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WHERE'S COASE?

TRANSACTION COSTS REDUCTION OR RENT-SEEKING IN DETERMINING US ENVIRONMENTAL POLICIES

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ABSTRACT

In 1960, Ronald Coase offered a decentralized bargaining framework for reducing transaction costs in externality mitigation. Subsequent US environmental policies have not made it primary. Policies are centralized and prescriptive. To explore why, I examine the Clean Air Act Amendments of 1970, 1977, 1990, the most wide-ranging US environmental law; the Magnuson-Stevens Fishery Act of 1976, the primary US fishing regulation; and the Endangered Species Act of 1973, suggested to be the most powerful conservation law in the world. It is commonly asserted that the transaction costs of Coase are high relative to command and control. I find no empirical support for this claim; it is not tested; nor does it appear in legislative histories as justification for observed regulation. Prescriptive controls may involve higher transaction costs than Coase. Relevant externalities often are local where information about abatement costs and benefits would be available and costs of defining and trading decentralized property rights potentially lower than in the political arena with larger numbers of heterogeneous parties and objectives. Rent-seeking by political agents rather than transaction cost reduction dominates policy selection. Coase's efficient collaborative problem solving has not been realized. Although the three laws provide public goods, they appear costly on the margin, inequitable, and mired in political controversy. High costs in all three laws is a key empirical finding. Predictions for policy formation motivated by transaction cost reduction or rent-seeking guide the analysis.

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Where's Coase?
Transaction Costs Reduction or Rent-Seeking in Determining US Environmental Policies[1]

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"…governance is the means by which to infuse order, thereby to mitigate conflict and realize mutual gain. Furthermore, the transaction is made the basic unit of analysis… Transaction cost economics appeals to the efficient alignment hypothesis to predict which transactions go where—to wit, transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competences, so as to effect a (mainly) transaction cost economizing outcome." O. E. Williamson (2010) Transaction Cost Economics: The Natural Progression, *American Economic Review* 100 (June): 673–690, 673, 681.

"The problem is to avoid the more serious harm …of choosing the appropriate social arrangement for dealing with the harmful effects. All solutions have costs and there is no reason to suppose that government is called for simply because the problem is not well handled by the market …it is likely the extension of Government economic activity will often lead to this protection against the action for nuisance being pushed further than is desirable….Furthermore, we have to take into account the costs involved in operating the various social arrangements (whether it be the working of a market or of a government department), as well as the costs involved in moving to a new system. In devising and choosing between social arrangements we should have regard for the total effect. This, above all, is the change in approach which I am advocating." Ronald H. Coase (1960, 44) The Problem of Social Cost, *Journal of Law and Economics* 3 (October): 1-44, 3, 44.

"…. property rights develop to internalize externalities when the gains of internalization become larger than the cost of internalization. (350). Harold Demsetz, "Toward a Theory of Property Rights," *The American Economic Review*, 1967, 57 (2): 347-359.

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I. Overview.

In *The Problem of Social Cost* (1960) Ronald Coase conceptually illustrated transaction cost efficiencies in addressing externalities, an archetypal example of market failure. He described how the assignment of property rights and decentralized negotiation could mitigate them more efficiently than standard prescriptive approaches that he associated with Pigou (1920).[2] His article is among the most cited in economics, contributed to his 1991 Nobel Prize, and has stimulated extensive academic discussion (Medema 2020). Even so, his framework has not been primary in US environmental and natural resource legislation enacted since 1970.[3]

In aspects of the Clean Air Act and Magnuson-Stevens Fishery Act use rights have been granted within regulatory caps. The Endangered Species Act allows for habitat credits exchange and safe harbor agreements to encourage landowner participation. These incentive systems come late in regulatory policies; are relatively limited with most controls nonnegotiable; and caps are imposed, not negotiated by parties directly affected. Further, allocation, exchange, and durability of use rights commonly are restricted, not seemingly for transaction cost reasons, but rent-seeking ones. While suggestive of the power of Coasean approaches to reduce costs and enlist incentives, these are not the broad bargaining approaches envisioned by Coase. While there has been plenty of time for his arguments to be incorporated in US policies, that has not occurred. Prescriptive regulation remains dominant.

Is the lack of decentralized Coase because the transaction costs are too high? Are costs prohibitive for defining and enforcing property rights among polluters and pollutees and for their subsequent exchange? Is Coase just impractical? Are decentralized Coasean approaches so fragmented in addressing national externalities that they encourage a competitive race to the bottom across regions and resources? Do local citizens undervalue environmental assets of national concern? Would the assignment of property rights be too inequitable, dispossessing some, and encouraging degraded hot spots?

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[2] An outline of Pigouvian approaches is provided in Salib, P.N. (2021). The Pigouvian Constitution. *University of Chicago Law Review*, 88:5: 1081-1156. See also discussion of Pigou and Coase in Hovencamp, H. (2009). The Coase Theorem and Arthur Cecil Pigou. *Arizona Law Review*. 51: 633-649.

[3] Medema, S.G. (2020). The Coase Theorem at Sixty. *The Journal of Economic Literature*. 58 (4): 1045-1128. See also Roumasset (1979) for formalizing key efficiency arguments in sharecropping contracts and their links to Coase. Roumasset, J. (1979). Sharecropping, production externalities, and the theory of contracts. *American Journal of Agricultural Economics* 61(4): 640-647.

Responses to these questions typically are yes to justify federal legislation (Medema 2020).[4] Nevertheless, asserted transaction cost barriers, although plausible, have no documented empirical support for addressing relevant externalities; the claims have not been tested; nor is there is evidence in legislative histories that proponents of prescriptive regulation weighed inherent transaction costs relative to those of Coase.[5] Indeed, transaction costs may be higher in molding and administering centralized controls in the political arena. Accordingly, rent-seeking objectives appear to dominate efficiency considerations in environmental policy selection.

Where property rights did not yet exist or appeared to be too costly to trade in the presence of multiple externality sources and affected parties, federal, state, and local governments might have provided a framework for establishing them and supporting their subsequent exchange. Following Ellickson (1982, 1991, 1993, 2016), local or regional organizations might have been formed, similar to a homeowners' association or groundwater conservation district (Edwards 2016), to provide a stage for identifying externalities, negotiating abatement, and defining enforcement (Mulligan 2023).[6] For less common cross-boundary pollution, coordinated mitigation might have been addressed by interstate compacts, such as those existing for cross-state freshwater flows.[7]

Bargaining also is observed to lower the compliance costs and to encourage efficiencies within existing command and control regulations. Deryugina et al (2021) provide examples of polluters purchasing nearby lands as environmental offsets, payments by consumers and government agencies for ecosystem services, and land acquisitions by government bodies and environmental NGOs to guard the supply of drinking water. Costello and Kotchen (2022) examine Coasean exchange alongside centralized government restrictions to control

[4] Medema, S.G. (2020); Schmalensee, R. and Stavins, R.N. (2019). Policy evolution under the Clean Air Act. *Journal of Economic Perspectives* 33(4): 27–50.

[5] For example, see the assertion of relatively high transaction costs under Coase made by Costello and Kotchen (2022, 948) "We assume two conditions as starting points for analysis. The first, which is quite standard, is that fully resolving some externality problems requires a centralized form of policy, and these are the environmental problems upon which we focus."

[6] Ellickson, R.C. (1982) Cities and Homeowners Associations, *University of Pennsylvania Law Review* 130:1519; (1991) *Order Without Law: How Neighbors Settle Disputes*; (1993) Property in land. *Yale Law Journal* 102: 1315-1397; (2016) When civil society uses an iron fist: The roles of private associations in rulemaking and adjudication, *American Law and Economics Review* 18: 237–73; Edwards, E.C. (2016). What lies beneath? Aquifer heterogeneity and the economics of groundwater management. *Journal of the Association of Environmental and Resource Economists* 3 (2): 453-491; Mulligan, C.B. (2023). Beyond Pigou: externalities and civil society in the supply–demand framework. *Public Choice* 196:1–18.

[7] Examples include the Colorado River Compact, 1922; the Republican River Compact, 1942; and the Rio Grande Compact of 1938.

externalities.[8] They argue that property rights of some type and related trade reduce the costs of quantity restrictions in providing public goods.[9]

To systematically address rent-seeking versus transaction cost reduction, three US environmental policies are examined: The Clean Air Act Amendments of 1970, 1977, and 1990, the most wide-ranging US law; the Magnuson-Stevens Fishery Act of 1976, the primary US fishing regulation; and the Endangered Species Act of 1973, asserted by some as the most powerful environmental law in the world with its strict, generally nonnegotiable, protection of critical habitat.

The comparative empirical analysis is not balanced across the three laws because of the differential range of the regulations and information about them available in the literature. The manufacturing and electric power-generating sectors, primarily regulated by the Clean Air Act accounted for 10.2 percent and 5 percent of US GDP respectively in 2023. There has been a corresponding large academic output on the Clean Air Act, much of it devoted to benefit measurement. By contrast, fisheries are far more peripheral in the economy, accounting for .8 percent of US GDP in 2023.[10] Accordingly, the academic literature is far more limited, with most directed to biological maximum sustained yield objectives. Even more narrow is the Endangered Species Act. Much of its literature focuses on incentive effects of the regulatory structure and estimating the economic contribution of nontraded species (Loomis and White 1996; Ferraro 2007; Innes and Frisvold 2009).[11] [12]

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[8] Deryugina, T., Moore, F., and Tol, R. S. J. (2021) Environmental applications of the Coase Theorem. *Environmental Science and Policy* 120: 81-88.

[9] Costello and Kotchen examine the relative costs and benefits of tax (price) versus prescriptive controls (quantity) in instrument selection, Costello, C. and Kotchen, M. (2022). Policy instrument choice with Coasean provision of public goods *Journal of the Association of Environmental and Resource Economists*, 9 (5). See Weitzman (1974) who explored the conditions under which prices or quantity instruments would be the optimal policy mechanism. Weitzman, M. (1974). Prices vs. quantities, *The Review of Economic Studies*, 41 (4): 477-491.

[10] St. Louis Federal Reserve Bank 2017 and National Institutes of Standards and Technology, https://www.nist.gov/el/applied-economics-office/manufacturing/manufacturing-economy/total-us-manufacturing.

[11] Loomis, J.B. and White, D.S. (1996): Economic benefits of rare and endangered species: summary and meta-analysis. *Ecological Economics.* 18(3): 197-206; Ferraro, P.J., McIntosh, C, and Ospina, M. (2007). The effectiveness of the US endangered species act: An econometric analysis using matching methods. *Journal of Environmental Economics and Management* 54 (3): 245-261; Innes, R. and Frisvold, G (2009). The Economics of Endangered Species. *Annual Review of Resource Economics* 1.

[12] To further illustrate, Web of Science searches for economics articles between 1960 and 2025 on the Clean Air Act reveals 317 articles, Endangered Species Act 96, and Magnuson Fishery Act, 1. Fishery regulation is dominated by biological maximum sustained yield objectives and most publications are in natural science, not economics or law journals, such as *Science* or *Publications of the National Academy of Sciences.* If the economics filter is removed, the fishery literature increases to 116.Webofscience.com.

Even so, these three well-known environmental laws across a range of externalities illustrate the comparative patterns of prescriptive regulation; the costs and benefits involved; their distribution; and the opportunities for alternative decentralized Coasean approaches. The investigation draws upon legislative histories, law reviews, and relevant economics literature.

The empirical analysis involves comparisons of regulatory structure, costs and benefits when either transaction cost reduction or rent-seeking are the motivations, following Keohane, Stavins, and Revesz (1998).[13] Applying a decentralized Coasean lens to existing legislation provides a metric for assessing what might be lost if prescriptive regulation is not the low transaction cost, efficient, and more equitable option. High costs of public goods provision under the three laws are major empirical findings.

