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Uncharted Territory - The Charter Forest Experiment on the Valles Caldera National Preserve: An Initial Economic and Policy Analysis

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ABSTRACT

The Valles Caldera National Preserve (VCNP), located in Northern New Mexico, was the first federal land acquisition specifically devoted to the application of the charter forest concept. Managed by a nine-member trust board, the VCNP represents a unique public lands management experiment. The objective of this article is to provide an initial economic, institutional, and policy analysis of the recreation program on the Preserve. Given its early prominence in program development, an analysis of the elk-hunt program is used to provide insights into how the Valles Caldera Trust has attempted to balance revenue generation and equity considerations while dealing with external pressures introduced by the state and private interests.

I. INTRODUCTION

Tucked away in the 2003 Budget Report of the President is a general proposal for legislative action to establish pilot charter programs on the nation's public lands.[1] The simplest definition of a charter forest is

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1. Quoted directly, "To overcome inertia and an excessive decision-making structure, USDA will develop legislation in 2003 to establish 'charter forests.' This proposal would

a public land unit that operates outside of existing federal land management agencies and has in place some type of alternative funding mechanism (*e.g.*, net-income financing). The proposal has generated considerable debate and many do not yet fully understand the concept or how it will be applied. However, a charter forest experiment is already underway in northern New Mexico. The 89,000-acre Valles Caldera National Preserve (VCNP), established on July 25, 2000, represents the first federal land acquisition to create a charter forest.

Management of the VCNP is in the charge of a nine-member trust board comprised of individuals representing federal, state, and local interests. The Valles Caldera Trust (VCT or the Trust) has a mandate to maintain the VCNP as a working ranch, protect the public interest, provide for sustainable use, and strive for financial self-sufficiency.[2] As a unique public land management experiment, the VCNP merits close scrutiny by land managers, policy makers, and researchers.[3] The objective of this article is to provide an economic, institutional, and policy analysis of the recreation program at VCNP, with particular attention to initial efforts at revenue generation, public access, and program design.

This article is divided into five sections including the introduction. The second section discusses the conceptual roots and

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establish certain forests or portions of forests as separate entities, outside the Forest Service structure, that report to a local trust entity for oversight." BUDGET REPORT OF THE UNITED STATES GOVERNMENT: FISCAL YEAR 2003, at 65, *available at* http://www.gpoaccess.gov/usbudget/fy03/browse.html (last visited Mar. 17, 2005). It would seem that the administration's statement applies to the nation's public lands in general since it does not directly mention programs already in existence, such as the Presidio Trust in San Francisco and the Valles Caldera National Preserve in New Mexico.

2. Valles Caldera Preservation Act, 16 U.S.C. § 698v-1 to v-6 (2000).

3. Economists have provided significant input in philosophical debates over public lands management, but that input should not be seen as emanating from a single philosophical perspective. For positions supporting the privatization of significant portions of the public domain, see B. Delworth Gardner, *Privatizing the Public Lands*, FOCUS ON UTAH, SUTHERLAND INSTITUTE (1996), *at* http://www.sutherlandinstitute.org/Publications/FocusonUtah/PublicLands/PublicLands.htm (last visited Mar. 17, 2005); Terry L. Anderson et al., *How and Why to Privatize Federal Lands*, CATO POLICY ANALYSIS NO. 363, 1, 1-25 (Dec. 1999), *available at* http://www.cato.org/pubs/pas/pa-363es.html (last visited Mar. 17, 2005). For alternative positions, see Daniel Bromley, *Public and Private Interests in the Federal Lands: Towards Conciliation in the Public Lands and U.S. Economy*, PUBLIC LAND AND THE U.S. ECONOMY: BALANCING CONSERVATION AND DEVELOPMENT 3 (George M. Johnston & Peter M. Emerson eds., 1984); JOHN B. LOOMIS, INTEGRATED PUBLIC LANDS MANAGEMENT: PRINCIPLES AND APPLICATIONS TO NATIONAL FORESTS, PARKS, WILDLIFE REFUGES, AND BLM LANDS 88-108 (1993). For a general review of alternative schools of thought in resource and environmental economics, see Alan Randall, *Methodology, Ideology, and the Economics of Policy: Why Resource Economists Disagree*, 67 AMER. J. AGRIC. ECON. 1022, 1022-38 (1985).

