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in Environmental Trading Markets**

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## Apples for Oranges: The Role of Currencies in Environmental Trading Markets

by James Salzman and J.B. Ruhl

### Introduction

Two major, integrally related trends define U.S. environmental law at the millennium. The first trend is to bring presently unregulated risks under the control of the regulatory system. The second trend . . . is toward bigger bubbles—toward broader and broader trading among pollutants and even among various types of risk reduction . . .<sup>1</sup>

**P**icture a playground where children trade environmental protection like baseball cards. The front sides bear slick images of endangered species, drops of acid rain, and vanishing habitats. The flip sides show all the statistics—population remaining, acreage consumed, who benefits from the wetlands, who is harmed by the pollution. And the kids sit huddled in an excited circle, busily swapping cards. To snag Jamie's prized cattail wetlands, Ben must part with his cherished saltwater marsh.

There are differences, of course, between this imaginary playground and a market in real environmental commodities. A "bad trade" in baseball cards is in the eyes of the beholder and, at worst, damages only a kid's pride. When parties trade environmental protection, though, what seems a good trade looking at the pictures may lose its appeal once we take a closer look at the statistics and the effects of the trade on the environment itself.

Over the last decade, there has been a sea change in environmental law and policy, marked by growing interest in market-based instruments of environmental protection. In particular, approaches that explicitly commodify environmental impacts by creating markets for their sale are on the rise. These environmental trading markets (ETMs) now operate in a range of regulatory settings where parties exchange credits to emit air pollutants, extract natural resources, and develop habitat.<sup>2</sup> In fact, every major environ-

mental policy review in the last five years has called for even greater use of ETMs.<sup>3</sup> Markets for environmental commodities represent the new wave of environmental protection and, despite critiques both subtle and shrill, they are still building.

ETMs have provided an enormously fertile area for scholarship. Articles have explored the mechanics of trading programs,<sup>4</sup> debated the advantages of trading over com-

at less cost. Assuming that compliance monitoring, information, and transaction costs are low, in theory a trading regime should be more efficient than regulatory standards when polluters have heterogeneous cost abatement schedules. Using pollution as an example, parties can gain emission credits by paying those with cheaper marginal abatement opportunities to reduce their pollution further as well as encouraging regulated entities to select among a range of compliance options. See, e.g., WILLIAM J. BAUMOL & WALLACE E. OATES, *THE THEORY OF ENVIRONMENTAL POLICY* 177-89 (2d ed. 1988) (arguing for marketable emission permits as an alternative to effluent fees).

3. The President's Council on Sustainable Development, a high-level stakeholder advisory group assembled by President William J. Clinton, produced a consensus report on the future direction of environmental policy. One of its key recommendations was to: "Make Greater Use of Market Forces. Sustainable development objectives must harness market forces through policy tools, such as emissions trading deposit/refund systems and tax and subsidy reform. This approach can substantially influence the behavior of firms, governments, and individuals." PRESIDENT'S COUNCIL ON SUSTAINABLE DEVELOPMENT, *SUSTAINABLE AMERICA: A NEW CONSENSUS FOR PROSPERITY, OPPORTUNITY, AND A HEALTHY ENVIRONMENT FOR THE FUTURE* 26 (1996).

The "Next Generation Project," sponsored by Yale with experts from academia such as Carol Rose and Don Elliott, also called for much greater use of market mechanisms such as ETMs. Marian R. Chertow & Daniel C. Esty, *Introduction to THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY* 11 (Marian R. Chertow & Daniel C. Esty eds., 1997); Robert Stavins & Bradley Whitehead, *Market-Based Environmental Policies*, *id.* at 105.

Enterprise for the Environment, a consensus panel bringing together influential environmental policy figures such as former EPA Administrators Bill Ruckelshaus and Bill Reilly, concluded that "[e]missions trading programs hold great promise as cost-effective methods for achieving environmental goals and encouraging technological innovation. Trading can be a useful policy tool with or without a cap on total emissions. . . . Greater use of this method could help solve a number of persistent environmental problems." ENTERPRISE FOR THE ENV'T, *THE ENVIRONMENTAL PROTECTION SYSTEM IN TRANSITION: TOWARD A MORE DESIRABLE FUTURE* 39 (1998).

While many policy recommendations have encouraged greater use of market instruments generally, it is worth noting that "when market-based systems are implemented, tradable permitting schemes generally prevail over alternatives such as emissions taxes." Jeffrey M. Hirsch, *Emissions Allowance Trading Under the Clean Air Act: A Model for Future Environmental Regulations?*, 7 N.Y.U. ENVTL. L.J. 352, 358 (1999) [hereinafter Hirsch]. This shows that, within the calls for greater use of market instruments, ETMs have been much more important than fees or taxes.

4. See, e.g., Robert W. Hahn & Roger G. Noll, *Environmental Markets in the Year 2000*, 3 J. RISK & UNCERTAINTY 351 (1990) (examining prospects for and design of marketable emissions permits); Tom Tietenberg, *Ethical Influences on the Evolution of the U.S. Tradable Permit Approach to Air Pollution Control*, 24 ECOLOGICAL ECON. 241, 243 (1998) [hereinafter Tietenberg I] (explaining how emissions reduction credits may be stored and spent).

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1. E. Donald Elliott & Gail Charnley, *Toward Bigger Bubbles*, F. FOR APPLIED RES. & PUB. POL'Y, Winter 1998, at 48 [hereinafter Elliott & Charnley].
2. First proposed in the 1960s, ETMs have been championed by legal and economics scholars as superior to traditional command-and-control regulatory approaches. Proponents claim that by allowing parties to weigh the marginal costs of actually reducing impacts against purchasing the rights of reduced impacts elsewhere, trading should provide the same or better environmental protection

mand-and-control regulation,<sup>5</sup> and, most recently, assessed the application of ETMs in the international sphere.<sup>6</sup> Within this wealth of literature, however, a basic aspect of trading has largely escaped attention. Perhaps because it is so obvious, there has been scant consideration of the simple question—*what is actually being traded?*

If one compares trading programs, they all seem to share a basic feature. The chlorofluorocarbon (CFC), fisheries, and proposed greenhouse gas ETMs, for example, all exchange commodities that appear to be fungible. One molecule of CFC, kilo of halibut, or ton of carbon dioxide (CO<sub>2</sub>) seems much the same as another, both in terms of identity and impact. It is trading apples for apples (or pork bellies for pork bellies). Thus ETMs are considered a type of commodity market, where environmental credits go to the highest bidder. And for good reason, since the Chicago Board of Trade now sells rights to emit sulfur dioxide (SO<sub>2</sub>) alongside pork bellies, orange juice, and grain futures.<sup>7</sup>

Indeed ETMs *must* assume fungibility—that the things exchanged are sufficiently similar in ways important to the goals of environmental protection—otherwise there would be no assurance that trading ensured environmental protection. While the precondition of fungibility may seem self-evident, this core assumption turns out to be more problematic than it first appears.

As an example of why fungibility matters, consider wetlands mitigation banking. This policy permits develop-

ers, once they have taken steps to avoid and minimize wetland loss, to compensate for wetlands that will be destroyed through development by ensuring the restoration of wetlands in another location.<sup>8</sup> The regulations mandate trades that ensure equivalent value and function between destroyed and restored wetlands. In practice most trades are valued in units of acreage. Within very loose guidelines, trades between productive (though soon to be destroyed) wetlands and restored wetlands are approved on an acre-for-acre basis. More sophisticated banks require ratios, trading development on one acre of productive wetlands for, say, restoration of four or five acres of wetlands somewhere else. Counting acres may make for easy accounting, but it is poor policy.

Why? The social value of the habitat is absent from the transaction. The ecosystem services provided by the wetlands—positive externalities such as water purification, groundwater recharge, and flood control—are largely ignored. Opinions may differ over the value of a wetland's scenic vista, but they are in universal accord over the contributions of clean water and flood control to social welfare.<sup>9</sup> Trading acres for acres provides an inadequate measure to capture what is really being traded of significance. To be sure, such a simple metric allows trades, but *other* important, unaccounted trade offs are occurring. The program can suffer from a lack of accountability (or, more accurately, a lack of countability).

In fact, upon close inspection, it turns out that *most* ETMs involve commodities and trades that exhibit a range of fungibilities. Legal trades can range from relatively straightforward kilos of surf clams to trades involving the exchange of different types of habitat (that may provide very different social benefits). To achieve the optimal outcome from ETMs, we need to understand and account much better for the qualities being traded. To do so requires careful consideration of the measure of exchange—the currency—since, in the final analysis, the currency forms the very basis of the transaction. The trading currency superficially makes the commodities fungible, determining what is being traded and, therefore, protected.

Many of the currencies employed by ETMs present trades of an acre of wetland here for an acre of wetland there, or a ton of emissions here for a ton there, as a basic exchange of apples for apples. In reality, though, this is a misleading description. More times than one might think, we are trading Macintoshes for Granny Smiths, apples for oranges, and, in some cases, apples for Buicks. Put simply, we can end up trading the wrong things.

5. See, e.g., Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1334 (1985) ("The current system does not in fact 'work' and its malfunctions . . . will become progressively more serious . . ."); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171, 172 (1988) [hereinafter Ackerman & Stewart, *Democratic Case*] ("A reform relying on market incentives is just plain better, in terms of all relevant public values, than the status quo."); Richard B. Stewart, *Models for Environmental Regulation: Central Planning Versus Market-Based Approaches*, 19 B.C. ENVTL. AFF. L. REV. 547 (1992) (arguing for the use of market-based incentives rather than command-and-control regulation); see also DALLAS BURTRAW, COST SAVINGS, MARKET PERFORMANCE, AND ECONOMIC BENEFITS OF THE U.S. ACID RAIN PROGRAM (Resources for the Future Discussion Paper No. 98-28-REV, 1988) (arguing that the acid rain program has induced innovation); Byron Swift, *The Acid Rain Test*, ENVTL. F., May/June 1997, at 16 (arguing that the acid rain program has allowed utilities to take advantage of cost-saving opportunities). But see David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command-and-Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289 (1998) [hereinafter Driesen I] (arguing that trading offers few advantages compared to traditional permitting); Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 STAN. ENVTL. L.J. 300 (1995) [hereinafter Heinzerling] (arguing that emissions trading does not promote democratic deliberation).
6. See, e.g., David M. Driesen, *Choosing Environmental Instruments in a Transnational Context*, 27 ECOLOGY L.Q. 1 (2000) (examining international allowance trading); David M. Driesen, *Free Lunch or Cheap Fix?: The Emissions Trading Idea and the Climate Change Convention*, 26 B.C. ENVTL. AFF. L. REV. 1 (1998) [hereinafter Driesen II] (suggesting limits to international emissions trading programs); Jonathan B. Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 798 (1999) [hereinafter Wiener] ("Global environmental protection should, therefore, presumptively favor quantity-based tradeable allowances, unless other policy attributes . . . persuasively overcome the presumptive advantage . . .").
7. See *Implementation of the Acid Rain Provisions of the Clean Air Act Amendments of 1990: Hearings Before the Subcomm. on Clean Air and Nuclear Regulation of the Comm. on Env't and Public Works*, 103d Cong. 23-25 (1993) (statement of Patrick Arbor, Chairman, Chicago Board of Trade).

8. This example is explored in detail in Part III.A.

9. "Processes which occur in wetlands (plant production, bacterial decomposition, nutrient recycling, etc.) . . . contribute to functions in the landscape that have ecological significance (i.e., trapping nutrients and sediments, supporting bird and mammal populations, etc.). From these functions, one can derive values that have social significance." *The Status of Wetlands Science: Hearings Before the Subcomm. on Env't. Protection of the Senate Comm. on Env't and Public Works*, 102d Cong. 36 (1991) (statement of Mark M. Brinson), quoted in Virginia C. Veltman, *Banking on the Future of Wetlands Using Federal Law*, 89 NW. U. L. REV. 654, 655 (1995) [hereinafter Veltman]; see also Katherine C. Ewel, *Water Quality Improvement by Wetlands*, in NATURE'S SERVICES 329-44 (Gretchen C. Daily ed., 1997) (explaining the services provided by wetlands); Oliver A. Houck, *Land Loss in Coastal Louisiana: Causes, Consequences, and Remedies*, 58 TUL. L. REV. 3, 78-80 (1983) (describing studies that value the water purification service of Barataria Basin wetlands at \$5.6 to \$23.6 million per year).



Within the vast literature on ETMs, important and insightful work has explored the related issues of hot spots and the nature of tradable rights,<sup>10</sup> but none has focused explicitly on the central role that currency selection plays in the structure and effectiveness of ETMs.<sup>11</sup> In this Article, we reconceptualize the debate whether ETMs promote environmental protection and social welfare. By exploring efforts to promote nonfungible trading—trading environmental apples for oranges—we undertake a rigorous examination of environmental commodities and the currencies we use to trade them. We argue that nonfungibilities and currencies drive the structure of ETMs, directly influencing their construction, rules of exchange, and provision for public participation. In short, we contend that a more complete understanding of the root issues of commodity and currency provides a previously unaided and strong foundation to understand better the potential and design of ETMs.

By breaking down the problem of ensuring environmental protection in the face of nonfungibilities, we create an analytical framework that can inform the assessment of any ETM. The structure flows from three distinct stages of an ETM's operation. *Currency adequacy* involves selection of the currency unit—can the metric capture the significant values exchanged or do some important features remain external to the trades? Part I of the Article sets out the theoretical issues underlying a currency's adequacy, including the metric of exchange and the persistent inability of many ETMs to account for nonfungibilities. Part II explores the construction of the exchange market, known as exchange adequacy, and how regulators in the environmental market must compensate for the inadequacy of currencies. Parts III

and IV focus on habitat ETMs, where the latent nonfungibilities found in all trading markets are greatly exacerbated. Part III applies the model developed in Parts I and II to a case study of major habitat ETM-wetlands mitigation banking.

Part IV examines the institutional mechanisms for reviewing trades known as review adequacy. We argue that when currency and exchange adequacy are not ensured, the model of exchange transforms from a commodity market to a barter market, from anonymous trading of generic commodities to individuals haggling over goods and services with unique attributes. In this setting, to what extent should we be willing to let owners of nonfungible environmental features strike deals which the rest of us cannot evaluate through any common medium of exchange and which many of us might not strike? Put more generally, who should determine the equivalency of such trades?

The rise of nonfungible trades creates significant concerns over protecting public interests. Our discussion explores measures that regulators can take to "police" ETMs when the combination of inadequate currencies and inadequate exchange procedures leaves the door open to trades that lead to a loss of social welfare. Breaking from what has effectively become a passive *ex ante* model for trade approval in most ETMs, we call for greater use of *ex post* approval measures, in part to ensure meaningful valuation of the public goods exchanged and in part to counteract the agencies' and trading parties' institutional biases to encourage nonfungible trades. We further argue that it is inappropriate to continue to use the conventional environmental permitting process to carry out nonfungible trades. In exploring this challenge, we analyze options for new institutional designs of a "permit-plus" system for habitat and similar ETMs.

ETMs can provide, and have provided, an important policy tool to achieve effective, efficient environmental protection. As a result, support for the use of ETMs to achieve environmental protection will surely continue to grow. Increased trading, however, necessarily requires application in an even broader spectrum of environmental contexts.<sup>12</sup> The best settings for ETMs—where currencies serve as effective proxies for environmental values, markets are rich with supply and diversity, and policing is straightforward—have largely been developed.<sup>13</sup> As trading programs

10. Anyone familiar with air pollutant trading is familiar with the hot spots issue—where the effects of pollution are concentrated in a small geographic area. As a result, nitrous oxides and aromatic hydrocarbon molecules aren't completely fungible because the marginal impacts of emission depend on where (and when) they're emitted. In programs that trade habitat, the problem of nonfungibility becomes even more accentuated because the parcels have unique landscape characteristics. For examples of hot spots scholarship, see Hirsch, *supra* note 3, at 373-75, 393 (discussing the hot spots issue in the SO<sub>2</sub> trading program); Stephen M. Johnson, *Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?*, 56 WASH. & LEE L. REV. 111, 129 (1999) [hereinafter Johnson] (explaining environmental justice scholarship on hot spots); Robert Mendelsohn, *Regulating Heterogeneous Emissions*, 13 J. ENVTL. ECON. & MGMT. 301 (1986) [hereinafter Mendelsohn] (discussing the heterogeneity of emissions); Tietenberg I, *supra* note 4.

The nature of the property right is clearly related to the currency; it explains what you can do and fundamentally determines the right's value, but the currency serves as the actual medium of exchange. See Robert Hahn, *Trade Offs in Designing Markets With Multiple Objectives*, 13 J. ENVTL. ECON. & MGMT. 1, 1-6 (1986) [hereinafter Hahn I] (examining how to define an emissions permit); Carol Rose, *Property in the Global Environmental Commons: Comparing Newfangled Tradable Allowances to Old-fashioned Common Property Regimes*, 10 DUKE ENVTL. L. & POL'Y F. 45 (1999) [hereinafter Rose]; Richard B. Stewart, *Economics, Environment, and the Limits of Legal Control*, 9 HARV. ENVTL. L. REV. 1, 16 (1985) [hereinafter Stewart] (describing an ETM's need for a quantifiable common measure of pollution, environmental degradation, or risk).

11. A number of articles on specific ETMs have pointed out the importance of currencies, but none have analyzed how they are determined and their central role in determining the ultimate structure and operation of the ETM. See, e.g., ENVIRONMENTAL LAW INST. (ELI), WETLAND MITIGATION BANKING 77-94 (1993) [hereinafter ELI-WETLAND] (examining the definition of credits in wetland mitigation banking); Royal C. Gardner, *Banking on Entrepreneurs: Wetlands, Mitigation Banking, and Takings*, 81 IOWA L. REV. 527, 531 (1996) [hereinafter Gardner I] (discussing the value of mitigation credits).

12. See generally Elliott & Charnley, *supra* note 1, at 48 (identifying a trend toward broader trading among pollutants and types of risk reduction); J.B. Ruhl, *Biodiversity Conservation and the Ever-Expanding Web of Federal Laws Regulating Nonfederal Lands: Time for Something Completely Different?*, 66 U. COLO. L. REV. 555, 661-69 (1995) (suggesting a free-standing statute for biodiversity conservation); David Sohn & Madeline Cohen, *From Smokestacks to Species: Extending the Tradable Permit Approach From Air Pollution to Habitat Conservation*, 15 STAN. ENVTL. L.J. 405, 450-51 (1996) [hereinafter Sohn & Cohen] ("Ultimately, implementing a well-designed market scheme may provide a mechanism for ongoing habitat conservation and land-use management that can survive independent of the ESA's fate."). The Framework Convention on Climate Change and subsequent Kyoto Protocol's provisions for joint implementation and the Clean Development Mechanism may create the possibility for a range of innovative trades of greenhouse gases and sequestration projects. See Wiener, *supra* note 6, at 710-13.

13. As Bill Pedersen describes, "trading is best suited to broad environmental problems where the same emissions have about the same effect everywhere, where the 'pollutant' being traded is relatively easy to measure, and where the market is restricted to a limited number of large sources that can bear the transaction costs." William F.



continue to move into settings in which environmental commodities are increasingly heterogeneous, currency, exchange, and review adequacy will become increasingly difficult to satisfy. This Article explains why. More important, it explores the basic challenges of program design in the face of nonfungibilities that ETM proponents have neither fully addressed nor, in some cases, considered.

## I. Currency Adequacy: Selection of the Currency Instrument

### A. The Mechanics of Marketable Permits

Before examining currency selection within ETMs, it is worthwhile to set out their basic operation. Dating from the first trading program in 1974, ETMs have reduced emissions of a wide range of pollutants,<sup>14</sup> managed fisheries and lobster harvests,<sup>15</sup> and channeled habitat development.<sup>16</sup>

Pedersen Jr., *The Limits of Market-Based Approaches to Environmental Protection*, 24 ELR 10173, 10174 (Apr. 1994) [hereinafter Pedersen]; see also Jaime Larmann, *Comparing Apples to Oranges? EPA Faces Difficulties in Bringing to Fruition an Emissions Trading Program for NO<sub>x</sub>*, 6 ENVTL. LAW. 603 (2000).

14. EPA has implemented trading markets for acid rain, codified as amended at 42 U.S.C. §§7401-7671(q), ELR STAT. CAA §§101-618 (Clean Air Act), CFCs, 40 C.F.R. §§82.5, 82.12 (2000), auto fuel efficiency standards, 15 U.S.C. §§2002, 2003 (repealed), leaded gasoline, 40 C.F.R. §80.20(d) (repealed), and other pollutants. Most emissions trading under the CAA has been in the form of netting, offsets, and bubbles. See, e.g., Robert W. Hahn & Gordon L. Hester, *Marketable Permits: Lessons for Theory and Practice*, 16 ECOLOGY L.Q. 361, 368-76 (1989) [hereinafter Hahn & Hester, *Marketable Permits*] (describing these practices and their performance); Robert W. Hahn & Gordon L. Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 YALE J. ON REG. 109 (1989) [hereinafter Hahn & Hester, *Where Did All the Markets Go?*] (describing offsets, bubbles, and netting in ETMs); James T.B. Tripp & Daniel J. Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 YALE J. ON REG. 369, 385-86 (1989) (describing some of the problems with EPA's bubble policy). EPA endorsed the use of ETMs in its 1986 emissions policy trading statement. General Principles for Creation, Banking, and Use of Emission Reduction Credits, 51 Fed. Reg. 43814 (Dec. 4, 1986) (emissions trading policy statement). The CAA and its 1990 Amendments provided further authority for EPA and states to control air pollution through tradable allowances. 42 U.S.C. §§7401-7671(q), ELR STAT. CAA §§101-618. California has created trading programs for nitrogen oxides (NO<sub>x</sub>), sulfur oxides, and volatile organic compounds (VOCs). See Matthew Polesetsky, *Will a Market in Air Pollution Clean the Nation's Dirtiest Air? A Study of the South Coast Air Quality Management District's Regional Clean Air Incentives Market*, 22 ECOLOGY L.Q. 359 (1995) (examining the marketable permit program in the Los Angeles Air Basin). Trading markets have also been created to address international environmental problems. The Montreal Protocol permits trading of production rights among member countries and within regional economic integration organizations. Montreal Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, arts. 2(5), 2(8), 26 I.L.M. 1550, 1553 (entered into force Jan. 1, 1989) [hereinafter Montreal Protocol].

While less common than markets for air pollutants, several states have created markets to control point and nonpoint source water pollution. See generally Hahn & Hester, *Marketable Permits*, *supra* note 14, at 391-96 (describing trading of water pollution rights in Wisconsin).

15. Individual transferable quotas (ITQs) have become a common management tool for fisheries in Canada, Iceland, New Zealand, and other countries. See Kirsten M. Batkin, *New Zealand's Quota Management System: A Solution to the U.S. Federal Fisheries Management Crisis?*, 36 NAT. RESOURCES J. 615, 626-31 (1996); Shi-Ling Hsu & James E. Wilen, *Ecosystem Management and the 1996 Sustainable Fisheries Act*, 24 ECOLOGY L.Q. 799 (1997); Alison Rieser, *Prescriptions for the Commons: Environmental Scholarship and the Fishing Quotas Debate*, 23 HARV. ENVTL. L. REV. 393 (1999); Alison Rieser, *Property Rights and Ecosystem Management in U.S. Fisheries: Contracting for the Commons?*, 24 ECOLOGY L.Q. 813 (1997).

Despite the myriad of ETMs and the many differences among them, their basic structure is simple.<sup>17</sup> The basis for trading environmental commodities is a regulatory prescription of behavior followed by regulatory permission of the behavior under controlled conditions.<sup>18</sup> In establishing a market, the government first creates a new form of property—legal entitlements to emit pollutants, catch fish, develop habitat—and then imposes a set of rules governing their exchange.<sup>19</sup> In the typical “cap-and-trade program” for pollution, policymakers establish a socially desirable level of aggregate emissions for a given pollutant. Regulators then determine a formula for initial allocation of emissions among sources and issue permits to members of the regulated community that entitle each bearer to emit a given quantity of that pollutant. In sum, the total quantity of emissions allowed by those permits should equal the aggregate level set by policymakers. Similarly, in the context of scarce natural resources, permits cap the bearer’s right to take a specified amount of the resource and the total quantity of permits is equal to the aggregate extraction or harvest level set by policymakers. All trading programs, therefore, take place within carefully constructed markets. Absent legal restrictions on pollutant emissions, fish landings, or wetlands development, and the creation of alienable entitlements to these activities, few if any trades would take place.

In practice, permits are exchanged through three types of trades. Air pollutant trades typically take place when the government allocates or sells transferable credits to A to pollute (see Figure 1). Once A has a credit, A can use it or sell it to B. B may then use the credit to pollute. In environmental terms, the benefit of A’s foregone impact is traded for B’s impact somewhere else.<sup>20</sup>

16. Tradable development right (TDR) programs have enabled local and state governments to direct development in order to protect landmarks and conserve open space and other sensitive areas. See, e.g., Robert M.L. Bellandi & Robert D. Hennigan, *The Why and How of Transferable Development Rights*, 2 REAL EST. REV. 60 (1977); Arik Levinson, *Why Oppose TDRs?: Transferable Development Rights Can Increase Overall Development*, 27 REGIONAL SCI. & URB. ECON. 283 (1997); James T.B. Tripp & Daniel J. Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 YALE J. ON REG. 369, 378-82 (1989); *Development Rights Transfer in New York City*, 82 YALE L.J. 338 (1972).
17. See generally Richard E. Ayres, *Developing a Market in Emission Credits Incrementally: An “Open Market” Paradigm for Market-Based Pollution Control*, 25 Env’t Rep. (BNA) 1522 (Dec. 2, 1994) (describing the differences between open market, hybrid command-and-control, and closed market systems).
18. See ELI-WETLAND, *supra* note 11, at 7 (“Demand for compensatory [wetland] mitigation exists only because it is a government-imposed condition on wetland development.”); Royal C. Gardner, *Federal Wetland Mitigation Banking Guidance: Missed Opportunities*, 26 ELR 10075, 10077 (Feb. 1996) (“[U]nlike typical markets, regulatory agencies control both the supply of and demand for [wetlands] mitigation.”) [hereinafter Gardner II].
19. David Driesen argues that the usual description of ETMs creating a legal “right” to pollute or destroy is inaccurate since holders of these rights may still face common-law liability for pollution damages, absent preemption (and the acid rain program specifically states that no property right is created, 42 U.S.C. §7651b(f), ELR STAT. CAA §§403(f)). He describes ETMs as “allowing evasion of imposed limits in exchange for compensating improvements elsewhere. Overcompliance by some actors is traded for undercompliance by others.” Interview with David Driesen, Assistant Professor, Syracuse University College of Law (Dec. 16, 1999).
20. It is assumed that the avoided environmental cost by A not causing an impact is equal to or greater than the cost of B’s impact. The same structure is used for many fishery ETMs.