II. Economizing on Transaction Costs vs Rent-Seeking in Environmental Regulation.

A. Transaction Cost Reduction in Environmental Policy Formation.

Ronald Coase rejected market failure assertions as justification for government intervention to address externalities. He argued that externalities might be dealt with more efficiently through the assignment of property rights and exchange among the polluter and pollutee (Pigou 1920; Bator 1954, 358; Samuelson 1954; Baumol 1972; Coase 1960; Demsetz 1996).[14] He asserted that conventional approaches could be excessively costly at the margin relative to the problem at hand. Even though Pigou's suggested tax policies were designed to equate marginal social and private net values, Coase suggested that the process placed abatement costs on polluters "polluter pays", giving them little stake in outcomes, with incentives to evade. It also potentially motivated pollutees to demand excessive regulation beyond where marginal social costs and benefits were equal, and for polluters to seek far less. Coase did not explore the motivation of government agents to equate private and social net products as Pigou suggested, nor the political circumstances under which such outcomes would ensue.

[13] Keohane, N. Revesz, R., and Stavins, R. (1998). The Choice of Regulatory Instruments in Environmental Policy. *Harvard Environmental Law Review* 22: 313–367.

[14] Pigou, A. C. (1920). *The economics of welfare.* London: Macmillan; Bator, F.M. (1958). The anatomy of market failure, *Quarterly Journal of Economics* 72: 353-54 Baumol, W. J. (1972). On taxation and the control of externalities. *The American Economic Review*, 62 (3): 307- 322; Samuelson, P.A. (1954). The pure theory of public expenditure, *Review of Economics and Statistics* 36 (4): 387–89. Coase, R.H. (1960). The problem of social cost. *The Journal of Law and Economics* 3: 1–44; (1996). Demsetz, H. (1996). The core disagreement between Pigou, the profession, and Coase in the analyses of the externality question. *European Journal of Political Economy* 12 (4): 565-579.

His decentralized approach for mitigation recognized the reciprocal nature of externality remediation among polluters and pollutees (Coase 1960, 2, 35). This created a setting whereby negotiation among the parties could lead to resolution as one party compensated the other for changes in production or behavior. Negotiation required the assignment and exchange of economic property rights (the right to be free of pollution or the right to produce and emit pollution). Coase suggested that the assignment of the rights could be based on maximizing the value of overall economic production and trade.[15]

As Coase recognized, externalities and the potential to address them presented opportunities for exchange. Costs and benefits of externality control would be better internalized through trade. Indeed, a fundamental virtue of using exchange versus prescriptive controls is that market trade reveals willingness-to-pay and willingness-to-accept. This feature leads to a more complete equalization of marginal costs and benefits in mitigation. Payments by either party, depending on the assignment of property rights, reduces the gap between social and private net benefits.

For Coase, the economic problem was to address externalities where possible and to avoid more serious aggregate harm. Overall economic welfare could be advanced in some cases by allowing the polluting activity to proceed, potentially in a limited manner, or avoiding subsidizing any alleged positive outcomes. Undeniably, according to Coase (1960, 18, 39), there would be cases where the most efficient response would be to do nothing.

Consequently, Coase outlined an efficiency argument for decentralized exchange in externality control. Agents had incentives to economize on transaction costs to make potentially-profitable exchange feasible. Importantly for social cohesion on controversial topics, they would *not* have to share the same values for externality abatement and environmental improvement. Indeed, differences would fuel trade. With exchange, resources could be reallocated; production redirected; and costs and benefits balanced.

Coase recognized that it was costly to devise and trade property rights, but he argued that it was not obvious that these transaction costs were higher than those associated with

[15] For example, the most common form of rights assignment is first possession. Lueck, D. (1995) The rule of first possession and the design of the law. *The Journal of Law and Economics.* 38 (2). Merrill, T.W. (2000). Explaining Market Mechanisms. *University of Illinois Law Review* 2000 (1): 275-298, and Libecap, G.D. (1989) *Contracting for Property Rights* point to distributional conflicts in raising the transaction costs of property rights definition and exchange.

implementation and enforcement of mandated regulatory caps (Coase 1960, 3, 18). As indicated below in the legislative history of the Clean Air Acts, there are the extensive and undocumented political transaction costs occasioned by the back and forth actions of lobby groups, politicians, the judiciary, and the EPA in determining the range and execution of the law. Extensive political exchange especially is apparent in the legislation's powerful Prevention of Significant Deterioration (PSD) rule adopted and modified beginning in 1977.[16] The transaction costs of political agent interaction, often contentious and repeated, are never weighed in the literature in judging the infeasibility of decentralized negotiations relative to prescriptive controls. Coase claimed that costs were case dependent and that they ought to be compared across methods in devising externality responses (Coase 1960, 34, 43).

Harold Demsetz (1964, 1967, 1968, 1996) gave structure for Coasean approaches and for markets in promoting efficiency by smoothing asset reallocation.[17] As economic institutions there was an efficient range of property rights completeness, depending on costs and benefits. Along this continuum, where the property right was less complete due to transaction costs, fewer attributes would be covered. As such, property rights innovation by lowering transaction costs could open a greater array of economic opportunities.[18]

All told, Coase outlined a potentially flexible, decentralized framework for collaborative externality reduction and institutional formation. Caps and rights allocations could be adjusted in response to new information that generated additional rounds of market exchange. Entry was open. Negotiators would be motivated by the gains suggested by shifting evidence of abatement costs and benefits. The extent of mitigation at any point in time would promote welfare because marginal tradeoffs would be directly addressed in negotiations between polluters and pollutees.

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[16] Revesz, R.L, (2001). Federalism and Environmental Regulation: A Public Choice Analysis. *Harvard Law Review* 116(2): 553-641.

[17] Demsetz, H. (1964) The exchange and enforcement of property rights. *The Journal of Law and Economics*, 7 (October): 11-26; (1967) Toward a theory of property rights. *The American Economic Review*, 57 (2): 347-359; (1968) The cost of transacting. *The Quarterly Journal of Economics*, 82 (1): 33-53; (1996). The core disagreement between Pigou, the profession, and Coase in the analyses of the externality question. *European Journal of Political Economy* 12 (4): 565-579.

[18] Demsetz and Williamson describe similar motivations for agents to reduce transaction costs in order to advance economic returns. Williamson, O.E. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications*; (1985) *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*; (1996) *The Mechanisms of Governance*; and (2010). Transaction cost economics: The natural progression, *American Economic Review* 100: 673-690.

Actions could be Pareto improving.[19] This suggested flexibility contrasts sharply with the legislative record of the three environmental laws examined here where policy adjustments can be tied up in time-consuming litigation and political rancor.

Despite efficiency and potential welfare advantages, decentralized Coasean externality remedies are not primary drivers in US environmental policies. Although there are generalized benefits to citizens from existing abatement efforts, they may not be the low-cost options, nor provided at the aggregate welfare-improving level (Sallee 2019).[20]

Before examining the three laws and rent-seeking within them, it is worthwhile exploring whether or not Coasean alternatives might have been feasible for each. The investigation focuses on the range of the relevant externalities. The more localized the problem, the fewer the parties involved, and the greater the information about the costs and benefits of mitigation. These factors would reduce the transaction costs of decentralized Coasean exchange.

B. Was Coase Impractical? Local vs Broad environmental Externalities and Transaction Costs.

Figures 1a-1c provide insights into the extent of the externalities each law was to address. What is important in these figures is that, whether it involved endangered species, ocean fisheries, or air pollution, the problem at hand appears relatively spatially narrow. If the relevant externality range for each is limited, the number of parties required for negotiation over mitigation property rights and exchange would be bounded. Further, a defined number of local parties would likely have somewhat similar objectives in pollution or extraction control, more so than for much larger and more heterogeneous national constituencies involved in centralized regulation. The prediction that such narrow externality ranges would facilitate agreement follows from the Nobel Prize work of Ostrom (1990) and summarized for natural resources in general by Cox et al (2010).[21] Within her framework, smaller groups with more homogeneous goals and costs are more successful in addressing wasteful resource exploitation.

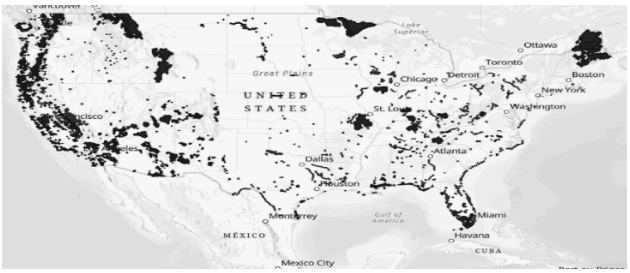
[19] A Kaldor/Hicks framework suggests that even if some parties are made worse off by policy, if the surplus is sufficiently large to compensate, even if no compensation occurs, the policy is Pareto improving. Under Coasean decentralized exchange, compensation is far more straightforward than in the policy arena and effective in molding institutional outcomes.

[20] Sallee, J.M. (2019). Pigou creates losers: On the implausibility of achieving pareto improvements from efficiency-enhancing policies. Cambridge: *NBER Working Paper 25831*. May.

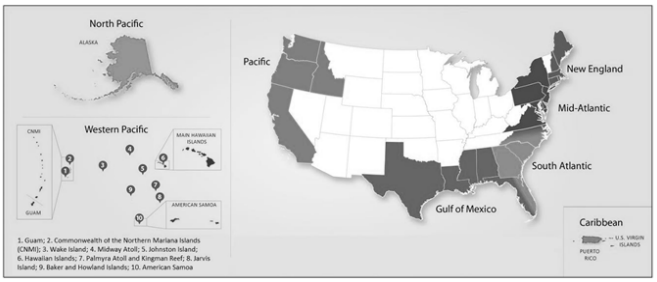
[21] Ostrom, E. (1990) *Governing the Commons.* Cox, M. Arnold G. and Tomas, S. V. (2010). A review of design principles for community-based natural resource management. *Ecology and Society.* 15 (4). December.

Figure 1: National Spread of Regulated Externalities

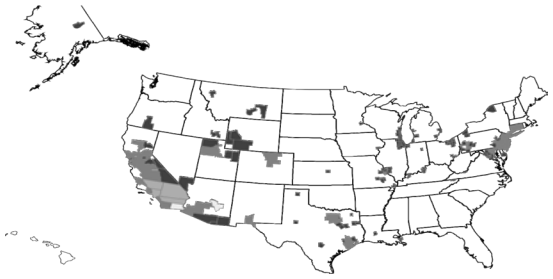
a. Critical Endangered Species Habitat



b. Fishery Regional Management Councils



c. EPA Clean Air Act Nonattainment Counties



Sources: a. US Fish and Wildlife Service. https://www.arcgis.com/apps/Embed/index.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77&extent=-124.1522,38.0501,-121.4496,39.2098&zoom=true&scale=true&details=true&disable_scroll=true&theme=light
b. Congressional Research Service (2023): US Regional Fishery Management Councils. R47645.
c. Source: EPA, www3.epa.gov. Counties with at least one pollutant that is in nonattainment.

Figure 1a is a map of critical habitat for listed species under the Endangered Species Act, prepared by the US Fish and Wildlife Service. Inspection indicates that critical habitat is quite localized, defined by sites where designated species currently or historically were found.[22] Protected species typically were not wide ranging, occupying specific, often isolated areas within US counties. The patterns of critical habitat imply that transaction costs of negotiated habitat set

asides might have been low. Moreover, because up to two thirds of designated species are found on private land where property rights existed, there was opportunity to purchase and retire areas from more intensive use.[23] Indeed, if private parties acted in ways that threatened the existence of some species, not weighing those costs would result in excessive exploitation. In such cases, those with economic property rights would bear opportunity costs in failing to capitalize on the rising value of critical species, as well as disregarding the impact of their land uses that were of concern to others, who might have would been willing to pay them to adjust their practices.

The practice of purchasing habitat takes place by environmental NGOs.[24] With widespread use of easements and land trusts for voluntary, compensated conservation there was a roadmap (Farmer, et al 2011).[25] Indeed, this *was* the direction of federal endangered species legislation prior to the Endangered Species Act of 1973.The Endangered Species Preservation Act of 1966 (Pub. L. No. 89-669, 80 Stat 926) and the Endangered Species Conservation Act of 1969 (Pub. L. No. 91-135, 83 Stat. 275) called for acquisition of land as habitat by expanding the National Wildlife Refuge System. The 1969 law also authorized the Secretary of the Interior to develop a list of species or subspecies of animals that were threatened with extinction. Even so, a Coasean decentralized approach was not taken. No senator and only four members of the House of Representatives voted against the bill in 1973. As noted by Doremus (2010): "Legislators appear to have regarded it as an opportunity to deliver ringing rhetoric that would please the environmental movement without facing any immediate political costs."[26] The role of rent-seeking and the costs it has generated in species protection are addressed later.