characteristics common to charter proposals, focusing on the trust model as applied to the VCNP. The third section of the article presents an overview of the institutional structure and policy goals of the VCT. Legislative mandates place the VCT in the position of having to balance protection of ecological integrity with considerations of equitable public access and financial sustainability. These considerations also must be balanced in the context of state, local, and private interests that each holds a stake in how the VCNP evolves. There are a wide variety of public access and outdoor recreation opportunities that the Trust is considering through initial program development. In the fourth section of the article, we analyze the VCNP elk-hunt program. Given its early prominence as a source of revenue generation, the Trust has attempted to use the elk-hunt program to balance equity concerns with revenue generation goals. The final section provides closing discussion and conclusions.

II. CHARTER FORESTS: CONFLICTING IDEALS AND AN UNEXPECTED CONSENSUS

The expanse of federal public lands spread across the American West has long fueled a philosophical debate between advocates for centralized public management and control and advocates for states' rights and private property interests. There are also calls for seeking out alternative institutional arrangements that would change the way natural environments are managed.[4] Against this backdrop, the charter forest concept represents a kind of middle ground or blending of policy ideas—retaining public ownership and public interest considerations while significantly increasing local or regional control.[5] Often, charter forest proposals contain explicit considerations for financial indepen-

4. *See* DANIEL KEMMIS, THIS SOVEREIGN LAND: A NEW VISION FOR GOVERNING THE WEST (2001); John A. Baden & Pete Geddes, *Reform, Don't Privatize National Forests*, BOZEMAN DAILY CHRON., July 3, 2002, *available at* http://www.free-eco.org/articleDisplay.php?id=20 (last visited Mar. 18, 2005). For further discussion, see Matt Jenkins, *Can Charter Forests Remake an Agency?*, HIGH COUNTRY NEWS, Mar. 18, 2002, *available at* http://www.hcn.org/servlets/hcn.Article?article_id=11081 (last visited Mar. 17, 2005).

5. The charter forest concept has evolved over time. For early work on the subject, see Richard L. Stroup & John Baden, *Endowment Areas: A Clearing in the Policy Wilderness?*, 2 CATO J. 691, 693 (1982). *See also* John A. Baden, *Park Problems? Try Trusts*, BOZEMAN DAILY CHRON., Sept. 10, 2003, *available at* http://www.free-eco.org/articleDisplay.php?id=361 (last visited Mar. 17, 2005); John A. Baden & Robert Ethier, *A Way to Encourage Environmental Entrepreneurship*, SEATTLE TIMES, Feb. 16, 1993, *available at* http://www.free-eco.org/articleDisplay.php?id=316 (last visited Mar. 17, 2005).

dence or management of programs out of net receipts or net income.[6] While stopping considerably short of privatization, the inclusion of a net-income financing requirement within charter proposals is an attempt to reduce the disincentives associated with reliance on congressional appropriations.[7] Although charter forests display a number of characteristics uncommon to more traditional public land management structures, financial independence perhaps best distinguishes the concept.[8]

Most of the criticisms directed at the charter forest concept are related to traditional public interest and national heritage arguments supporting continued public ownership of the nation's lands. Critics see a direct linkage to a devolution agenda, which stresses transfer of control to local authorities or, in the extreme, outright privatization of the public lands.[9] Charter forests are viewed as potentially undercutting democratic principles by transferring control from the federal government to local interests. Given that most of the proposed charters are for lands in the West where historical resource extraction interests are strongest, critics argue that handing control over to local interests is tantamount to giving the lands to miners, loggers, and ranchers. Critics