Figure 1

## Traditional "Cap-and-Trade" ETM

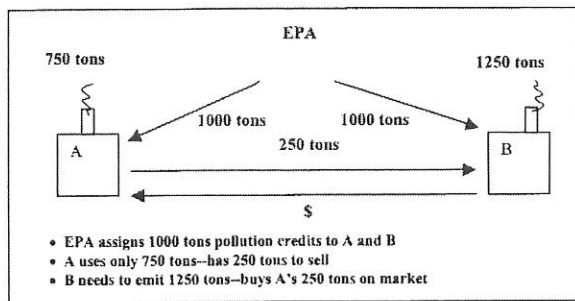


Figure 2

## Wetlands Mitigation Banking ETM

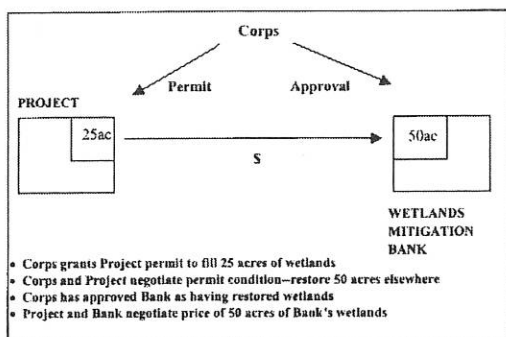
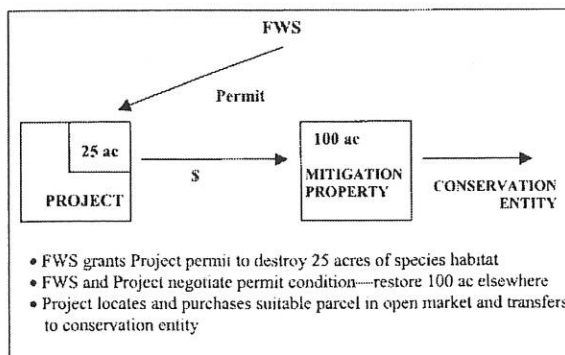


Figure 3

## Habitat Mitigation As Permit Condition



Proponents of trading programs argue that such arrangements increase efficiencies. In the case of air pollutant trades, for example, by letting the market rather than regulators determine individual actors' impacts, profit-motivated agents who can control pollution at low cost will reduce more emissions than needed to comply with permit limits. They can then sell surplus allowances at a profit to higher cost agents. Thus, the greatest share of reductions will come from agents who can do so at the cheapest cost, allowing each polluter to weigh the marginal cost of abatement against the cost of buying credits and make an efficient individual decision. If the cap is set appropriately, marketable

permits achieve the same level of protection as command-and-control alternatives at a lower cost.<sup>21</sup> Such a process, trading supporters argue, should also be more democratic than traditional command-and-control regulations because it forces regulators and elected officials to deliberately consider environmental goals and to discuss explicitly the appropriate level of pollution.<sup>22</sup> The net result thereby delegates power from the government to actors held accountable in the marketplace, allowing the regulated community to select appropriate control strategies and encouraging innovative practices and technologies.<sup>23</sup>

The trading scheme challenged in the classic *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*<sup>24</sup> case presents a case in point. Bubbling allowed the regulated facility to allocate emissions within its bubble (a form of internal trading) to maximize efficient production while meeting the emissions cap.<sup>25</sup> The acid rain trading program has also been regarded as a success story. Trading of allowances has been very active, and as a result, facilities have overcomplied with the reduction requirements. In 1995, utilities emitted 40% less SO<sub>2</sub> than permitted.<sup>26</sup> Economists estimate the compliance costs to achieve such reductions were up to 40% lower than would have been the case under the existing command-and-control requirements.<sup>27</sup>

These enthusiastic claims have not gone unchallenged, however. Recent scholarship has contended that in many cases trading has not delivered the same or better protection at less cost, and has proven overly complex to administer and enforce.<sup>28</sup> Strong normative critiques contend that trad-

- ETMs can thus promote increased production efficiency (similar levels of protection as command-and-control but at less cost) and allocational efficiency (best distribution of costs). See Vivien Foster & Robert W. Hahn, *Designing More Efficient Markets: Lessons From Los Angeles Smog Control*, 38 J.L. & ECON. 19, 21 (1995) (estimating savings from the ETM in Los Angeles); Don Fullerton et al., *Sulfur Dioxide Compliance of a Regulated Utility*, 34 J. ENVTL. ECON. & MGMT. 32 (1997) (showing that regulatory rules can double the cost of compliance). In 1997, EPA estimated that 5.1 million allowances were traded on private markets. Hirsch, *supra* note 3, at 387-88.
- Ackerman & Stewart, *Democratic Case*, *supra* note 5, at 172 ("A reform relying on market incentives is just plain better, in terms of all relevant public values, than the status quo."). But see Driesen I, *supra* note 5, at 329; Heinzerling, *supra* note 5, at 343 ("[I]n deciding whether to adopt a trading program . . . 'democracy' cannot be counted on the side of pollution trading.").
- Daniel J. Dudek & John Palmisano, *Emissions Trading: Why Is This Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 219 (1988) ("The bottom line is that the successes of emissions trading cannot be denied."); Robert W. Hahn, *Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders*, 3 J. ECON. PERSP. 95, 96 (1989) [hereinafter Hahn II] ("One instrument which has been shown to supply the appropriate incentives . . . is marketable permits.").
- 467 U.S. 837, 14 ELR 20507 (1984).
- Elliott & Charnley, *supra* note 1, at 49. Bubbling refers to the practice of treating multiple sources of air pollution at a single site as if they were covered underneath a large bubble, i.e., as a single source.
- Dallas Burtraw & Byron Swift, *A New Standard of Performance: An Analysis of the Clean Air Act's Acid Rain Program*, 26 ELR 10411 (Aug. 1996) [hereinafter Burtraw & Swift].
- Id.*; Richard Schmalensee et al., *An Interim Evaluation of Sulfur Dioxide Emissions Trading*, 12 J. ECON. PERSP. 53, 64 (1998) (estimating savings between \$225 and \$375 million per year).
- See, e.g., Daniel H. Cole & Peter Z. Grossman, *When Is Command-and-Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection*, 1999 WIS. L. REV. 887 (arguing the benefits of command-and-control regulations); Driesen I, *supra* note 5, at 311-22 (assessing the performance of bubbling and the lead and acid



ing programs legitimize pollution, weakening the environment's special claim to public protection.<sup>29</sup> And both environmental justice and economics scholarship clearly recognize that certain air pollutant trading may lead to hot spots and distributional inequities.<sup>30</sup>

The respective merits of ETMs versus command-and-control regulation, while an extremely important debate, lies beyond the scope of this Article. In practical terms, there is undeniably strong and growing support for increased use of ETMs to achieve environmental protection. Assuming that trading will continue, what are the implications of trading nonfungible commodities?

### B. Measures of Exchange

The basic goal in any trading system is to move toward a pareto-efficient outcome, allowing sufficient exchanges such that each party reaches a point where it is worse off by engaging in further trades. The key question, though, is how can "worse off" be measured?<sup>31</sup> Whether we can confidently trade x for y depends on what we are trying to maximize and on our standard of measurement. And that turns on the currency of exchange.<sup>32</sup>

Unfortunately, environmental law lacks a common unit of exchange. We tend to think of environmental protection simply in terms of reducing physical impacts on the environment—less pollution and less development means more protection. Most observers, though (and most of our laws), value environmental protection through the anthropocentric view—that is, how those reduced impacts directly relate to human quality of life, whether that be reduced health risks, clearing the haze in the Grand Canyon, or conserving

rain ETMs); Ann Powers, *Reducing Nitrogen Pollution on Long Island Sound: Is There a Place for Pollutant Trading?*, 23 COLUM. J. ENVTL. L. 137, 140-41 (1998) [hereinafter Powers] (listing problems to date of ETMs' thinness, high transaction costs, and uncertainty over security of property rights).

It is important to note that many of these critiques have come from strong proponents of trading. Dudek and Hahn are big supporters of trading but they have also been leading critics of some trading programs in practice. See, e.g., Dudek & Palmisano, *supra* note 23, at 241 (noting industry's hesitation to trade); Alex Farrell et al., *The NO<sub>x</sub> Budget: Market-Based Control of Tropospheric Ozone in the Northeastern United States*, 21 RESOURCE & ENERGY ECON. 103, 112 (1999) (showing sources of uncertainty and potential problems with the NO<sub>x</sub> ETM); Hahn II, *supra* note 23, at 98-101 (describing performance of ETMs).

29. STEVEN KELMAN, *WHAT PRICE INCENTIVES?: ECONOMISTS AND THE ENVIRONMENT* (1981) (discussing ethical concerns with trading pollution rights); see also Cass R. Sunstein, *On the Expressive Function of Law*, 144 U. PA. L. REV. 2021 (1996) (examining the function of law in "making statements"); Tietenberg I, *supra* note 4, at 253 ("The environmental community . . . argued that the air belongs to the people and it, as a matter of ethics, should not become private property."). Commensurability issues are discussed *infra* note 64.
30. See, e.g., Eileen Gauna, *Federal Environmental Citizen Provisions: Obstacles and Incentives on the Road to Environmental Justice*, 22 ECOLOGY L.Q. 1, 72-74 (1995) (discussing environmental justice issues); Tom Tietenberg, *Tradable Permits for Pollution Control When Emission Location Matters: What Have We Learned?*, 5 ENVTL. & RESOURCE ECON. 95 (1995) [hereinafter Tietenberg II].
31. And worse off for whom? If the two trading parties are better off but third-party interests are ignored, the trade may well end up being pareto-inferior.
32. We use the term, "currency," to refer to the denomination of the exchange, the measurement metric. Thus the currency of money would be dollars, not the dollar bills themselves. In the acid rain trading program, the currency would be tons of sulfur, not the actual allowance stating this.

biodiversity.<sup>33</sup> From this vantage, the ideal currency would likely be a measure of social value. In the context of trades among greenhouse gases, the ideal unit would be marginal cost to society from the emission's contribution to climate change. However, such measures of utility cannot be calculated with any certainty so we rely on a proxy—in this case the emission's global warming potential.<sup>34</sup>

Indeed, environmental law relies almost entirely on proxy measures. In the case of power plant emissions, for example, what we care about is the environmental and consequential social impact of acid deposition, but we do not regulate or trade units of acid rain impact. Instead we use the proxy of tons of sulfur emitted, which is assumed to be a sufficient indicator of potential impact on social welfare.<sup>35</sup> Regulating at the source of emission is less environmentally meaningful than at the point of impact, the receptor, but cost and technological constraints force our hand.<sup>36</sup> Hence, if our

33. We appreciate that this is explicitly an anthropocentric approach, quite at odds with deep ecology or land ethic norms, but we believe it describes accurately the perspective of most citizens. It certainly explains the broad resonance we find when teaching Bill Baxter's classic utilitarian argument of "people or penguins" in our environmental law classes. WILLIAM F. BAXTER, *PEOPLE OR PENGUINS: THE CASE FOR OPTIMAL POLLUTION* (1974); see also Barton H. Thompson Jr., *People or Prairie Chickens: The Uncertain Search for Optimal Biodiversity*, 51 STAN. L. REV. 1127, 1127-30 (1999) (describing the continuing relevance and influence of Baxter's book). Indeed with the exception of the Endangered Species Act (ESA), the Marine Mammal Protection Act, and minor provisions of other statutes, the fact that our environmental laws take an anthropocentric perspective, focusing on protection of human health and the human environment, seems an unobjectionable description.
34. Global warming potential is a measure that compares different greenhouse gases' relative contribution to global warming, i.e., the capacity to trap heat in the atmosphere. The global warming potential of carbon dioxide (CO<sub>2</sub>) is set at 1. Note that this does not directly correlate with increasing temperatures, rising sea levels, or other physical impacts of climate change.
35. One can equally describe this as identifying the optimal point of regulation. In the pollution context, ideally one wants to regulate based on units of risk to individual receptors. This is technically too difficult and expensive, however. Short of that, we should seek to regulate the level of exposure to classes of receptors (accepting that individuals have different sensitivities), then the ambient concentration (realizing that airsheds and wind patterns are not uniform), and finally at the level of particular emission sources (the site we actually do regulate). At each step further from the ideal point of regulation, the currency less accurately reflects what we care about. As Rose has observed:

[E]ntitlements must be created in resource features that can be identified, measured and monitored, but careful management of those features does not necessarily overlap with the best protection for the resource in question. For example, tradable [SO<sub>2</sub>] allowances are calculated in tons of emissions, because emissions by weight are relatively easy to measure and monitor. But, because of wind and weather conditions, emissions in some places cause more damage to forests and lakes than do emissions in other places. Trading in the wrong direction, as it were, from emitters in downwind or forested areas to upwind emitters, thus has the potential to create greater damage rather than would be the case if rights could not be traded and moved about.

Rose, *supra* note 10, at 60-61.

Note that even though the ultimate point of regulation is quite far downstream from our ultimate concern (in this case the impacts of acid deposition), it still may be optimal once technological limitations and costs are taken into account if a close correlation exists between a source's emissions and the risk to individuals, trees, or aquatic life. Hence complex modeling is used to justify state implementation plans under the CAA.

36. Proxy choice is not solely a challenge for ETMs. We do the same for traditional command-and-control regulation. The emissions from coal-fired utilities, for example, are limited in terms of tons of sulfur, not by the net impact from their release.



proxy for impacts of acid deposition is sulfur emissions, the currency will necessarily be some variant of tons of sulfur. It is vital, then, that we get the proxy right, for it determines the currency for both the medium of trading and the goal of environmental protection.

To express this in a simple example, let's consider the ideal case of fungibility where variance across space, type, and time are eliminated. Here, trades of homogeneous commodities simultaneously take place in a small, discrete location—small blue marbles traded at the same time across a kitchen table. If we are trading identical blue marbles, the number of marbles may serve as a perfectly adequate metric. If we are trading blue and yellow marbles, the number and color of marbles are adequate currencies. If, however, some marbles are highly radioactive and others are not, the simple

currency metrics of color and quantity fail to capture an important variable.<sup>37</sup> If the currency cannot incorporate the environmental values we care about, these become external to the exchange and, as a result, trades may actually worsen the environment or natural services delivered. Inadequate currencies allow externalities to bleed out of the trading market. We may end up with a nice pile of marbles that glow in the dark.<sup>38</sup> In the extreme case, the currency can actually encourage environmentally harmful behavior.<sup>39</sup>

Nonfungibilities can arise across three dimensions—space, type, and time—and depending on the market an effective currency may need to capture all three.<sup>40</sup> Chart 1 gives practical examples across different ETMs. It is important to note that all three types of nonfungibilities may be present in the same ETM.

**Chart 1**  
**Examples of Nonfungibilities in ETMs**

Environmental Trading Market	Nonfungibility of Space	Nonfungibility of Type	Nonfungibility of Time
<b>Rule 1610:</b> Program allows trading of reduced vehicle volatile organic emissions for increased refinery volatile organic emissions	Vehicle emissions are geographically diffused versus "hot spot" of concentrated refinery emissions	Vehicle emissions may be less carcinogenic than refinery emissions	Vehicle emissions fluctuate in regular patterns over 24-hour periods whereas refinery emissions experience regular peaks
<b>Wetlands Mitigation Banking:</b> Corps of Engineers permit allows destruction of wetlands in return for contributing to wetlands restoration project located elsewhere	The lost ecosystem services may have been delivered to many people whereas the services of the restored wetlands may be delivered to few	The destroyed wetlands may have had a higher capacity or service provision compared to the restored wetlands	The permit may allow destruction of the wetlands before the quality of the restoration of other wetlands is known
<b>Habitat Conservation Plans:</b> Fish and Wildlife Service permit allows destruction of endangered species habitat in return for securing preservation of another parcel of the habitat located elsewhere	The lost habitat may have been part of a contiguous habitat system for the species, whereas the preserved habitat may be isolated and thus of less overall value	The lost and preserved habitats may have provided functional values to different populations of the species, and we do not know which population is more important to the overall viability of the species	The lost habitat may have been of ideal vegetative maturity for the species, while the preserved habitat may require time to achieve that state
<b>Alaska Halibut Individual Transferable Quotas:</b> Permits to catch Alaska Halibut are traded among fishers to avoid derby pressures in fishery	One fisher may catch in halibut breeding area, while other may catch fish in nonbreeding zones	Tons of halibut does not account for bycatch, highgrading or size of fish (juvenile instead of mature)	One fisher may catch halibut during breeding season, while other catches out of breeding season

37. To take another example, knowing that one car costs \$20,000 and another costs \$80,000 tells me a great deal about the cars and that consumers value one more than the other; but if I need to buy a car that can haul a trailer, the currency of dollars is inadequate. It fails to capture an important value and express it. Or, to introduce a market dynamic, assume that apple trees in an orchard produce two types of apples, pretty and ugly, but that both taste the same. Farmers currently sell apples by the bushel. A supermarket will pay a higher price per bushel than a canning factory but only wants to buy pretty apples. In this case, there is a market incentive to develop a grading system (a more sophisticated currency) so the values important to the supermarket are meaningfully captured and communicated.

38. In the above example, the currency must capture color, number, and, hopefully, radioactivity. Note, however, that a similar result may occur even if the currency does capture radioactivity. This will happen if the parties are indifferent to this value. In such a case the disjunction between private and public interests in trading can result in a loss of social welfare.

Choosing the wrong currency increases the chances that environmental protection will suffer, but one might argue that serendipity can work both ways on a case-by-case basis and may, on occasion, lead to environmental improvements. Part IV explains why, in the case of habitat ETMs, trades will generally not result in environmental benefits.

39.

[W]ith respect to fishing allowances, a [tradable environmental allowance] may employ a relatively simple measure, as would be the case where an individual fishing quota is measured in pounds or tons of a particular target fish. But fishermen know that bigger fish bring more at the market than smaller ones, and this can induce them to "high-grade," keeping the bigger fish and simply discarding the smaller (and now dead) specimens, with potentially disastrous effects on the fish population as a whole. . . . [T]he quest for simplicity in [tradable environmental allowances] has feedback effects on what actually gets preserved.

Rose, *supra* note 10, at 60.

40. Writing about trading bubbles, Elliott and Charnley identify four dimensions: "geographic, inter-temporal, inter-pollutant, and inter-risk." Elliott & Charnley, *supra* note 1, at 49.

## 1. Nonfungibilities of Space

Because most ETMs trade commodities from different locations, spatial nonfungibilities can easily arise. ETMs for CO<sub>2</sub> and CFCs do not raise spatial concerns because the compounds mix in the upper atmosphere independent of the site of emission. But once the trading area exceeds the area of harm or benefit, affected populations are no longer indifferent to the trades.<sup>41</sup> Rather than simply allocating among parties for greatest efficiency, there are now clear winners and losers. Concentrations of pollutants such as volatile organic compounds (VOCs) and air toxics, for example, can elevate health risks through the creation of local hot spots. Indeed, J.H. Dales' seminal discussion of ETMs specifically noted the problem posed by hot spots.<sup>42</sup> This problem has been well recognized both in practice and in the literature and, not surprisingly, the vast majority of ETM scholarship addressing nonfungibilities has focused on spatial nonfungibilities.<sup>43</sup>

The most illustrative recent example of spatial nonfungibility concerns Los Angeles' attempt to trade VOC emissions between cars and oil refineries.<sup>44</sup> In its Rule 1610 program, California's South Coast Air Quality Management District program allows VOC emitters to purchase old polluting cars and scrap them in exchange for VOC reduction credits.<sup>45</sup> The large polluters (primarily oil refineries) can avoid lowering their actual emissions or installing new equipment to satisfy permit standards if they can purchase and retire enough cars, thereby gaining sufficient emission credits. The net result, proponents claim, is overall reduction of VOC emissions in the Los Angeles airshed at least cost, since taking old polluting cars off the road may prove cheaper than pollution control retrofits. Despite retiring

over 17,000 cars, this program has been sharply criticized by environmental justice groups who claim that the bulk of trades were carried out by four refineries operating in close proximity to two Latino communities.<sup>46</sup> Diffuse vehicular emissions formerly spread across 12,000 square miles, they charge, effectively have been exchanged for refinery emissions concentrated across only 20 square miles.<sup>47</sup> This presents a classic, though far from unique, hot-spot problem.

## 2. Nonfungibilities of Type

The most basic, and obvious, currency unit is type. Apples are traded for apples, not oranges. Under the acid rain program, a tradable allowance provides regulatory "permission" to emit a ton of sulfur, not nitrogen, not carbon, not hydrocarbons. Nonfungibility of type may seem obvious for pollutants, but as one moves into habitat trading, clear delineations of type begin to blur as the units become increasingly nonfungible. Habitats are inevitably heterogeneous, both in biophysical terms (their soil, flora and fauna, hydrology, climate) and as a result of the services they provide. Yet a simple currency of acres will never capture these differences.<sup>48</sup>

Even trades among the same pollutants, upon closer inspection, demonstrate that simple metrics of type can mask significant differences. Article 5(3) of the Kyoto Protocol, for example, relies on the currency of global warming potential to convert six greenhouse gases into a carbon equivalent index.<sup>49</sup> However, each of the gases has different monitoring and, as a result, different enforcement uncertainties associated with it. For example, we know much more about the sources and emissions of hydrofluorocarbons than we do about methane. As a result, by bundling these different gases together in the same currency, the United Nations Framework Convention on Climate Change is camouflaging oranges to appear as apples.<sup>50</sup> VOCs are treated the same way. The category of VOCs comprises more than 600 different compounds. Many have differing reactivities and some,

41. "Pollutants also vary in their dispersion factors with some pollutants detoxifying quickly or settling rapidly into a less harmful medium. The location of a source of emissions is important because dispersion from different points will result in varying exposures to sensitive populations." Mendelsohn, *supra* note 10, at 301.

"[A]s quality becomes scarcer in an area, people care very intensely about additional damage. Additionally, concentrating damages raises serious equity considerations, since one group (possibly lower-income people or others with relatively little political power) will suffer the damages while others are free of them." Gloria E. Helfand & Jonathan Rubin, *Spreading Versus Concentrating Damages: Environmental Policy in the Presence of Nonconvexities*, 27 J. ENVTL. ECON. & MGMT. 84, 90-91 (1994).

42. J.H. DALES, POLLUTION, PROPERTY, AND PRICES 79 (1968) ("[I]t is immediately pointed out that a ton of any particular kind of waste will do much more damage in some places than in others . . .").

43. "Given local and long distance dispersion and the distribution of human and nonhuman populations, it is clear that the damage from emissions varies dramatically across space. Treating all areas alike completely ignores these spatial considerations." Mendelsohn, *supra* note 10, at 309; see also Ackerman & Stewart, *supra* note 5, at 1350 (arguing that established regional boundaries do not take into account spatial considerations); Tietenberg I, *supra* note 4, at 249-50 (addressing spatial issues with tradable permits); *Technology-Based Emission and Effluent Standards and the Achievement of Ambient Environmental Objectives*, 91 YALE L.J. 792, 810-14 (1982) (Prof. Richard Revesz's student notes proposing a zoned permit solution to hot spots).

44. VOCs are regulated because of their role in creating tropospheric ozone, better known as smog.

45. The operation of Rule 1610 is set out in detail by Richard T. Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231, 252 (1999) [hereinafter Drury]; see also Lily N. Chinn, *Can the Market Be Fair and Efficient?: An Environmental Justice Critique of Emissions Trading*, 26 ECOLOGY L.Q. 80 (1999).

46. Johnson, *supra* note 10, at 131.

47. Drury, *supra* note 45, at 252-54. In fighting this program, Citizens for a Better Environment and the National Association for the Advancement of Colored People (NAACP) Legal Defense Fund challenged the auto-scraping program claiming it violated civil rights laws and had not been approved under California's state implementation plan. In response, the South Coast Air Quality Management District (SCAQMD) has put the program on hold and adopted a 10-point plan aimed at preventing toxic hot spots in minority communities. Johnson, *supra* note 10, at 166 n.108 (complaint on file with authors).

48. See Part III.B. In a similar example from British Columbia described by Prof. Jody Freeman, the Ministry of Forests (Ministry) calculated how much land to set aside for ecosystem preservation and reforestation purposes when allocating timber in the annual allowable cut. The Ministry's goal was to preserve 2% of the total stock—regardless of where it comes from, regardless of its suitability as habitat, regardless of how productive it would be for reforestation efforts. In practice, then, the Ministry would set aside random parcels that weren't even connected. One might ask how the bear population is supposed to cross from one section of their habitat to another 10 miles away, but the Ministry's simple currency of acres could not account for these important considerations. Interview with Jody Freeman, Professor of Law, UCLA School of Law (Feb. 15, 2000).

49. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22. The gases are CO<sub>2</sub>, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons, and sulfur hexafluoride.

50. Interview with Tom Tietenberg, Professor, Colby College (Apr. 20, 1999).



such as benzene, are serious carcinogens. ETMs, however, treat VOCs identically and fail to differentiate on the basis of toxicity or reactivity.<sup>51</sup> Indeed the Rule 1610 ETM, described above, has come under its harshest criticism for this very reason. Not only does the program concentrate on VOCs, critics charge, but it effectively trades less carcinogenic VOCs (car emissions) for more carcinogenic ones (refinery emissions).<sup>52</sup>

### 3. Nonfungibilities of Time

The last dimension of fungibility is time. Trades may involve disparate benefits over time periods, also resulting in winners and losers. This is clearest in the case of habitat trades, discussed in Part III, where timing problems can lead to significant gaps in environmental values. For example, if we allow a party to destroy mature forested wetlands in exchange for engaging in a seedling planting restoration project in another location, even if the restoration project is vastly larger in size we will experience a temporary net loss of habitat values.

Time nonfungibilities occur not only as uncertain future events but also seasonally. Smog formation, for example, requires sunlight, still air, nitrogen oxides (NO<sub>x</sub>), and VOCs. Depending on local or seasonal conditions, either of the chemical compounds can prove the limiting factor for the reaction. Thus, at times when NO<sub>x</sub> is scarce, additional VOC emissions contribute nothing to tropospheric ozone formation; yet when NO<sub>x</sub> is abundant, marginal VOC emissions cause smog formation. Depending on when they are emitted, VOCs can have very different impacts on air quality.<sup>53</sup>

### C. Currency Design Strategies

The test of a currency's effectiveness lies in how well it captures these different dimensions. In assessing the practice of VOC trading under Rule 1610, for example, the currency of tons fares poorly. In regard to space, it tells us nothing about where, within the airshed, the VOCs were emitted and the likelihood of hot spots.<sup>54</sup> While a measure of tons certainly tells us the general type and number of molecules exchanged, it does not distinguish the more hazardous from less hazardous VOCs.<sup>55</sup> Nor, ultimately, does it indicate the

likelihood that VOC emissions over a given time could contribute to smog formation.<sup>56</sup> Thus, VOC trading can involve significant nonfungibilities, leading to increased or concentrated impacts in the name of environmental protection. One VOC molecule may well not be the same as another. And, as Chart 1 demonstrates, upon further investigation this holds true for most trading programs.

A key issue to recognize at this point is the importance of explicitly constructing the ETM around defined environmental protection goals. To rephrase the question posed in the Introduction: *What should we actually be trading?* Bruce Ackerman and Dick Stewart have argued that trading is a more democratic process than command-and-control approaches because it requires determining the total level of allowable emissions or, more broadly, of environmental impact.<sup>57</sup> Our analysis builds on this argument by contending that ETM design requires focusing on not only the quantitative level of environmental impact but also the *qualitative* goal of the ETM. If our principal objective in wetlands protection is conservation of open space, then acres may be an adequate currency for a wetlands ETM. If the goal is conservation and delivery of services, then acres fare poorly. Put another way, focusing on currencies forces us to consider *what* we should be protecting, not simply *how much*. Absent this clear articulation of qualitative goals, the currency cannot be adequately determined.

Assuming the goals have been articulated, though, how can currency design capture the important variance across nonfungible commodities? Consider three basic strategies: simple currency, universal currency, and comprehensive currency.

#### 1. Simple Currency

The first strategy keeps the *simple currencies* we currently employ—acres for wetlands, tons for VOCs—and lives with their shortcomings, muddling on as best we can. After all, nonfungibilities exist in every ETM. The main issue is whether they matter. While upon close inspection one might find we really are trading Granny Smiths for Macintoshes, the differences may not be meaningful because it still amounts to apples for apples. And, in some key respects, simplicity *does* have its virtues. While obvious, it needs to be recognized that ETMs with simple currencies function.<sup>58</sup> Simple currencies ensure that all the parties to the transaction, as well as those outside, understand the commodities exchanged and can clearly communicate with one another. Developers, local politicians, and environmental groups all understand trades for acres better than trades for services. Moreover, successors-in-interest know the rights they have acquired.<sup>59</sup>

#### 2. Universal Currency

Second, one could rely on a *universal currency*, such as money or risk. Indeed the problems posed by currency ade-

51. VOCs are treated as a single, uniform class of compounds by command-and-control regulations under the CAA as well. See, e.g., 42 U.S.C. §7545, ELR STAT. CAA §211 (requiring reformulated gasoline that reduces ozone-forming VOCs).

52. See Drury, *supra* note 45, at 255-57 (claiming that cancer risks from refinery emissions (including benzene) are greater than the risks from vehicular emissions and that refinery emissions have more toxic co-pollutants than exhaust emissions from a car's tail pipe).

53. Described more technically,

a marketable emissions allowance system that regulates the cumulative emissions of sources over a fixed period may have a difficult time controlling a secondary pollutant like ozone because both precursor emission rates and the rate at which precursors are transformed into ozone change from hour to hour and day to day.

Farrell et al., *supra* note 28, at 109.

54. To do so would require a currency that had a spatial component identifying the location of the emission.

55. To do so would require separate currencies identifying discrete classes of VOCs grouped by carcinogenicity.

56. To do so would require a currency that identified the time (or season) of emission.

57. Ackerman & Stewart, *Democratic Case*, *supra* note 5.

58. "Markets work best under simple trading rules. That gives those who design markets an incentive to oversimplify environmental problems to make their market mechanisms more workable." Pedersen, *supra* note 13, at 10175.