Figure 1 b is a map of the eight regional management councils created by the Magnuson-Stevens Act. As shown, the regions encompass distinct areas of US oceans where local fish congregate. Even more wide ranging stocks such as Alaska halibut and sable fish dominantly remain within their regions, implying that regional fishing quotas and rights were possible for relevant fisheries. Overfishing due to open access has always been a problem. The Coasean solution would have been to assign property rights to fish and to allow fishers to determine the

[23] Adler, J.H. Adler, J.H. (2024) Tarnished Gold: The Endangered Species Act at 50, *Florida International University Law Review*, 18 (2). Symposium: Environment forum: From science to public policy. 29-38

[24] Ferraro, P.J., McIntosh, C., and Ospina, M. (2007). The effectiveness of the U.S. Endangered Species Act: An econometric analysis using matching methods" *Journal of Environmental Economics and Management* 54: 245.

[25] Farmer, J.R., Knapp, D., Meretsky, V.J., Chancellor, C., Fischer, B.C., (2011). Motivations influencing the adoption of conservation easements. *Conservation Biology* 25(4): 827- 834.

[26] Doremus, H, (2010). The Endangered Species Act: Static law meets dynamic world, 32*Washington University Journal of Law and Policy* 32: 175, 177.

total allowable annual harvests. With tradable shares, the number of fishers, vessels, and related equipment and crews could be reduced as needed in any over-capitalized fishery. Because share values depended upon product value and costs, vessel owners had an incentive to search for new techniques, lower-cost gear, and new markets with higher valued fish products.[27]

Beyond Coase, there were prominent academic calls for property rights remedies for overfishing by Gordon (1954), Scott (1955) and Christy (1973).[28] Christy described a Total Annual Allowable Catch (TAC) to be set in each fishery with a corresponding assignment of catch shares or individual transferable quotas (ITQs) as property rights within the TAC. The catch shares would be freely transferable. With the fishery closed to all but shareholders and shares valuable only so long as the relevant stocks were protected, fishers could set the TAC. [29] The incidence of and incentives for overharvest would be reduced.

Iceland introduced a tradeable rights system in 1975, one year before Magnuson-Stevens was enacted and twenty-one years before the legislation generally authorized individual fishing quotas. Was this difference due to information problems regarding stock conditions and harvests in the US compared to Iceland? This seems unlikely. The regional management councils provided a forum for assembling an array of interests for each fishery. By providing a framework for negotiation, this provision in the law might have provided structure for defining and exchanging fishery property rights in 1976.[30] The delay in granting use rights and the associated costs arising from rent-seeking are considered below.

Finally, Figure 1c is a map of nonattainment counties, those whose air quality is below the uniform national air quality standards prescribed by the Clean Air Act. It is obvious that more heavily polluted counties are relatively isolated in distinct parts of the country. Many states have no nonattainment counties, and others with one or two. Southern California is an outlier with

[27] For complete overview of ITQs see Arnason, R. (2024) Individual transferable quotas in fisheries. *Encyclopedia of Energy, Natural Resource, and Environmental Economics.*

[28] Gordon, H. S. (1954). The economic theory of a common-property resource: The fishery. *Journal of Political Economy*, 62(2): 124-42. Scott, A. (1955). The fishery: The objectives of sole ownership. *Journal of Political Economy.* 63. 116. Christy, F.T., (1973). Fisherman quotas: a tentative suggestion for domestic management. Law of the Sea Institute, Univ. Rhode Island, Occ. Pap. No. 19, June.

[29] At risk species, ecosystems, and juvenile fish can be protected under a rights-based system. See Wallace, S., Turris, B., Driscoll, J., Bodtker, K., Mose, B., & Munro, G. (2015). Canada's Pacific groundfish trawl habitat agreement: A global first in an ecosystem approach to bottom trawl impacts. *Marine Policy*, *60*, 240–248.

[30] Dan Holland, Senior Scientist, Northwest Fisheries Science Center, NOAA pointed this to me.

both large counties as well as atmospheric and geologic conditions that trapped local pollution. The region also was not site of heavy industry and power plant facilities.[31]

The suggested narrow territorial range of many pollutants indicates that transaction costs of local regulation might have been low. Cross-state acid rain pollution that better fits the common narrative of high transaction costs was not addressed and incorporated into the Clean Air Act of 1970 or 1977 until 1990 with controls implemented in 1995.[32] Dwyer (1995, 1220) emphasizes that interstate, transboundary air pollution was *not* the concern of the 1970 Clean Air Act that focused instead on local, intrastate pollution.[33]

Revesz (2001, 578-584) describes efforts by municipalities and states to reduce local pollution and provides examples in Pittsburgh, Chicago, and Cincinnati, along with some states. He suggests these actions were driven by growing empirical studies of the benefits of lowering emissions. To explain the rise of federalized actions, Revesz (2001, 584) points to rent-seeking as a motive.[34] Revesz (2001, 578-582) submits that state and local efforts prior to federal intervention seemingly were effective, based on local tradeoff assessments for controlling emissions of particulates, PM, and ground level SO_2. [35] These are also the *same* controlled pollutants that generate major benefits reported by the EPA in its positive aggregate benefit/cost analysis for the Clean Air Act.[36]

Unlike the Endangered Species Act with documented at-risk species and the Magnuson-Stevens Fishery Act with depleted harvests and deteriorating stock conditions, the Clean Air Act

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[31] Mobile emissions from automobiles were a principle source in Southern California.

[32] See Schmalensee and Stavins (2019, 33) for suggesting high transaction costs were a barrier to decentralized exchange: "If resources such as clean air could be recognized as a form of property, with corresponding rights that could be traded in a market, private actors could allocate the use of this property in a cost-effective way."

[33] Dwyer (1995). The practice of federalism under the Clean Air Act. *Maryland Law Review*, 54(4), 1183-1225. 1220, argues that interstate pollution controls under Clean Air Act amendments did not receive attention until 1977 with major provisions in the 1990 Amendments.

[34] Revesz (2001, 588-589) also explores interstate transmission of ozone generated by automobile exhaust and California's low emission vehicle regulations. Control of extensively transmitted pollutants, such as ozone would have required interstate coordination, and the federal government could have played a role in facilitating such efforts. Doing so seemingly did not require the observed elements of the Clean Air Act that include uniform national air quality standards and prevention of significant air quality deterioration in attainment counties (PSD) that levy disproportional costs and benefits across regions. Coasean approaches at the local and state level might have been coordinated where needed to address cross boundary pollutants and mitigated such inequities.

[35] For infant mortality and other health benefits of reduced air pollution, see research summarized in Clay, K. and Severnini, E.R. (2024). Clearing the air: Historical air pollution and health. *NBER Reporter* July 23, 2024.

[36] https://www.epa.gov/clean-air-act-overview/benefits-and-costs-clean-air-act-1990-2020-second-prospective-study where the human health benefits of reducing particulates and ground level SO_2 are the greatest contributors to total benefits. EPA. *The Benefits and Costs of the Clean Air Act from 1990 to 2020 Final Report* – Rev. A U.S. Environmental Protection Agency Office of Air and Radiation April. 2-9.

did *not* have an agreed-upon baseline for implementing centralized regulation. The legislative history of the Clean Air Act does not reveal consideration of what the alternative air quality might have been with more local decentralized Coasean bargaining in the absence of the federal Clean Air Act.[37] Indeed, the regulatory process provided no effective instruments for determining *ex-ante* efficient air quality levels across the country with its many heterogeneities in pollution, population densities, economic development, industrial production, incomes, and terrain.[38]

Federally-imposed uniform standards and compliance mandates were promoted by political advocates as being necessary to avoid a race-to-the-bottom by states and localities that would undermine national air quality objectives.[39] For example, Senator Prouty of Vermont claimed: "To be sure, minimum Federal standards are a must, as they free the 50 States from the necessity of competing for business by lowering their standards."[40] A large-scale shifting of pollution from nonattainment counties to attainment ones under a race-to-the-bottom scenario would have required major migration of industrial facilities and power plants that otherwise would not have been economically or technically feasible. Relocation of this magnitude has never been tested outside the policy, and it seems implausible. Rent-seeking on the other hand could motivate some industry and union representatives along with their political sponsors to raise the costs of individual firm or plant migration via regulatory restrictions. This issue is addressed below.

C. Rent-seeking in the Provision of Environmental Public Goods.

When command and control characterizes externality mitigation rather than Coasean decentralized negotiations, political actors, not market participants are the principal parties.[41] The political arena includes politicians, agency officials, possibly judges, as well as lobby groups comprised of firms, labor unions, environmental NGOs, as well as other interest groups. With rent-seeking, political negotiations are driven at least in part by an aim to secure privately-

[37] Mulligan (2023) criticizes centralized approaches because they ignore locally negotiated regulation.
[38] Aldy, J E, Auffhammer, M. and Cropper, M. (2022), Looking back at 50 years of the Clean Air Act, *Journal of Economic Literature* 60(1): 179-232.
[39] Dwyer, J. P. (1995). The practice of federalism under the clean air act. *Maryland Law Review*, 54(4), 1183-1225, 1195.
[40] Dwyer, J.P. (1995), 1195, footnote 60.
[41] For analysis of partisan politics and political polarization in environmental policies, see Lueck, D., Ramos Pastrana, J.A., and Torrens, G. (2025). Campaign Contributions, Partisan Politics, and Environmental Polarization in the U.S. Congress. *Journal of Law, Economics, and Organization* 41:159-195.

beneficial and desirable government statutes and agency actions (Tullock 1967, 2005; Krueger 1974).[42]

A dynamic political rent-seeking framework is outlined by Keohane, Revesz, and Stavins (1998, 319-362) within the context of the Clean Air Act to explore why observed prescriptive policies rely so little on market or incentive-based instruments.[43] They do not examine why environmental policies are centralized in federal regulatory controls in the first place. They describe the demand for and supply of specific regulations across firms, individuals, unions, environmental interest groups, and legislators. They also do not explore an independent role for administrative agencies.[44]

Keohane. Revesz, and Stavins (1998, 314-317) provide rent-seeking explanations for elements of the Clean Air Act, including more stringent regulation of sources of *new* pollution, than of existing ones, despite the fact that both would be contributors to deteriorating air quality; the sparce and late use of incentive-based instruments within prescriptive controls; the adoption of caps and tradable permits, not emission taxes; and their free allocation via grandfathering to incumbent firms rather than auction. Their framework is expanded for implications for environmental regulation with rent-seeking, rather than efficiency, is a primary driver.

Rent-seeking is defined here to include standard pecuniary or commercial returns to designated parties from preferential government policies that cannot be competed away. Rent-seeking is aimed at securing durable producer surplus via constraints on entry and raising rivals' costs. Rent-seeking also takes place in the political assignment of preferential property rights that includes constraints on any subsequent trade in response to new cost and benefit information. In this case, the political objective of agents is to designate a relatively permanent allocation of ownership, production, and employment along with rents associated with it. This also is a form of restrictions on entry and raising rivals' costs.

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[42] Tullock, G. (1967). The welfare costs of tariffs, monopolies, and theft. *Western Economic Journal* 5: 224–232; (2005*) The Rent Seeking Society*; Krueger, A.O. (1974) The political economy of the rent-seeking Society, *American Economic Review*, 64 (3): 291-303.

[43] Keohane, N. Revesz, R., and Stavins, R. (1998). The Choice of Regulatory Instruments in Environmental Policy. *Harvard Environmental Law Review* 22: 313–367.

[44] Merrill (2000) uses a similar rent-seeking approach to address the dominance of command and control and the limited use of incentive-based systems within them. He explores why grandfathered permits, rather than taxes are used whenever incentive instruments are adopted. His explanation focuses on the tradeoffs among political agents in weighing wealth maximization versus distributional objectives in regulatory design.