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6. Financial independence refers to net-income financing rather than federal subsidization and support through general tax revenues. *See Community-Based Land Management and Charter Forests: Oversight Hearing Before the Subcomm. on Forests and Forest Health of the House Comm. on Resources*, 107th Cong. 11-18 (2002) (statement of Jay O'Laughlin, Professor of Forestry, University of Idaho). Arguments for reforming federal public land management to require that programs be run off their net-receipts have a long history. *See, e.g.*, RANDAL O'TOOLE, REFORMING THE FOREST SERVICE 6-8 (1988). In the case of the VCNP, the VCT is allowed to request federal appropriations to help fund operations. Valles Caldera Preservation Act, 16 U.S.C. 698v-2 (2000). It is expected that the Trust will take programmatic steps to gradually reduce the VCNP dependence on federal support. *See* VALLES CALDERA TRUST, VALLES CALDERA NATIONAL PRESERVE, DRAFT FRAMEWORK AND STRATEGIC GUIDANCE FOR COMPREHENSIVE MANAGEMENT 53-58 (2004).

7. For example, one criticism of current U.S. Forest Service funding practices is that publicly subsidized timber sales create a perverse incentive to expand the scope of such projects, further harming the environment. Randal O'Toole, *Charter Forests Offer Public Lands Solution*, CASCADE POL'Y INST., Spring 2002, *available at* http://www.cascadepolicy.org/..%5Cpdf%5Cenv%5Ccharter_forests.html.

8. *See* Terry L. Anderson & Holly Lippke Fretwell, *A Trust for Grand Staircase-Escalante*, POL. ECON. RES. CTR. 1, 7 (1999); Stroup & Baden, *supra* note 5, at 705-08.

9. *See* Michael McCloskey, *Charter Forests and the Devolution Agenda*, OKLA. SIERRA CLUB, July 2002, *available at* http://oklahoma.sierraclub.org/greencountry/Pages/charter%20forest.html (last visited Mar. 17, 2005); Lisa Shelton, *What's Going on in the Forest? Critics Take on Bush's Healthy Forest Initiative*, RAVEN REV., Nov. 1, 2002, *available at* http://www.raven.prescott.edu/features/forest.html (last visited Mar. 17, 2005); Greg Lakes, *Charter Forest Proposal Is All Talk, but That's a Significant Start*, HEADWATERS NEWS, Mar. 27, 2002, *available at* http://www.headwatersnews.org/ /p.032702.analysis.printer.html (last visited Mar. 17, 2005).

highlight that most, if not all, charter proposals contain provisions to streamline legal and administrative appeals processes, which reduces oversight.[10] Streamlining also diminishes the recourse that citizens have to appeal potentially harmful land management practices.[11] Another argument against the charter forest model is that the alternative funding mechanisms typically included in charter proposals provide incentives to generate revenue by further degrading the public lands as managers focus on extractive or consumptive marketable commodities.[12] Other alternative sources of revenue, such as rationed recreational access, require more than just minimal fees. Such fees, it is argued, are viewed as a form of double taxation that would prohibit many from enjoying a national birthright and would potentially promote inequitable access.[13]

Fundamentally, the arguments for devolution are based upon a long-held feeling that the federal government has usurped the primacy of local interests who depend upon the public lands for a living. That the economic linkages between rural western economies and the nation's public lands have changed over time has only exacerbated these feelings.[14] The "sagebrush rebellion" and "wise use" movements represent the magnitude of this ill will.[15]

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10. McCloskey, *supra* note 9. Proponents suggest that process streamlining is a necessary step that must be taken if "Analysis Paralysis" is to be broken. *See Community-Based Land Management and Charter Forests: Hearing Before the Subcomm. on Forests and Forest Health of the House Comm. on Resources*, *supra* note 6, at 11, 12.

11. Jenkins, *supra* note 4.

12. Bill Willers, *Charter Forests: Privatizing the Public Domain*, BUS. J. MILWAUKEE, Apr. 15, 2002), *available at* http://milwaukee.bizjournals.com/milwaukee/stories/2002/04/15/editorial4.html (last visited Mar. 17, 2005).