59. See Rose, *supra* note 10, at 59.



quacy—the challenge of accounting for trades of non-fungible commodities—seem remarkably similar to those faced by practitioners of cost-benefit analysis and comparative risk assessment. After all, the idea of exchange is basic to any policy decision since it will necessarily involve trade offs, often of nonfungible units. Banning the use of CFCs, for example, decreases the risk of skin cancer from ozone depletion but may increase threats from climate change.<sup>60</sup> Improving vehicle fuel efficiency may lessen the risk of climate change but increase traffic fatalities.<sup>61</sup> These are often characterized as risk-risk dilemmas, but can just as easily be characterized as trading one type of risk for another.

When the same impact is shared by alternate activities, comparisons are relatively straightforward. Seatbelt laws may save some lives but endanger others by increasing reckless driving; yet in both cases the common measure to assess the outcomes is the same—traffic injuries. But for heterogeneous harms (such as skin cancers versus climate change), the comparisons must be indirect. Similarly, monetizing costs and benefits is relatively straightforward when the significant variables are all exchanged in markets.<sup>62</sup> Once one takes into consideration nonmarketed goods, such as human lives and scenic vistas, valuation turns to shadow pricing techniques to provide a common monetary unit for comparison.<sup>63</sup>

Both methodologies seek to reduce disparate, seemingly nonfungible features to a common currency, whether it be dollars or deaths per 100,000 people. Such common units could, in theory, embrace a wide range of externalities and justify trades in seemingly different, perhaps incommensurable, commodities.<sup>64</sup> While admitting that the calculations

are inexact, risk assessment and cost-benefit analysts seek to reduce the uncertainty by improving methodology and process. For example, Don Elliott and Gail Charnley, two of the major proponents of ETMs, have called for greater use of trading among different pollutants in cases where the benefits of reduced risk are clear.<sup>65</sup> As John Graham and Jonathan Wiener have suggested:

But it is chiefly our lack of methods of comparison—of ways of seeing commonality among these risks—that makes these risks seem dissimilar or noncomparable, not an inherent incommensurability. As we improve methods of risk analysis, the idea of calculating the “net risk” of a risk portfolio, or the change in a net risk due to a risk tradeoff, may become more meaningful.<sup>66</sup>

Thus one might argue that in analyzing the trading of nonfungible commodities one need look no farther than the cost-benefit and risk debates.

While these insights do inform our analysis, it is important to note that in practice neither money nor measures of risk have often been used as trading currencies for three basic reasons.<sup>67</sup> The first concerns fit. Many environmental

by making environmental amenities seem like any other commodity: a good that has its price, to be set through market mechanisms.” Sunstein, *supra* note 29, at 2046; see also Michael J. Sandel, *It's Immoral to Buy the Right to Pollute*, N.Y. TIMES, Dec. 15, 1997, at A23 (discussing the argument put forth by some developing countries that an international emissions trading program would allow developed nations to buy their way out of reductions). But see Martha Nussbaum, *The Costs of Tragedy: Some Moral Limits of Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1005 (arguing that assigning monetary values to goods does not necessarily mean that our values, as well, have been changed).

For our purposes, the first criticism is most relevant. While trade offs clearly must be made for society to function, in deciding which trade offs to accept there may be no objective way to come up with a single scale to rank them, no defensible way to combine or aggregate assessment across different dimensions of value. One could choose between policies by counting the number of letters in each proposal, of course, but the result is meaningless. This is where concerns over nonfungibility and commensurability mesh, and it is a key issue in Part IV's discussion of institutional review of trades.

60. The common replacement for CFCs, compounds known as HFCs and hydrochlorofluorocarbons (HCFCs), while not strong ozone depleters, do unfortunately act as strong greenhouse gases. To a certain extent, the choice between CFCs and their replacements is a choice between contributing to ozone depletion or to climate change. See DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 551 (1998).

61. Frank B. Cross, *The Public Role in Risk Control*, 24 ENVTL. L. 887, 949 n.237 (1994) (“Efforts to conserve gasoline with greater automobile fuel efficiency may cause as many as 20,000 additional deaths from smaller cars.”).

62. Once you have a common currency that captures the values of different commodities through a common unit, e.g., gin and pork bellies expressed in dollars, it allows trading of different things and society can move from a barter economy to a market economy. The prerequisite, though, is a market mechanism through which meaningful valuation will occur.

63. Shadow pricing techniques, such as contingent valuation or hedonic pricing, attempt to create a market where none exists through polling people's willingness to pay or observing the premium people pay to benefit from certain environmental amenities. See James Salzman, *Valuing Ecosystem Services*, 24 ECOLOGY L.Q. 887, 893 (1997) [hereinafter Salzman].

64. An important question in the context of cost-benefit analysis, and with implications for ETMs, centers on the issue of incommensurability—the legitimacy of trading nonfungible commodities at all. The literature on incommensurability does not provide a commonly agreed upon definition of the term. See Richard Craswell, *Incommensurability, Welfare Economics, and the Law*, 146 U. PA. L. REV. 1419, 1421 (1998). In the context of trading, though, its application is straightforward. Apples cannot legitimately be traded for oranges, one might argue, because there is no meaningful basis to compare the goods.

Some go farther and argue that it is immoral to reduce certain things to monetary currency, e.g., value of a human life, and, therefore, trading is inappropriate. Others contend that reducing certain features to commodities creates spill-over effects. We will be conditioned to think about nature differently, for example. As Sunstein has described, “emissions trading has damaging effects on social norms

65. In response to the criticism that one cannot measure risks accurately enough to trade, Elliott and Charnley argue that although one cannot measure exactly, one can still assess the relative magnitude of the options. Thus “easy trades” between seemingly nonfungible options are entirely appropriate if the magnitude of differences between the two risks is large enough with little uncertainty. As they note: “It is undeniably correct that we cannot make risk comparisons when we have many alternatives to compare; the uncertainties and debatable value judgments are simply too large in those cases. But we can nevertheless make valid comparisons among different environmental risk reductions in many cases.” Elliott & Charnley, *supra* note 1, at 51.

66. John D. Graham & Jonathan B. Wiener, *Confronting Risk Trade Offs*, in RISK VERSUS RISK: TRADE OFFS IN PROTECTING HEALTH AND THE ENVIRONMENT 33 (John D. Graham & Jonathan B. Wiener eds., 1995). There is a large and growing literature on the merits and practice of such valuation, and whether such dollar figures or risk statistics are usefully accurate. See generally Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 YALE L.J. 165 (1999) (defending the use of cost-benefit analysis by government agencies in project evaluation).

67. Some habitat ETMs do allow monetary payments in exchange for permits (often on a per acre basis), known as “in-lieu fees,” either to a habitat bank or the government. The assumption is that the funds will be spent by the relevant agency or group for equivalent and appropriate habitat or for other purposes that presumably offset the permitted impacts. Royal C. Gardner, *Money for Nothing? The Rise of Wetland Fee Mitigation*, 19 VA. ENVTL. L.J. 1 (2000) [hereinafter Gardner III]. Unstructured in-lieu fees in general, and all in-lieu fees in wetlands mitigation banking, are disfavored. See, e.g., *Branhaven Plaza, L.L.C. v. Inland Wetlands Comm'n*, 740 A.2d 847 (Conn. 1999) (holding that the commission could not accept monetary and

trades, particularly those involving habitat management, are not amenable to measures of risk. As one moves from regulation of pollutants to habitat, the risk paradigm becomes awkward because the loss of habitat may have little bearing on human health.<sup>68</sup> The second reason concerns efficiency. It is one thing to undertake detailed cost-benefit and risk analyses over several months (or years) to evaluate regulatory initiatives, poring over the data to craft policy instruments. It is quite another to determine prices for pork bellies on the Chicago Board of Trade or barter goods on the town square. Put simply, currencies in regulatory and trading settings must satisfy very different institutional requirements. The conversion of environmental commodities to dollars or units of risk will often simply take too long or be too expensive to be useful in an active trading setting.<sup>69</sup> Finally, proper risk assessments and cost-benefit analyses provide a range of estimates reflecting data uncertainty and assumptions.<sup>70</sup> For a trading program to operate, it goes without saying that the price and quantity must be specific, not estimates within one standard deviation.

### 3. Comprehensive Currency

A third currency design strategy is in some respects the most obvious—develop a *comprehensive currency* to ensure the trades are equitable. To return to the blue marbles example, the currency should capture not only the number of marbles and their color but their radioactivity as well. In a more familiar setting to those contemplating marriage, diamonds are not assessed simply by the number of carats. Diamonds are also differentiated by gradations in quality. This more precise approach to pricing increases the transaction costs (particularly the information costs) associated with buying and selling diamonds, but those additional transaction costs obviously are worth it to the buyers and sellers. Similarly, in the wetlands context one could imagine a currency that captured acreage, provision of key services (biophysical capacity for nutrient filtration, floodwater retention,

in-kind contributions from permittee in mitigation for wetlands damage because the use of the funds was unspecified); see also Gardner I, *supra* note 11, at 583; David T. Urban & John H. Ryan, *A Lieu-Lieu Policy With Serious Shortcomings*, NAT'L WETLANDS NEWSL., July/Aug. 1999, at 5, 9-10.

68. Establishing monetary values for many ecosystem services is infeasible, as well. "Wetland functions provide a wide range of services and products with economic benefits that accrue primarily off-site. Most of these are not reflected in markets, or at least not in markets directly linked with wetlands, and cannot be captured as income by the owners of wetlands." Dennis King, *The Dollar Value of Wetlands: Trap Set, Bait Taken, Don't Swallow*, NAT'L WETLANDS NEWSL., July/Aug. 1998, at 9.
69. "For a variety of reasons, there is a growing perception within the field of economics and elsewhere that estimating the overall value of specific habitats in dollar terms is impractical. . . . The authors of several recent reviews of habitat valuation have reached this conclusion." James Boyd, *Indicators of Ecosystem Value* (1999) (unpublished manuscript, on file with the author).

Determining values for ecosystem services will be especially difficult because a number of shadow pricing methodologies assume that the polled people have a sufficient knowledge of functions provided by nature to give meaningful responses. See Salzman, *supra* note 63, at 895. As the costs of these methodologies drop, however, some of this criticism will be mooted.

70. Interview with Kip Viscusi, Professor, Harvard Law School (Feb. 8, 2000); see also Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 DUKE L.J. 729, 731-32 (describing the wide uncertainty range in risk assessments).

nursery habitat), and delivery of services (size of local population affected).<sup>71</sup>

While theoretically an attractive solution, merely recommending that we tailor the currencies more precisely conflicts with the goal of efficiency. Accounting meaningfully for nonfungibilities across type, space, and time imposes a heavy information burden on those designing and supervising the trading regime.<sup>72</sup> As the cost goes up, parties (both to the transaction and third parties) become less likely to participate and, at a certain point, may reach a state where no trading takes place.<sup>73</sup> Recall that the prime attraction of trad-

71. Wetlands ecologist King has developed an analytical method that accounts for these dimensions. The model takes into account the biophysical capacity of the site to produce services, the opportunity that services will be actually delivered to a population, the scarcity and demand that would make these services valuable to the population, and equity concerns over which populations are gaining and which are losing in a wetlands trade. The method does not attempt to convert these measures into a common unit but, rather, provides a series of scales through which to evaluate particular aspects of the trade. Needless to say, this is a complex undertaking. An EPA study, for which one of the authors is the principal investigator, is applying this method to evaluate a current wetlands trade to see if it can be applied in practice. See Lisa Wainger et al., *Wetland Value Indicators for Scoring Mitigation Trades*, 20 STAN. ENVTL. L.J. 413 (2001).

One could equally imagine the use of a "currency vectors" approach, where the currency captured both basic measures (such as acreage) and the direction of the trade (improved flood controls, decreased waterfowl habitat, decreased nutrient filtration, reduced service delivery to populations, etc.). Though less precise than the COPE model, such a currency would provide meaningful information across the range of nonfungibilities. Of course, in some cases even a comprehensive currency will be inadequate to achieve certain policy goals. As Rieser has noted in discussing ITQs:

ITQs alone do not create an institutional framework within which fishermen must work with other groups and individuals who depend upon and are concerned with a healthy, functioning marine ecosystem. In this way ITQs may run counter to the trend in environmental policy generally and, in particular, the new mandates of the Sustainable Fisheries Act that require fisheries management to take account of the inter-relatedness of species and their habitats, as well as the ecological ramifications of heavy fishing pressure on increasingly lower trophic levels. These changes in the law, which reflect the growing global concern for preserving biological and ecological diversity, may mean the ITQ with its emphasis on achieving efficiency is already an obsolete policy instrument.

Alison Rieser, *Prescriptions for the Commons: Environmental Scholarship and the Fishing Quotas Debate*, 23 HARV. ENVTL. L. REV. 393, 417 (1999) (footnotes omitted).

- 72.

Not only does an efficiency target make it necessary to track the physical relationships underlying the emission, transport, and chemical reactions of the polluting substances, it also requires calculating the degree of exposure to those substances and relating that exposure to physical and, ultimately, monetized damage (both human and nonhuman). Each of these steps is subject to data limitations and uncertainty. . . . In principle, tradeable rights could be more closely calibrated to location, but in practice, such closer refinements would be likely to make rights considerably more complex and hence less easy to define, trade and monitor.

Tietenberg II, *supra* note 30, at 96.

73. The experience of the Grand Parkway Association, the group responsible for development of Houston's third outer loop highway, provides an analogous and illustrative example. In order to evaluate development alternatives, the association created a matrix with 49 different criteria (such as presence of endangered species, type of wetland habitat impacted, effect on dark skies, cemeteries, etc.). Diane Schenke, the executive director of the project, described the net result as paralysis by analysis. They were faced with too many variables to reach a consensus. Interview with Diane Schenke, Executive Director, Grand Parkway Association (Apr. 28, 2000).



ing programs is their efficiency. As transaction costs increase, potential efficiency improvements are lost. Thus the policy instrument's viability rests on a balance.<sup>74</sup>

In the context of wetlands mitigation banking, regulators have sought to develop and employ more comprehensive currencies. But the net result, described in Part III, has been Gresham's Law in practice—just as bad money drives out good money, simple currencies drive out complex ones. Thus, of the three currency designs to satisfy exchange adequacy—simple currency, universal currencies of dollars and risk, or comprehensive currency—the first has been overwhelmingly adopted by trading programs. Relying on a simple currency, though, may create important externalities to the trade. In response, and in an effort to minimize these externalities, ETMs often restrict exchanges of environmental commodities, which we now turn to in Part II.

## II. Exchange Adequacy: Constructing the Exchange Market

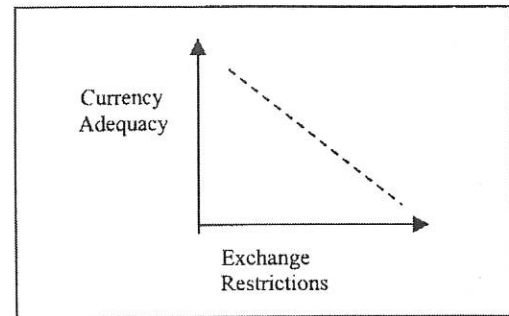
When the condition of fungibility is imperfectly satisfied and the currency does not adequately capture important values, how can the market be structured to minimize externalities and ensure that trades promote environmental protection? Currency imperfections do not, in and of themselves, present an insurmountable barrier to efficient use of trading mechanisms in effectuating environmental policy. As in any market context, if the externalities caused by poor currency design can be identified, then the rules of the market itself can be manipulated to close the holes. Indeed, since environmental trading markets are creatures of regulatory construction in the first instance, further refinements of the market can be carried out directly through regulatory fiat.

In practice, the problems posed by currency shortcomings have been addressed through restrictions of market exchange—limiting who can trade, where they can trade, when they can trade, and what the exchange rate of the currency should be.<sup>75</sup> In fact, we argue that ETMs demonstrate an inverse correlation between currency adequacy and the intensity of market constraint. As Figure 4 demonstrates graphically, comprehensive currencies reduce the need for exchange controls; conversely, crude currencies will often result in tightly constrained trading schemes because the market maker desires to minimize environmental externalities. The danger of engaging in aggressive market construction to restrict the currency's application, though, lurks in the very real potential for market-design errors to compound

or replace the currency shortcomings with more deeply rooted problems. Indeed, these second-level market imperfections—arbitrage and thin markets—may be more difficult to detect and correct without completely undermining the advantages of trading that motivate the experiment in the first place.

Figure 4

### Currency adequacy versus Exchange Restrictions



#### A. Market Refinements Across Space, Type, and Time

Nonfungibilities of space are neutralized by restricting the area of exchange. While there are sound environmental reasons to encourage trading within a large area,<sup>76</sup> when the location of sources counts and space heterogeneity is high, emissions of the same type can cause different impacts. For example, a recent market was established among water treatment plants in the Long Island Sound (the Sound) to reduce nitrogen discharge loads causing hypoxia (oxygen depletion) conditions.<sup>77</sup> The program quickly ran into the problem that ecological effects of nitrogen discharges are not uniform throughout the Sound. Because of complex flow and circulation patterns, the areas of greatest hypoxia occur in the western end of the Sound, near New York City. Nitrogen discharged anywhere in the Sound contributes to hypoxia in the western end, albeit in varying degrees depending on location, as well as to local hypoxia. Hence, the basic unit of currency for the trading—nitrogen discharges—failed to capture the spatial concentration of hypoxia impacts. It failed the standard of currency adequacy. To compensate for the inadequate currency, those studying the viability of the trading program proposed a market construction alternative—divide the Sound into different discharge zones corresponding to different effects on western end hypoxia levels, assign each zone a “value” based on proportionate impact using the zone with the high-

74. Transaction costs can, of course, arise from a number of sources, such as information collection, negotiation, monitoring, and enforcement. This problem has been studied in depth by both economists and law professors. As Hahn has succinctly observed: “There is an unavoidable trade-off that must be entertained—the relative efficacy of a market and the degree to which environmental quality objectives will be met.” Hahn I, *supra* note 10, at 10; see also John P. Dwyer, *The Use of Market Incentives in Controlling Air Pollution: California's Marketable Permits Program*, 20 *ECOLOGY L.Q.* 103 (1993) [hereinafter Dwyer] (demonstrating the importance of transaction costs to active trading); Juan-Pablo Montero, *Marketable Pollution Permits With Uncertainty and Transaction Costs*, 20 *RESOURCE & ENERGY ECON.* 27, 29 (1997) (modeling the effects of transaction costs and uncertainty on ETM efficiency); Robert N. Stavins, *Transaction Costs and Tradeable Permits*, 29 *J. ENVTL. ECON. & MGMT.* 133 (1995) (describing the importance of transaction costs in ETM design).

75. See, e.g., Hahn I, *supra* note 10, at 8-9 (listing the range of rules limiting exchanges within state emissions trading programs).

76.

[I]nterest in trading remains strong at the federal level, and in some localities. This interest is stimulated in part by the growing recognition that some water quality problems can be addressed only on a large geographic scale. A federal policy shift toward increasing emphasis on watershed management coincides with, and perhaps encourages, consideration of trading schemes.

Powers, *supra* note 28, at 142.

77. See *id.* at 197-206.



est impact as value "1.0," and use the relative values to establish nitrogen discharge trading ratios between zones.<sup>78</sup>

Beyond using coefficients to weigh currencies, it is useful to consider not only what the currency is but, equally, how and when it may be spent. Thus some currencies effectively become legal tender based on where they are traded in order to minimize distributional inequities.<sup>79</sup> Unrestricted trading of air pollutants across airsheds therefore is allowed for CFCs, which mix in the upper atmosphere independent of the site of emission, but not for NO<sub>x</sub> or VOCs.<sup>80</sup> Opponents of the Rule 1610 program described in Part I have called for banning trades by sources located near hot spots.<sup>81</sup> Some local governments have banned distant trades and others, lacking this authority, use creative incentives to reduce spatial nonfungibilities.<sup>82</sup>

Some programs appear to gloss over spatial nonfungibilities, using currencies regarded, rightly or not, as reliable indicators of true environmental impact. The sulfur trading program, for example, assumes that a ton of SO<sub>2</sub> emitted in the Midwest has the same potential for acid rain as a ton emitted on Long Island, and therefore permits trades between New York and Ohio utilities.<sup>83</sup> This freedom to

trade freely across airsheds, however, is curtailed by a series of regulatory restrictions on where the currency may be used.<sup>84</sup> Whether such restrictions are efficient or effective remains a topic of debate.<sup>85</sup>

South. Raymond Hernandez, *Albany Battles Acid Rain Fed by Other States*, N.Y. TIMES, May 2, 2000, at A1.

The program designers were aware of these potential problems, but "preimplementation modeling showed that the expected reductions from an unrestricted trading system would take place in precisely the areas that would be targeted for greater control by a more complicated system. Therefore the gains from implementing a more complicated system appeared small in comparison to the administrative cost." Tietenberg II, *supra* note 30, at 98. Another factor that may be in play is the level of emissions reduction. That is, the deep reductions mandated in the ETM may also alleviate the problem of spatial nonfungibilities. While certain areas might receive more emissions than others, hot spots might still occur, but as a result of net reductions over the entire trading area, the local concentrations are not very hot—we may not need to care about heterogeneity of distribution.

78. Trading ratios are found in other ETMs, including wetlands and air emissions. The San Francisco Bay area AQMD, for example, sets offset ratios of 1.1:1 for trades within 2 miles, 1.2:1 for trades from 2-15 miles, and 2:1 for trades over 15 miles. Tietenberg II, *supra* note 30, at 107-08.

79. Some ETMs rely on restricting trades within a pre-defined zone. See Tietenberg I, *supra* note 4, at 249-50 (describing the Ozone Transport Commission's restrictions on trading of NO<sub>x</sub> along the eastern seaboard). The 1990 CAA Amendments also control ozone through categories. Offsets must come from areas with equal or more nonattainment, and the most severe nonattainment areas can sell, but not purchase, offsets. The SCAQMD divided the Los Angeles Basin into 38 zones, only allowing sale of emission credits to downwind partners. Tietenberg II, *supra* note 30, at 107.

80. Compare 42 U.S.C. §7671f(a), ELR STAT. CAA §601(a), allowing trading of CFCs, with 42 U.S.C. §7503(c) ELR STAT. CAA §173(c), limiting inter-airshed trades of criteria pollutants in nonattainment areas.

81. Citizens for a Better Environment has called for a prohibition on trades of toxic substances, trades into overburdened communities (determined by using a cumulative risk threshold), trades that will have adverse impact on environmental justice, and cross-pollutant trades if the traded pollutant is less hazardous than those emitted. In accordance with the National Environmental Justice Advisory Committee (NEJAC) guidelines, it would allow community review and comment on proposed trades. See Drury, *supra* note 45, at 283-87.

82. Lake County, Illinois, for example, requires that all wetlands mitigation take place in the county. Another town in Illinois, while lacking authority to ban certain types of trades, leveraged its stormwater permitting authority to require a wetlands mitigation ratio of 1:1.5 within the town limits and 1:3 outside the town. Interview with Mark Burkland, Attorney, Knight & Holland (Apr. 28, 2000).

83. In response to the acid rain trading program, for example, a spokesman for the Adirondack Council stated that "[t]he trading program didn't take into consideration where the pollution would fall after it was traded. . . . We have Lilco [a Long Island utility], whose pollution will go out to sea, trading to the Midwest, whose pollution will fall on us." James Dao, *A New, Unregulated Market: Selling the Right to Pollute*, N.Y. TIMES, Feb. 6, 1993, at A1.

Several state attorneys general, from New York, Connecticut, New Hampshire, and Rhode Island, have criticized the amendments for not focusing on areas most affected by acid rain. While they failed to get EPA to prevent hot spots, the attorneys general and the Adirondack Council, an environmental group, sued EPA for refusing to allow states to block allowance trading when running permit programs under the CAA.

Hirsch, *supra* note 3, at 393. In the same vein, the New York legislature recently passed a law penalizing New York utilities that sell pollution credits to coal-burning power plants in the Midwest and the

84. This is known as regulatory tiering. Thus, in the acid rain trading program, sulfur allowances may be traded nationally but may only be used in locations where they satisfy the state implementation program and the national ambient air quality standards. Tietenberg II, *supra* note 30, at 103. According to EPA's emissions trading policy statement, published in the *Federal Register* in 1986 and reflected in several rules, emission trades must be environmentally equivalent. Thus distant trades are only supposed to be approved pending a demonstration of air quality equivalence. 51 Fed. Reg. at 43814.

Skeptical that these guidelines will restrict ETM activities, some states have taken the issue on themselves. "[E]nvironmental concerns have prompted New York to consider restricting allowance sales to [M]idwest utilities upwind from New York's Adirondack Mountains. According to some midwestern and New York utilities, this possibility has diminished their inclination to trade with one another because of the threat that the trades could be overturned in the future." Sohn & Cohen, *supra* note 12. New York has told Long Island Lighting that it can't sell its allowances to anyone upwind. Raymond Hernandez, *Lilco Is to Stop Selling Credits to Upwind Producers*, N.Y. TIMES, Apr. 30, 1998, at B1. Some ETMs also require detailed modeling before allowing trading. Hahn I, *supra* note 10, at 7.

85. A number of commentators believe spatial restrictions on trades are misguided. In writing about the NO<sub>x</sub> trading program, Farrell et al. write:

[A]n analysis of the effects of restricting the allowance market by geographic zones to prevent wrong-way trades shows that such restrictions would be expensive but have little, if any, environmental effect. Similarly, preventing sources from banking excess allowances from one year to another also has significant costs while it is not clear there are any environmental benefits from doing so.

Farrell et al., *supra* note 28, at 121-22.

Environmental justice advocates, on the other hand, argue that the spatial restrictions are not tight enough. As Johnson relates:

Critics might argue that the concerns about toxic hot spots are inflated. Trading schemes are often coupled with command and control standards, so that an industrial source must meet certain technology-based standards before they can trade for pollution rights. . . . Thus, there are limits on the amount of pollution that will flow to a toxic hot spot. This criticism is flawed for several reasons. Technology-based standards are not necessarily designed to protect human health or the environment. . . . Thus, if several sources are emitting pollution into the air or water at levels that meet technology-based standards in a toxic hot spot, those standards will not necessarily protect the health or environment of the surrounding community. Although states may impose more stringent limits on sources in those toxic hot spots in order to meet health-based or environmentally-based water quality standards or air quality standards, the health-based or environmentally-based standards do not necessarily protect the health and safety of communities because the standards are set based on risk assessments that do not address the cumulative or synergistic impacts that pollution can have on persons.

Johnson, *supra* note 10, at 130 n.97.

Nonfungibilities of type are neutralized by explicitly restricting exchanges to the same commodity. In the pollutant context, heterogeneous trades are rare. Under the Clean Air Act (CAA), there are separate trading programs for SO<sub>2</sub>, NO<sub>x</sub>, hazardous air pollutants, CFCs, etc.<sup>86</sup> Both Congress and the U.S. Environmental Protection Agency (EPA) have emphatically declared that toxin trading is unacceptable.<sup>87</sup> The Clean Water Act's (CWA's) total maximum daily loads program also restricts such trades, allowing biochemical oxygen demand (BOD) for BOD, chemical oxygen demand (COD) for COD, albeit from different types of sources.<sup>88</sup> These restrictions ensure that we trade apples for apples, not apples for oranges. This restriction is loosened in some cases by the use of ratios for trades between point and nonpoint sources or habitat.<sup>89</sup>

Temporal nonfungibilities may be neutralized by restricting trades to narrow time periods. Bubbling and offsets require simultaneous trades.<sup>90</sup> In more complex schemes, the currency's value can be restricted by issue, compliance, and expiration dates.<sup>91</sup> In the wetlands program, mitigation is supposed to occur only when the restored habitat is fully functional.<sup>92</sup> Sometimes, though, the time window is made more flexible. Under the CAA's prevention of significant deterioration (PSD) program, EPA allows trading of contemporaneous emissions, but "contemporaneous" is generously defined as a five-year period.<sup>93</sup>

86. See, e.g., 42 U.S.C. §7671f, ELR STAT. CAA §607 (CFC trades); *id.* §7651b, ELR STAT. CAA §403 (sulfur trades); *id.* 7511a(g)(4), ELR STAT. CAA §182(g)(4) (ozone trades); *id.* §173(c) (criteria pollutants and precursors in nonattainment areas).

