G. (1948). *Breaking New Ground*, New York: Harcourt Brace and Jovanovich, reprint, 1972, Seattle: University of Washington Press.
- Powell, J.W. (1879). *Report on the Lands of the Arid Region of the United States with a More Detailed Account of the Land of Utah with Maps*. Washington D.C. US Geographical and Geological Survey.
- Priest, C. (Forthcoming, 2019). *Credit Nation*. Princeton: Princeton University Press.
- Robbins, R. M. (1942). *Our Landed Heritage. The Public Domain 1776-1936*. Princeton: Princeton University Press.
- Shrubsole, G., Powell-Smith, A. (2017). *Who Owns England?* Accessed March 22 2018. <http://map.whoownsengland.org/>
- Steer, H.B. (1938). *Stumpage Prices of Privately Owned Timber in the United States*, Washington D.C.: US Department of Agriculture, Technical Bulletin No. 626.
- Steer, H.B. 1948, *Lumber Production in the United States, 1799-1946*. Washington D.C.: United States Department of Agriculture, Miscellaneous Publication 669.
- Story, J. (1858). *Commentaries on the Constitution of the United States (Vol. 2)*. Boston, Massachusetts. Little Brown.
- Scott, A. (1955). The Fishery: The Objectives of Sole Ownership. *Journal of Political Economy* 63 (2): 116-124.
- Teele, R. (1904). The Organization of Irrigation Companies. *Journal of Political Economy* 12 (1904), 161-178.
- Turner, F.J. (1893). *The Significance of the Frontier in American History*. Report of the American Historical Association: 199-227.

http://www.archive.org/stream/1893annualreport00ameruoft/1893annualreport00ameruoft_djvu.txt.

U.S. Public Lands Commission (1880). Report of the Public Lands Commission. 46th Congress, 2nd Session, House Executive Document 46. Washington D.C.: Government Printing Office.

United States Department of Agriculture (1936). The Western Range, 74th Congress, 2nd Session, Senate Document 199, Washington D.C.: Government Printing Office.

United States Federal Emergency Administration of Public Works, (1934). Report of the Mississippi Valley Committee of the Public Works Administration. Washington D.C.: Government Printing Office.

United States Senate (1905,) Report of the Public Lands Commission. 58th Congress, 3rd Session, . Senate Document 189. Washington D.C. Government Printing Office.

Wahl, R.W. (1989). Markets for Federal Water: Subsidies, Property Rights, and the Bureau of Reclamation. Washington D.C.: Resources for the Future.