13. The debate over recreational fees on public lands is much broader than applications to charter forests. Congress initiated the "Rec Fee Demo" program on federal lands in 1996 and extended it several times; it has also been the subject of heated debate. For a synopsis, see Bob Berwyn, *Battle Royal Brewing over Rec Fee Program*, ENVTL. NEWS NETWORK, Mar. 10, 2001, *at* http://www.enn.com/arch.html?id=4431 (last visited Mar. 17, 2005). For more detailed policy discussion and references, see John Loomis, *The Role of Economics in Managing Natural Resources for Society*, *in* SOCIETY AND NATURAL RESOURCES: A SUMMARY OF KNOWLEDGE 295, 296 (Michael J. Manfredo et al. eds., 2004); Jerrell Ross Richer & Neal A. Christensen, *Appropriate Fees for Wilderness Day Use: Pricing Decision for Recreation on Public Land*, 31 J. LEISURE RES. 269, 269–80 (1999); Robert K. Davis et al., *Role of Access Fees in Managing Wildlife Habitat on the Federal Lands*, TRANSACTIONS 52ND N.A. WILDLIFE AND NAT. RESOURCES CONF. 544, 544–51 (1987); Annette Puttkammer, *Recreation Fees in Wilderness and Other Public Lands: An Annotated Reading List*, *in* LINKING WILDERNESS RESEARCH AND MANAGEMENT–VOL. 3 (Vita Wright ed., 2001) (GTR RMRS-GTR-79-VOL3, RMRS, Ft. Collins, CO).

14. Over the last several decades, structural economic adjustment has significantly changed the nature and composition of regional economies in the Rocky Mountain West. For example, many traditional natural resource extraction activities have declined significantly in relative importance, while the relative importance of tourism and service sectors has increased, including many high skill, technical service jobs. Many who have

Proponents of the charter forest concept argue that most, if not all, of the problems of the public lands are due to the attenuation of private property rights.[16] The continued subsidization of logging, mining, and grazing has seriously eroded the health of the public lands.[17] It is argued that social costs can be largely internalized with a clear definition of property rights.[18] The continued government ownership of land impedes this process and prevents individuals from bearing the cost of poor decision making.[19] The weak link in the argument is that true public goods (*e.g.*, protection of biodiversity and wilderness preservation) are non-rival and non-exclusive and will be underprovided by markets due to free-riding behavior.[20]

In the general case, the extent to which the charter forest concept embodies a devolution/privatization agenda is debatable. Provisions to protect the public interest are included within charter proposals.[21]

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seen traditional employment disappear and be replaced by what are perceived to be inferior service jobs commonly misunderstand this adjustment. Also not fully understood is the crucial role that environmental amenities play in attracting jobs, in-migrants (including retirees), and revenues to Western economies. *See* THOMAS MICHAEL POWER & RICHARD N. BARRETT, POST-COWBOY ECONOMICS: PAY AND PROSPERITY IN THE NEW AMERICAN WEST 51–68 (2001). By way of example, in 2003, natural resource extraction employment in New Mexico fell by 11 percent, while retail trade and service (including tourism) employment was expected to increase by 1.7 and 2.5 percent, respectively. Currently, recreation and tourism rank fifth in terms of employment, behind government, retail trade, professional services, and health care. LAWRENCE A. WALDMAN, THE NEW MEXICO ECONOMY 1, 5–6 (2004), *at* http://www.edd.state.nm.us/FASTDATA/unmovervieweconomy.pdf (last visited Mar. 17, 2005).

15. The "sagebrush rebellion" is the antecedent of the "wise use" movement; both stress the need to transfer control of the public lands to local hands. An excellent summary discussion is found in Loomis, *supra* note 3, at 107–08.