87. In a letter to Congress at the time of the acid rain trading program's passage, for example, EPA Administrator Reilly made clear that toxins would not be part of an ETM. Letter from John Sununu, White House Chief of Staff, and William Reilly, Administrator, EPA, to Tom Foley, Speaker, House of Representatives (May 22, 1990), reprinted in LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 2846 (1993) (setting out the features of the bill and stating that toxins would be controlled by technology standards); see also 59 Fed. Reg. 15504 (Apr. 1, 1994) (considering only trades within the same facility for hazardous air pollutants).

88. See OFFICE OF WATER, U.S. EPA, DRAFT FRAMEWORK FOR WATERSHED-BASED TRADING 2-10, app. B-2 (1996) (EPA 800-R-96-001) ("EPA does not currently envision a situation in which 'cross-pollutant' trading could work under current regulatory conditions and technical limitations.").

89.

Much of the success of a trading program, as measured by improvements in water quality, rests with the difficult decision of choosing an appropriate trading ratio. A trading ratio acts as the exchange rate that equates the environmental impact of point and nonpoint source loadings. It is the amount of nonpoint source control that a point source discharger must undertake to generate a unit of credit at the point source.

Esther Bartfeld, *Point-Nonpoint Source Trading: Looking Beyond Potential Cost Savings*, 23 ENVTL. L. 43, 67 (1993) (discussing ratios for water pollutant trading). We discuss the use of ratios for wetlands trading in Part III.

90. See 40 C.F.R. §51.165 (1999).

91. Dale A. Carlson & Anne M. Scholtz, *Designing Pollution Market Instruments: Cases of Uncertainty*, 12 CONTEMP. ECON. POL. 114, 121-22 (1994) (proposing "staggered" ETM credits).

92. See Part III.

93. Elliott & Charnley, *supra* note 1, at 49-50.

## B. Market Fragmentation, Background Markets, and Other Design Pitfalls

### 1. Arbitrage

Notwithstanding their effectiveness in reducing externalities, there is a danger that imposing additional market restrictions to compensate for currency shortcomings can create second-order problems. Few constructed markets can operate hermetically sealed from external free-market conditions. Thus in financial markets, absent Draconian restrictions, official currency exchange rates must coexist with private currency trading markets, and price control regimes must coexist with private goods trading markets. Private market rent seekers, more commonly known as arbitrageurs and black marketeers, will seek out and take advantage of any imperfections in the constructed market. To an economist, these effects are simply evidence of "the market" at work, weeding out inefficiencies in any market setting, constructed or not, so as to maintain a true market equilibrium.

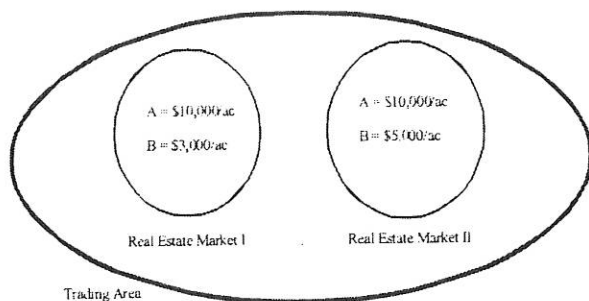
There is no reason to believe that environmental trading programs are immune to these market-driven forces. Consider the following situation depicted below in Figure 5, an acre-based habitat trading program established using the following market restrictions: two types of habitat, type A and type B, are protected through a regulatory program that requires compensatory habitat mitigation whenever habitat is destroyed, i.e., a developer can trade destroyed habitat in exchange for mitigation habitat. Moreover, although types A and B can be traded for each other, because of general habitat function differences, one acre of type A habitat is deemed to be worth five acres of type B habitat. The conservation goal for the area is to achieve a balance of the two habitats that favors conservation of type A habitat because of its superior habitat value, and which is relatively consistent throughout the area so as to maintain overall ecological function.<sup>94</sup> A trading program, it is thought, will let "the market" most efficiently decide which acres are developed within this hoped-for pattern.

Once this habitat trading market is set in motion, however, it necessarily coexists with the background real estate markets operating within the defined trading area. The real estate market, of course, reflects values relevant to developers and consumers of developed habitat. The trading market, by contrast, is designed to capture values of habitat function, albeit crudely reflected in the acre-based currency. Yet the imposed habitat value exchange rate between type A and B habitats cannot ignore the real estate market's exchange rate between the two types. When the constructed habitat value system is overlaid on the relatively unconstrained real estate market, it is easy to see how "mistakes" in trading valuation can undermine environmental protection values.

94. This last requirement is an important condition. Consistent habitat distribution both provides corridors for species to range throughout the area and may be necessary for species that depend on the two habitat types, e.g., for nesting and feeding.



Figure 5



For example, the 1:5 trading ratio between type A and type B habitat is intended to reflect the superior habitat function value of type A habitat. But in real estate market I, type A habitat is worth only three-and-one-third times as much as type B. In real estate market I, therefore, a developer could develop five acres of type B habitat and mitigate with either five acres of type B habitat at a cost of \$15,000, or one acre of type A habitat at a cost of \$10,000. Easy decision. Thus, the result of using the 1:5 habitat value exchange rate in the long term could be widespread depletion of type B habitat throughout the trading area and extensive conservation of type A habitat, which may not promote the original conservation goals of the trading program.

Another problem could arise if the trading area is defined too broadly. As depicted in Figure 5, there may be more than one real estate market encompassed within the trading area. Say developers in the trading area believe that type A habitat is undervalued in the real estate market and in fact presents a more profitable development profile than type B habitat, so that they wish to develop type A habitat and use type B habitat to mitigate. Type B habitat is worth the same in habitat value throughout the trading area, but is worth more in real estate value in market II than in market I. As a result, developers in real estate market II can practice a form of arbitrage by reaching into real estate market I for cheaper type B conservation acres to compensate for development in market II, facilitating more development of type A acres in market II. Once again, we may wind up with a distribution of developed and conserved acres within the larger trading area that is inconsistent with the conservation goals of the trading program.

To an economist, this is simply evidence of market efficiency at work. Indeed, as the economist would predict, over time the real estate market price of type B habitat will rise if it is demanded for mitigation of type A development, and price disparities in type B acres within the trading area will dampen as demand for the cheap acres increases. That is market efficiency. But it may not be environmentally acceptable to let that market dynamic play out—by the time the real estate market adjusts, the conservation goals of the trading program may have been irrevocably undermined. Design defects in the constructed market can therefore cre-

ate externalities that exist independent of the currency design deficiencies.<sup>95</sup>

Regulators detecting this problem would have a number of solutions. In the arbitrage scenario, for example, the original trading area could be split into several trading areas corresponding to the two real estate markets, thus making arbitrage between real estate markets impossible. Or type B habitat could be divided into several types corresponding to price differential ranges and the exchange rates between the reconstituted habitat types could be altered. For example, if the cheap type B acres were redefined as type C and new exchange rates between it and types B and A habitat were defined, the arbitrage opportunity can be foiled. In short, any constructed market defect can be corrected with additional market constructions.<sup>96</sup> The challenge is in detecting the defect and its externality and designing market-procedure corrections that solve the externality without creating a new one.

## 2. The Inevitable Trade Off Between Fat and Sloppy or Thin and Bland

Recall the idealized trading situation, where parties exchange identical goods simultaneously in a small area. In this case, there are few, if any, externalities to the trade but, unfortunately, there are few, if any, trades, as well. The temptation to add market refinement on top of refinement to ensure exchange adequacy, to reduce nonfungibilities, must be tempered by the need for nonfungibilities. The point of using trading as an environmental policy instrument lies precisely in its ability to take advantage of market commodity heterogeneity and different trader utility preferences. People who feel exactly the same about small blue marbles will not trade small blue marbles among themselves if the marbles are indistinguishable, i.e., perfectly fungible. To have a trading market, we have to include differences in the marbles, differences in the way people feel about those differences, and have enough of the marbles and marble lovers to engage in active trading.<sup>97</sup>

95. Despite the goal of creating an even distribution of habitat types, market participants have no incentive to abide by that goal and feel no cost when they ignore it. It is external to the transactions.

96. Equally, the ratio between type A and B habitat could be changed to act as an insurance buffer against further development of type A habitat. Wetland mitigation trades often employ ratios, e.g., giving up one acre of wetland for two acres of restored wetlands. This essentially discounts for the expected failure rate and uncertainty in restored wetlands. This decisionmaking under uncertainty, though, may be one of false precision since, in any particular case, a 2:1 or 3:1 ratio might be no better than 1:1 if the currency fails to capture important measures.

97.

If there is no difference in costs of control among sources under a bubble, there will be no advantage to market trading. . . . Thus, the power of bubbles to improve efficiency and save costs is a function of how broadly they can be extended in time and space and across risks.

Elliott & Charnley, *supra* note 1, at 50; see also Powers, *supra* note 28, at 198 ("A rational basis for trading exists only if there is a substantial difference among dischargers in controlling a given amount of pollution."); Frank S. Arnold, *SO<sub>2</sub> Trading Success Not Easily Replicable*, ENVTL. F., May/June 1999, at 11 ("The situations that are tailor-made for tradable permit systems are those in which many sources with substantially different abatement costs all contribute to create an environmental problem, but polluters' locations and other characteristics have no effect on the damages.").



This is no less true in environmental trading markets. Someone willing to buy 20 acres of mitigation bank wetlands in return for authorization to destroy 10 acres of wetlands 5 miles away from the bank has made a decision that the trade is worth it, and so have the regulatory entity approving the trade and the wetland bank selling the bank acres. The project developer weighed the trade based on the dollar investment return potential, as did the wetlands bank, and the agency weighed it based on the conservation return potential. The trade could only occur because the acres were in different locations and the developer, bank, and agency had different utility preferences for those acres. In short, for environmental policy to tap into the advantages of market trading efficiency, there must be markets within which to trade and traders willing to engage in trades.

In highly constructed environmental trading markets, however, the market may become too "thin" to accommodate a meaningful volume of trading. In the previous habitat trading arbitrage scenario, for example, if in our quest to root out the arbitrage we subdivide the original trading area too finely, we are left with many small geographic markets within which there is no arbitrage but, equally, no trading. Or, if trades are allowed only between like habitat types, supply deficiencies may make trading difficult and limited in scope and duration. The smaller the trading zones, in any of the three dimensions of type, space, and time, the fewer the trading opportunities.<sup>98</sup>

Therein lies the fundamental trade off in environmental markets that rely on exchange restrictions to compensate for crude currency design. Markets require heterogeneity of goods and participants (over type, space, and time) and an ample supply of each. The success of an ETM is a direct function of the parties' variance across important dimensions. A "fat" or thick market would impose loose or no restrictions on those market dimensions, posing no transaction costs to traders besides complying with the rules. This is fine if currency adequacy is achieved—if the currency can meaningfully capture these differences and allow informed comparisons. But in the absence of effective currency design, heterogeneity also carries with it the potential for externalities. Fat markets are sloppy. We can attempt to plug the externality holes by constricting the type, space, and time heterogeneity of the market, but in so doing we weaken the market's trading potential.<sup>99</sup> Thin markets are bland. Un-

til we develop more refined currency instruments, therefore, a significant policy choice in constructed environmental trading markets will be how fat or thin to make the market; that is, how much externality potential we are willing to tolerate in order to take advantage of the perceived efficiency qualities of markets.<sup>100</sup>

This is not a trivial dilemma. When the adequacy of a currency is impeded by lack of information, technology, or money, market design can step in to take over the job of dampening externalities in the market. But when the market commodities are nonfungible in terms of type, space, or time and the currency remains crude, attempting to solve all the problems through market construction techniques runs into the same problem as complex currencies—it may be at the limit of our knowledge and technological capacity. And even where knowledge and technology are available to perfect trading currencies, the expense associated with valuing the traded goods may so increase the transaction costs that no willing traders come forward.<sup>101</sup>

The combination of sloppy currencies and fat markets thus may be the most expeditious way of encouraging trading in the environmental policy context, at least until cheaper ways of perfecting currency design and goods valuation are developed. But then what about the externalities? Clearly, if the goal of increased social welfare is to be preserved in such trading systems, some method of policing individual trades will be required in order to exclude trades that cause unacceptable externality problems. We explore this issue in Part IV's discussion of review adequacy. To make that analysis more concrete, and further explore the dynamic between currency selection and market constraints described in Parts I and II, we narrow our focus in Parts III and IV to habitat ETMs. While the lessons we raise hold true for other ETMs, the problems of nonfungibilities are clearest, and most difficult, in the contexts of wetlands mitigation banking and habitat conservation plans (HCPs).

98.

[A] system that limits the number of likely traders or that segments the market into distinct subgroups increases the risk that the number of buyers and sellers will be inadequate to support a thick market. The two-phase approach of the [SO<sub>2</sub>] program, the geographic segmentation in the offset and banking programs, and the separate treatment under the offset program of new and existing sources all illustrate this effect. In contrast, the lead phasedown's success stems at least partly from its uniform regulation of relatively homogeneous entities.

Sohn & Cohen, *supra* note 12, at 432-33; see also Tietenberg II, *supra* note 30, at 106 (describing how small zones reduce trading opportunities); Hahn I, *supra* note 10, at 6 (stating that in thin markets price taking behavior can no longer be assumed, even as a rough approximation).

99. Clearly, not all exchange restraints cause excessively thin ETMs. There exists a continuum along which restrictions become increasingly burdensome for trading parties. The point at which the marginal loss of trading parties creates markets that are too thin will depend on the particular ETM and the type of restriction.

100. As a result, economists often argue to keep markets fat and deal with nonfungibility problems on an ad hoc basis. Professor Tietenberg, for example, argues that it's better to implement a basic system around emission permit trades and deal with severe hot spots on a case-by-case basis rather than create rigid zones or wholesale trade restrictions.

Economic models of the trading process formulate the problem as searching for the lowest cost solution subject to the constraint that trading equilibrium can result in the violation of an ambient concentration constraint. The control authority rules which govern the trades of nonuniformly mixed pollutants are usually not consistent with this formulation for the simple reason that they disallow any trades which unacceptably increase the concentrations in any subportion of the region even if those trades do not result in a violation of the ambient constraint. The failure to accept those trades can increase the cost of pollution control considerably.

Tietenberg I, *supra* note 4, at 254; see also Mendelsohn, *supra* note 10, at 312 (arguing that dense central cities should be treated as separate markets, while rural and suburban counties should be combined under a single standard).

101. See, e.g., Hahn II, *supra* note 23, at 97-98 (recounting the history of the Fox River Water Permit system in Wisconsin, where the system's complexity and uncertainty over property rights led to only one trade in the first six years of the program); see also Arnold, *supra* note 97, at 11 ("Clearly, when the same emissions from different sources cause different amounts of harm, the modeling efforts and administrative costs necessary to implement a trading program that will reliably achieve the environmental improvement target are far greater than for [SO<sub>2</sub>] and similar cases.").

### III. Currencies and Market Constraints in the Real World—Wetlands Mitigation Banking

The success of ETMs in the SO<sub>2</sub> and similar pollutant trading programs has buoyed efforts to expand trading into other environmental contexts where nonfungibility is more acute, most notably habitat protection. For example, after leaving it dormant for almost a decade, the U.S. Fish and Wildlife Service (FWS) recently discovered the so-called HCP provision of the Endangered Species Act (ESA)<sup>102</sup> and leveraged it as a way of allowing land development that degrades endangered species habitat by preserving or enhancing endangered species habitat elsewhere. In other words, a developer can swap acres of endangered species habitat here for acres of endangered species habitat there.<sup>103</sup> This program, with vigorous official support,<sup>104</sup> is gaining tremendous momentum and has already accounted for hundreds of thousands of acres swapped.<sup>105</sup> But there may be good reason to question whether the trading success of the SO<sub>2</sub> program can easily be duplicated in the habitat context. Can a trading market for habitat be so easily established? Should the currency be acres, or something more refined such as a measure of functional value of the acres? And if the currency turns out to be imprecise, how easy will it be to weed out externalities through market constrictions without making the market too thin? The fact that these questions have been relatively easy to solve in some pollutant trading contexts does not necessarily mean that HCPs and other new wave habitat trading programs will have the same experience.

Indeed, an example of how the HCP and other habitat trading programs may fare under the trend toward aggres-

sive use of ETMs in environmental policy is provided through the wetland mitigation banking experience, a habitat trading program that has been in existence, and thus "field tested," for over a decade.<sup>106</sup> In wetlands mitigation banking, a "bank" of wetlands habitat is created, restored, or preserved and then made available to developers of wetlands habitat who must "buy" habitat mitigation as a condition of government approval for development. Building off the purported success of the wetlands program, current habitat trading proposals have increasingly been packaged as mitigation banking constructs.<sup>107</sup> Proponents of using mitigation banking in HCP contexts, for example, argue that "[d]eveloping *intelligent* policy for endangered species mitigation banking should not take as long as it did for wetland mitigation banking."<sup>108</sup> That assumes, of course, that wetland mitigation banking has developed into an intelligent policy and that replicating the wetlands model in endangered species habitat banking also would be an intelligent move. We question both assumptions, and thus have chosen wetlands mitigation banking as a case study to explore the lessons it offers for the use of ETMs when trading involves significant nonfungible environmental features.

#### A. Establishing the Wetlands Trading Market

Like any other ETM, the basis for wetlands trading is a regulatory proscription of behavior followed by regulatory permission of the behavior under controlled conditions.<sup>109</sup> In this case the behavior is filling of wetlands. Thus, although CWA §311 broadly prohibits "the discharge of any pollutant by any person,"<sup>110</sup> which as defined would prevent filling of

102. 16 U.S.C. §1539(a)(2), ELR STAT. ESA §10(a)(2). Although Congress added the HCP provision to the ESA in 1982, it was not until the early 1990s that the FWS began issuing any appreciable number of HCP permits. By 1992, for example, the FWS had issued only 12 HCP permits, whereas it had issued 225 by October 1, 1997. See DEFENDERS OF WILDLIFE, FRAYED SAFETY NETS vi-xiii (1999). For background on these developments and the HCP program in general, see Eric Fisher, *Habitat Conservation Planning Under the Endangered Species Act: No Surprises and the Quest for Certainty*, 67 U. COLO. L. REV. 371 (1996); Shi-Ling Hsu, *The Potential and the Pitfalls of Habitat Conservation Planning Under the Endangered Species Act*, 29 ELR 10592 (Oct. 1999); Albert C. Lin, *Participants' Experiences With Habitat Conservation Plans and Suggestions for Streamlining the Process*, 23 ECOLOGY L.Q. 369 (1996); J.B. Ruhl, *How to Kill Endangered Species, Legally: The Nuts and Bolts of Endangered Species Act "HCP" Permits for Real Estate Development*, 5 ENVTL. LAW. 345 (1999); Barton H. Thompson Jr., *The Endangered Species Act: A Case Study in Takings and Incentives*, 49 STAN. L. REV. 305 (1997).
103. See Hsu, *supra* note 102, at 10594-600 (describing the HCP negotiation process between agency and permittee, and concluding that HCPs may provide environmental benefits when "valuable habitat and low-quality development land is exchanged for valuable development land and low-quality habitat"); Ruhl, *supra* note 102, at 391-96 (describing the HCP mitigation negotiation process).
104. For example, the FWS has published a lengthy handbook describing the steps required to obtain an HCP permit. See FWS & NATIONAL MARINE FISHERIES SERVICE, *ENDANGERED SPECIES HABITAT CONSERVATION PLANNING HANDBOOK* (1996) [hereinafter HCP HANDBOOK]; see also Hsu, *supra* note 102, at 10594-99 (describing various official statements in favor of HCP permitting).
105. For an excellent statistical summary of the 208 HCP permits that the FWS had issued nationally by August 1997, including acreage statistics, see National Center for Ecological Analysis and Synthesis & American Institute of Biological Sciences, *Using Science in Habitat Conservation Plans* (1999), at <http://www.nceas.ucsb.edu/projects/hcp>. HCP permits cover areas within which swapping takes place that vary widely in terms of size, with some covering a few acres while others cover in excess of 1.6 million acres. *Id.* at 19-20.

106. For a comprehensive analysis of the wetlands mitigation banking concept and its history, see ELI-WETLAND, *supra* note 11 (also available in substantially the same form at ROBERT BRUMBAUGH & RICHARD REPERT, WATER RESOURCES SUPPORT CENTER, INSTITUTE FOR WATER RESOURCES, U.S. ARMY CORPS OF ENGINEERS, NATIONAL WETLANDS MITIGATION BANKING STUDY: FIRST PHASE REPORT (1994)); Gardner I, *supra* note 11.

107. See Michael J. Bean & Lynn E. Dwyer, *Mitigation Banking as an Endangered Species Conservation Tool*, 30 ELR 10537, 10537 (July 2000) ("Today, mitigation banking for endangered species is much like wetland mitigation banking nearly two decades ago."); ENVIRONMENTAL DEFENSE FUND (EDF), *MITIGATION BANKING AS AN ENDANGERED SPECIES CONSERVATION TOOL* (1999), available at <http://www.environmentaldefense.org/programs/Ecosystems/SafeHarbor/pdf/mb.pdf> (last visited Apr. 16, 2001) (providing an overview of the wetland mitigation banking program and describing how it can be employed by analogy in the endangered species habitat context) [hereinafter EDF-ENDANGERED SPECIES]; NATURAL HERITAGE INST., *WHERE PROPERTY RIGHTS AND BIODIVERSITY CONVERGE: LESSONS FROM EXPERIENCE IN HABITAT CONSERVATION PLANNING* 26 (2000) ("Mitigation banking can achieve habitat goals in an economically efficient manner and can reconfigure habitat in ways that traditional HCPs cannot.").
108. Bean & Dwyer, *supra* note 107, at 10537 (emphasis added). For criticism of the trend toward ETMs in the endangered species protection context, see Nancy K. Kubasek et al., *Cross-Examining Market Approaches to Protecting Endangered Species*, 30 ELR 10721 (Sept. 2000).
109. See ELI-WETLAND, *supra* note 11, at 7 ("Demand for compensatory [wetland] mitigation exists only because it is a government-imposed condition on wetland development."); Gardner II, *supra* note 18, at 10077 ("[U]nlike typical markets, regulatory agencies control both the supply of and demand for [wetlands] mitigation."); Jennifer Neal, *Paving the Road to Wetlands Mitigation Banking*, 27 B.C. ENVTL. AFF. L. REV. 161, 181 (1999) ("The market for mitigation bank credits depends upon the demand for credits, which, in turn, depends upon governmental regulation mandating compensatory mitigation for unavoidable wetlands loss.") (citation omitted).
110. 33 U.S.C. §1311(a), ELR STAT. FWPCA §301(a).



wetlands, CWA §404 authorizes the Secretary of the Army to "issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into navigable waters at specified disposal sites."<sup>111</sup> These permits, administered principally through the U.S. Army Corps of Engineers (the Corps) and known ubiquitously as "404 permits," "wetland permits," or "Corps permits," are the cornerstone of federal protection of wetland resources.<sup>112</sup> The permitting program, however, admits of many exceptions and nuances, complicating whether a permit is required for a particular fill activity and how to get one.<sup>113</sup> The point for our purposes is that many routine land development activities require and receive 404 permits. Along the way, permit applicants and the Corps often must confront the issue of "mitigation."<sup>114</sup>

The Corps' guidelines for mitigation provide that 404 permit applications should be reviewed using a "sequencing" approach.<sup>115</sup> The first preference is to require the applicant to avoid filling wetland resources, followed by minimization of adverse impacts to those wetlands that cannot reasonably be avoided, followed by the least desirable

option of providing compensatory mitigation for those unavoidable adverse impacts that remain after all minimization measures have been exercised.<sup>116</sup> With respect to compensatory mitigation, moreover, EPA and the Corps traditionally have preferred on-site to off-site locations for the mitigation activity,<sup>117</sup> and have preferred in-kind mitigation to mitigation that uses a substantially different type of wetland (thus neutralizing nonfungibilities of space and type).<sup>118</sup> Finally, regardless of location, EPA and the Corps value measures that restore prior wetland areas as the highest form of mitigation, followed by enhancement of low-quality wetlands, then creation of new wetlands, and, least-favored of all, preservation of existing wetlands.<sup>119</sup>

Notwithstanding its official status as the least-favored alternative behind avoidance and minimization in the agencies' sequencing pecking order, compensatory mitigation has been the oil allowing the 404 permit program to move forward because it greases the skids of permitting. Compensatory mitigation frees up highly valued wetlands for more comprehensive and flexible development.<sup>120</sup> Building a shopping center around an avoided wetlands site, presumably on choice commercial development land, obviously presents more design constraints and development expenses than transferring the wetlands to some less desirable portion of the property. The developer is in the best position to evaluate these economic efficiencies and knows when the compensatory land swap is superior in that respect to the avoidance strategy. Compensatory mitigation thus has taken some of the "sting" out of 404 permits and reduced the fre-

111. *Id.* §1344(a), ELR STAT. FWPCA §404(a). EPA has the power to veto the U.S. Army Corps of Engineer's (the Corps') permits if it finds the discharge would have an unacceptably adverse effect on environmental resources. *Id.* EPA has exercised this power infrequently. See U.S. EPA, EPA'S CLEAN WATER ACT SECTION 404(C) VETO AUTHORITY (2000), available at <http://www.epa.gov/OWOW/wetlands/facts/fact14.html> (last visited Apr. 17, 2001) ("EPA has completed only 11 'veto' actions out of an estimated 150,000 permit applications received since the regulations went into effect in October 1979"); see generally S. Scott Burkhalter, *Oversimplification: Value and Function: Wetland Mitigation Banking*, 2 CHAP. L. REV. 261, 267 (1999); Gardner I, *supra* note 11, at 536 n.48.

112. With respect to federal Corps' jurisdiction under the 404 program, early in the program's history judicial interpretation required the Corps to extend its reach to tidal wetland areas. See *Natural Resources Defense Council v. Callaway*, 392 F. Supp. 685, 686, 5 ELR 20285, 20285 (D.D.C. 1975) (declaring that the term "navigable waters" as used in the CWA is not limited to the "traditional tests of navigability"). Since then the courts have upheld Corps' efforts to extend its jurisdiction even further inland. See, e.g., *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 139, 16 ELR 20086, 20090 (1985) (upholding regulation of wetlands "adjacent to the waters of the United States"). *But see* *Solid Waste Agency of N. Cook County v. Corps of Eng'rs*, 531 U.S. 159, 31 ELR 20382 (2001) (Corps' jurisdiction does not extend to isolated non-navigable waters such as ponds and mudflats).

113. For a concise description of the §404 permitting process, see Burkhalter, *supra* note 111, at 267-74; Margaret N. Strand, *Wetlands: Avoiding the Swamp Monster*, in ENVIRONMENTAL ASPECTS OF REAL ESTATE TRANSACTIONS 720-56 (James B. Witkin ed., 2d ed. 1999).

114. For a survey of environmental laws using mitigation techniques to achieve compliance with regulatory requirements, see Thomas J. Schoenbaum & Richard B. Stewart, *The Role of Mitigation and Conservation Measures in Achieving Compliance With Environmental Regulatory Statutes: Lessons From Section 316 of the Clean Water Act*, 8 N.Y.U. ENVTL. L.J. 237 (2000). Schoenbaum and Stewart define mitigation generally as any measure "aimed at reducing or eliminating the adverse environmental stresses imposed by a facility, project, or activity." *Id.* at 237. They divide mitigation into "source-based" methods designed "to achieve this objective by imposing technology-based controls or other regulatory requirements on the source of the stress," and "ecosystem-based" methods that "reduce or eliminate source-imposed stresses by enhancing the affected ecosystem or providing replacement or substitute resources for those affected." *Id.*

115. 33 U.S.C. 1344(b), ELR STAT. FWPCA §104(b). Section 404 does not mention a mitigation requirement for permit issuance. Rather, this provision of the statute directs EPA, in conjunction with the Corps, to develop guidelines that the Corps must apply in deciding whether to authorize the fill disposal at a wetlands site.

116. See Memorandum of Agreement Between Department of the Army and the Environmental Protection Agency Concerning the Clean Water Act Section 404(b)(1) Guidelines, 55 Fed. Reg. 9210, 9211-12 (Mar. 12, 1990) [hereinafter Memorandum of Agreement]. Section 404 thus uses both source-based mitigation (avoidance and minimization) and ecosystem-based mitigation (compensation). For background on the agencies' sequencing requirement, see ELI-WETLAND, *supra* note 11, at 19-22; Gardner I, *supra* note 11, at 535-39.

117. See Memorandum of Agreement, *supra* note 116, at 9211. For background on the agencies' preference for on-site mitigation, see ELI-WETLAND, *supra* note 11, at 30-32, 56-57.