Further and important in environmental regulation, rent-seeking is defined to include value-based or philosophical non-pecuniary returns from strongly-desired environmental policies often based on health, biological, and engineering assessments with associated public goods. In this case, rent-seekers receive policy-delivered private values for less than they would be willing to pay for. This is policy consumer surplus that cannot be competed away.

Within a rent-seeking framework, agents do not gain economic property rights via political development and implementation of policy, as is the case with Coase's privately-negotiated settings. They are not driven by transaction cost reductions or by resource reallocation through smooth alienability. On the demand side, firms, labor unions, politicians, and members of environmental NGOs join in reducing externalities, but in potentially self-serving ways. These include creation of scarcity rents, avoiding tradeoff considerations, and provision of externality reduction at higher total cost than under Coase.[45]

On the supply side of rent-seeking regulation, politicians respond to demand for politically-popular policies, at least among those constituencies who have high voting participation rates, potentials for campaign contributions, and abilities to mobilize the broader electorate. These characteristics enhance election probabilities.[46] Politicians may also have ideological beliefs that make them predisposed to policy adoption or rejection. Finally, regulatory agency officials may act to support policies that potentially increase their mandates, budgets, and staffing. As with politicians, agency representatives may also have ideological or philosophically-based positions on policy administration.

Weitzman's (1975) influential paper provides further insights for evaluating environmental policy design.[47] He examines the efficiency bases for prices (Pigouvian taxes) or quantities (production or emissions quotas, cap-and-trade) in externality abatement. Rent-

[45] Maloney, M.T. and McCormick, R.E. (1982). A Positive Theory of Environmental Quality Regulation. *The Journal of Law and Economics* 25 (1): 99-123. See also similar arguments by Keohane, Revesz, and Stavins (1998, 317, 348-352) in describing rent-seeking objectives for grandfathering offset permits under the Clean Air Act's nonattainment provisions for plant entry or modification, creating entry barriers, and in authorizing intrafirm, "bubble" trading, while denying comparable interfirm trades.

[46] The rise of environmental NGOs and the overall environmental movement is discussed by Coglianese, C. (2001). Social Movements, Law, and Society: The Institutionalization of the Environmental Movement. *University of Pennsylvania Law Review* 150:85-118. For discussion of the issues involved in interpreting poll data, see Berinsky, A.J. (2017). Measuring Public Opinion with Surveys. *Annual Review of Political Science*. 20:309-329. Revesz, R. (2001, 559-572) outlines and criticizes a public choice framework for examining federal environmental legislation.

[47] Weitzman, M. (1974). *Prices vs. quantities*, *The Review of Economic Studies*, 41 (4): 477-491.

seeking, where efficiency is not the policy motive, is not considered. A quantity instrument targets a fixed amount of the externality, while potentially allowing the price to vary, whereas a price instrument maintains a constant price, while allowing the quantity to vary. Under limited information and associated uncertainty, if the marginal cost of abatement is rising more steeply than the marginal gain, then taxes are superior to quantity restrictions. Polluters have flexibility in responding to the tax in cost-efficient ways. Alternatively, if the marginal benefit of abatement (the cost of the externality) rises more steeply than the marginal cost, then quantity controls are more efficient. Quanty controls provide a certain level of environmental quality when the benefit of reduction is highly sensitive to the total amount of pollution. With no uncertainty about marginal costs and benefits, Weitzman argued that either approach had comparable welfare outcomes.

Weitzman's efficiency predictions about efficient policy selection do not seem to be borne out empirically. Prices are not adopted, whereas quantity controls always are. Is this because the marginal benefit of abatement always is rising more steeply than the marginal costs of control? Because we do not observe marginal costs and benefit measurements in the legislative histories of the policies examined, it is difficult to conclude that advocates in the political arena were solely motivated by efficiency, rather than rent-seeking.

Costello and Kotchen (2022) also examine the relative costs and benefits of tax (price) versus prescriptive controls (quantity) in efficient instrument selection when there is the option of some Coasean provision alongside centralized prescription.[48] In their framework Coasean provision is the private delivery of environmental public goods within existing centralized policy that fixes quantities. They conclude that Coasean provision favors prices over quantities with uncertainty over either the marginal benefits or costs of pollution control. They do not examine why Coasean provision occurs late and in limited ways within prescriptive regulation nor explore the implications of policy design if rent-seeking, not efficiency is the underlying motivation for political agents.

All told, observed centralized environmental quantity regulation appears not to follow from asserted high transaction costs with Coase, but rather from rent-seeking purposes. For environmental NGOs desiring certainty in environmental quality; industry and union lobbyists

[48] Costello, C. and Kotchen, M. (2022). Policy instrument choice with Coasean provision of public goods *Journal of the Association of Environmental and Resource Economists*, 9 (5).

desiring competitive advantages; politicians desiring reelection; and agency officials desiring regulatory mandates, the marginal costs of regulation (unless very high and transparent) are of less concern than the marginal benefit of regulation. Accordingly, agents in the political arena favor quantity controls-caps or quotas, not prices.

In political bargaining, general citizens may lack sufficient information to distinguish private and public benefits and costs in environmental programs, as well as lack an ability to organize across multiple group characteristics.[49] Accordingly, they can be ineffective in moderating the effects of more partisan policies implemented through the efforts of better-organized groups, supportive politicians, and agency officials. As a result, they receive public goods, but at steeper costs. Any negative welfare effects, unless very large, are difficult for citizens to discern and to oppose. Proponents have little interest in advertising such costs. Smaller, organized, and more homogeneous interests can promote desired programmatic outcomes, bearing primarily only lobby expenses.[50] In his study of resistance to secure, alienable property rights in fisheries Hannesson (2006, 173) commented that inefficiencies create their own constituencies.[51]

III. Rent-seeking in Protecting At-risk Species: The Endangered Species Act of 1973 (16 USC 1531).

For terrestrial species, the regulatory agency is the Fish and Wildlife Service (FWS) and for marine, the National Oceanic and Atmospheric Administration (NOAA). The ESA has been labeled the most powerful environmental law in the country, if not the world.[52] This judgement

[49] Olson (1965, 36). Coglianese (2001) does not address collective action cost differentials across the population in gauging overall citizen support. Acemoglu, D. (2003) provides a similar argument for the inability of citizens to hold politicians accountable. Why not a political Coase theorem? Social conflict, Commitment, and Politics. *Journal of Comparative Economics* 31: 620–52, 621.

[50]The public choice literature on lobbying and government environmental regulation includes in addition to Olson (1965), Peltzman, S. (1976). Toward a more general theory of regulation. *The Journal of Law and Economics.* 19 (2): 211-40; Olson, M. (1965). Stigler, G. J. (1971). The economic theory of regulation, *Bell Journal of Economics*, 5, 3–[21;] Buchanan, J. M. and Tullock, G. (1962). *The Calculus of Consent*; Becker, G.S. (1983). A theory of competition among pressure groups for political influence. *The Quarterly Journal of Economics.* 98 (3): 371-400Laffont, J.J. and Tirole, J. (1991) The politics of government decision-making: A theory of regulatory capture. *The Quarterly Journal of Economics*, 106 (4): 1089-1127 and Johnson, R.N. and Libecap, G.D. (2001) Information distortion and competitive remedies in government transfer programs: The case of ethanol. *Economics of Governance* 2: 101-134.

[51] Hannesson, R. (2006). *The privatization of the oceans*. Cambridge, MA: MIT Press.

[52] See discussion and references in Adler, J.H. (2024). Tarnished Gold: The Endangered Species Act at 50, *Florida International University Law Review*, 18 (2). Symposium: Environment forum: From science to public policy. 2-3.

follows from its strict prohibition of human actions that could harm targeted species, enforced by civil and criminal penalties. The judgement is not from demonstrated successes.

Because of its authoritative controls and unequal distribution of costs and benefits across the population as indicated below, the law has become a lightning rod, surrounded by acrimonious debate in political competition over policy and the rents it provides.[53] The ESA has not been reauthorized since 1988, although it continues under previous legislation, and budgets have been more limited than biologists believe necessary for species recovery. Efforts to amend and reauthorize the law have not made it out of committee for Congressional vote. Mired in disagreement, funding has been constrained by congressional opponents.[54]

Section 4 of the ESA requires that species listed for the law's protections are to be based solely on the best available science "*without reference to possible economic or other impacts of such determination* [italics added]." Although a 1978 amendment allowed for economic factors to be considered in critical habitat designation (not listings), the centerpieces of the law remain biological mandates and not potentially collaborative, more effective solutions as Coase suggested.[55]

There is no agency cost/benefit analysis that might otherwise focus attention on species most apt to recover or to inform agency budget allocation and actions. Under the law, the FWS must devote scarce resources to target species, regardless of recovery potential. The agency is to conserve species listed as endangered or threatened by using "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." [56]

Section 9 prohibits any unauthorized "taking" of endangered species on private lands (16 USC §1538). Taking not only includes killing, wounding, or capturing an endangered species,

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[53] See discussion in Wood, J. (2024), America's wildlife habitat conservation act, explained. Downey, H., Priest, J., Regan, S, Watkins, T., Wood, J., and Yablonski, M. (2023) *A Field Guide for Wildlife Recovery: The Endangered Species Act's Elusive Search to Recover Species—And What to Do About It*, Property and Environment Research Center, Bozeman, MT.

[54] Adler, J.H. (2024) Tarnished Gold: The Endangered Species Act at 50, *Florida International University Law Review*, 18 (2). Symposium: Environment forum: From science to public policy. 12. On persistent under funding, see Eberhard, E.K., Wilcove, D.S., and Dobson A.P. (2022) Too few, Too late: US Endangered Species Act undermined by inaction and inadequate funding. 19 *PLOS ONE*, October 12, 2022.

[55] Bean, M.J. and Rowland M.J. (1997). *The Evolution of National Wildlife Law*: 198-200. Congressional Research Service, *The Endangered Species Act: Overview and Implementation. The Endangered Species Act of 1973* (ESA; P.L. 93-205, 87 Stat. 884, 16 U.S.C. §§1531-1544).

[56] Adler, J.H. (2024) Tarnished Gold: The Endangered Species Act at 50, *Florida International University Law Review*, 18 (2). Symposium: Environment forum: From science to public policy. 9.

but also destroying or adversely modifying its habitat. Violators are subject to fines and other civil and criminal penalties.

The ESA directs the administering agencies to develop and maintain a list of species designated as endangered or threatened. Listing is to be based upon biological evidence that a species is in danger of extinction. Once listed, it becomes illegal for anyone to take that species, where take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" a member of the species. [57] Listing can bring restrictions on how private and government land can be used. Critical habitat designation also can trigger a variety of property regulations, permitting delays, and environmental impact studies. There are winners and losers in the process. With much at stake, interest groups lobby Congress and the FWS for listings or their delay (Ando 1999, 2001, 2003). [58] These groups include landowners and economic development organizations versus environmental NGOs.

Incentive-based instruments within the ESA's prescriptive structure are limited and have come late. Habitat conservation plans (HCPs) by landowners along with conservation banks and tradable offset credits were authorized via 1982 amendments to the ESA, *nine* years after the law was passed. They were to reduce the impact on landowners of critical habitat designation within their properties and to encourage private conservation. They allow for some economic activity to take place if offsetting habitat investment occurs elsewhere. Safe Harbor Agreements also were added in 1995 by the EPA, *twenty-two years* after the law was enacted. They authorize landowners to privately protect habitat without the threat of the EPA adding additional critical habitat designation to their properties should at-risk species proliferate beyond previous designated areas. Both instruments remain on the fringes of the law and are not central regulatory instruments.