16. Proponents of privatization are also called free market environmentalists. TERRY L. ANDERSON & DONALD R. LEAL, FREE MARKET ENVIRONMENTALISM 4 (1991).

17. Stroup & Baden, *supra* note 5, at 691–93.

18. Gardner, *supra* note 3.

19. *Id.*

20. Public goods can be the source of both use and non-use (*e.g.*, existence values). Over the last several decades, economists have developed a battery of techniques for assessing the non-market values, willingness to pay or accept compensation, for changes in environmental public goods. These approaches include a variety of both stated preference (*e.g.*, the survey-based, contingent valuation method) and revealed preference methods (*e.g.*, the travel cost method). For a review, see A PRIMER ON NONMARKET VALUATION (Patricia A. Champ et al. eds., 2003). For discussion and examples of the application of non-market valuation approaches to public lands, see LOOMIS, *supra* note 3, at 156–59; RANDALL S. ROSENBERGER & JOHN B. LOOMIS, U.S. DEP'T OF AGRIC., BENEFIT TRANSFER OF OUTDOOR RECREATION USE VALUES: A TECHNICAL DOCUMENT SUPPORTING THE FOREST SERVICE STRATEGIC PLAN (2000 REVISION) (2001).

21. *Community-Based Land Management and Charter Forests: Hearing Before the Subcomm. on Forests and Forest Health of the House Comm. on Resources*, *supra* note 6. The VCPA contains

Ideally, charter proposals provide for the public interest, allow for increased local input, and remove the economic disincentives associated with public subsidization. In the specific case of the VCNP, land ownership changed from private to public, rather than the other way around.

Given that the VCNP is managed by a fully independent Trust, the following discussion focuses on the trust model. Public trusts have played a role in land management at the state level for a long time. In the traditional sense, a trust is an entity charged with managing a resource for the benefit of a designated party.[22] In this case, a trust represents a land management body that bears responsibility to care for and preserve the well being of a specified parcel of land for the benefit of the public.[23] Given the risk and uncertainty associated with inter-temporal allocation, there is an incentive for trusts to take more conservative actions than otherwise would be pursued by the individual.[24]

Trusts have been used on numerous occasions to manage a portfolio of natural resources, so a precedent does exist. State endowment lands are a ready example of how the principles of trust doctrine have been applied to public land management.[25] Private organizations also use trust doctrine to promote sustainable land management.[26] Besides the VCT, two other independent trusts have been given the responsibility to manage federal land. The Presidio Trust was established in 1996 to manage the Presidio military reservation, which is now a part of Golden Gate National Recreation Area.[27] The Oklahoma

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various provisions requiring the Trust to guard the public interest. Valles Caldera Preservation Act, 16 U.S.C. § 698v-1 to v-10 (2000).

22. Antony Scott, *Trust Law, Sustainability, and Responsible Action*, 31 ECOLOGICAL ECON. 139, 139-40 (1999).

23. *Id.*

24. This is because trusts do not maximize expected utility. *Id.* at 145-49.

25. JON A. SOUDER & SALLY K. FAIRFAX, STATE TRUST LANDS: HISTORY, MANAGEMENT, AND SUSTAINABLE USE 33-36 (1996).

26. The National Audubon Society and Rainey Wildlife Sanctuary are two examples of private organizations that have used trusts to manage sensitive ecosystems. Anderson & Fretwell, *supra* note 8, at 8-9.

27. The Presidio Trust is made up of seven individuals: six are appointed by the President of the United States; the seventh is either the Secretary of the Interior or his/her designee. The trust is responsible for the maintenance and upkeep of the buildings and open space contained within the reservation. Operational funds are obtained by leasing space to public and private interests. THE PRESIDIO TRUST, *at* http://www.presidio.gov/TrustManagement (last visited Mar. 17, 2005). The Oklahoma City Memorial Trust descends from the Oklahoma City Volunteer Task force that built the management framework for the Oklahoma City National Memorial. OKLAHOMA CITY NATIONAL MEMORIAL HISTORY, *at* http://www.oklahomacitynationalmemorial.org/hist_deta.htm?id=2693480 (last visited Mar. 17, 2005).