118. See Memorandum of Agreement, *supra* note 116, at 9211. For background on the agencies' preference for in-kind mitigation, see ELI-WETLAND, *supra* note 11, at 58-59. Wetland ecologists generally divide wetlands into seven major types, within which there is tremendous variation from region to region in terms of physical characteristics and functions. See *id.* at 25-29.

119. See Memorandum of Agreement, *supra* note 116, at 9211. For background on the agencies' mitigation type preferences, see ELI-WETLAND, *supra* note 11, at 53-55. Another variation of compensatory mitigation is to dispense with the identification of mitigation habitat, whether on-site or in off-site banks, and simply allow the developer to pay a fee that can be used later to finance habitat restoration, creation, enhancement, or preservation. For a thorough discussion of these so-called in-lieu fee methods, criticizing their use in wetland protection contexts, see Gardner III, *supra* note 67.

120. The economics are very straightforward. As King describes:

The market value of an acre of dry land can be as high as a few hundred thousand dollars per acre, even a few million dollars per acre in some prime coastal areas. If the land is a wetland but is "permissible," its market value might be slightly less because developing it would require draining and filling as well as some "compensatory mitigation." The same wetland, if it had no hope of being permitted for development, could have a market value as low as a few thousand dollars per acre.

King, *supra* note 68, at 7.



quency of incidents when 404 permitting is portrayed as unreasonably obstructive.<sup>121</sup>

While attractive in theory, the project-by-project compensatory mitigation approach has been widely regarded as having failed miserably in terms of environmental protection.<sup>122</sup> Whether on-site or near-site, the piecemeal approach complicated the Corps' ability to articulate mitigation performance standards, monitor success, and enforce conditions.<sup>123</sup> Many developers went through the motions of so-called landscape mitigation—planting what was required or regrading where required to meet the minimum letter of the permit—then moved on.<sup>124</sup> As several commentators have observed, “[t]he success record for isolated mitigation projects has been spotty, and few regulators believe that these projects will succeed.”<sup>125</sup>

In light of these problems, the Corps and EPA (supported by many commentators) started shifting compensatory activities from on-site to off-site mitigation, thus opening the

door to the wetlands mitigation banking technique. This approach, its proponents argued, would prove advantageous both in terms of efficiency and ecological benefits, aggregating small wetlands threatened by development into larger restored wetlands in a different location.<sup>126</sup> Defined generally as “a system in which the creation, enhancement, restoration, or preservation of wetlands is recognized by a regulatory agency as generating compensation credits allowing the future development of other wetland sites,”<sup>127</sup> wetlands mitigation banking allows a developer who has mitigated somewhere else in advance of development to draw from the resulting bank of mitigation “credits” as the development is implemented and wetlands are filled. The concept has progressed beyond this personal bank model, however, as large commercial and public wetlands banks, not tied to a particular development, sell mitigation credits to third-party developers in need of compensatory mitigation.<sup>128</sup>

Wetland mitigation banking now resembles a commodity market, with freewheeling, entrepreneurial wetlands banks offering for sale (and profit) finished off-site wetlands as “credits” to anyone who is in need of mitigation for their 404 permits.<sup>129</sup> It is precisely this technique that the Corps and EPA officially endorsed in their 1995 *Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks (Federal Guidance)*, articulating a standard review proce-

121. See Gardner I, *supra* note 11, at 586 (“The federal retreat from strict sequencing is an attempt to provide regulatory relief to small landowners and small businesses.”). One study of commercial wetlands mitigation banks concluded that “it is the practice of regulators to relax the first two sequencing requirements—avoidance and minimization of wetland impacts—if the wetland that will be impacted is of low to mid quality,” thus creating a market for mitigation. Shirley Jeanne Whitsitt, *Wetlands Mitigation Banking*, 3 ENVTL. LAW. 441, 463-64 (1997).

122. See, e.g., Bean & Dwyer, *supra* note 107, at 10538-39 (“The track record of traditional, project-by-project wetland mitigation is dismal.”); Gardner I, *supra* note 11, at 540 (“The failure of compensatory mitigation is wetland regulation’s dirty little secret.”); Veltman, *supra* note 9, at 670 (“The California State Coastal Conservancy sponsored a review of [58] permits issued for creation and restoration projects in the San Francisco Bay area between 1978 and 1983. The report found that only 2 of the 58 projects could be deemed successful.”).

123. See Michael S. Rolband et al., *Wetlands Banking for Sound Mitigation? Yes, Virginia*, NAT’L WETLANDS NEWSL., May/June 1999, at 4 (“Off-site non-bank mitigation, authorized by individual project permits, is difficult to administer, monitor, and enforce.”).

124. As one wetlands restoration expert has put it, “it is easier and cheaper to hire, say, a landscaper who will design and build something that looks green and wet . . . than hire a restoration expert.” Keith Bowers, *What Is Wetlands Mitigation?*, LAND DEVELOPMENT, Winter 1993, at 28, 33.

125. Lawrence R. Liebesman & David M. Plott, *The Emergence of Private Wetlands Mitigation Banking*, 13 NAT. RESOURCES & ENV’T 341 (1998) (discussing a Florida state agency study finding a 27% success rate of such projects); Gardner I, *supra* note 11, at 540-42 (discussing the Florida study); see also ELI-WETLAND, *supra* note 11, at 31 (discussing the dismal record of piecemeal on-site mitigation projects); CHESAPEAKE BAY FOUND., MARYLAND NONTIDAL WETLAND MITIGATION: A PROGRESS REPORT 30-39 (1997) (discussing independent study finding poor record of compensatory mitigation). It is also worth noting that while compensatory wetland mitigation policies relying primarily on wetland creation can result in no net loss of wetlands, they are likely to result in overall loss of habitat since the land being converted to wetlands usually is already open space. That is, the net result is less undeveloped land than before. Compensatory mitigation that relies on enhancement or preservation of existing wetlands is likely to produce a net loss of wetlands. See Alyson C. Flournoy, *Preserving Dynamic Systems: Wetlands, Ecology, and Law*, 7 DUKE ENVTL. L. & POL’Y F. 105, 128-29 (1996). Under any compensatory approach, of course, there is no guarantee that the mitigated site would have remained undeveloped indefinitely, but even in this sense the compensatory mitigation approach can present a baseline problem. Wetlands are dynamic systems. By considering only existing wetlands in deciding what should be protected, compensatory mitigation stifles the process of wetlands creation, e.g., the hardening of coastal shorelines. The result is an “invisible loss of wetlands” that are not naturally created and will never have the chance to become so. Interview with Alyson C. Flournoy, Professor, University of Florida School of Law (Apr. 28, 2000).

126. Veltman summarizes the rationales cited for shifting from on-site to off-site mitigation locations and from small- to large-scale of mitigation sites:

[O]ffsite mitigation provides a greater selection of hydrologically and ecologically favorable locations, thus increasing the opportunity for a well-functioning replacement. Additionally, offsite projects can be joined into one large mitigation, which is beneficial because “larger wetland systems are generally more self-sustaining. They can provide habitat for more types of species, a longer and more self-sustaining food chain, more habitat niches, and a wider variety of habitat types—which, in turn, can better accommodate ecosystem succession, migration, and change.” Thus, the presumption in favor of onsite versus offsite mitigation often encourages, rather than prevents, poorly designed wetlands that will either fail or, if viable, provide a nonequivalent replacement.

Veltman, *supra* note 9, at 673 (citations omitted); see also Michael Rolland, *The Systemic Assumptions of Wetland Mitigation: A Look at Louisiana’s Proposed Wetland Mitigation and Mitigation Banking Regulations*, 7 TUL. ENVTL. L.J. 497, 510-11 (1994) (noting also that on-site mitigation “puts the mitigation for wetlands loss in the hands of a sometimes hostile developer”).

Notwithstanding these oft-cited benefits, replacing many small “postage stamp” wetlands with large contiguous mitigation projects is not necessarily always a desirable approach, as research indicates that some systems of small isolated wetlands provide more biodiversity value than a large contiguous wetland of the same type. In sufficient abundance and proximity, small isolated wetlands provide greater variability of conditions, insurance against natural perturbations, and source-sink population dynamics than can a contiguous wetland of equal total size. Moreover, the desirability of either kind of wetland habitat will depend on the particular species in mind, thus a policy favoring large contiguous wetlands necessarily disadvantages species that depend on systems of small isolated wetlands. See Raymond D. Semlitsch, *Size Does Matter: The Value of Small Isolated Wetlands*, NAT’L WETLANDS NEWSL., Jan./Feb. 2000, at 5.

127. See ELI-WETLAND, *supra* note 11, at 3.

128. See Gardner I, *supra* note 11, at 581-87; Jonathan Silverstein, *Taking Wetlands to the Bank: The Role of Wetland Mitigation Banking in a Comprehensive Approach to Wetlands Protection*, 22 B.C. ENVTL. AFF. L. REV. 129, 145 (1994).

129. There are over 70 such commercial mitigation banks operating in the United States today. See Liebesman & Plott, *supra* note 125, at 341.

ture for establishing and using wetlands banks in the 404 permit process.<sup>130</sup> With the support of federal agencies, as well as many environmental advocacy groups,<sup>131</sup> land development interests,<sup>132</sup> and academics,<sup>133</sup> the wetlands mitigation banking program has blossomed since the late 1980s.<sup>134</sup> In a wide range of fora, its advocates have contended that off-site mitigation banking should be preferred over on-site or near-site compensatory mitigation because of greater efficiency, scale effects, and environmental protection.<sup>135</sup>

130. See Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks, 60 Fed. Reg. 58605 (Nov. 18, 1995) [hereinafter Federal Guidance]. See generally Gardner I, *supra* note 11, at 563-69. A prospective bank sponsor must submit a prospectus to the Corps. The relevant federal and state agencies, known as the Mitigation Bank Review Team, use the prospectus to evaluate the merits of the bank pursuant to the sequencing approach and other preferences applicable to compensatory wetlands mitigation in general. The agencies and the bank sponsor then negotiate a banking instrument outlining all the details of bank objectives, ownership, operation, and enforcement. Finally, the proposed bank instrument is submitted for public notice and comment before a final bank instrument is implemented. A number of states have also provided statutory or regulatory frameworks for using commercial wetlands mitigation banks in satisfaction of state wetlands protection laws. See ELI-WETLAND, *supra* note 11, at 16-18; Gardner I, *supra* note 11, at 569-77; Rolland, *supra* note 126, at 511-44.
131. See ELI-WETLAND, *supra* note 11, at 153 (concluding that wetlands mitigation banking can offer ecological advantages to on-site mitigation in some instances and "can also provide economies of scale and greater regulatory certainty").
132. See Liebesman & Plott, *supra* note 125, at 371 (touting wetlands mitigation banking as "an innovative, market-based solution for many of the problems with the existing wetlands regulatory system").
133. See Gardner I, *supra* note 11, at 557-62 (advocating the ecological and efficiency benefits of wetlands mitigation banking).
134. Brumbaugh, manager of the Corps' Institute for Water Research National Wetlands Mitigation Banking Study, reports that there were five banks in operation in 1985, 40 in 1992, and more than 100 in 1995 with hundreds more in development at that time. See Robert W. Brumbaugh, *Wetland Mitigation Banking: Entering a New Era*, WETLANDS RES. PROGRAM BULL., Oct./Dec. 1995, at 3 & fig. 1, at <http://www.wes.army.mil/el/wrtc/wrp/bulletins/v5n3/brum.html> (last visited Apr. 16, 2001). An annual national conference on wetlands mitigation banking, now in its third year of production, has sponsors including the Corps, EPA, and a wide variety of private and public entities and pitches itself to mitigation bankers, landowners, developers, regulators, local government, suppliers, nurseries, engineers, and a host of others interested in banking policy and methods. See Third National Mitigation Banking Conference: Learn About Wetlands, Habitat, and Conservation Banking (brochure for May 17-19 conference, Denver, Colo.).
135. The Corps and EPA claim that:

Mitigation banks provide greater flexibility to applicants needing to comply with mitigation requirements and can have several advantages over individual mitigation projects, some of which are listed below:

1. It may be more advantageous for maintaining the integrity of the aquatic ecosystem to consolidate compensatory mitigation into a single large parcel of contiguous parcels when ecologically appropriate;
2. Establishment of a mitigation bank can bring together financial resources, planning and scientific expertise not practicable to many project-specific compensatory mitigation proposals. This consolidation of resources can increase the potential for the establishment and long-term management of successful mitigation that maximizes opportunities for contributing to biodiversity and/or watershed function;
3. Use of mitigation banks may reduce permit processing times and provide more cost-effective compensatory mitigation opportunities for projects that qualify;
4. Compensatory mitigation is typically implemented and functioning in advance of project impacts, thereby re-

If these arguments seem similar to those advanced on behalf of mainstream ETMs versus the command-and-control model of regulation, it is no coincidence. Notwithstanding the substantial expense and procedural rigor associated with establishing a commercial wetlands mitigation bank, the program, both conceptually and by official endorsement, has all the makings of a habitat trading market. One commentator describes it as "akin to a commercial paper transaction: Party A (the credit producer) informs Party B (the regulatory agency) that the credits should be released to Party C (the entity with mitigation requirements)."<sup>136</sup> The Corps succinctly describes this feature of commercial wetlands banks as "an implicit move away from a rigid, onsite, in-kind preference for piece-meal compensatory mitigation towards a broader-based trading system that takes advantage of qualitative differences among wetlands and that can use the potential economic profits from the development of some low-valued wetlands (that may be doomed in any event)."<sup>137</sup>

Indeed, the wetlands mitigation banking experience suggests that, like the pollutant trading context, laws requiring mitigation of habitat destruction easily can be adapted into laws allowing habitat trading. In addition to wetlands mitigation banking, the ESA HCP program now seems well on its way to evolving into a full-blown ETM. Indeed, the FWS has recently endorsed endangered species habitat banking as a new method of satisfying HCP endangered species habitat mitigation requirements.<sup>138</sup> Whether the HCP and similar habitat trading markets can control for nonfungibilities as effectively as some of the air pollutant ETMs, however, is a different question. Currency selection is the critical first step in evaluating the degree to which a habitat trading market will face the nagging problems of externalities and trades that reduce social welfare.

### B. Currency Adequacy

To ensure equivalent trades of wetlands, the currency must incorporate important values provided by both the wetlands to be lost and the wetlands used for mitigation. Of course, this begs the questions of what the relevant values are, how we measure them, and how we reflect them in a conve-

ducting temporal losses of aquatic functions and uncertainty over whether the mitigation will be successful in offsetting project impacts;

5. Consolidation of compensatory mitigation within a mitigation bank increases the efficiency of limited agency resources in the review and compliance monitoring of mitigation projects, and thus improves the reliability of efforts to restore, create or enhance wetlands for mitigation purposes; [and]

6. The existence of mitigation banks can contribute towards attainment of the goal for no overall net loss of the nation's wetlands by providing opportunities to compensate for authorized impacts when mitigation might not otherwise be appropriate or practicable.

See Federal Guidance, *supra* note 130, at 58607. Banking also avoids the threat of takings claims that may arise from exercising the avoid and minimize requirements of sequencing. See *infra* note 209. For a discussion of takings claims generally in the wetlands regulation context, see Robert Meltz, *Wetlands Regulation and the Law of Regulatory Takings*, 30 ELR 10468 (June 2000).

136. See Gardner II, *supra* note 18, at 10075.

137. See Brumbaugh, *supra* note 134, at 4.

138. See HCP HANDBOOK, *supra* note 104, at 3-21; see also Ruhl, *supra* note 102, at 395-96.



niently traded currency.<sup>139</sup> If all we care about in wetlands protection is acres of wetlands, then the job is simple—identify wetlands and count up the acres. But if we care about the delivery of the functional value of wetlands to the environment and society, acres leave much to be desired as a currency for trading wetlands. Not all wetland acres are created equal—they are nonfungible when their ecosystem service values are considered.<sup>140</sup>

If mitigation banking encompasses trades between nonfungible wetlands, i.e., involving different types of wetlands, wetlands in different watersheds, and wetlands lost and restored in different time frames, the range of values traded broadens, and thus the need for a refined currency becomes more acute. If the currency does not accurately capture the value sought to be measured, e.g., the habitat service, the flood control service, the water filtration service, we have less reason to be confident in the equivalency of trades. Developing and using a wetland assessment methodology that measures these and other relevant values, or some reliable indicia thereof, would thus be the critical first step in developing a framework for wetland mitigation banking that allows open trades based on a universally accepted currency.<sup>141</sup>

The Corps has granted broad discretion to state and local authorities to select currencies.<sup>142</sup> Roughly 40 different wetlands assessment methods have been used, varying in terms of the type of habitats in which the method is used, the basic targets of assessment, and the functional and social values encompassed in the assessment.<sup>143</sup> Over one-half of the methods go beyond assessment of habitat suitability to encompass some assessment of wetland function, but many of these function-based methods are bounded by limitations on type of habitat for which the method can be used, e.g.,

coastal wetlands only, and limited in terms of the functions assessed, e.g., limited to avian species functions.<sup>144</sup> Moreover, the data requirements for these advanced methods are significant.<sup>145</sup> Given the specific focus and data-hungry techniques of the more advanced assessment methods, the choice between counting acres and conducting in-depth scientific research for each trade makes currency selection in wetlands banking a critical threshold issue for the trading program's structure.

Reviews of wetland assessment methodology theory and practice conducted since banking sprang onto the scene in 1985 have categorized assessment methods into three major types:

*Simple indices* are derived from quickly and easily observed characteristics of a wetland, and usually serve as surrogate "indicators" of one or more ecological functions [e.g., percent cover of aquatic vegetation].

*Narrowly tailored systems* attempt to measure directly a limited range of wetland services, such as wildlife habitat, through a detailed procedure focusing on that particular wetland service [e.g., percent duck habitat].

*Broadly tailored systems* examine a range of wetland functions covering a number of observable characteristics.<sup>146</sup>

Simple index methods, such as counting acres, make mitigation banking easier and less costly, but "are often the least sensitive to wetlands values and functions. Also, most simple indices do not take into account scale effects."<sup>147</sup> Clearly, it would be difficult to integrate ecosystem service valuation into wetlands mitigation banking programs relying on simple index methods. Similarly, narrowly tailored methods, such as those attempting to evaluate habitat values, are generally focused on specific habitat types or species, and thus can result in "mitigating to the test"—that is, driving the banking process toward the favored habitat type or species. Also, "comparing cumulative [habitat units] for different sets of species involves risks inherent in comparing apples and oranges."<sup>148</sup> In other words, the narrowly tailored methods fail to produce a currency that can be reliably used across nonfungible features of assessment, suggesting that these methods will not successfully integrate all the value measurements needed if the goal is to produce a currency applicable across nonfungible biological, economic, and social factors. Thus, the Environmental Law Institute (ELI) concludes, "[f]or wetland managers concerned about the spectrum of functions provided by a wetland, there is no substitute for a carefully considered, broadly tailored analysis."<sup>149</sup>

In practice, however, these broader assessment methods tend to be expensive and to produce reams of qualitative results that, for ease of comparison, wetlands managers tend to reduce to quantitative value scores that often mask the ecological rationales.<sup>150</sup> Indeed, comprehensive reviews in

139. The critical junctures at which currency selection must be incorporated into wetlands mitigation banking decisionmaking to efficiently regulate externalities are at the wetlands assessment and wetlands trading stages. ELI describes these as the "[c]redit definition and valuation" issues, and recognizes that they are the most complex issues in mitigation banking. See ELI-WETLAND, *supra* note 11, at 77.

140. For an excellent description of why they are not fungible, see Dennis M. King & Luke W. Herbert, *The Fungibility of Wetlands*, NAT'L WETLANDS NEWSL., Sept./Oct. 1997, at 10. Indeed, research increasingly points to the fact that habitat qualities vary tremendously over geographic space, with some areas providing "hot spots" of biological diversity far in excess of others. See Norman Myers et al., *Biodiversity Hotspots for Conservation Priorities*, 403 NATURE 853 (2000) (noting that 25 hot spots comprising 1.4% of the earth's surface house as many as 44% of all vascular plant species and 35% of all species in four vertebrate groups).

141. Wetland function assessment methods "attempt to establish, in either a qualitative or quantitative fashion, the nature and extent of different services which a wetland may provide. Once those services are known, they may be translated into a 'currency' which can serve as the medium of trade for a wetland mitigation bank." ELI-WETLAND, *supra* note 11, at 77.

142.

Because wetlands are complex and incompletely understood, it is difficult to assign a quantitative number to their value. Instead of confronting this difficulty head-on, the Corps-EPA Mitigation [Memorandum of Agreement] provides broad guidelines for valuing wetlands, leaving local permitting authorities with virtually unfettered discretion in determining whether a just compensation for destroyed wetlands has been achieved.

Veltman, *supra* note 9, at 673-74.

143. See CANDY C. BARTOLDUS, *A COMPREHENSIVE REVIEW OF WETLAND ASSESSMENT PROCEDURES: A GUIDE FOR WETLAND PRACTITIONERS* (1999).

144. *Id.* tbls. 1-3.

145. *Id.* tbl. 3.

146. ELI-WETLAND, *supra* note 11, at 78.

147. *Id.* at 89.

148. *Id.* at 90. For example, if we measure habitat value based on what makes good habitat for ducks, which for a variety of institutional reasons many of the habitat-based indices use as the benchmark, we will wind up with more duck habitat and less habitat for species that do not thrive in duck habitat. See *id.* at 36.

149. *Id.* at 90.

150. *Id.* at 91.



1992 and 1993 of wetlands mitigation banks in operation concluded that only a small number employed a broadly tailored method (a comprehensive currency), while among the rest "debiting and crediting transactions are based on two basic currencies—acreage and functional replacement."<sup>151</sup> To determine whether banks established after these studies have adopted more complex currencies, we contacted new banks by telephone and e-mail.<sup>152</sup> We identified and were able to describe in detail 36 banks established after 1994.<sup>153</sup> Overall, we found that simple currency methods continue to dominate.<sup>154</sup>

For the most part, then, wetlands assessment methods in actual use in wetlands mitigation banks have advanced very little from the beginning of the decade, meaning that the trading currency has stagnated at the relatively crude acre-based form.<sup>155</sup> Wetlands mitigation banking entities

seem focused on using the simplest and most expedient assessment method that the relevant regulatory bodies will approve, and the regulatory bodies do not appear widely to require or even encourage a more sophisticated approach.<sup>156</sup> Trades based on gross wetland classes and fixed ratios, e.g., two acres of type A are worth three acres of type B, dominate the wetlands mitigation banking practice. And, so long as the regulatory framework accommodates that practice, there is little reason for those in need of wetlands mitigation banking units to integrate the more complicated, costly, and time-consuming tasks that a refined currency would entail without evidence that it will improve their net trading position. As the ELI report thus aptly concludes, a wetland mitigation bank currency must be:

(1) simple to determine and to monitor, and (2) able to represent a sufficient range of values and functions. None of the existing systems do both of these things well. The multivariate systems are quite useful for onsite, or project-specific, mitigation, but they lack the simplicity for use in banking. The simple systems overlook critical functions.<sup>157</sup>

In practice, the currency choice has been based on the path of least resistance. A comprehensive currency is too expensive to mint<sup>158</sup> and too arduous to use.<sup>159</sup> Given these practical realities, it is no surprise that instead of developing and refining valuation approaches for assessment and

151. Writing in 1994, ELI found four banks used the wetland evaluation technique (WET), a broadly tailored method, and the rest were split between using acre counts (a simple index) and the habitat evaluation procedure (HEP) (a narrowly tailored method). See ELI-WETLAND, *supra* note 11, at app. B. Similarly, in its 1994 First Phase Report of the National Wetland Mitigation Study, the Corps' Institute for Water Resources (IWR) reviewed 44 banks existing in 1992. IWR's conclusions were consistent with those of ELI, finding 12 banks used an inventory method (acres) exclusively, 8 used a function evaluation method (usually habitat units) exclusively, and the other banks used other methods and combinations of methods. IWR counted none using what ELI would call a broadly tailored index method. INSTITUTE FOR WATER RESOURCES, U.S. ARMY CORPS OF ENGINEERS, NATIONAL WETLANDS MITIGATION STUDY: FIRST PHASE REPORT 31-32 (1994).

152. This work was conducted under an EPA STAR grant with Jim Salzman as principal investigator. Abridged results are published in, J.B. Ruhl & Juge Gregg, *Integrating Ecosystem Services Into Environmental Law: A Case Study of Wetlands Mitigation Banking*, 20 STAN. ENVTL. L. J. 365 (2001). For project summary, see *supra* note 71.

153. Nineteen of these banks use an acre-based index; 15 use one of the function-based methods, and 2 use a "best professional judgment" approach. This split between acre-based and function-based methods is consistent with ELI's and IWR's earlier findings. See INSTITUTE FOR WATER RESOURCES, *supra* note 151, at 31-32 (providing pre-1994 data).

154. Indeed, the Corps has been criticized for being unwilling to engage in broad functional measurement in other aspects of the 404 permit program as well, including wetland delineation and permit approval and denial. See Michael J. Mortimer, *Irregular Regulation Under Section 404 of the Clean Water Act: Is the Congress or the Army Corps of Engineers to Blame?*, 13 J. ENVTL. L. & LITIG. 445, 460-73 (1998) (providing an empirical study of Corps actions). Many state wetland protection programs are accused of suffering from the same shortcoming. For example, Maryland has one of the most sophisticated regulatory programs in place for wetlands protection yet it, too, relies on a simple currency. As a Chesapeake Bay Foundation report described, the Maryland Department of the Environment's method "to calculate the amount of mitigation required to compensate for wetland impacts is replacement ratios. While this method considers acreage, vegetation, and to a limited extent, uniqueness, it does not specifically consider wetlands functions gained or lost." CHESAPEAKE BAY FOUND., *supra* note 125, at 10.

155. See Jack T. Chowning, *In-Lieu-Fee Programs Belong Among Mitigation Options*, NAT'L WETLANDS NEWSL., July/Aug. 1999, at 9 ("Dating back to before 1990, an acre-for-acre requirement for mitigation has been the most common starting point for wetland mitigation, because a technical framework for decisionmaking has not been available."); Veltman, *supra* note 9, at 675 ("Despite the availability of these [broad-based] valuation techniques, permitting authorities most often choose to value wetlands purely on number of acres."). One exception is Florida's recent legislative initiative requiring state and local agencies engaged in wetland mitigation banking to adopt a uniform wetland mitigation assessment method that "must determine the value of functions provided by wetlands and other surface waters considering the current conditions of these ar-

eas, utilization by fish and wildlife, location, uniqueness, and hydrologic connection." Fla. H.B. 2365, §4 (2000) (amending FLA. STAT. §373.414(18)). For a discussion of the Florida wetlands mitigation banking program within which this new assessment method will fit, see John J. Fumero, *Environmental Law: 1994 Survey of Florida Law—At A Crossroads in Natural Resource Protection and Management in Florida*, 19 NOVA L. REV. 77, 101-08 (1994).

156. Others concur in this bottomline assessment:

Apart from gaps in scientific knowledge, do we have the funds, expertise, and time to carry out relatively detailed and accurate assessment of wetland functions and values on a wetland-by-wetland or area-wide basis in regulatory or other management efforts? There is no indication from the experience of any federal agency, state, or local wetland program that we can.

Jon Kusler & William Niering, *Wetland Assessment: Have We Lost Our Way?*, NAT'L WETLANDS NEWSL., Mar./Apr. 1998, at 1, 11.

Although the MOA [Memorandum of Agreement] calls for a minimum 1:1 functional replacement, in practice, this has often been read to mean a precisely 1:1 acreage replacement. This occurs as a result of the broad discretion given to permitting authorities to select valuation methods and make compensation decisions.

Veltman, *supra* note 9, at 676.

157. ELI-WETLAND, *supra* note 11, at 91.

158. See Rolland, *supra* note 126, at 513 ("The more functions that are considered when assigning credits, the more likely the exchange will be accurate; yet greater accuracy is also more costly and difficult to determine.").