In terms of effectiveness, costs, and equity the ESA has been broadly popular. ESA regulatory costs are spread across all citizens so that individual shares are small. Moreover, the attraction of saving species is appealing so that the law retains overall support. With limited

[57] Ando (2003, 148). Do interest groups compete? An application to endangered species. *Public Choice* 114: 137–159

[58] Ando, A.W. (1999). Waiting to be protected under the Endangered Species Act: The political economy of regulatory delay. *The Journal of Law and Economics* 42 (1): 29-60; (2001). Economies of scope in endangered-species protection: Evidence from interest-group behavior. *Journal of Environmental Economics and Management* 41: 312– 332; and (2003) Do interest groups compete? An application to endangered species. *Public Choice* 114: 137–159.

information, individual citizen assessment of the law's general benefits, costs, and performance, however, would be very difficult. Indeed, broader ESA costs and benefits generally are not advertised to voters. As argued by Wyman (2008, 510) direct compensatory payment to landholders via Coasean negotiations would have made the costs of the ESA larger and far more observable. Moreover, because costs would have to be weighed across alternatives, focus might have been more on species where recovery was feasible and not on all at risk species as desired by conservation proponents.[59]

Economic costs are not integral in species designation. In 1978 in *Tennessee Valley Authority v. Hill* the U.S. Supreme Court held that the ESA explicitly placed species conservation above other social goals when in conflict. The court held that "The plain intent of Congress in enacting this stature was to halt and reverse the trend toward species extinction, *whatever the cost*." (437 US 153, 184. 1978, [italics added]).

When costs are not weighed, it is difficult to answer the question of how far restrictions on private resource use should go. For advocates, they should go far enough to bring the target species back from the edge of extinction. The costs involved would be those necessary to achieve the goal. For landowners regulated under the law, the costs they bear to provide a public good should be paramount. There are no clear grounds for negotiation and compromise. As indicated below, these differential cost distributions undermine collective efforts at species protection and likely contribute to ESA's limited recovery results.

Although the ESA was not to consider economic costs in listings, some assessments shifted sharply when they became politically significant, as with Congress's overriding of delay in construction of the Tellico Dam in Tennessee. There were litigated concerns about the endangered snail darter.[60] Congress responded in 1978 by amending the ESA to require economic considerations in critical habitat declarations.[61] After the dam controversy, the snail

[59] Wyman, K.M. (2008, 510), Rethinking the ESA to reflect human domination over Nature. *New York University Environmental Law Journal*. 17: 490-528.

[60] Construction was halted by the US Supreme Court in *Tennessee Valley Authority v Hill* (437 US. 153, 172-73, 1978).

[61] See: Congressional discussion of the Tellico Dam controversy in *A Legislative history of the Endangered Species Act of 1973, as amended in 1976, 1977, 1978, 1979, and 1980*: together with a section-by-section index / prepared by the Congressional Research Service of the Library of Congress for the Committee on Environment and Public Works, U.S. Senate

darter was found to have other populations; moved from being categorized as endangered to threatened; and finally delisted as recovered in 2022.[62]

A general neglect of costs can lead potentially to too much protection as Coase warned. The possibility of excessive regulation was illustrated by the dusty gopher frog (listed in 2001) case in 2018 (*Weyerhaeuser Co. v. U.S. Fish and Wildlife Service*).[63] The FWS had designated critical habitat for lands where the frog had not been found historically. The court ruled that the action was unwarranted. Additionally, Auffhammer et al (2020) estimated that critical habitat declaration under the ESA lowered vacant land values near the Bay Area of California by 48 percent to 78 percent. Even though the broad estimated price and land development effects suggested by Frank et al (2025) are smaller than those found in studies of specific areas, narrow impacts can be large for local land users, making them worse off and reducing their support for preservation.[64]

Finally, the northern spotted owl's 1990 listing in the Pacific Northwest led to reduced logging in affected federal forests by 80 percent; the loss of 32,000 blue-color jobs, 14 to 28 percent of timber industry employment in the counties with northern spotted owl habitat; along with lower property values and out migration from lumbering communities. During ongoing conflict between rural inhabitants and environmental groups, the owl's population has continued to decline in the face of habitat loss from wildfires and the intrusion of an aggressive competitor, the barred owl.[65]

Figure 2 documents cumulative ESA listings, recoveries, and extinctions between 1967 and 2024. It is important to note that the axes have different measures. The left axis of listings

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[62] See Nark, J. (2025). This tiny fish's mistaken identity halted a dam's construction. Scientists say the snail darter, whose endangered species status delayed the building of a dam in Tennessee in the 1970s, is a genetic match of a different fish. *New York Times* January 3, 2025. https://www.nytimes.com/2025/01/03/science/snail-darter-fish-tellico-dam.html.

[63] Congressional Research Service, *Home is Where the Habitat is: Supreme Court Addresses Critical Habitat under the Endangered Species Act* December 19, 2018. The Supreme Court held that only actual habitat of an endangered species could be designated as critical habitat under the Endangered Species Act (ESA). See also Wood, J. and Watkins, T. (2021) Critical habitat's 'Private Land Problem': Lessons from the dusky gopher frog," *Environmental Law Reporter* 51, no. 7.

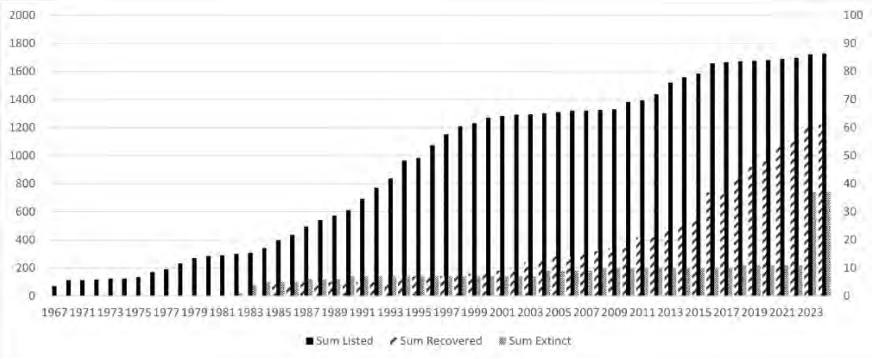
[64] Auffhammer, M., Duru, M., Rubin, E., and Sunding, D.L. (2020). The economic impact of critical-habitat designation: Evidence from vacant-land transactions. *Land Economics,* 96 (2) 188-206. Frank, E.G., Auffhammer, M., McLaughlin, D., Spiller, E. and Sunding, D. (2025). The cost of species protection: The Land Market Impacts of the Endangered Species Act. *NBER Working Paper* 33352.

[65] Ferris, A.E. and Frank, E.G (2021) "Labor Market Impacts of Land Protection: The Northern Spotted Owl," *Journal of Environmental Economics and Management*, 109:102480 (2021). See also "Endangered and Threatened Wildlife and Plants; 12-Month Finding for the Northern Spotted Owl," 85 Fed. Reg. 81144, 81152 (December 15, 2020).

approaches 2,000, while the right axis of recoveries and extinctions approaches 100. The differences are used to illustrate patterns of listings, recoveries, and extinctions. It is not obvious from the data that the law is a success as supporters claim.

Listings, which place species under the Fish and Wildlife and NOAA regulatory regime, are the primary indicators of action under the law. By contrast, recoveries and extinctions as outcomes of listings are slim. While the ESA calls for recovery, there is no realistic baseline for evaluation. The law does not require it, nor do the competing parties have incentives to provide one that weighs expected benefits and costs. Although endangered or threatened species listings that trigger ESA land use controls continue to rise, only about 3 percent of listed species have recovered.[66] While the law calls for recovery, there are politically controversial criteria for evaluation and reassessment.

Figure 2 : Cumulative ESA Listings, Recoveries, Extinction 1967-2024.



Source: Calculated from data in US Fish and Wildlife Service, ECOS dataset.

Because NGO members primarily bear only direct lobby costs, they can seek listings that might not pass any *ex-ante* cost/benefit calculus. They may have strong personal preferences for species protection and for shielding the lands upon which the species depends for aesthetic, recreational, or moral reasons (Ando 1999, 2003). Similarly, because landowner groups confront immediate, uncompensated private costs while internalizing only small portions of any public goods generated, they are motivated to seek under-provision in listings. Absent evidence on relative costs and benefits there are no benchmarks for citizen assessments.

[66] Downey, H., Priest, J., Regan, S., Watkins, T., Wood, J., and Yablonski, M. (2023). *A Field Guide for Wildlife Recovery: The Endangered Species Act's Elusive Search to Recover Species—and What to Do About It*. Property and Environment research Center. September 20, 2023.

In addition to lobbying, litigation also forces listings by the FWS. Langpap (2022) analyzes litigation by environmental NGOs to compel listing, critical habitat designation, and funding for imperiled species.[67] Such organizations file hundreds of law suits, and he finds that litigation accelerates or expands listings, critical habitat designation and size, as well as expenditures for targeted species.[68] Because budgets are constrained, outlays are aimed at politically important species (Ferraro et al 2007).[69] Although listing and increased species specific expenditures can bring status improvement, it may have adverse consequences by signaling landowners of forthcoming agency action.

Because of the disproportional distribution of costs and benefits, the ESA provides few incentives for active private stewardship of endangered species habitat. Listing and designation of critical habitat can place landowners at risk of lower land values and land use options. Listing has led to documented declines in farmland values and employment in affected counties.[70]

As a result, landowners are motivated to engage in preemptive harvests or other practices detrimental to critical habitat to reduce the risk of ESA controls. Further, the law discourages information sharing about the location, number, and state of endangered species on their properties or leased areas by landowners or permit holders. Doing so could invite the onslaught of the law and its penalties.[71]

Preemptive critical habitat destruction or other proactive harm to endangered species to avoid ESA land use restrictions are illegal under the law. As a result, there is little information on such actions for systematic analysis. Lueck and Michael (2003) and Zhang (2004) reveal both

[67] Langpap, C. (2022). Interest groups, litigation, and agency decisions: Evidence from the Endangered Species Act *Journal of the Association of Environmental and Resource Economists* 9 (1). 1-26. Langpap points out that lawsuits have grown dramatically over 1990-2016, the period examined. See also Langpap, C., Kerkvliet, J., and Shogren, J.F. (2018). The economics of the U.S. Endangered Species Act: A review of recent developments. *Review of Environmental Economics and Policy* 12 (1): 69–91 and Langpap, C. and Shimshack. J.P. (2010). Private citizen suits and public enforcement: Substitutes or complements? *Journal of Environmental Economics and Manag*ement 59 (3): 235–49.

[68] Kerkvliet, J. and Langpap, C. (2007). Learning from endangered and threatened species recovery programs: A case study using U.S. Endangered Species Act recovery scores," *Ecological Economics* 63: 499.

[69] Ferraro, P.J., McIntosh, C., and Ospina, M. (2007). The effectiveness of the U.S. Endangered Species Act: An econometric analysis using matching methods" *Journal of Environmental Economics and Management* 54: 245.

[70] Melstrom, R.T. (2020). The effect of land use restrictions protecting endangered species on agricultural land values. *American journal of agricultural economics* 103 162 and Melstrom, R.T., Lee, K., and Byl, J. (2018). Do regulations to protect endangered species on private lands affect local employment? Evidence from the listing of the lesser prairie chicken, *Journal of agricultural and resource economics* 43: 346.

[71] Ando, A.W. and Langpap, C. (2018). The economics of species conservation. *Annual Review of Resource Economics* 10: 445.

private incentives under the law and the potential negative effects on the target species.[72] They examine the proximity of endangered red cockaded woodpecker nesting areas in North and South Carolina in encouraging economically premature timber harvests on private lands. The harvests eliminate old growth timber stands as potential habitat for the woodpecker. Providing habitat for a single woodpecker colony could cost up to $200,000 in foregone timber sales.

Lueck and Michael estimate that the observed private reduction in habitat led to the potential loss of between 21 and 67 red cockaded nesting colonies, close to the estimated 84 private land colonies already protected by the ESA. Zhang (2004, 160) found that the ESA made landowners 25 percent more likely to harvest forest if endangered red cockaded woodpeckers nested within a mile of their properties.[73]

All told within the rent-seeking framework outlined above, the ESA provides costly, perhaps limited public goods. Species are listed without cost or recovery consideration, and few have rebounded. Costs are imposed narrowly on landowners where most at-risk species are found, generating counter-productive efforts at preemptive habitat destruction. The law imposes other costs on urban and agricultural land uses. It is very unlikely that many ESA listings would pass any marginal economic cost/benefit calculation, which is not done. Moreover, depending on how species are valued and the discount rates used, given the very limited evidence of recovery, it is possible that the ESA would not generate aggregate benefits that exceeded costs.