159. As one study concluded, "as wetland assessment techniques become more complicated and couched in technical language . . . the number of potential users diminishes." Kusler & Niering, *supra* note 156, at 11. Some advocates of wetlands mitigation banking overlook this problem, suggesting the currency difficulties in wetlands ETMs are simply a matter of the Corps' failure to mandate a particular assessment method for all trades. See, e.g., Lisa M. Schenck, *Wetlands Protection: Regulators Need to Give Credit to Mitigation Banking*, 9 DICK. J. ENVTL. L. & POL'Y 103, 120 (2000) ("Since regulators have so many valuation methodologies to choose from, they should select the procedure or combination that provides the most accurate valuation and accounts for the many different wetland types and functions.").

trades, wetlands mitigation banking assessment methods have stagnated in the acre-based and narrow function-based approaches, resulting in the use of relatively crude currencies for wetlands habitat trading purposes.<sup>160</sup>

### C. Exchange Adequacy

Because they fail to account for the significant environmental and social welfare values across space, type, and time, it is difficult to evaluate the environmental performance of an ETM that uses crude currencies. For example, despite claims by the Maryland Department of the Environment that the state had gained 122 acres of wetlands between 1991 and 1996, a Chesapeake Bay Foundation study found that there had been a net loss of 51 acres of wetlands functions.<sup>161</sup> More recently, a study by the National Academy of Sciences was even more damning. Concluding that the "no net loss" goal for maintaining fish and wildlife habitats was not being met.<sup>162</sup> The analytical framework we propose in this Article predicts that crude currencies, such as those derived from the simple index measures of wetland qualities that prevail in wetlands banking programs, will result in tightly constrained trading schemes if the market maker desires to control for environmental externalities. By contrast, sophisticated wetland assessment methods, such as ones that fully reflect wetland function values, can be converted to currencies that limit externalities sufficiently to allow the market maker to permit trades to be made regardless of type, space, and time differences. The comprehensive currency, reflecting function and service value, would make differences in type irrelevant, allow comparison of impact to different locations, and allow discounting for purposes of timing differentials.<sup>163</sup> The wetlands banking program, hamstrung as it is by its crude currency forms, bears out this postulated inverse relationship between currency sophistication and intensity of market constraint.

160. This problem is likely to be more acute in the endangered species habitat context. As EDF has explained, "as a practical matter, our ability to quantify precisely current survival probabilities and the impacts of helpful or harmful actions is rudimentary to nonexistent." EDF-ENDANGERED SPECIES, *supra* note 107, at 31. Turning to acre-based formulas is of little advantage because we "have no neat formula by which to weight [sic] each of these many variables and produce a meaningful index value to assign to the acre." *Id.* Hence, it is "the practical reality that the varied circumstances and needs of particular species will inevitably produce different 'currencies' to define bank credits and debits." *Id.*; see also Bean & Dwyer, *supra* note 107, at 10548-49. The need to mint a currency for each species may price most endangered species ETMs out of reach, or, more likely, lead the ETMs to rely on simple acre-based currencies despite their shortcoming and hope to control externality problems through exchange constraints.

161. See CHESAPEAKE BAY FOUND., *supra* note 125, at i.

162. John Heilprin, *Government Faulted on Wetlands*, Associated Press (June 27, 2001).

163. For example, when Florida recently enacted legislation requiring all state and local agencies engaged in wetland mitigation banking to devise and adopt a uniform functional assessment method, see *supra* note 155, it anticipated the type, space, and time nonfungibilities inherent in the process. The assessment method thus must (1) "account for different ecological communities in different areas of the state"; (2) "determine the value of functions provided by wetlands . . . considering . . . location"; and (3) "account for the expected time-lag associated with offsetting impacts." Fla. H.B. 2365, §4 (2000) (amending FLA. STAT. §373.414(18)). The Florida Department of Environmental Protection has until January 2002 to devise this all-encompassing currency for mitigation banking. We wish them luck.

## 1. Nonfungibility of Type

The preference the Corps and EPA demonstrate for in-kind compensatory wetland mitigation reflects the substantial differences in rarity, time to maturity, and functions that different wetland types exhibit. Because crude currencies such as acres and habitat function fail to capture these complex differences in wetlands, wetlands mitigation banking programs also are reluctant to stray far from a strict in-kind policy. For example, the *Federal Guidance* allows out-of-kind mitigation in banking only "if it is determined to be practicable and environmentally preferable."<sup>164</sup> Even when out-of-kind trading is allowed, however, banks typically impose fixed trading ratios between acres of the wetland types as a surrogate for more precise measurements of comparative function value.<sup>165</sup> In short, as compared to open or fixed ratio out-of-kind trading, "[i]n-kind mitigation requires less understanding of tradeoffs because it is based on the assumption that certain wetland functions . . . will follow the wetland form."<sup>166</sup> The cost of this in-kind requirement, however, is a thinning of the wetlands trading market from all wetlands to the defined in-kind type.

## 2. Nonfungibility of Space

The value of wetlands' services depends fundamentally on their landscape context.<sup>167</sup> Even controlling for type, a bog wetland in Maine may not provide the same function values as one in Oregon, or even one in the next county. And even if it does, it certainly will not deliver the services of nutrient trapping, flood control, or nursery habitat to the same parties. Obviously, however, the preference for on-site mitigation the Corps and EPA have adopted for compensatory mitigation in general cannot apply strictly to wetland mitigation banking. Instead, the concept of a geographically defined "service area" is imposed on wetlands banks to define the area "wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources."<sup>168</sup> In general, service areas should be no larger than the watershed within which the bank is located, unless reaching beyond that market is "practicable and environmentally desirable."<sup>169</sup> Coupled with an in-kind constraint, this service area constraint could significantly

164. *Federal Guidance*, *supra* note 130, at 58611.

165. See ELI-WETLAND, *supra* note 11, at 92. Trading ratios also are often imposed to adjust for different mitigation forms, e.g., restoration versus preservation, and for the general uncertainty that the bank wetlands will exhibit as much acre-for-acre integrity as the filled wetlands. See *id.*

166. *Id.* at 30.

167. See Salzman, *supra* note 63, at 896 ("The value of a wetland's nutrient trapping services, for instance, depends on the location of its out-flow. Does it flow to shellfish beds (high value) or a fast-flowing ocean current (low value)?"). In our EPA grant, we are studying a trade in Florida of inland wetlands for wetlands located on a small island in a river. Even if the two wetlands have the same biophysical capacity, the delivery, and therefore value, of their services will differ significantly. See also ELI-WETLAND, *supra* note 11, at 30 ("[M]ost wetland functions have value because of where they exist in the landscape.").

168. *Federal Guidance*, *supra* note 130, at 58611.

169. *Id.*



further narrow the potential supply of wetlands in the trading market.<sup>170</sup>

### 3. Nonfungibility of Time

One of the purported advantages of wetland banking programs is that the bank has created the wetlands before the credits are drawn, so that the mitigation is secured before the wetlands are filled. In general, therefore, the *Federal Guidance* provides that “[t]he number of credits available for withdrawal (i.e., debiting) should generally be commensurate with the level of aquatic functions attained at a bank at the time of debiting.”<sup>171</sup> With large commercial banks, however, the expense and time involved with establishing functional wetlands, particularly those of types that require long maturation periods, could make the banking cost prohibitive if credits could not be drawn before the bank’s wetland values are fully in place. The *Federal Guidance* thus allows some leeway in the timing requirement, allowing credit withdrawal before equal wetland values are established, if the bank possesses adequate financial assurance and has exhibited a high probability of success.<sup>172</sup> In some cases this policy results in lags of up to six years between the times of wetland destruction and wetland replacement.<sup>173</sup>

170. The spatial fungibility issue is even more complicated in the endangered species context, where strategic siting of bank service areas must account for species movement, habitat succession, and discontinuities in suitable habitat locations. See EDF-ENDANGERED SPECIES, *supra* note 107, at 30-31; Bean & Dwyer, *supra* note 107, at 10537.

171. Federal Guidance, *supra* note 130, at 58611. Studies of wetland restorations have found a remarkably low rate of success. The Florida Department of Environmental Regulation found a success rate of 45% for tidal wetlands creation, 12% for freshwater wetlands creation. Veltman, *supra* note 9, at 669.

172. See Federal Guidance, *supra* note 130, at 58611. Explaining the pressure to relax time restraints, a Corps official has written:

Among the most critical issues that affect the financial success of commercial banks, and thus the willingness on the part of the private sector to get involved in commercial banking, is the timing of debiting versus accrual of credits in the bank. Ideally, mitigation banks are constructed in advance of development projects that result in wetland losses and are seen as a way of reducing uncertainty in the wetlands replacement process. However, virtually all private commercial bank entrepreneurs argue that for their banking ventures to be economically viable, they need to be allowed to sell credits before replacement wetlands are fully functioning or self-maintaining. Allowing a bank to be debited before it achieves a fully functioning stage involves a trade-off between ecologic and economic risks. The later the bank may be debited (along a time continuum from planning through design, construction, and operation), the lower the ecologic risk. However, delays in allowing debiting increase the financial risk to the investor. The private sector generally needs some level of immediate return to justify the financial risk or to supplement initial funding. . . . Private commercial banks implemented to date reflect the value of time. Regulators have allowed debiting (generally to a limited extent) shortly after bank construction, during construction, or even shortly before construction, if there was an approved site plan and appropriate real estate arrangements and financial assurances (such as funds for remedial work, if needed, and for long-term management).

Brumbaugh, *supra* note 134, at 4-5.

173. See Michael G. Le Desma, *A Sound of Thunder: Problems and Prospects in Wetland Mitigation Banking*, 19 COLUM. J. ENVTL. L. 497, 506 (1994).

### D. Fat and Sloppy Versus Thin and Bland

Our findings and those of others suggest that practical constraints on the implementation of more sophisticated assessment methods designed to produce a refined currency for trades—in terms of costs, time demands, and complexity—have prevented wetland mitigation banking from ensuring currency adequacy. Thus, wetlands banking has been forced into the next best alternative—designing market constraints to plug up the holes that the crude currency otherwise leaves open to externalities. Assessment methodology has become the proverbial tail that wags the dog, keeping the wetlands program from tapping the full benefit of market trading efficiency as the market makers (EPA and the Corps) attempt to shore up the weak currency with market constraints.

There is good reason to believe this problem will be endemic to habitat trading programs in general until ecologists can deliver a cheaply calculated, refined currency for habitat values. The cost of valuing the currency in the SO<sub>2</sub> program is low—a ton is a ton. But the cost of creating habitat currencies is either very cheap—an acre is an acre—or, if we demand reliable measures of environmental and social service values, very expensive. Developers have an incentive to use the least expensive currency the government will allow. The government has an incentive not to make the currency too expensive to mint, or no one will use it and the trading program will expire of its own accord.<sup>174</sup> Because of these agency and participant incentives, as described in Part I, the net result has been Gresham’s Law in practice—simple currencies have driven out complex ones. Despite policies mandating that habitat trading ensure equivalent value and function,<sup>175</sup> the experience is that the programs are not administered this way. In practice, most habitat trades to date in wetlands and HCP programs have been approved on the basis of acres, in many instances ensuring equivalence in neither value nor function. If parties have a choice between a complex (and expensive) currency that measures equivalent function or a simple metric, and both deliver a 404 permit, simplicity will always win. Thus, given the choice in the habitat context of acres or complicated measures of value, acreage has won. Moreover, now that the Corps has committed to the mitigation banking program as the ideal of compensatory mitigation, many believe that there is pressure within the Corps to facilitate the program by easing the official avoid-minimize-compensate sequencing policy that has already eroded substantially.<sup>176</sup> Avoiding wetlands and minimizing wetland impacts reduce the demand for mitigation bank credits and thus thin the market. Predictably, the pressures to adopt crude currencies and to keep markets thick combine to allow the seepage of externalities from the wetlands mitigation banking market.

174. For the public choice analysis of agency decisions, see Part IV.B.

175. See Memorandum of Agreement, *supra* note 116, at 9212 (Wetland values shall be determined “by applying aquatic site assessment techniques generally recognized by experts in the field and/or the best professional judgment of Federal and State agency representatives, provided such assessments fully consider ecological functions included in the Guidelines.”).

176. See Bean & Dwyer, *supra* note 107, at 10550 (“[C]onservation interests worry that the practical effect of the mitigation banks is to tempt regulators to skip rather lightly past avoidance and minimization and proceed instead directly to compensation in the form of purchasing credits from a bank.”).



For example, a recent study of wetland banking in Florida found that trades, even in the same watershed, have produced "a transfer of wetlands from highly urbanized, high-population density areas to more rural low-population density areas."<sup>177</sup> The same problem has plagued mitigation banking in Virginia, where a recent study found that most mitigation banks are located in rural areas while most wetland losses take place in urban and suburban areas.<sup>178</sup> In other words, as can be expected from a market efficiency perspective, developers want to develop wetlands where land is dear (urban) and wetland banks want to locate where land is cheap (rural). The existing wetlands mitigation banking framework lets them do so, or at least fails to scrutinize the externality effects of the practice. The result is trades that move wetlands out of areas where they may provide services to urban populations and into sparsely populated areas. Should we be concerned about this "market-driven 'migration' of wetlands across the urban-rural landscape,"<sup>179</sup> even though it is a reflection of the efficiency of trading? If we care about the equity of who receives wetland services and their value, then the answer is yes, and we should closely examine the redistribution of wetland service values within the environment and between human populations.<sup>180</sup> But if we care primarily about keeping the wetland banking market thick, then the answer is no, for to add another location restriction based on keeping trades within the same "population-shed" would surely thin the market considerably.

Given this state of affairs, the aggressive integration of open trading models into wetlands and other habitat contexts poses concerns for environmental protection. Even the most developed habitat assessment methods presently in use are ill-prepared to produce reliable, inexpensive, and ready measurements of a habitat's environmental and service values. Such measurements require far more money and time to produce on a site-specific basis than developers, habitat bankers, and the government seem prepared to allocate. In the absence of such measurements, the government and environmental groups will likely require at a minimum

constraints on habitat trading markets, i.e., stronger exchange adequacy.

But even the current trading constraints are seen by many as too restrictive. Observers have criticized the *Federal Guidance* for adhering too strictly to the sequencing approach and other conditions applied generally to compensatory mitigation, arguing that "this policy could prevent a banking market from ever emerging."<sup>181</sup> This is the inevitable pressure any regulated market faces when externalities must be controlled through market constrictions rather than through a refined currency—at some point the constraints threaten to swallow the market. Surely a loosening of type, space, and time constraints would make banking more flexible and economically attractive to entrepreneurs, but at what price to the environment?

Indeed, the *Federal Guidance* invites further pressure to restrict the market with its "practicable and environmentally desirable" standard for exceptions to the set of trading constraints. As commercial banking becomes more widespread, it is likely that the criticisms bank sponsors have already lodged against the *Federal Guidance* will intensify if the market for credits does not swell. Moreover, to the extent mitigation banking is intended to replace the project-by-project approach to compensatory mitigation in the regime of 404 permits, the Corps already feels pressure to ensure that the market does not become too thin. And make no mistake, the Corps is feeling pressure to loosen the timing restrictions of the *Federal Guidance* and other exchange adequacy safeguards and has openly discussed relaxation of its restrictions.<sup>182</sup>

At the extreme, of course, land developers and bank sponsors most prefer a nationwide bank of freely transferable credits, and have been pushing for this and relaxation of other restraints.<sup>183</sup> Such relaxation of space, type, and time restraints may seem reasonable if the Corps believes the existing crude wetlands currencies are sufficient. If so, though, it will be banking on sheer serendipity to believe that wetlands banking and other habitat trading programs will produce consistently positive results for the environment. Where pressure is high to keep the market thick and currencies simple, the alternative to leaving matters to chance lies in integrating a mechanism into the market for reviewing bad trades, which leads to the next section of our analysis.

#### IV. Review Adequacy: Designing Approval and Intervention Mechanisms

Once an ETM has designed its currency and imposed trading restrictions to compensate for externalities created by the currency's shortcomings, how does the ETM assess trades? Unlike children trading baseball cards, when trading involves the environment there are interests beyond those of the traders that must be taken into account. The previous dis-

177. King & Herbert, *supra* note 140, at 11.

178. See Ann Jennings et al., *Down Sides to Virginia Mitigation Banking*, NAT'L WETLANDS NEWSL., Jan./Feb. 1999, at 9, 10. The Virginia study also found an increasing trend toward the use of banks in one watershed to compensate for losses in a different watershed. See *id.* at 9-10.

179. King & Herbert, *supra* note 140, at 11. In a similar example, our EPA project is studying a mitigation banking trade in Florida where a wetland near a community was filled in exchange for restoring a wetland on a small island in the middle of a river.

180. We are not suggesting that the shift from urban to rural wetlands is necessarily an unwise policy in all cases. In some settings, the urban wetlands to be developed may be comprised of many small, isolated wetlands of poor quality, whereas the rural mitigation bank may produce a large, contiguous, high-quality habitat. We are suggesting, however, that the shift between the human populations serviced may be significant and thus should be considered in the evaluation of the mitigation banking policy, whereas the Florida and Virginia studies show that it has not been. Moreover, research has revealed the importance of small, isolated wetlands to maintaining biodiversity and habitat for some species, thus the ideal of large, contiguous rural wetlands will not always provide superior environmental value. See *supra* note 126. There is also evidence that restoration of small urban wetlands can yield significant ecological benefits both within the urban area and to distant aquatic systems by controlling urban runoff. See Elizabeth H. Smith & Sandra Alvarado, *Enhanced Wetlands in Urban Landscapes: A Demonstration With the Corpus Christi Bay National Estuary Program*, NAT'L WETLANDS NEWSL., Nov./Dec. 1998, at 9-11.

181. Liebesman & Plott, *supra* note 125, at 342; see also Gardner II, *supra* note 18, at 10075 (stating that the *Federal Guidance* "does not go far enough to encourage private-sector investment in the process of wetland mitigation"); William W. Sapp, *The Supply-Side and Demand-Side of Wetlands Mitigation Banking*, 74 OR. L. REV. 951, 981-90 (1995) (arguing for relaxation of strict sequencing, on-site mitigation preference, and in-kind mitigation preference in order to increase the demand for mitigation banking credits, i.e., to thicken the market).

182. See *supra* note 171.

183. See ELI-WETLAND, *supra* note 11, at 58.

cussion demonstrated that broadened use of ETMs in settings such as wetlands, endangered species protection, and similar habitat-based programs where nonfungibilities run high can result in exchanges that all but ignore environmental and social welfare values important to the public at large. This does not necessarily mean that ETMs should be avoided in such contexts. But it does suggest that they should be implemented only when an efficient and effective institutional structure can be grafted onto the ETM to protect the public goods involved.

This need to account for the public interest poses a fundamental, and largely unrecognized, challenge for ETMs. Two competing views have dominated in the quest for an environmental policy institution that best represents the public interest. One view advocates the market, the other politics.<sup>184</sup> ETMs represent a shift from politics to the market as a means of allocating environmental resources. But when the market lacks a currency to measure commodity equivalence and exchange rules do not capture all significant externalities, is fully relying on the constructed market sensible? If it is not possible to meaningfully compare environmental features using the crude currencies of many ETMs, how will anyone know if the market is serving the public interest, i.e., increasing social welfare? It may behoove the public, therefore, to retain some mechanism of market intervention to screen for and correct ETM exchanges that reduce social welfare.

As Part IV explains, the provision of a meaningful review mechanism presents the most problematic design issue for ETMs trading in nonfungible environmental features. Most ETMs effectively employ *ex ante* generic rules rather than *ex post* review of individual trades, relying on the currency and exchange restrictions to prevent trades that reduce social welfare. This might work fine for a commodity market exchanging identical goods, where the traded habitat or air pollutant is as fungible as pork bellies. But, as we argue in the sections below, this commodity vision of habitat ETMs is inapt. The more appropriate model is that of a barter market, where the goods exchanged are not generic. In this setting, *ex post* review may be necessary to ensure equivalent trades.

We next examine the institutional incentives of the relevant parties, finding that this, too, suggests the need for an *ex post* review of ETMs. Fundamentally, trading parties seek not the conservation of wetlands but, rather, a development permit and profit from the transaction. As a result, they will seek to maximize nonfungibilities to drive down costs. Agencies, who are supposed to serve as the check to ensure equivalent trades, have strong incentives to keep markets thick. Thus on the margin neither the trading party nor the agencies will favor rigorous (and therefore costly) review. Only those public interests that value the public goods being traded have an incentive to demand a meaningful review mechanism. While this analysis argues in favor of *ex post* review, it complicates its design. The question thus boils down to how to satisfy the public's demand for *ex post* review without bringing the ETMs to a halt.

In the last section of Part IV, therefore, we evaluate alternative institutional review procedures based on how well they respond to the tension between the needs for rigorous *ex post* review and a functioning market. This forces consid-

eration of the timing and form of intervention, the various interests that must be taken into account to make intervention meaningful, and the process through which trades are assessed once intervention authority is exercised. We also focus on the current practice of wedging ETMs into traditional permitting programs, revealing a potentially intractable conflict between the objectives of government, the regulated industry, and the public. In the final analysis, we have no perfect solution for an institutional design. Rather, we make what we consider to be a reasonable demand—advocates of trading nonfungible environmental features should bear the burden of producing a comprehensive currency that works and is affordable, devising exchange restrictions that minimize the opportunities for significant externalities, or creating institutional mechanisms to ensure meaningful review of trading outcomes. When neither currency, exchange, nor review adequacy is satisfied, ETMs risk losing much of their credibility.

### A. Approval Strategies

#### 1. Wholesale Review

Starting our discussion with an idealized ETM helps set out the significant challenges of designing institutional approval mechanisms for trades. Assume, then, an ETM in which the demands of currency and exchange adequacy are fully satisfied. The ETM's currency captures all the relevant attributes of the traded environmental goods in easily calculated units, and trading restrictions compensate for any externalities created by the currency's shortcomings without thinning the market. It would be reasonable to expect that such a trading regime could operate relatively free of government oversight because "bad trades" would not take place. Beyond the initial allocation of rights and the need to uncover cheating, there would simply be no need for government intervention.

This idealized ETM scenario suggests at most the use of a wholesale strategy of approval. Here the government sets the initial trading rules, grants entitlements to private parties, stands back and acts as a referee.<sup>185</sup> The government still needs to monitor compliance and undertake enforcement efforts, much as the U.S. Securities and Exchange Commission (SEC) does in regulating stock markets. Cheating is a concern, but one might argue the situation is qualitatively no different than the role the Internal Revenue Service or the SEC plays in monitoring compliance with tax and security laws. One could simply penalize cheating with a big fine after the fact.<sup>186</sup> The government may have to step

185. See, e.g., Sohn & Cohen, *supra* note 12, at 431-32 ("[I]n the lead phasedown program, the regulatory authority only records and tracks credit ownership; trades require no prior approval or public input."); Polesetsky, *supra* note 14, at 395-96 (describing the limited administrative role under the RECLAIM credit trading regime).

186. This enforcement assumption of the passive model bears scrutiny. Unlike monetary sanctions that can largely undo the harm caused by tax and securities fraud, habitat destruction is irreversible. Saying "oops" after the fact has very different consequences with ETMs than in traditional enforcement settings. Retrospective correction of environmental errors cannot be assumed. Moreover, one might argue that the problem of monitoring ETM compliance is far greater than the problem of monitoring income or securities, both because of the relative cost of monitoring performance and the lack of checks within the system, e.g., both employers and employees report the employee's income, yet they do not share the same interests in cheating.

184. See DANIEL A. FARBER, *ECO-PRACTICISM* 35-69 (1999) (describing the competing views).



in and tinker with the rules or allocations to perfect the market, much as central banks intervene to reduce high levels of arbitrage by influencing foreign exchange rates. Beyond that, however, the government sits back and contentedly observes exchanges, assuming the commodities are fungible and environmental protection is assured, so long as the trading rules are followed. Importantly, this model reduces uncertainty, increasing the likelihood of thick markets.<sup>187</sup> Thus market advocates routinely call for a more passive approach without government oversight of each transfer.<sup>188</sup> And, not surprisingly, generic approval serves as the status quo for most ETMs.

## 2. Retail Review

Many environmental reform proponents seem practically exuberant over the prospects of using trading markets to shape environmental policy, reciting the success stories of the SO<sub>2</sub> and leaded gasoline ETMs while calling for the use of trading in an even broader spectrum of environmental contexts. But we suspect that the low-hanging fruit, where currencies serve as effective proxies for environmental values, markets are rich with supply and diversity, and policing is straightforward, has largely been picked.<sup>189</sup> In short, it will be difficult to replicate the acid rain trading program more than infrequently. More realistically, informational, technological, and financial limits will keep currencies sloppy, regulatory bodies will struggle to design trading restrictions that reduce externalities while keeping markets thick, and policing poor trades will require vigilant monitoring and a strong will to intervene. The preceding discussion in the Article considered how design strategies could tackle these inherent challenges. As Parts I, II, and III demonstrated, however, in some cases, perhaps many, currency and exchange adequacy will not in and of themselves ensure trades that preserve public goods and promote social welfare. Currency design and trading restriction strategies may not eliminate all the important externalities.

The referee model of wholesale review—broad rules for conducting multiple transactions—assumes that the rules work and simply need to be enforced. By contrast, a retail review—individual review of each transaction—is appropriate when one has little confidence, *despite* the currency and exchange rules, that the market will select environmentally protective trades.<sup>190</sup> In this role the government defines the currency and sets the trading rules, but it *also* retains the discretion to reject trades.<sup>191</sup> The government acts as arbiter,

assessing private trades to ensure they satisfy the policy goals of the program.<sup>192</sup> Since habitat trades represent private resources that have a public goods component, there may be a strong public interest at stake. An ex post mechanism can therefore provide a critical safety net for trades that satisfy currency and exchange adequacy yet result in loss of social welfare, i.e., trades that ex ante approval would not catch.<sup>193</sup> The choice of general rules of trade over case-by-case review will reduce transaction costs but, unless the rules of exchange are carefully crafted, will not effectively detect trades where environmental values are lost.

Put differently, if wholesale review resembles the government's oversight of a commodity market, then retail review requiring substantive approval by the government looks more like a *barter market*. When fungibility of commodities cannot be assumed, as it can for markets in pork bellies, gold, or soy beans, discretionary authority to evaluate individual goods becomes important. As trades increasingly resemble apples for oranges, it becomes necessary for the government to say, borrowing a phrase from Justice Potter Stewart: "I know an equivalent trade when I see it."<sup>194</sup>

mergers that concentrate market power. In practice, about 90% of the 4,000 mergers per year that fall under the act raise few concerns, but about 10% get a serious look. If the government chooses not to approve the merger, it shoulders the burden of justifying in court why it would be contrary to public policy. Few of these challenges ever go to court, though, since the parties work out side deals where certain interests are divested. Interview with Jonathan Baker, former Director, Bureau of Economics, Federal Trade Commission (Nov. 17, 1999).

192. The government can act even more directly as a market participant, offering to swap federal for state or private lands, purchasing habitat from landowners, obtaining commitments from polluters to reduce their emissions, or buying commitments from fishing boats not to fish beyond certain limits. The private party determines for herself whether the government benefit offered (money or land) is sufficient. See John P. Dwyer, *California's Tradable Emissions Policy and Greenhouse Gas Control*, 118 J. ENERGY ENGINEERING 59, 61 (1992) (claiming that offset trades in California are subject to public review and agency approval).
193. See generally Ashutosh A. Bhagwat, *Modes of Regulatory Enforcement and the Problem of Administrative Discretion*, 50 HASTINGS L.J. 1275 (1999) (ex ante regulatory powers shield agency discretion and should be used sparingly in substantive areas where agency discretion can threaten important social interests); Mark Seidenfeld, *Bending the Rules: Flexible Regulation and Constraints on Agency Discretion*, 51 ADMIN. L. REV. 429 (1999) (examining the rationales for ex ante constraints versus ex post review of agency decisions and arguing that ex ante constraints are often unworkable in contexts where normative quality is important to the program).
194. *Jacobellis v. Ohio*, 378 U.S. 184, 197 (1964) (Stewart, J., concurring) ("I shall not today attempt further to define the kinds of material I understand to be embraced within that shorthand description [of hard-core pornography]; and perhaps I could never succeed in intelligibly doing so. But I know it when I see it, and the motion picture involved in this case is not that."). For example, one critic of federal land exchange programs, through which public lands are traded for private lands, has observed that the trading parties' assessment of trades is difficult because:

Land exchanges are essentially barter-trade without a medium of exchange such as money. Those who engage in land exchanges therefore face the problem of finding some way to measure the value of different goods. Without the benefit of prices or some other standard, people with different products have a difficult time determining whether a trade makes sense for each person engaged in it—that is, whether it is fair.

Tim Fitzgerald, *Federal Land Exchanges: Let's End the Barter*, PERC Policy Series No. PS-18, at 8 (June 2000), available at <http://www.perc.org/ps18.pdf> (last visited Apr. 17, 2001). The additional question we suggest must be asked of ETMs is, fair for whom? As trading in habitat contexts affects values of concern to groups outside of the trading parties, the evaluation of the fairness of the trades is even further complicated by the barter nature of the trading market.