IV. Rent-Seeking in Addressing the Race to Fish: Magnuson-Stevens Fishery Act (1976) 16 U.S.C. 1801 et seq.

Although there currently are incentive-based instruments as catch shares, for the first *twenty years* or so of the Magnuson-Stevens Act, regulation relied upon prescriptive harvest and equipment controls. The law never relied upon Pigouvian taxes. Initially under the law, fishers remained motivated by the race to fish, and within limited entry, made licensed vessels more powerful with more storage space. Overall, harvests did not decline, and fish stocks fell.

[72] Lueck, D. and Michael, J. (2003). Preemptive habitat destruction under the Endangered Species Act," *Journal of Law & Economics* 46 (1): 27-60; Zhang, D. (2004). Endangered species and timber harvesting: The case of Red-Cockaded Woodpeckers," *Economic Inquiry* 32: 150-165.

[73] See also Adler, J.H. (2008). Money or nothing: The adverse environmental consequences of uncompensated land use controls. *Faculty Publications. Case Western Reserve Law School Scholarly Commons.*

Regulators responded with additional constraints on net sizes, trawls, and fishing seasons, but harvests and economic returns continued to fall.[74]

The costs imposed by Magnuson-Stevens is illustrated by the experience of the Pacific Northwest halibut fishery of the US and Canada. The relevant data provided in Grafton et al. (2000) for the British Columbia fishery also apply to the US because the stocks were migratory and the fleets were similar, only partitioned by national ocean boundaries between the US and Canada. Limited licensing regulations implemented in Canada in 1980 allowed for a maximum of 435 vessels. There also were additional gear restrictions and minimum fish size rules. Although designed to enhance the stock, increases in biomass from regulation made entry and expansion within the limited licensing scheme even more attractive.[75]

After 1980, a fishing derby arose as fishers competed by adding vessels, crews, and times spent fishing. The number of vessels rose quickly from 333 in 1980 to the limit of 435 by 1988, when total harvest peaked at 12,859,562 pounds, up 128 percent from 1980. Older vessels were withdrawn, and were replaced by new, more efficient ones within the maximum. Pressure on the stock grew and stock assessments indicated sharp declines. Regulators were forced to take their only option of reducing the allowable season. By 1990 the season had shrunk to *6* days from 65 days. In the US portion of the fishery the season was *4* days in 1984.[76] For the remainder of the year, vessels, captains, and crews shifted to other fisheries, perhaps over exploiting them, or waiting idle, accruing capital and potential labor costs.

Moreover, the value of the harvest declined. With a very short fishing season, the catch had to be stored frozen for the rest of the year, denying consumers higher valued fresh fish.[77] Finally, beyond excessive fishing costs and reduced market value, there were lost gear, equipment conflicts, higher discard rates for non-target species, and increased hazards in fishing.

In face of a failure of quantity regulation across US fisheries, catch shares were finally implemented in 1990 and 1992, but only in three US fisheries. Further adoption was placed on

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[74] Johnson, R.N. and Libecap, G.D. (1982). Contracting problems and regulation: The case of the fishery. *The American Economic Review*, 72 (5): 1005-1022; Grafton, R.Q., Squires, D., and Fox K.J. (2000). Private property and economic efficiency: a study of a common-pool resource. *The Journal of Law and Economics, 43*(2), 679-714.

[75] Homans, F. and Wilen, J. (2005) Markets and rent dissipation in regulated open access fisheries *Journal of Environmental Economics and Management* 49 (2): 381-404.

[76] Karpoff, J.M. (1987, 191), Suboptimal controls in common resource management: The case of the fishery *Journal of Political Economy*, 95(1): 179-194.

[77] See also Huppert, D.W. (2005, 205-206). An overview of fishing rights. *Reviews in Fish Biology and Fisheries* 15:201–215.

hold in 1996 for *five* more years. Although there would have been transaction costs in assigning property rights in fisheries, the major factors affecting their design seemingly were political objectives to protect rents in traditional fishing operations and communities from entry by lower-cost fishing vessels.

Congressional hearings on the Reauthorization of the Magnuson-Stevens Act in 1995 and 1996 reveal constituent positions on the assignment of property rights.[78] Across various fishing regions, North Pacific, New England, MidAtlantic, and Gulf Coast, parties lobbied for preferential property rights assignments and the rents they provided. In general, larger commercial fishers favored tradable catch shares that could be consolidated. Smaller commercial and recreational fishers opposed them due to asserted harm to local practices. Environmental NGOs typically were against, concerned about biological targets that could be threatened by more efficient, larger vessels. Importantly, there also was philosophical opposition among academics to assigning a private property right to an ostensible public resource. [79] No party called for the negotiated setting of the TAC as would occur under Coase.

Ultimately, the 1996 reauthorization of Magnuson Stevens defined catch shares as narrow usufruct harvest permits that could be revoked at any time without compensation, and not be renewed: "shall not create, or be construed to create, any right, title or interest in or to any fish before the fish is harvested."[80] Transferability was limited to prevent vessel consolidation and generally to retain a small vessel, community-based fishery.[81] The use rights within fishing caps were complex. They included community development quotas, individual fisher quotas,

[78] S. 39, hearing on the reauthorization of the Magnuson Fishery Conservation and Management Act: hearing before the Subcommittee on Oceans and Fisheries of the Committee on Commerce, Science, and Transportation, United States Senate, One Hundred Fourth Congress, first session, March 4, 1995, Boston, Massachusetts; March 25, 1995, Anchorage, Alaska; May 13, 1995, New Orleans, Louisiana; July 15, 1995, Charleston, South Carolina.

[79] The position of one prominent group against a property rights regime is indicated in this statement: "ITQs [individual transferable quotas] are the creation of economists…. ITQs reduce the number of boats in the fleet and can increase unemployment… ITQs typically result in the fleet being concentrated… resulting in economic concentration and market power…. Perhaps most important, ITQs can lead to increases in social class distinctions and severe problems with equity and social justice." Acheson, J., Apollonio, S., and Wilson, J. (2015). Individual transferable quotas and conservation: a critical assessment. *Ecology and Society*, 20(4).

[80] 16 U.S.C. § 1853a(b), (16 USC as amended 110 Stat 3576-77. Courts held that fishing licenses and permits do not function as property protected by the Fifth Amendment Takings Clause. *American Pelagic Fishing Company v. U.S., 379 F.3d 1363.* For the benefits of property rights in fisheries and the nature of the actual privileges provided under Magnuson Stevens, see Fina, M. and Kade, T., (2012). Legal and policy implications of the perception of property rights in catch shares, *Washington Journal of Environmental Law and Policy* 2(2): 283-327.

[81] Lian, C., Singh, R., and Weninger, Q. (2009). Fleet restructuring, rent generation, and the design of individual fishing quota programs: Empirical evidence from the Pacific Coast Groundfish Fishery. *Marine Resource Economics*, 24: 329–359.

cooperative quotas, individual processor quotas, and individual transferable quotas. Community development quotas were granted to Western Alaska natives with little fishing experience to contract with actual fishers via annual leases. Cooperative fishing quotas were delegated to members, and generally short-term share transfers could only occur within the group. Individual fisher quotas and individual transferable quotas allowed for broader short- and long-term exchanges (leases and sales) but generally were subject to limitations. These included bounds on total vessel catch shares held, requirements for crew and onboard captain exchanges, and caps on total vessel capacities to promote smaller vessels. Processor fishing quotas were transferable, typically only among processors. [82]

Table I: US Fishery Property Rights

Region	Fishery	Catch Share Type*	Year Implemented	Separable, Divisible, and Transferrable?	Restrictions
North Pacific	Western Alaska Community Development Quota	CDQ	1992	N/A	Ownership traded within the community; 10% of total quota; individual shares can be expanded or revoked.
	Halibut and Sablefish	ITQ	1995	Yes, but limited	Individually allocated; revoked with inactivity;[83] quota shares within regulatory area and transferable only among same vessel class.[84]
	Bering Sea American Fisheries Act Pollock	Group Co-op	1999	Yes, but limited	Named vessels harvest within co-ops; shares not transferable across sectors.
	Bering Sea/ Aleutian King & Tanner Crab	ITQ/IPQ, can be Co-op	2005	Yes, but limited	Shares to owners/crew and processors; species/area specific shares; regional delivery; revokable if inactive; transfer requires prior experience[85].
	Bering Sea/Aleutian Non-pollock Groundfish Trawl	Individual within Co-op	2008	Restricted	Quota shares and transfers only to co-op members.[86].
	Freezer Longline Conservation Cooperative	Co-op	2010	Restricted	Shares/transfers only to co-op members.
	Central Gulf of Alaska Rockfish	Individual within Co-op	2012	Restricted	Co-op shares/transfers only to vessels within quota.
Pacific	Pacific Coast Fixed Gear Sablefish	ITQ	2001	Yes, but limited	Owner on board only; with individual quota.
	Pacific Coast Groundfish Trawl	Individual ITQ/Co-op	2011	Yes, but limited	Separate area shares; no transferability across inshore/at-sea sectors; aggregation limits.

[82] Holland, D.S., E. Thunberg, J. Agar, S. Crosson, C. Demarest, S. Kasperski, L. Perruso, E. Steiner, J. Stephen, A. Strelcheck, and M. Travis. (2015). US catch share markets: A review of data availability and impediments to transparent markets. *Marine Policy* 57:103–110.
[83] *50 CFR § 679.40 - Sablefish and halibut QS.* (n.d.). LII / Legal Information Institute. Retrieved January 23, 2024, from https://www.law.cornell.edu/cfr/text/50/679.40
[84] 7 Fed. Reg. 57130, 57136 (Dec. 3, 1992).
[85] *Fisheries of the Exclusive Economic Zone off Alaska; Bering Sea and Aleutian Islands Crab Rationalization Program; C Shares*. (2022, July 15). Federal Register. https://www.federalregister.gov/documents/2022/07/15/2022-15193/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-crab
[86] *50 CFR 679.41 -- Transfer of quota shares and IFQ.* (n.d.). Retrieved January 23, 2024, from https://www.ecfr.gov/current/title-50/part-679/section-679.41

New England	General Category Atlantic Scallops	ITQ	2010	Yes, but limited	Scallop vessel owners only; none across sectors; aggregation limits[87].
	Northeast Multispecies Groundfish	Individual within Co-op	2010	Restricted	Shares/transfers within co-op.
Mid-Atlantic	Surfclam and Ocean Quahog	ITQ	1990	Yes	Transfers from ITQ holders.[88] [89]
	Mid Atlantic Golden Tilefish	ITQ	2009	Yes	Aggregation limit.
South Atlantic	South Atlantic Wreckfish	ITQ	1992	Yes	Aggregation limit.
Gulf of Mexico	Red Snapper	ITQ	2007	Yes	Transfer within total individual quota.[90] [91]
	Grouper and Tilefish	ITQ	2010	Yes	Transfers within total individual quota.[92] [93]

Source : https://media.fisheries.noaa.gov/2023-09/FEUS-2020-final2-web-0.pdf; Holland et al (2015).

In light of regulatory restrictions and uncertainty, most U.S. catch share programs have very thin markets with high participation costs, undermining their efficiency.[94] There are economic consequences. Grainger and Costello (2014) compare dividend price ratios (lease price/sales price) for catch shares in the U.S., Canada, and New Zealand, and find that the ratios were significantly higher in the U.S. with riskier sales and more reliance upon leases, than in New Zealand where clearer property rights existed.[95] Fisheries remain relatively inefficient, and communities linked to them poorer than otherwise might have been the case.[96] Rent-seeking under Magnuson-Stevens has imposed high costs for conserving fishery stocks.

V. Rent-Seeking in Air Pollution Control: The Clean Air Act Amendments of 1970, 1977, and 1990 (42 U.S.C. §7401 et seq.).

[87] *Fishery Management Guide — Part 11: Limited Access Fisheries.* (n.d.). Retrieved January 2, 2024, from https://masglp.olemiss.edu/fisherymanagement/part11/
[88] Fisheries, N. (2023, May 30). *Atlantic Surfclam and Ocean Quahog | NOAA Fisheries.* NOAA. https://www.fisheries.noaa.gov/permit/atlantic-surfclam-and-ocean-quahog
[89] *Atlantic Surfclam and Ocean Quahog.* (2024, January 26). Mid-Atlantic Fishery Management Council. https://www.mafmc.org/scoq
[90] 50 C.F.R. § 622.21(a).
[91] *50 CFR § 622.21 - Individual fishing quota (IFQ) program for Gulf red snapper.* (n.d.). LII / Legal Information Institute. Retrieved January 2, 2024, from https://www.law.cornell.edu/cfr/text/50/622.21
[92] 50 C.F.R. § 622.21(a).
[93] *50 CFR § 622.21 - Individual fishing quota (IFQ) program for Gulf red snapper.* (n.d.). LII / Legal Information Institute. Retrieved January 2, 2024, from https://www.law.cornell.edu/cfr/text/50/622.21
[94] Holland et al (2015, 108-109)
[95] Grainger and Costello (2014) compare dividend price ratios (lease price/sales price) for weak fishery rights in the US and compare them with the secure property rights in New Zealand. Dividend price ratios are higher in the US as parties relied more upon short term leasing than sales. Grainger, C.A. and Costello, C.J. (2014). Capitalizing property rights insecurity in natural resource assets. *Journal of Environmental Economics and Management* 67 (2): 224-240.
[96] Sutherland, S.A. and Edwards, E.C. (2022). The impact of property rights to fish on remote communities in Alaska *Land Economics,* May 2022, 98 (2) 239-253.

The Clean Air Act Amendments of 1970, 1977, and 1990 are the principal air quality laws for the US.[97] As detailed by Stern (1982); McCubbins, Noll, and Weingast (1989); Dwyer (1995); Orford (2021); and Daniels et al (2022), the political process in the design and administration of the laws was a complicated one, involving lobbyists, the courts, and differently-motivated members of the House, the Senate, and the President.[98] There were distinct objectives driven by philosophical, health, economic, and re-election concerns.[99] Transaction cost reduction issues, however described, do not arise in the debates as prominent drivers of the legislation. Alternatively, the intricate debates over provisions of the law suggest high policy based transaction costs.

The Clean Air Act amendments addresses air pollution via National Ambient Air Quality Standards (NAAQS), State Implementation Plans (SIP), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPS). Key pollutants are carbon monoxide (CO), lead (Pb), particulate matter (PM), ozone (O3), nitrogen dioxide (NO2), and sulfur dioxide (SO2).

Amendments to the 1963 Clean Air Act in 1970, 1977, and 1990 along with judicial rulings authorized the EPA to set uniform national ambient air quality standards (quantities) and to regulate emissions for stationary, mobile, old, and new sources of hazardous air pollutants.[100] States were to draft state implementation plans (SIP) to meet the standards by December 31, 1975. Counties that met or exceeded them were deemed to be in attainment. Under prevention of significant air quality deterioration (PSD) restrictions, air quality above the NAAQS in attainment counties was not to be compromised by new sources of pollution, even if they posed no threat to ambient standards.[101] Counties deemed to be nonattainment were to be evaluated annually by the EPA as to progress in meeting the standards. Failure of states to draft plans for

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[97] Van Doren, P. and Firey, T.A. (2017), Regulation at 40, *Regulation* Spring, 34-36.

[98] Stern, A.C. (1982). History of air pollution legislation in the United States *Journal of the Air Pollution Control Association*, 32(1), 44-61; McCubbins, M., Noll, R.G., and Weingast, B.R. (1989). Political control of agencies. *Virginia Law Review* 75: 431-482; The practice of federalism under the Clean Air Act. *Maryland Law Review*, 54(4), 1183-1225; Orford, A.D. (2021). The Clean Air Act of 1963: Postwar environmental politics and the debate over federal power. *Hastings Environmental Law Journal* 27 (2), Article 2: 1-77; and Daniels, B., Follett, J.P., and Davis, J. (2020). The making of the Clean Air Act. *Hastings Law Journal*. 71 (4). Article 3. 901.

[99] Discussion of lobbying and exchanges with politicians is in Bombardini, M. and Trebbi, F. (2020). Empirical models of lobbying. *Annual Review of Economics.* 12:391-413. See also, Aces, A. (2024). Influence seeking in the federal bureaucracy: Do groups lobby or monitor policymakers? *Quarterly Journal of Political Science* 19(1): 27-52.

[100] Clean Air Act of 1963, Pub. L. 88-206, 77 Stat. 392 (1963).

[101] Maloney and McCormick (1982, 118-119).

reaching attainment would lead the agency to withhold a variety of federal funding sources for land use and transport, to ban permits for construction of plants that might generate new sources of pollutants, and to impose its own plan for attainment. The uniform air quality targets were set nationwide, based on epidemiological estimates and engineering integrated assessments. The NAAQS did not weigh variation in costs and benefits of pollution reduction across locations.

In fact, some regions might have desired lower air quality as a tradeoff for more economic growth. Daniels et al (2020, 924) indicate the implied differential weighing of costs and benefits across rich and poor counties if local populations could determine their own levels of regulation. In terms of the federal Clean Water Act with its prescribed national standards, the governor of Alabama, one of the nation's poorest states, apparently advertised in Indiana papers with a statement quoted by EPA Director Ruckelshaus: "'[b]ring your industry down here. It is okay with us if you pour some stuff in the river. We want jobs'".

Dwyer (1995, 1218) recognized the diversity of conditions in the US that would influence local tradeoffs in determining optimal regional air pollution levels and their regulation: "The Nation spans a continent, with an astonishing range of environmental conditions and problems. Differences in climate and weather (e.g., patterns of temperature, wind, rainfall, humidity), geography (e.g., deserts, mountains, plains, coastal regions), the relative importance of sources and types of pollution (e.g., cars, large utilities and factories, numerous small sources), environmental and public health risks (e.g., special need for visibility control, size of affected human population), and economic conditions confound attempts to have a successful, highly centralized regulatory program."[102] A rent-seeking explanation for the NAAQS and related provisions of the Clean Air Act, not transaction cost advantages is examined below.

The economics literature highlights benefits of the Clean Air Act through health improvements, related reduction in mortality, increases in worker productivity, as well as gains in property values from reduced emissions (Aldy et al. 2022, 183-185). Measures of aggregate benefits versus costs reveal considerable net overall gains in the provision of air quality public goods.[103] There is, however, is no ready mechanism or incentive among agents compared to Coase, for evaluating marginal costs and benefits throughout programmatic design and

[102] Dwyer, J. P. (1995). The practice of federalism under the clean air act. *Maryland Law Review*, 54(4), 1183-1225, 1195.

[103] EPA. *The Benefits and Costs of the Clean Air Act from 1990 to 2020 Final Report* – Rev. A U.S. Environmental Protection Agency Office of Air and Radiation April. 2-9.

application of the law. Regulatory Impact Analysis (RIA) was added in 1981 by Presidential Executive Order calling for examination of the effects of proposed policies that might have an estimated annual impact of $100 million or more (Aldy et al. 2022, 185). Regulatory costs generally are compliance and administrative costs. They do not obviously include the costs of displaced employment if plants close in nonattainment areas, or the opportunity costs in attainment regions imposed by Prevention of Significant Deterioration and New Source Review constraints on industrial migration to or expansion within them.

Prevention of Significant Deterioration (PSD) of Air Quality Standards under the Clean Air Act applied to all attainment and nonattainment areas (Revesz 2001, 576). PSD limited the ability of plants to relocate from nonattainment to attainment counties, an action that might have been a low-cost solution to NAAQS restrictions. Initially promulgated in the early 1970s by the EPA and formalized with the Clean Air Act Amendments of 1977, PSD rules were designed to reduce particulates, SO_2, and NO_x emissions, primarily from coal fired power plants and industrial firms. The issue was whether the PSD-mandated air qualities were to be applied to attainment regions where air qualities were already above national standards or just to nonattainment areas. A broad application of PSD was strongly supported by environmental organizations. When the EPA initially determined that Congress had not intended to impose PSD on regions with high air quality, the Sierra Club successfully sued, and the Supreme Court held that PSD applied to attainment counties as well.[104] Moreover, firms and unions located in nonattainment areas, along with their political representatives had reason to back broad application of PSD.

The 1977 amendments also introduced New Source Review (NSR), regulating new or modified sources of pollution in attainment counties that had not previously faced as much regulatory scrutiny. Along with PSD, NSR required that new or modified plants in attainment counties were to adopt the best available control technologies to hold air quality at existing high levels. In nonattainment counties, new or modified stationary sources of air pollution were required to adopt technologies with the lowest achievable emission rate and to offset emissions through acquisition of reductions by another facility. Markets emerged for offsets (Shapiro and

[104] *Sierra Club v. Ruckelshaus*, 344 F. Supp. 253 (D.D.C. 1972), aff'd per curiam by an equally divided Court sub nom. Fri v. Sierra Club, 412 U.S. 541 (1973). See McCubbins, Noll, and Weingast (1989, 452-453).

Walker 2024).[105] Regulatory costs receive comparatively less attention than mandated abatement.

Cost issues associated with the Clean Air Act were raised in 1976 when three coal fired power plants near St. Louis in a nonattainment area, petitioned the D.C. Circuit Court for relief, arguing that compliance was financially impossible. The DC Court and subsequently, the US Supreme Court dismissed requests for assistance based on costs. In *Union Electric v. EPA*, 427 US 246 (1976), the Supreme Court ruled that economic and technological infeasibility claims could not be considered in challenging state implementation plans approved by the EPA. Costs were not in the agency's approval criteria under the Clean Air Act. The Court's rationale was that Congress had intended strict compliance with the NAAQS, forcing industries to adopt pollution control technologies. The EPA's role was to consider whether State Implementation Plans met statutory criteria that did not include economic or technical feasibility.[106]

In 1997 the EPA revised upwards the NAAQS for particulates and ozone, and the American Trucking Associations, Inc., other private organizations, as well as the States of Michigan, Ohio, and West Virginia challenged the new standards. In *Whitman v. American Trucking*, 531 US 457 2001 the Supreme Court held that while the EPA had discretion in setting and implementing standards, it could not consider financial effects in doing so. The EPA was to assess whether or not SIPs met the NAAQS and not to define how the SIPs were to meet them.[107]

In another case, however, the EPA was directed to consider costs in deciding to regulate specific facilities. Regulation of mercury and arsenic emissions from certain coal and oil-fired steam-generating power plants under the 1990 Clean Air Act Amendments and the EPA's Air Toxic Rule was estimated to cost $9.6 billion per year. In 2000 the EPA determined that costs should not be considered in promulgating regulations if they were considered appropriate and necessary. Cost considerations were reserved for later in the regulatory process. A group of nonprofit organizations, corporations, and 23 states challenged EPA's conclusion. The US Circuit Court for the District of Columbia upheld the EPA in 2014, but upon appeal, the US

[105] Shapiro, J.S. and Walker, R. (2004). Is Air pollution regulation too lenient? Evidence from US offset markets. *NBER Working Paper 28199*, 2020, revised 2024.

[106] The Supreme Court held that that "Congress intended claims of economic and technological infeasibility to be wholly foreign to the Administrator's consideration of a state implementation plan," (*Union Elec. Co.*, 427 U.S. at 256). Quoted in Daniels et al (2020, 957).

[107] The US Supreme Court ruled in 2001 in *Whitman v American Trucking Associations Inc* (531 U.S. 457), that the Clean Air Act "unambiguously bars cost considerations from the [pollution limits]-setting process." States had considerable flexibility in defining how they met the NAAQS, and the instruments used in doing so.

Supreme Court reversed the decision. In *Michigan v. Environmental Protection Agency*, 576 U.S. 743 (2015) the court ruled that the EPA went beyond its delegated authority. [108] According to the court, the agency should have considered costs and benefits in determining whether the power plant regulation was appropriate and necessary, not after the regulatory decision was made.