187. One could theorize, a priori, that greater uncertainty over government approval of trades would lead to a poorly functioning market. The closer a trade moves toward becoming a risky investment, the less the potential interest among trading parties. See Hahn & Hester, *Where Did All the Markets Go?*, *supra* note 14, at 140 ("Because firms value certainty when considering major investments, they are likely to find internal trading advantageous, even if emission credits might be acquired at a lower cost through an external trade.").

188. See *supra* note 184.

189. Even in the air pollution setting, experts are beginning to doubt the ease and success with which the SO<sub>2</sub> ETM model can be transported to other pollutant markets. See *Trading Programs May Cut Emissions, But No "Silver Bullets," EPA Official Says*, 30 Env't Rep. (BNA) 1321 (Nov. 19, 1999).

190. The authors are grateful for Stewart's suggestion of the retail/wholesale terminology.

191. In this respect, ex post ETM review resembles the Hart-Scott-Rodino process at the Federal Trade Commission and the U.S. Department of Justice, where private parties have an incentive to create



The challenge lies in devising a program that enables the arbiter to “see” bad trades and provides the institutional authority and incentives to do something about them.

This sort of review mechanism, though, poses two obvious problems. The first is little different from the challenge we observed in Parts I and II. An additional review layer adds to transaction costs through sheer administrative expense, delay in approval, and added uncertainty for approval. In this regard, it is instructive to note that in the early days of the bubbling and offset programs, EPA generally insisted on ex post (retail) review of every trade while state programs relied on ex ante policing (wholesale review). EPA’s approach increased the transaction costs and uncertainty of final approval, resulting in fewer than half the trades than would be permitted under more generic state reviews.<sup>195</sup>

Moreover, unless intelligently designed and monitored, there exists a very real possibility that a retail review process could lead to *overvaluation* of exchanged commodities as significant in magnitude as the undervaluation prompting the initial concern. That is, any system put in place to catch trades that undervalue public goods runs the risk of catching trades that are correctly valued, as well, and unnecessarily requiring additional compensation. Intelligent design, discussed below, can reduce these problems but not eliminate them.

### B. Interest Analysis

Even if one believes a retail review strategy is appropriate to ensure review adequacy of nonfungible trades, the key question remains as to the proper kind of oversight and approval process. The answers depend first on the likelihood of such trades that need to be caught and second on our expectations of the parties with a stake in the outcome—the agency, trading parties, and the public. As to the first inquiry, the analysis in Parts I and II demonstrates that ETMs with sloppy currencies and loose restrictions will systematically fail to capture values represented by nonfungibilities. On balance, this will not reduce overall environmental protection and social welfare *so long as* the externalities (both positive and negative) are evenly distributed. The case study in Part III, though, shows that this is not the case. Developers trading for wetlands will always choose less expensive mitigation sites. These tend to be distant from populations for the obvious reason that land prices are lower. But wetland services such as flood protection, water purification, and detoxification are more valuable when delivered to populations. Distant wetlands, *ceteris paribus*, will provide less social welfare for the simple reason that their services are delivered to smaller populations where their marginal contribution is likely less valuable because other nearby undeveloped land may make additional service provision redundant.<sup>196</sup> While

195. See Hahn & Hester, *Where Did All the Markets Go?*, *supra* note 14, at 127-28; Richard B. Stewart, *Emissions Trading: Lessons From Domestic Experience*, Remarks at Greenhouse Gas Emissions Trading Policy Forum (Denver, Colo.) (July 31, 2000) (on file with authors). It is worth noting, as well, that the wholesale strategy followed by the states was also employed by EPA in its successful lead, CFC, and sulfur trading programs.

196. Recall, too, that proponents of ETMs argue that trading’s efficiency gains should provide better protection at the same or less cost. This claim loses its force if the best one can argue is that on balance the result of ETMs using crude currencies is a wash. And even if one might argue that overall gains and losses in services balance out, some level

each case will present unique factors, as a general rule the greater the nonfungibilities involved, the greater the likelihood of unequal trades, and thus the *potentially* greater social welfare loss.

How large that potential loss may grow depends in large part on the interest group dynamics inherent in ETMs. We observed previously that trading in environmental commodities necessarily requires consideration of the effect trades have on social welfare. If the public interest were consonant with the interests of the trading parties and the government entity running the ETM, then we could rest comfortably on the assumption that what is good for the ETM is good for the public. And if deviations between the public interest and the interests of the ETM participants varied randomly, we could console ourselves that in the long run the differences would net out as a wash. But there is good reason to believe that the institutional framework of ETMs will cause the interests of ETM participants, traders, and government alike, to systematically deviate from the public’s, thus squarely posing the problem of having to devise some way of determining what the public interest is—not an easy challenge in itself—and of identifying and correcting instances when ETMs produce results in sharp conflict therewith.<sup>197</sup>

### 1. Trading Parties

In exploring the public choice pressures on institutional interests, let’s start with the trading parties and revisit the assumption posited at the beginning of Part IV. We assumed the idealized case where there are no deficiencies in currency adequacy and suggested that, beyond government oversight of allocation and enforcement issues, the environmental protection goals should be assured by a purely private trading regime. But this is only true if the parties to the transaction value environmental protection. What if the currency does capture metrics of environmental significance, but the trading parties are indifferent, *ignoring* these values

of retail review makes sense (given risk aversion to negative outcomes) as an insurance policy to ensure that a wash remains the worst-case scenario.

197. Determining the public interest in objective terms would seem to require assessing social welfare functions. In practice, relying on the Arrow Impossibility Theorem, Michael Levine has argued this cannot be done.

[A]s hard as it is to determine whether two outcomes are equally efficient in the Pareto sense, it is demonstrably impossible . . . to construct a democratically derived and consistent social welfare function that would allow one to assert objectively that one outcome is socially preferred over another. Of course, it would be possible to choose outcomes preferred by a particular firm or group with references to their preferences, but that would violate the democratic condition which public interest theorists generally hold dear . . . Unless a democratic, consistent aggregation of the preferences of individuals in a group is possible, there is no objective way to tell what is socially preferred (in the “public interest”). . . . [I]t is best to describe those policies that would be ratified or adopted by a polity using its usual political procedures as “general interest,” rather than “public interest” policies.

Michael Levine, *Regulatory Capture*, in *NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW* 267, 268-69 (3d ed. 1999) [hereinafter Levine]. In our view, if a trade leads to an overall loss of ecosystem services to a population, then it reduces social welfare and is likely not in the public interest (depending on the benefit produced by development). Using Levine’s terminology, such a trade would not be in the general interest.

and acting instead on a different set of interests? In that setting, the ETM will promote environmental protection only when environmental protection and the traders' interests happen to coincide.

Take the example of wetland mitigation banking. Throughout this Article we have described the exchange through the eyes of the public as one between conserved habitat B and destroyed habitat A. But in the eyes of the trading parties, the real exchange taking place is between the requirement to provide conserved habitat B and the permit to destroy habitat A. The conserved habitat is the price of the permit, pegged to the level of destruction. While the public and environment are experiencing a trade of habitat, the developer is simply paying for a permit.<sup>198</sup> For private parties seeking to maximize profits, the goal of the transaction is permission to develop at least cost, not to promote environmental protection. As a result, the private parties to the trade are not quality-conscious, so long as the trade results in permit approval. There is no benefit in mitigating or restoring any more than is necessary.<sup>199</sup>

Indeed, to keep costs down trading parties will seek to promote nonfungible trades, pushing the market to the limit in order to exploit differences of type, space, and time between the commodities for least-cost transactions. If a party can gain a permit to fill a hardwood wetland in a growing suburb today in exchange for starting restoration of a cattail wetland in a distant rural area at some point in the future, it surely will. In fact, the regulated industries from which the habitat ETMs recruit traders increasingly demand forms of contractual protection requiring that the agencies treat the barterers they strike as final sales.<sup>200</sup> As explained earlier, trading parties can be expected to desire certainty, simple currencies, and low transaction costs in an ETM. Not surprisingly, that is how they are behaving.

Thus there seems little doubt that trading parties would prefer to retain the "curtain" of the traditional permitting system, negotiating ad hoc trades in the same closed agency-applicant format used to process permit applications. Delegating some form of decisionmaking power to

198. As far as the developer is concerned, her only transaction is paying a mitigation bank in exchange for a permit from the Corps. She could care less about the services provided by the restored wetlands, or even where they are, so long as she receives the permit to develop. See Alyson C. Flournoy, *Restoration Rx: An Evaluation and Prescription*, 7 ARIZ. L. REV. 187, 208 (2000) (observing that by making mitigation the "quid pro quo" for the permit, permittees seek only enough mitigation success to obtain and retain the permit, thus placing a heavy monitoring burden on the permitting agency).

199. See generally Marylee Guinon, *No Free Lunch*, 7 RESTORATION & MGMT. NOTES 2 (1989) (examining the frequency of under-reporting of costs in the restoration business and the severity of resulting problems); Dennis M. King, *Costing Out Restoration*, 9 RESTORATION & MGMT. NOTES 15 (1991) (examining economic issues and expected results of restoration projects).

200. See generally Jean O. Melious & Robert D. Thornton, *Contractual Ecosystem Management Under the Endangered Species Act: Can Federal Agencies Make Enforceable Commitments?*, 26 ECOLOGY L.Q. 489 (1999) (analyzing whether contractual obligations entered into by federal agencies are enforceable). This trend is part of what many scholars perceive as a movement toward greater use of contract and quasi-contract instruments in administrative regulation processes. See David A. Dana, *The New Contractarian Paradigm in Environmental Regulation*, 2000 U. ILL. L. REV. 35 (presenting motivations behind, examples of, and legislative proposals for a contractual relationship between government agencies and private parties); Daniel A. Farber, *Triangulating the Future*, 2000 U. ILL. L. REV. 61; Jody Freeman, *The Contracting State*, 28 FLA. ST. U. L. REV. (forthcoming 2001).

"the public interest" within the permitting process raises the costs of uncertainty because there is no assurance, a priori, that any trade will withstand review even if the agency's guidelines are met. One might just say, "live with it industry, here are the new rules," and hope that private parties grudgingly go along.<sup>201</sup> But doing so gravitates toward command-and-control models and hardly seems consistent with the notion that ETMs provide market efficiencies.

## 2. Agencies

Absent strict oversight to ensure that environmental values form the basis of exchange, analysis of the trading parties' interests suggests that the final exchanges may well not be environmentally equivalent. What are the agency's inherent interests in approving trades? We posit that the agency's and trader's interests in fostering trades will often coincide such that, on the margins, it leads to a market that is not environmentally quality conscious. The raw evidence for this is clear. The case study in Part III demonstrated two trends—the Corps' vigor in endorsing mitigation banks and the FWS' vigor in promoting HCPs—both of which have been pursued despite crude currencies and minimal public input. Why are these agencies so eager to promote trades in the face of inadequate currencies and limited public participation?<sup>202</sup>

To be sure, trading can deliver important environmental benefits. The odds for long-term conservation of habitat are much greater if the regulated party genuinely *accepts* the restrictions imposed by a wetland or endangered species on his or her land, which will be more likely if the restriction is arrived at through a quid pro quo bargain rather than prescriptive regulation.<sup>203</sup> Moreover, trading may allow the agency to get more environmental protection bang for its buck than it practically could have gained through prescriptive regulation.<sup>204</sup> In an era of tight and often shrinking budgets this is a genuine advantage. These explanations are sound, defensible environmental justifications often presented by government when promoting ETMs in habitat protection settings.<sup>205</sup> But there are additional interests at play here.

First, trading strengthens the agency's hand. Despite the agency's desire to promote trades, the developer wants the trade, too. When it seeks to develop wetlands or endangered species habitat, the developer faces uncertainty in obtaining agency approval through a permit. In terms of financing, uncertainty costs money. The agency can leverage the uncertainty of litigation or permit approval to force a trade more to its liking. It is not uncommon for the FWS, for example, to

201. In contrast to the recent FWS strategy in the *Federal Register*, see Federal Guidance, *supra* note 130, where they effectively say, "live with it public, no radical change."

202. One could equally ask why the Corps is pushing for further relaxation of the in-kind, on-site requirements.

203. See Schoenbaum & Stewart, *supra* note 114, at 329-30.

204. See HCP HANDBOOK, *supra* note 104, at 3-7 to 3-8 (describing multi-species focus), 3-19 to 3-26 (describing range of mitigation options); Ruhl, *supra* note 102, at 404 (multi-species), 393-96 (mitigation).

205. See, e.g., Hsu, *supra* note 102, at 10598 (summarizing Secretary of the Interior Bruce Babbitt's stated rationales for supporting HCPs); U.S. FWS, U.S. DEPARTMENT OF THE INTERIOR (U.S. DOI), MAKING THE ESA WORK BETTER: IMPLEMENTATION OF THE TEN POINT PLAN AND BEYOND 7 (1997) (describing agency's vision for HCP program).



withhold issuance of the permit until its habitat swap conditions are met.<sup>206</sup> Hence, some trades would not happen absent the agency's aggressive interpretation of regulations to create trading opportunities.<sup>207</sup>

In addition to wielding trades as a sword, agencies have strong incentives to foster trades as a shield. It is no secret that endangered species and wetlands have long served as political lightning rods for property rights groups. The Corps and the FWS have become wary of conflict over these provisions as the result of incessant *sturm und drang* in public fora. And for good reason, since every congressional session witnesses new proposals to weaken the habitat protections of the ESA and the CWA. This combination of public attack and political threat has led to real, pounding pressure on the agencies.<sup>208</sup> To a great extent, then, habitat ETMs serve as *political steam valves*, dissipating public attacks and blunting pointed legislation<sup>209</sup> and litigation.<sup>210</sup> ETMs thus serve as politically important defensive policies to ensure the viability of habitat protection. As a result, and as a consequence of the Clinton Administration's high-profile support of ETMs, the agency is invested in the programs and does not want them to fail.

206. See Ruhl, *supra* note 102, at 391-96 (explaining the practical leverage FWS has over the HCP permit applicant in the negotiation of mitigation given its power to issue or deny the permit).

207. This strategy flows from Gerd Winter's observation that "[t]he agency's basic bargaining chip is its ability, either in law or in practice, to refrain from exercising its full authority," and thus:

[E]ven the failure to assert questionable power may be a bargaining chip. What an agency is giving up is the possibility that a court will decide that it in fact has the power it pretends to. . . . Indeed, the ability to regulate at the border of its authority may be a reason why an agency prefers bartering to efforts at full legal enforcement.

Gerd Winter, *Bartering Rationality in Regulation*, 19 LAW & SOC'Y REV. 219, 221-22 & n.3 (1985). For example, the FWS' authority to prohibit development of habitat under the ESA is far from certain in most circumstances, but the agency has used that uncertainty to lead many developers to seek HCP permits in lieu of testing the bounds of the FWS' power in court. See Dana, *supra* note 200, at 47 (stating that one necessary characteristic of contractarian approaches to environmental regulation, such as HCPs, is that the agency threatens application of regulatory power as a bargaining chip); Hsu, *supra* note 102, at 10597 (suggesting that the FWS could be even more aggressive than it has been in its legal positions, thus providing more leverage for aggressive negotiation of HCPs); Ruhl, *supra* note 102, at 356-64 (explaining why it is often uncertain whether an HCP permit is required or simply a safe move for the developer and how the FWS can use aggressive legal positions to move more developers toward opting in favor of the HCP approach).

208. Interview with Ray Ludwiszewski, former General Counsel, EPA (Feb. 24, 2000); see, e.g., *Citizens for Private Property Rights*, at <http://hometown.aol.com/proprts/cppr/home.html> (last visited Apr. 15, 2001) (describing the HCPs in San Diego County as "legalized land theft"); *American Land Rights Association*, at <http://www.landrights.org/Mission.htm> (last visited Apr. 10, 2001) (comprising a 26,000-member organization committed to combating "the excesses of regulations such as the [ESA], wetlands, etc.") (on file with Stanford Law Review).

209. See Hsu, *supra* note 102, at 10596 (HCPs provide the FWS "a situation where they could 'bargain in the shadow of the law,' rather than take their chances with the legislative or judicial branches.")

210. See Gardner I, *supra* note 11, at 542-50 (describing wetlands mitigation banking as a tool to avoid successful regulatory takings claims); Hsu, *supra* note 102, at 10595 ("The upsurge in HCPs can also be explained by an increasing threat of unfavorable precedent being set in takings jurisprudence."). For a comprehensive treatment of the takings compensation issue using the ESA and its HCP permits program as a case study, see Thompson, *The Endangered Species Act*, *supra* note 102.

We therefore suggest that the policy entrepreneurs in agencies and the business entrepreneurs of habitat development have sufficient overlap of interests that both can benefit from increased trading in the habitat context. On the margin, then, one would expect the agency's and applicant's interests to coincide closely in promoting trades, even if that means papering over nonfungibilities.<sup>211</sup> A "culture" of trading emerges, in which agency and traders operate informally under norms of behavior they develop over time and which are not always fully transparent.<sup>212</sup> To be sure, those norms could coincide closely with environmental protection goals, as repeat players, such as mitigation banks and developers who frequently enter the trading market, work to stay on good terms with the agency.<sup>213</sup> But once it has embraced the ETM, the agency may develop values that are idiosyncratic of the trading program and which may lead it to diverge from the public interest values embedded in the regulatory program as a whole.<sup>214</sup> This is particularly problematic in the case of nonfungibilities because, as Bill Pedersen has succinctly observed, "[m]arkets work best under simple trading rules. That gives those who design markets an incentive to oversimplify environmental problems to make their market mechanisms more workable."<sup>215</sup> One can therefore see why agencies charged with administering ETMs have persuasive reasons to keep the currencies sloppy and markets thick, and why they will also resist squelching deals.<sup>216</sup>

211. We have already discussed why trading parties prefer simple currencies. One would expect that the optimal precision of the currency, from the agency's perspective, would also be an imprecise currency. Because such a currency maximizes discretion, the agency will be less exposed to judicial review. The economic theory of regulation describes this as "slack," providing "a zone of freedom of action for regulators or legislators in which they can operate with lessened fear of punishment by the polity for decisions that deviate from those the polity would adopt on its own." Levine, *supra* note 197, at 269.

212. See Dana, *supra* note 200, at 47 (describing HCPs as part of the "new contractarian paradigm" in environmental regulation, for which the default position in case of unsuccessful negotiation is the command-and-control regulatory program); Freeman, *supra* note 200 (describing the culture of informal negotiation that arises in contexts such as HCPs); Hsu, *supra* note 102, at 10597-98 (proposing that because in formal legal terms the ESA allows the FWS only to regulate or not regulate, informal HCP mitigation negotiations allow the FWS to "escape from a binary world where either the FWS or the landowner is a winner, and the other is a loser"); Ruhl, *supra* note 102, at 391-96 (describing HCP mitigation as a "project-specific topic of negotiation").

213. See Freeman, *supra* note 200 (suggesting the repeat player factor may be strong in this sense).

214. Seidenfeld, *supra* note 193, at 474-79 (describing the problem of idiosyncratic agency values). See generally Michael E. Levine & Jennifer L. Forrence, *Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis*, 6 J.L. ECON. & ORG. 167 (1990) (examining the competing theories of why agencies act, or believe themselves to be acting, in the public interest).

215. Pedersen, *supra* note 13, at 10175. These assertions are empirically testable and, while worthy of further research, they are certainly consistent with our findings in the wetlands mitigation banking program.

216. It is worth noting, in this regard, the EPA's quiescence in vetoing mitigation actions. There have been roughly 20 vetoes in the past 25 years. The most comprehensive history and review of EPA's veto authority contends that the low number is due primarily to resource constraints. A more probing political economy analysis might well uncover other important factors such as low return of political capital, low public salience of the program, and interinstitutional costs of exercising the veto. William B. Ellis, *Section 404(c): Where Is the Balance?*, NAT. RESOURCES & ENV'T, Summer 1992, at 25, 64.

### 3. Public Interest

So what about the public interest? As a threshold matter, ETMs generally expand the scope of the public interest by expanding the scope of the affected citizenry. In so far as the agency and applicant have clear incentives to keep the market thick, this will necessarily result in more diverse sectors of the public being touched by trades. In wetland mitigation banking, for example, the mitigation bank community will usually be different than the development project community. When delivery of ecosystem services are involved, as will often be the case with habitat, these communities should have real and often diverse interests in the trade negotiation and its outcome.<sup>217</sup> Each community will want to minimize the negative externalities it is forced to bear and maximize the positives it retains.<sup>218</sup>

From an advocacy perspective, concerned sectors of the public will want to ensure the possibility for meaningful review of trading outcomes, which in turn requires development of an objective, verifiable record documenting the agency rationale for the trade. The affected parties presumably will also seek the opportunity for meaningful participation in approving and reviewing trades. Assuming relevant interests are represented, their combined efforts to minimize externalities can push trading outcomes toward a public interest outcome. If all relevant interests are not represented, however, the self-interested efforts of those that are involved may cause trading outcomes to deviate from the larger public interest. The interest analysis thus leads directly to a procedural analysis.

#### C. Procedural Analysis

We do not mean to suggest in these preceding analyses that the Corps or the FWS have completely abandoned their statutory mandates or have been captured by trading interests. There is good reason to believe, however, that the confluence of agency and trading interests to promote ETMs, coupled with ineffectual public participation, significantly increases the potential on the margin for nonfungible trades that fail to provide adequate environmental protection and promote social welfare. How should these objectionable trades best be caught and corrected? There are five basic questions, and we believe the last warrants the most attention.

#### 1. Constrain Agency Discretion

The option implicit in Parts I and II is to *constrain discretion up front*. By requiring application of sound currencies and trading rules that restrict nonfungibilities, currency and exchange adequacy can minimize the likelihood of substantive inadequacy. As we have shown, however, technical,

217. It is a separate, though important, issue whether these communities are knowledgeable, or really do care, about the loss of ecosystem services, particularly since their effect is often indirect and delayed. See Salzman, *supra* note 63, at 894-96.

218. As one practitioner has observed in the public lands field, where trades between public and private land parcels are common, "every parcel of public land has its own constituency that will urge retention of that parcel in public ownership. . . . [M]any interests are aligned to oppose any sale or other disposition of resources from the public domain." Murray D. Feldman, *The New Public Land Exchanges: Trading Development Rights in One Area for Public Resources in Another*, 44 ROCKY MT. MIN. L. INST. 2-1, 2-38 (1998).

practical, and public choice constraints suggest that currency and exchange adequacy will rarely be achieved, particularly in the habitat context. We are not suggesting that work on these fronts to perfect currencies and exchange rules is wasted effort. Indeed, there is large room for innovation in this area. If retail review and its attendant problems—high transaction costs and overvaluation—can be avoided by improved currency and exchange adequacy, that clearly is a preferred alternative. But what do we do in the meantime, which we believe may be a *long* time, with ETMs that have a strong potential to produce trades that reduce social welfare?<sup>219</sup>

#### 2. Inform Agency Discretion

One might look to the example of the National Environmental Policy Act (NEPA) and *require greater impact analysis* prior to approval of each trade.<sup>220</sup> Analyzing the trade in more detail and allowing public comments would clearly slow down the process and increase transaction costs, but it could also flag problematic trades where public goods could be lost. At its best, such an approach would, in the spirit of *Calvert Cliffs Coordinating Committee v. U.S. Atomic Energy Commission*,<sup>221</sup> force the agency to take a hard look at each transaction prior to approving it and give the public an opportunity to ferret out defects in the trade. To reduce the transaction cost problem, one could imagine scoping reviews that focused not on trade by trade but, rather, on a review over a series of trades or time periods, or perhaps calibrating the impact review to the size of the project. This would be a version of adaptive management—impact planning that leads to better government decisions. Certainly the inherent agency incentives to let trades go through in order to keep the market thick, discussed above, could reduce the *ex ante* impact review to a post hoc rationalization of pre-ordained trade approvals, but this potential problem is little different than that currently faced by NEPA.<sup>222</sup> Overall, however, it does seem hard to square the model of project-by-project environmental assessments, which routinely take many months or more to complete, with the vision of a vibrant, ongoing market driven by multiple traders and transactions.

#### 3. Increase Political Accountability

A third option lies in increasing *political accountability*. One might argue that if concerned citizens truly care about trading practices that reduce social welfare, they will make

219. It is important to keep in mind, as well, that the current rules for wetlands mitigation banking require trades that ensure equivalent value and function. See Memorandum of Agreement, *supra* note 116, at 9210 (stating that the Corps "will strive to achieve a goal of no overall net loss of values and functions"). If these rules are not closely followed, it is not clear why additional rules would be.

220. National Environmental Policy Act, 42 U.S.C. §§4321-4370a, ELR STAT. NEPA §§2-209.

221. 449 F.2d 1109, 1 ELR 20346 (D.C. Cir. 1971) (holding that NEPA requires an agency to consider alternatives to its actions to the fullest extent possible).

222. See, e.g., Joseph L. Sax, *The (Unhappy) Truth About NEPA*, 26 OKLA. L. REV. 239, 239 (1973) ("I know of no solid evidence to support the belief that requiring articulation, detailed findings or reasoned opinions enhances the integrity or propriety of the administrative decisions. I think the emphasis on the redemptive quality of procedural reform is about nine parts myth and one part coconut oil.").



their concern felt through the ballot box or traditional channels of advocacy. In fact, this seems to be occurring in the case of spatial nonfungibilities and environmental justice, hence the Executive Order on Environmental Justice and the creation of EPA's National Environmental Justice Advisory Committee.<sup>223</sup> This approach seems unlikely to achieve similar success in the case of habitat ETMs, however. Unlike the confluence in environmental justice of racial equality and human health risks, habitat trades concern social welfare loss from ecosystem services. While important, these losses are often indirect and only appreciated after a natural crisis, e.g., flooding along the Mississippi River or crashing fisheries. Moreover, as the preceding discussion argued, the balance of political pressure to reduce or promote trades likely weighs toward even more trades, since they operate effectively as political steam valves.

#### 4. Strengthen Judicial Accountability

A fourth option would be to promote greater *judicial accountability*. The deferential standard of review for permitting decisions remains a strong hurdle for those challenging habitat trades, particularly since neither the ESA nor §404 speaks clearly enough to the issue to allow courts simply to apply the statutory text.<sup>224</sup> Courts have overturned a handful of HCPs, but the rarity of such decisions proves the rule.<sup>225</sup> Thus, Congress or the agencies could set a higher standard of judicial review, perhaps placing the burden on the applicant to demonstrate no net loss of social welfare or services caused by the trade, or providing liberal citizen suit rights to enforce trading performance standards under strict standards of judicial review. But leaving it to litigation between agencies, traders, and public interest groups to hash out the details imposes high transaction costs and leaves the ultimate decision to a disinterested observer.<sup>226</sup> In fact, if barter

is a more accurate description of habitat trades than is the commodity market model, then it is not at all clear we want a disinterested observer making the decision on the trade's merits. Indeed, because the trades will involve the loss of ecosystem services for some communities and perhaps a gain for others, our concern is precisely that we do want interested parties involved in assessing the impact of trades on nonfungible values.

#### 5. Provide for More Meaningful Public Participation

To account for the concerns of interested parties requires consideration of the fifth option, *increased public participation*, and a foray into administrative law. As trading has spread into more and more environmental contexts, it is becoming increasingly evident that the familiar institutional settings of environmental decisionmaking *themselves* are ill-equipped to facilitate trading and maintain some of the core values of environmental policy. Most environmental policy today is implemented through permitting regimes in which a single regulated entity applies for authorization to carry out an otherwise prohibited activity and can obtain that authorization only upon demonstrating to a government agency that it has satisfied a long list of emission limits, performance criteria, monitoring requirements, and other prescribed standards.<sup>227</sup> The setting within which this takes place, known ubiquitously as "permit processing" and a trademark of command-and-control regulation, involves the applicant and agency haggling over whether the litany of standards has been met.<sup>228</sup>

Although the standards often leave some room for negotiation, generally the agency and applicant know at the beginning of the process the realistic outer bounds of the final permit, set in place through objective technical standards or emission limits. Those limits are decided ahead of time through the rulemaking process from which the standards are derived, as well as through well-known case law and agency policy. The applicant hires a team of consultants who are familiar with those standards and laws to hash out the issues with the agency's staff of experts and lawyers, and out of this process pops a final permit for the public to behold.