Beyond judicial rulings on Clean Air Act costs, Greenstone (2002) finds that between 1972–1987 nonattainment counties, where regulations were most binding, lost approximately 590,000 jobs, $37 billion in capital stock, and $75 billion of output in pollution-intensive industries (1987 dollars).[109] Currie and Walker (2019, 15) point out that if a worker is unemployed for long periods of time and/or cannot find a comparable paying job in future years, the uncompensated transitional costs of finding new employment and in reallocating production may be large. Walker (2013) investigates the transitional costs of the 1990 Clean Air Act amendments for manufacturing workers due to a change in county level attainment status. He finds that workers in newly regulated plants lost $5.4 billion (in 1990 dollars) in earnings due to the amendments and that these costs were mostly accounted for by a combination of delay in finding a new job elsewhere and lower earnings in future positions.[110] The estimated losses for the average worker were equal to 20 percent of annual pre-regulatory earnings.[111]

The analysis of Shapiro and Walker (2024) suggests that the costs of additional pollution releases under the Clean Air Act Amendments of 1977 may have been less than the estimated benefits of higher air quality.[112] The law required that new or expanding plants in nonattainment areas purchase pollution-reduction offsets from existing facilities so that overall air quality was not compromised. They find that offset prices were less than the estimated benefits of improved air quality across areas of the country covered, except in Houston, the country's major petrochemical center. Firm expansion and additional employment and production levels that did *not* take place in light of offset requirements, however, are missing in the cost estimates. These

[108] Michigan, et al v. EPA, U.S. Circuit Court of Appeals for the D.C. Circuit, No 14-46 (04-15-2014).
[109] Greenstone, M. (2002). The impacts of environmental regulations on industrial activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures. *Journal of Political Economy* 110 (6): 1175-1219.
[110]Currie, J. and Walker, R. (2019, 3–26, 15-16); Walker, R. (2013). The transitional costs of sectoral reallocation: Evidence from the Clean Air Act and the workforce. *Quarterly Journal of Economics* 128 (4): 1787–835.
[111] The transition costs on displaced workers are addressed also by Autor, D., Dorn, D., Hanson, G., and Song, J. (2013) Trade Adjustment: Worker Level Evidence. *NBER Working Paper 19226.*
[112] Shapiro, J.S. and Walker, R. (2004). Is Air pollution regulation too lenient? Evidence from US offset markets. *NBER Working Paper 28199,* 2020, revised 2024.

opportunity costs of foregone and hence, unobserved economic activities would be relevant if the standards underlying the offset requirements were too restrictive.

Finally, Clay et al (2022) examined the costs of compliance for power plant utilities in nonattainment counties, and hence subject to more intense regulatory controls.[113] They find that power plant productivity fell by 16 percent. Costs were greatest for older vintage plants, where losses ranged from 38 to 58 percent. Annual total productivity losses were about $2.3 billion (2020 USD).

The distribution of costs and benefits under the Clean Air Act raise environmental justice concerns. Primarily, environmental justice has centered on air pollution hot spots where concentrations of pollutants disproportionately affect underserved, underrepresented populations of low socioeconomic status.[114]Environmental justice issues also arise in nonattainment areas where there have been plant closing and uncompensated employment losses. In attainment areas there may be fewer economic opportunities available to relevant populations due to restrictions from both PSD and NSR on plant relocation.

Rent-seeking through raising rival's costs and limiting entry could be an approach taken by certain industry representatives to explain provisions of the CAA (Revesz 2001, 575-577). There are relatively few empirical studies that examine this issue. One by Maloney and McCormick (1982, 118-119) examines changes in the profitability of established, polluting nonferrous smelting firms following judicial approval of PSD rules for attainment regions. The rulings potentially raised the costs for competitive entry by new smelters in those areas. They find positive profitability shifts for incumbent polluting firms under PSD, consistent with a rent-seeking hypothesis.[115] Nash and Revesz (2007, 1681-1696, 1707-1720) also describe how New Source Performance Standards, New Source Review, and Prevention of Significant Deterioration under the Clean Air Act Amendments of 1970 and 1977 served to grandfather benefits for incumbent firms and to inflict costs on potential competitors.[116] They argue that rules served to prolong the existence of older, dirtier facilities and distorted investment decisions to avoid

[113] See Clay, K. et al (2022, 33) for discussion of industry opposition.
[114] Revesz, R.L. (2022). Air Pollution and Environmental Justice. *Ecology Law Quarterly* 49: 187-252.
[115] McCubbins, Noll, and Weingast (1989, 452-453). See also Revesz (2001, 575-577) for similar rent-seeking arguments as motivation for PSD.
[116] Nash, J.R. and Revesz, R.L. (2007) Grandfathering and Environmental Regulation: The Law and Economics of New Source Review. *Northwestern University Law Review*101 (4): 1677-1733 for detailed analysis of the use of grandfathering and rent-seeking in the New Source Review provision in the administration of the Clean Air Act.

stringent new source reviews. Finally, Congressional voting patterns on the 1977 for PSD amendments to the Clean Air Act also are consistent with rent-seeking efforts to impose costs on regions where economic activity might move. Members of Congress from more urban, industrial Northeastern, MidAtlantic, and New England states voted for PSD, and those from more rural southern and western states that often were poorer, voted against.[117]

Another form of rent-seeking arises when advocates for maintaining high air quality in attainment areas secure their nonpecuniary preferences without having to bear much direct cost. For example, in opposition to marketable permit schemes under the Clean Air Act, a representative of the Natural Resources Defense Council and the National Clean Air Coalition asserted that "The pristine air quality in the West is a global treasure."[118]

A cap-and-trade system for national acid rain quantity control was added under the 1990 Clean Air Act amendments (Schmalensee and Stavins 2019). These were adopted thirty years after Coase and *twenty years* after the 1970 Clean Air Act amendments.[119] [120] Within SO_2 caps, tradable emission allowances were grandfathered to incumbent coal-fired electricity generating facilities. Grandfathering delivered rents to these units, whose owners would have had to pay for emission permits with auctioning. Across two phases, total SO_2 emission goals were met more rapidly and at lower cost than had been forecast.[121]

The California air emissions auction and trading program, AB 32, enacted in 2006, authorized tradable pollution permits within quantity caps. As an indication of rent-seeking in the political process, AB 32 has not been the state's only mechanism for addressing greenhouse

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[117] Pashigian, B. P. (1985). Environmental regulation: Whose self-interests are being protected? *Economic Inquiry* 23 (4): 551-74; see also Buchanan, J. M. and Tullock, G., (1975) Polluters' profits and political response: Direct controls versus taxes," *American Economic Review*, March: 139-47.

[118] Nash, J.R. and Revesz, R.L. (2001). Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants. *Ecological Law Quarterly* 28: 569-661, 591.

[119] As described by Anderson, T. L. and Libecap, G.D. (2014). *Environmental Markets: A Property Rights Approach*, 159-166, the SO_2 allowance market eventually collapsed as various subsequent regulatory interventions to meet a variety of objectives undermined the security and trade of the allowances. See also Schmalensee, R. and Stavins, R.N. (2013). The SO_2 allowance trading system: The ironic history of a grand policy experiment. *Journal of Economic Perspectives* 27(1): 103-22.

[120] Other incentive instruments under the CAA include the US Lead Phaseout in fuels, RECLAIM in the Los Angeles Basin, and Greenhouse gas emission reduction in California. Stavins (1998) argues that the 1990 shift to market-based instruments in the Clean Air Act was driven by support from the President, members of Congress, agency officials in the EPA, and certain environmental NGOs, such as EDF because of their efficiency potentials Stavins, R.N. (1998). What Can We Lean from the Grand Policy Experiment? Lessons from SO_2 Allowance Trading. *Journal of Economic Perspectives* 12 (3): 69-88.

[121] Nash and Revesz (2001, 584-586) and Aldy et al (2022, 194-195) the SO_2 program and RECLAIM. Regional Greenhouse Gas programs are detailed in https://www.rggi.org/.

gases and other pollutants. California has relied also upon political mandates to halt internal combustion vehicle sales (cars, trucks, SUVs) in the state by 2035, to restrict natural gas use in homes and businesses, to impose other clean energy regulations, and to require broad disclosure of emissions by all businesses. Nevertheless, the allowance auctions have raised some $3-$4 billion annually. A key efficiency element for auctions is that they be revenue neutral with revenues returned to taxpayers to reduce distortive taxes (Hahn and Noll 1982).[122] Otherwise a fund becomes attractive for political distribution of rents.[123] Although 35 percent of the Greenhouse Reduction Fund is to benefit lower income residents to make the program more equitable and revenue neutral, much of the rest is directed to politically-directed outlays, some of which are to subsidize risky new alternative energy technologies.[124]

VII. Concluding Remarks: Transaction Cost Reduction or Rent-Seeking in Mitigating Environmental Externalities.

This exercise examines why Coasean approaches with their potential efficiency benefits are absent as principal drivers in US environmental legislation and explores the resulting aggregate costs. Coase (1960) illustrated conceptually how property rights and decentralized market exchange could provide transaction cost efficiencies in externality mitigation. He provided a suggested policy framework, not an organizational agenda. In *The Problem of Social Cost*, he criticized standard approaches that he labeled as Pigouvian as potentially inefficient with solutions more costly on the margin than the problem. He recognized that transaction costs would affect the allocation of property rights and the extent of exchange. Coase asserted that case-by-case comparisons were required to determine the transaction costs and welfare advantages of decentralized versus centralized approaches.

The US environmental laws examined range from the narrow Endangered Species Act to focused fishery regulation under Magnuson-Stevens to the very broad Clean Air Act

[122] Hahn, R. and Noll, R. (1982). Designing a Market for Tradable Emissions Permits. In Magat, W.A. ed, *Reform of Environmental Regulation*. Brookings. 163-208.
[123] https://ww2.arb.ca.gov/our-work/programs/california-climate-investments/california-climate-investments-funded-programs. https://www.epa.gov/climate-change/climate-change-regulatory-actions-and-initiatives#:~:text=EPA's%20Clean%20Air%20Act%20protections,air%20pollutants%20such%20as%20benzene. Virtually none of the GHG control efforts involve tradable permits to equalize marginal reduction costs across sources.
[124] Carl, J. and Fedor, D. AB 32 Cap and Trade: An Energy Policy Essay for California's AB 32 Cap-and-Trade-and–Cash Back, not Cap-and-Trade-and-Tax. Shultz-Stephenson Task Force on Energy Policy www.hoover.org/taskforces/energy-policy 2014.

Amendments. As such, the investigation provides insight into the origins, benefits, and costs of overall environmental policies. Subsequent, limited use of incentive-based or market approaches has occurred within central quantity regulatory constraints. Taxes (prices) are not used despite efficiency arguments in the academic economics literature (Weitzman 1975, Costello and Kotchen 2022). The productivity advantages, economic welfare gains, and collaborate externality responses suggested by Coase have not been achieved.

Although higher transaction costs with Coase might explain an efficient resort to centralized regulation, there is no evidence such comparisons were made in adopting observed policies. Indeed, most externalities of concern when the laws were adopted were local, not transboundary. Transaction costs might have been relatively lower for addressing externalities in endangered species, ocean fisheries, or air pollution. Following Ostrom (1990), the number of parties involved in negotiation over mitigation property rights and exchange would have been lower with more similar objectives in pollution or extraction control than for much larger and more heterogeneous national constituencies in centralized regulation. Policy transaction costs plausibly may exceed those associated with decentralized abatement. Comparative transaction costs of the two approaches appear never to be examined in the economics or legal literatures in policy selection or evaluation.

The apparent reason for the dominance of prescriptive controls even in the presence of plausible higher transaction costs is the desire and ability of interest groups, politicians, and agency officials to advance their self-interests through rent-seeking, rather than through economic property rights and exchange. They capture resource rents via desired policies or preferential, non-tradable property rights at comparatively lower direct costs than a market approach would entail. Politicians and agency officials can secure re-election and regulatory mandates and budgets.

In general, an important lesson of Coase and the empirical record of the examined US environmental policies is that centralized political decision making, influenced by rent-seeking, leads to inefficient, costly, and inequitable provision of environmental public goods. This setting helps to explain why US environmental laws are politically controversial. Moreover, the discussion suggests that although transaction cost efficiencies mold institutional formation as suggested by Coase, Demsetz, and Williamson in the private sector, they are less critical in the policy arena where rent-seeking dominates.