Environmental permitting as just described has played a central role in the successes achieved toward protection of public environmental values. Ironically, however, the permitting process itself occurs mainly between the applicant and the agency. For a program devoted to protection of public values, the public is remarkably absent from the process.

ante or ex post mechanisms. The adversarial model may appease those interested most in the rule of law, but it is doubtful that its transaction costs are worth it in terms of improved substantive performance of the ETM. See Seidenfeld, *supra* note 193, at 480.

223. Exec. Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 3 C.F.R. 859, ADMIN. MAT. 45075 (1997); EPA Administrator Browner created NEJAC to provide "independent advice to EPA on all matters relating to environmental justice" and to serve as a "forum for integrating environmental justice with other EPA priorities and initiatives." Michael D. Mattheisen, *The U.S. Environmental Protection Agency's New Environmental Civil Rights Policy*, 18 VA. ENVTL. L.J. 183, 196 (1999) (citing OFFICE OF ENVTL. JUSTICE, U.S. EPA, ENVIRONMENTAL JUSTICE 1994 ANNUAL REPORT 3 (1994), available at <http://www.epa.gov/docs/oejpubs/94report/94report.txt.html> (last visited Apr. 17, 2001)).
224. See *Friends of Endangered Species v. Jantzen*, 760 F.2d 976, 981-82, 15 ELR 20455, 20456 (9th Cir. 1985) (applying the "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" standard of judicial review to an HCP permit).
225. See, e.g., *Sierra Club v. Babbitt*, 15 F. Supp. 2d 1274, 1280-82 (S.D. Ala. 1998) (holding adequacy of HCP off-site mitigation funding was not supported in the record); *San Bernardino Valley Audubon v. Metropolitan Water Dist.*, 83 Cal. Rptr. 2d 836, 844 (Cal. App. Ct. 1999) (holding that state environmental impact review did not adequately consider impacts of HCP using "habitat value units" as basis for habitat trading program). In the wetlands context, see, e.g., *Branhaven Plaza, L.L.C. v. Inland Wetlands Comm'n*, 740 A.2d 847 (Conn. 1999) (holding that monetary and in-kind contributions are not acceptable mitigation for wetlands damage when the use of the funds is not specifically directed for wetland remediation activities).
226. Given the difficulty of selecting currencies that define nonfungible values and of constructing markets that identify and weed out externalities, an evaluation of the "goodness" of any particular trade is necessarily left to the reviewing body. Given how value laden that decision can be for habitat trades, there are serious questions as to whether judges will be any better at sorting out the bad trades in ex post proceedings than will be other reviewing bodies in different ex

227. The environmental law literature is replete with handbooks and other manuals describing how applicants should prepare and pursue permit applications. See, e.g., *THE CLEAN AIR ACT HANDBOOK* 119-40 (Robert J. Martineau Jr. & David P. Novello eds., 1998); *THE RCRA PRACTICE MANUAL* 70-92 (Theodore L. Garrett ed., 1994).

228. See, e.g., Donna L. Kolar, *Practical Advice for Permitting a Waste Disposal Facility*, NAT. RESOURCES & ENV'T, Summer 1989, at 11 (describing the negotiation points for hazardous waste permits); Mary Ellen Ternes & Ross A. Macfarlane, *Negotiating Title V Operating Permits: A View From the Provinces*, NAT. RESOURCES & ENV'T, Fall 1998, at 417 (describing the negotiation points for CAA permits).

Environmental permitting regimes have been premised on a fundamental trade off in this respect: in return for the security of prescribed *ex ante* permitting standards (developed by the agency through public notice-and-comment rulemaking and applied to each applicant in a permit proceeding), the public has yielded an equal seat at the permit negotiating table. The public can usually provide comments to the agency after a draft permit is negotiated between agency and applicant,<sup>229</sup> and can seek judicial review of the permit once issued, but has neither veto power in the first stage nor an easy time in the second under standards of review that are deferential to agency decisions.<sup>230</sup> The *quid pro quo* has been, at least in theory, that the permit negotiation is bounded by the standards adopted through notice-and-comment rulemaking and enrolled in the code books for all to see. Agency discretion is limited, variances are rare, and failure to abide by the standards is easily detected and constitutes reversible error.

Enter trading, and that settled state of affairs is rocked to its core. Trading appears in the habitat protection picture awkwardly wedged into permitting programs as a form of "mitigation" and under cover of the reform flags of flexibility, innovation, and efficiency, not as an integral part of permitting, not as an independent process.<sup>231</sup> Rarely do agencies, applicants, or public advocates consider this as forcing trading into the permit setting.<sup>232</sup> But that is precisely what is involved. The heavy reliance on loosely worded nonlegislative rules means that agencies do not clearly circumscribe their trading such that the public can know in advance that its interests are protected at the table.<sup>233</sup> In other words, the *quid pro quo* of notice-and-comment rulemaking that provided the basis for permitting has not been duplicated in habitat trading.

Permitting in the era of trading has thus become a hybrid creation. The problem is not that wedging trading into permitting necessarily fails to deliver mitigation values, but rather that the permitting regimes were not designed with trading in mind and have evolved in ways that will make it difficult to squeeze trading in without *pushing out* some of the fundamental institutional premises upon which permitting regimes have evolved. The traditional permitting model is hardly a market in the traditional sense of markets, but with the advent of trading it is increasingly being used as the market mechanism for trading public environmental values.

229. See, e.g., 16 U.S.C. §1539(c), ELR STAT. ESA §10(c) (public notice-and-comment requirement for HCP permits).

230. See *supra* note 224.

231. As the wetlands mitigation banking case study explained, mitigation banking is designed to satisfy the Corps' so-called sequencing approach to §404 permit application evaluation, which places compensatory mitigation behind avoiding and minimizing impacts to aquatic habitat. See *supra* notes 115-26 and accompanying text. HCPs are based on specific statutory criteria requiring the applicant seeking the permit to demonstrate that it "will, to the maximum extent practicable, minimize and mitigate the impacts of such taking." 16 U.S.C. §1539(a)(2)(B)(ii), ELR STAT. ESA §10(a)(2)(B)(ii). In the absence of a viable habitat trading program, therefore, developers would be left with avoiding and minimizing impacts as their only compliance options.

232. Neither the EPA/Corps *Federal Guidance* nor the FWS HCP *Handbook* use the term "trading" at any point to describe the mitigation program.

233. Though published or noticed in the *Federal Register*, neither the EPA/Corps *Federal Guidance* nor the FWS HCP *Handbook* was promulgated as a notice-and-comment rule.

Our concern in this sense is straightforward: placing the applicant and agency in charge of trading public environmental values raises serious questions as to whether the deal struck between the permitting system and the public's participatory role—in which the public agreed to keep its nose largely out of "permit processing" in return for bounded permit issuance standards—is still a good deal for the public. The traditional permitting system works fine for the agency and applicant even in the era of trading; it is the public whose interests are difficult to square. It is thus no surprise, for example, that environmental groups have begun to complain that mitigation decisions in the HCP program are taking place without following "biological standards"—in other words, not according to the traditional permitting system—and environmental groups have called for more public participation as a result.<sup>234</sup>

In this respect, consider the following description of the HCP permitting process by Defenders of Wildlife.

Citizens from various stakeholder groups have no formal role in the HCP process except through the public comment period and, for some plans, through [NEPA] or requirements of state or local law. Often, by the time public meetings occur or official drafts are released for comment, however, both the regulated interests and the services have invested so much money and time in plan development that they are unlikely to change course . . . [C]itizens (including those representing the environmental community) generally have not had a seat at the negotiating table in many major recent negotiations despite the fact that conservationists (in addition to FWS) represent the public's interest in protecting endangered species. . . .

For the vast majority of plans . . . public participation was not adequate, given the plans' large effects on public resources. The most glaring examples are large-scale, single-landowner plans that significantly affect public resources. . . . While those plans did have public meetings and/or formal comment periods, the conservation strategies resulted from private negotiations with largely token attempts at listening to the public's concerns. In addition, numerous small-scale HCPs reviewed here involved exclusive negotiations between the landowner and [the] FWS. . . . This lack of public participation has resulted from an absence of formal requirements to involve the public and the limited leverage of citizens who do not have a direct financial stake in negotiations.<sup>235</sup>

Defenders of Wildlife's assessment, based on a study of over 20 HCPs, comports with the general experience of one of this Article's authors who, when in private practice, regularly represented a wide variety of public and private entities seeking HCP permits.<sup>236</sup> It does not differ substan-

234. See, e.g., DEFENDERS OF WILDLIFE, FRAYED SAFETY NETS, *supra* note 102, at 59-61, 80-81 (summarizing Defenders of Wildlife's critique of HCP program).

235. See *id.* at 41, 43-44.

236. Professor Ruhl has since described the mitigation negotiation process in terms consistent with the Defenders of Wildlife's public participation findings. See Ruhl, *supra* note 102, at 385-86 ("In practice . . . [the] FWS and [the] NMFS have delayed public notice until the time when the HCP has undergone that formative negotiation step."). In the typical single-owner, large-scale HCP project setting for which the Defenders of Wildlife expresses the most concern in this regard, the developer and the FWS haggle over the amount of take the project will cause and the amount of mitigation land the developer must trade in return. Once that issue is settled, the developer enters the real estate market to find the least expensive tract of land that will satisfy the mitigation requirements, which usually are spec-



tially, either, from descriptions of some air pollutant ETMs.<sup>237</sup>

#### D. Design Impasse?

This shortfall of meaningful public input described above is particularly problematic if inherent agency and trader institutional interests encourage approval of trades with significant, and unexamined, nonfungibilities. The interests of the agency, applicant, and public change fundamentally as mitigation under permitting programs gradually becomes synonymous with trading. Trading of nonfungible commodities, if it is to thrive and promote social welfare, is an open-ended game requiring robust markets and plenty of room for negotiation that considers the multiple values exchanged. That does not square easily with the relatively closed permitting system. Simply put, as more public values are up for grabs in trading regimes, the public ought to rethink whether it wishes to continue to limit its checks on the process to notice-and-comment and deferential judicial review. Thus, we believe the most fundamental design challenge trading poses to environmental policy lies not in currency adequacy (finding the second-best currency) or exchange adequacy (structuring a viable market that restricts nonfungibilities), but in review adequacy and confronting the pressures trading places on the institution of environmental permitting.

Identifying this problem, though, makes its resolution no easier. What role exists for the public between the largely ineffectual practice of commenting on trades that effectively are *fait accompli* and absolute veto power? Currently, par-

ified based on habitat type and location, and seeks the agency's approval of the trade. Unlike the wetlands mitigation context, most HCP mitigation is through preservation at trading ratios of 3:1 or higher, though occasionally mitigation involves habitat enhancement and management. These significant issues are almost always settled by the time the draft HCP permit is submitted for public comment. Thus, in the authors' experience, having allowed environmental groups and other public advocates a "seat at the table" during the negotiation phase would have substantially altered the HCP habitat trading process. See also Holly Doremus, *Preserving Citizen Participation in the Era of Reinvention: The Endangered Species Act Example*, 25 *ECOLOGY L.Q.* 707 (1999) (examining the growing tension between the HCP and other ESA reform programs and public participation values).

237. Many of the air pollutant ETMs employ *ex ante* approval mechanisms and thus leave no opportunity for public input on trades. Compare the Defenders of Wildlife's account of public involvement in HCP approval with the following description of ETMs in California's SCAQMD.

Most states have permitting procedures through which affected community members can advocate for pollution control requirements on facilities. However, pollution trading allows facilities to avoid those permit requirements—usually without the knowledge or involvement of the affected community. Pollution trades made pursuant to Rule 1610 and RECLAIM are not subject to public review or comment. In fact, the public faces numerous difficulties finding out what companies are trading to avoid compliance with pollution control standards. For instance, RECLAIM credits can be purchased from independent brokers, without any environmental agency or public oversight. A company wishing to increase or continue its pollution need only purchase the required credits on the open market, without any public review or comment. In this way, the democratic will, as represented in permit and regulatory requirements imposed after full public review and comment, can be reversed by a simple economic transaction.

Drury, *supra* note 45, at 278-79.

ties seeking to develop habitat review the regulations and guidelines when preparing their application. There may be room to haggle when seeking a permit as issues come up, but, equally, there is a shared expectation that if the trading party meets its side of the bargain the agency will too. By the time of public input, the agency has made its findings and the deal has largely been cut. Hence, the calls from environmental groups for something more. But what?

At one extreme, we could put trades in the democratic hands of the public, leaving the deals struck by agency and traders to ratification or veto by popular vote. The democratic model pushes public participation to the forefront, where interested parties can play a direct role. Mass public participation can serve many interests—including increasing agency accountability, minimizing concentrations of power, and facilitating the flow of information to citizens and decisionmakers.<sup>238</sup> But at some point the introduction of more and more participation from broader and broader segments of the public gives rise to serious concerns about the potential for interest group interference with program goals, grandstanding, and dissemination of misinformation—what some call "participation run amok."<sup>239</sup> The democratic model may appease those interested most in participation, but in its purest form it is tantamount to giving the public the whole table, not just a seat.

Another alternative could be patterned on calls for more collaborative forms of decisionmaking.<sup>240</sup> For example, an independent panel comprised of persons with no investment in the trading program could be modeled on architectural review boards or regional planning boards used in land use contexts to act as the arbiter of trades.<sup>241</sup> To serve the goal of public participation, the panel could be comprised not only of scientific experts, but also representatives of the full range of public interests involved in the trading program. Most trades would be handled through the routine of agency-trader haggling, but the agency, trader, or any member of the public could flag controversial trades for deliberation and final resolution by the panel. As the early experience of bubbling made clear, however, the review requirement cannot be open-ended.<sup>242</sup> Even more faithful to the collaborative model, all trades could be hashed out by stakeholder groups composed on an ad hoc basis to be representative of the various interests at play in each trade and operating under rules of consensus.<sup>243</sup> The result of this form of trading by mediation would be an agreement the traders could take as final and presume to be secure from attack by other interested parties.

238. Jim Rossi, *Participation Run Amok: The Costs of Mass Participation for Deliberative Agency Decisionmaking*, 92 *Nw. U. L. Rev.* 173, 182-87 (1997).

239. See *id.* at 211-40. Not to mention the immense transaction costs and likely low level of interest among potential participants.

240. Jody Freeman, *Collaborative Governance in the Administrative State*, 45 *UCLA L. Rev.* 1, 23-24 (1997) (advocating increased use of "collaborative governance" structures).

241. John S. Applegate, *Beyond the Usual Suspects: The Use of Citizen Advisory Boards in Environmental Decisionmaking*, 73 *IND. L.J.* 903 (1998).

242. See *supra* note 194.

243. See Carrie Menkel-Meadow, *Toward Another View of Legal Negotiation: The Structure of Problem Solving*, 31 *UCLA L. Rev.* 754, 795-801 (1984) (advocating involvement of parties to a legal dispute in a problem-solving endeavor as a means of overcoming intransigence and refusal to relate to the needs of others).

Such collaborative approaches, however, merely beg the question of institutional choice, for meaningful consent requires institutions through which local public interests can give their consent. How are the representatives of local interests selected for the expert panel or the stakeholder group? Are they drawn from the city council, the planning board, a referendum, universities, citizen advisory panels, lottery?<sup>244</sup> To whom are they accountable? How does one deal with the problem of the persistent objector, obstreperous nongovernmental organizations (NGOs), or other strategic behavior in which citizen participation may block real environmental progress? And regardless of the structure, greater public involvement still requires analyzing the appropriate role of government as decisionmaker, as well as the appropriate level of intervention, since different regulatory entities behave differently.<sup>245</sup> Collaborative models, in other words, have their own institutional baggage to handle, and we, like many others, are not confident they offer more hope than the adversarial and democratic models in cutting through the obstacles for using ETMs in habitat trading contexts.<sup>246</sup>

Apparently finding no satisfactory solution either, the U.S. Department of the Interior has responded to the design dilemma with a measure that it touted as meeting the concerns of meaningful participation, but which in fact provided the public no rights of participation in the permitting process that it did not already have.<sup>247</sup> The agency apparently had no insights into what additional public participation it could provide without transforming the permitting process into something different. By the same token, the environmental groups have failed to define exactly what form of participation they desire over and above that level. Presumably, they have the same concerns that have been raised in the commodity trading-style ETMs, where trading is shielded from any public input,<sup>248</sup> but no one expressing concerns with either context has cogently described a union between ETMs and public participation that does not result in one subjugating the other.

The seeds of a design impasse are thus apparent, though its solution is not. ETM critics argue that bargains struck in

approving trades are often inappropriate, insufficiently considering public interests. The preceding analysis of commodities, currencies, and exchange restrictions in Parts I, II, and III has shown why this occurs. But it is apparent that each of the three interests involved—agency, traders, and public—has something different in mind in response to the question of what the proper institutional approval design should look like. Each, in its own way, envisions a “permit-plus.” For all interests, the ideal “plus” is an efficiently operating ETM that consistently delivers appropriate levels of environmental protection at lower cost. Where that Holy Grail is not easily attained, the interests diverge.

For agencies, the “plus” is ultimate discretion to approve or disapprove trades. The rules of permitting constrain agency discretion, both through the ex ante standards promulgated in the rules and through ex post citizen suits and judicial review. But prescriptively dictating too specifically the standards for trades, or subjecting the agency to strict review after trades are struck, denies the agency the room to maneuver and barter.<sup>249</sup> Thus, agencies that want to barter will stake out room by keeping the rules of agreement loose and unbounded. The FWS, for example, has authored hundreds of pages of informal “guidance” for developing HCPs, but very few formal rules.<sup>250</sup> In describing the agency’s need for broad discretion in the same terms an inspired artist might use, the FWS guidance document explains that the agency chose not to “establish specific ‘rules’ for developing mitigation programs [because] that would limit the creative potential inherent in any good HCP effort.”<sup>251</sup>

For traders fearful of the discretion the agency wields in that setting, the “plus” is a contract fixing the terms of the barter and protecting the trader from subsequent renegeing by the agency. Traders argue that these contractual protections are necessary to encourage their commitment of land and other financial resources to the long-term habitat protection solutions the agency seeks to attain through trad-

244. In the idealized setting, the same people would be affected by developed and restored wetlands. In this case, it would make sense for them to determine the adequacy of the trade. Once the costs and benefits are no longer uniformly shared, however, difficulties arise in reaching agreement.

245. See Hahn II, *supra* note 23, at 111-12, on the effects of having different levels of government implement selected policies:

It might seem, for example, that if the problem is local, then the logical choice for addressing the problem is the local regulatory body. However, this is not always true. Perhaps the problem may require a level of technical expertise that does not reside at the local level, in which case some higher level of government involvement may be required. . . . [T]he level of oversight can effect the implementation of policies.

246. See, e.g., Mark Seidenfeld, *Empowering Regulatory Stakeholders: Limits on Collaboration as the Basis for Flexible Regulation*, 41 WM. & MARY L. REV. 411 (2000).

247. See Notice of Availability of a Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, 65 Fed. Reg. 35342, 35346-47, 35456 (June 1, 2000) (the FWS expands the public comment period on most proposed HCP permits from 30 to 60 days and states it “will strongly encourage potential applicants to allow for public participation during the development of an HCP,” but does not specify what such participation might entail or what the agency might do if the applicant refuses to allow it).

248. Drury, *supra* note 45, at 279.

249. See Freeman, *supra* note 240 (describing why the trend toward contractarian models of regulation requires the agency have space to work out the content of negotiations); Winter, *supra* note 207, at 228-29 (describing agency implementation processes generally as barter systems in which the agency requires discretion to maneuver). Readers familiar with local land use and zoning law may observe that bargaining has long been a tradition in that setting. But local land use decisions fall into two categories: legislative and quasi-judicial. Legislative acts such as comprehensive rezonings often do involve raw political bargaining, but they are decided by legislative bodies, e.g., the city council, where politics rule the day. Many land use permits, however, are decided in administrative settings where rules of procedure, criteria for decision, and standards of judicial review ostensibly are more tightly bounded and room for negotiation is more limited, such as is the case for variance and special exception procedures. JULIAN C. JUERGENSMEYER & THOMAS E. ROBERTS, *LAND USE PLANNING AND CONTROL LAW* 173-76 (1998) (describing generally the differences between legislative and administrative actions in local land use authorities); Carol Rose, *Planning and Dealing: Piecemeal Land Controls as a Problem of Local Legitimacy*, 71 CAL. L. REV. 837 (1983) (describing the origins of the distinction and the role bargaining has played in various settings). While bargaining undoubtedly occurs in practice even in the administrative land use setting, the insertion of trading into environmental permitting introduces a level of informal bargaining in the permitting setting not heretofore officially endorsed in land use or other regulatory settings controlling land development.

250. Compare HCP HANDBOOK, *supra* note 104 (extensive informal guidance), with 50 C.F.R. pt. 17 (limited formal rule structure). This would be predicted by the economic theory of regulations. See Levine, *supra* note 197.

251. See HCP HANDBOOK, *supra* note 104, at 3-19.



ing.<sup>252</sup> Thus, for example, many of the recently developed HCP policies are geared toward assuring the applicants that the government will keep its side of the bargain.<sup>253</sup> However, putting aside constitutional doctrines that may limit the effectiveness of such a contractual remedy,<sup>254</sup> any trend toward contractarian approaches to environmental protection simply exacerbates concerns that the agency may assume undemocratic, idiosyncratic values that move public interest norms to the sidelines.<sup>255</sup>

For the public fearful of both the agency's unbounded discretion<sup>256</sup> and the possibility that traders may get too good a deal at the public's expense,<sup>257</sup> the "plus" is a seat at the negotiating table. As noted previously, however, while many environmental NGOs have complained about the direction in which wetlands mitigation banking and HCPs are headed, and have demanded a seat at the table to correct the alleged problems, none have described what power comes with that seat. Presumably, they seek not only information and process transparency, but also some mechanism for exerting direct influence over the trading outcomes. Exactly what the scope of that power must be to satiate their participation demands, and how they propose it be exercised, remains unclear.

What is clear is that groups like Defenders of Wildlife want to take away some of the protections applicants currently receive in the permitting process. Whether this amounts to a veto power or simply reserving the ability to change the terms of the trade as the public representatives see fit is less certain. Also clear is that traders are seeking protections they do not currently receive in the permitting process. They seek some finality to the trade, though the exact form is uncertain. Through it all, agencies want the flexibility to barter with a free hand, and yet the power to override the will of the public and the traders when the trade does

not strike the agency as a good deal. This state of affairs thus has all the makings of an intractable design problem.

Permitting is not about discretionary agency trading. Permitting is not about private contracting. Permitting is not about the public ratifying or vetoing the permit. It is an understatement, therefore, to observe that it will be difficult to accommodate all these "plusses" at the same time. In all cases, the bigger the "plus" in permit-plus the less it looks like permitting.<sup>258</sup> The "plus" risks swallowing the assumptions on which permitting is based and overshadowing its own trading function. This is not to suggest that there is no longer a role for permitting in the habitat protection context. Rather, the question is whether we continue to allow agencies to wedge ETM mechanisms into habitat permitting programs, or, if we are committed to making ETMs work in highly nonfungible settings, whether we design an independent institution within which the trading takes place.

Our preceding description of the contending models to ensure review adequacy may well bring to mind haggling in a bazaar, and we believe this is an entirely appropriate image to consider. In valuing nonfungibles that cannot easily be captured in currencies, the commodity vision of ETMs breaks down. Absent adequate currencies that capture important values and adequate rules of exchange that minimize externalities, we are left only with barter to identify trades that promote environmental protection and social welfare—an imprecise yet ultimately exacting process. This leaves us with no shortage of decisionmaking models for ETMs that operate in the habitat trading context and elsewhere where nonfungibilities run high. But none escape the basic trade off between the interests at stake.

Currency and exchange inadequacies prevent us from knowing in advance which trades fail to satisfy basic program demands of environmental protection. When we lack confidence in the ETM operating independently, the question of assessing "fair" trades has to be left in the hands of some reviewing body. Is it an agency with ultimate discretion? Is it the public with power of veto at the polls? An expert review panel? A court? Each alternative improves one interest's position at the expense of another's, or depends on unrealistic behavioral assumptions, or both.

## V. Conclusion

In this Article, we have demonstrated the central roles that nonfungibilities and currencies play in determining the

252. Melious & Thornton, *supra* note 200, at 491.

253. See *id.* at 491, 501-04 (discussing the No Surprises, Safe Harbors, and Candidate Conservation Agreements policies in this context).

254. See *id.* at 514-22 (discussing the application of the Winstar doctrine regarding the extent of government sovereign immunity in contract settings).

255. As Freeman has argued, the growth of "the Contracting State" challenges the dominant administrative law theories.

Although most administrative law scholars would surely acknowledge that informal negotiation, bargaining and exchange pervade the regulatory process, none of the several competing theories of administrative law—public interest, pluralist, civic republican and public choice—advances the normative claim that regulation ought to be the product of explicit contracting between agencies and stakeholders. . . . Perhaps an agency cannot easily occupy both a contractual and hierarchical [i.e., regulatory] position with respect to stakeholders simultaneously. One might reason, for example, that to act as a contractual partner an agency might need to surrender its unique role as a trustee or guarantor of the public interest.

Freeman, *supra* note 200.

256. Indeed, there is good reason to believe environmental groups fear agency discretion more than traders do, and that controlling discretion is more important to environmental groups than achieving effective regulatory strategies. See generally John Scholz, *Cooperative Regulatory Enforcement and the Politics of Administrative Effectiveness*, 85 AM. POL. SCI. REV. 115 (1991).

257. Environmental groups have aggressively opposed the ESA reforms designed to provide HCP applicants more "assurance" that the agency will not change the terms of the agreement except in limited circumstances. See Ruhl, *supra* note 102, at 402-03.

258. For example, recent policies liberalizing trading between public land and private land holdings, i.e., efforts to keep the market fat, have significantly unsettled the process for permitting private development projects planned for formerly public land. One practitioner in that field observes that

the new land exchanges short-circuit the normal project permitting and evaluation process. An almost premature value judgment is made, before the full comprehensive review and rational planning exercises under NEPA and other federal authorities, of whether a particular project should proceed in a certain area. There is not a full opportunity to examine mitigation measures that might be used to offset development impacts, nor is there an opportunity to evaluate and gather in one place an analysis of the potential environmental impacts of a project and provide agency decisionmakers with a range of how to proceed with project approval and permitting. Significantly, this short-circuiting of the normal project permitting process also results in the loss of public involvement.

Feldman, *supra* note 218, at 2-41.

structure and success of environmental trading markets. The standards of currency adequacy, exchange adequacy, and review adequacy provide a comprehensive framework through which to analyze and understand the various trade offs inherent in the design of ETMs. They also reveal the particularly difficult challenges of institutional design.

Ultimately, a meaningful permit-plus approach for habitat-based ETMs requires institutional analysis of decision-making bodies at fundamental levels. It requires a root-level examination of regulatory theory to design the most appropriate structures that systematically improve protection of public interests currently overlooked and, at worst, actively ignored. The needs for such a research initiative are clear. The commodity model of trading cannot, we believe, sufficiently satisfy the demands posed by the trading of nonfungible environmental amenities. This is not to say such markets are necessarily inefficient or undesirable; but when significant values remain unaccounted for in the trades, barter becomes the more appropriate model and the need for a more rigorous evaluation process presents itself. Crafting this process represents a serious and difficult challenge for environmental law, particularly as the trend toward diversification of ETMs into broader contexts continues.

On whose shoulders should this challenge be carried? We have no quarrel with the general proposition that trading can

be efficient and thus the public has good reason to promote and finance research into better currencies and exchange rules for ETMs. But it ought not be the public's burden to assume the risk of inadequate trades while that research program is underway. The SO<sub>2</sub> program, blessed as it is with a relatively fungible trading commodity, has satisfied the challenge, and perhaps other ETMs can do so as successfully. But the burden should be on proponents and practitioners to answer persuasively three fundamental questions.

Is the currency capable of capturing what we care about? Answering this requires not only a technical consideration of measurement capacity but a clear judgment by the body politic of the proper environmental protection goal, e.g., no net loss of wetland acres or services? Will exchange restrictions be sufficient to dampen significant externalities? This brings into play how one decides the proper balance between market constraints and thick markets. And, as discussed in the preceding paragraphs, are there mechanisms in place to catch trades that reduce environmental protection or social welfare? Exchanging environmental apples for oranges may be a beneficial policy choice, but let us be honest about what the ETMs are trading. Given current knowledge and financing, we recognize that the burden of answering these questions may prove difficult for ETMs involving highly nonfungible environmental features. The magnitude of the challenge, however, makes it no less important.