City National Memorial Trust was created in 1997 to manage the memorial that sits at the site of the Alfred P. Murrah Federal Building bombing. While both these bodies are sometimes cited as examples of the charter concept, they differ from the VCNP in their urban locale and pre-existing inclusion in the federal domain.

It is argued that trusts can be structured to account for local interests and to flexibly manage financial resources.[28] Local input into the decision-making process is achieved by giving a seat to local interests on the trust board. Financial self-sufficiency requires the trust to fund operations out of net-income, forcing board members to account for the costs of management decisions and removing negative incentives brought about from reliance on subsidization. [29] In theory, the public interest is protected by clearly defining the institutional relationship between the trust and the beneficiary.[30] Well-defined policy objectives provide the foundation of this relationship. Such objectives would include the preservation and conservation of natural resources and environmental amenities, the provision of fair and equitable public access, and the protection of cultural and historical sites. The operational latitude granted in the chartering document binds actions taken by the trust to meet such objectives.[31] Although charter proposals typically contain provisions exempting the managing body from portions of the legal and administrative appeals process, they are still required to satisfy federal environmental and land-management legislation.[32] Process transparency (*e.g.*, open meeting requirements and public comment periods) provides another level of public accountability.

The charter forest concept continues to evolve. The VCNP is a test of the provisions typically contained within charter proposals. For the concept to mature, policy makers, researchers, and land mangers must be able to draw on the lessons that are to be learned from the VCNP.

III. THE VALLES CALDERA NATIONAL PRESERVE: AN EXPERIMENT

Located in the Jemez Mountains of Northern New Mexico, the VCNP spans approximately 89,000 acres and is defined by its unique

28. Anderson & Fretwell, *supra* note 8, at 7.
29. *Id.* at 18-22.
30. Scott, *supra* note 22, at 40.
31. Stroup & Baden, *supra* note 5, at 705-08.
32. *See Community-Based Land Management and Charter Forests: Hearing Before the Subcomm. on Forests and Forest Health of the House Comm. on Resources, supra* note 6 at 13.

topography (the largest sunken volcano in North America) and relatively pristine landscape. Within its boundaries exist extensive wildlife, including a large elk herd (variously estimated at between 4000 and 6500), the headwaters of the Jemez River and San Antonio Creek, timber reserves, a high-elevation grassland, and a number of cultural and archeological sites. Also known as the Baca Ranch, the lands encompassed by VCNP boundaries have a long history of use by tribes, settlers, hunters, and ranchers for a variety of purposes.[33] Along with consumptive values, non-consumptive values associated with the cultural, historical, scientific, ecological, and recreational characteristics add to the distinctiveness of the site.[34]

For decades the federal government has viewed the area as a potentially valuable addition to the public domain. New Mexico Senator Clinton Anderson (D-N.M.) attempted to broker a deal to transfer the Valles Caldera to the federal government in the 1960s.[35] In 1975, the National Park Service designated the Baca Ranch as a National Natural Landmark.[36] Between 1978 and 1980, federal efforts to acquire the Valles Caldera were renewed as the owner, the Forest Service (USFS), the Fish and Wildlife Service (USFWS), and the National Park Service (NPS) discussed transferring the property to public ownership.[37] Unfortunately, the owner passed away before any sale could be finalized. Renewed efforts by Congress to purchase the tract were initiated in the mid-1990s.[38]

The negotiations that led to the final deal were contentious and time consuming. A primary issue in completing the public acquisition of the Valles Caldera was negotiating an acceptable sale price. A review assessment by the Government Accounting Office (GAO) conflicted with the findings of both an independent appraisal conducted by Van Court and Company and a later review opinion by the USFS.[39] At issue was the $101 million price that had been settled on by the private owner and the federal government. The GAO review assessment placed the fair market value of the Valles Caldera at roughly $37 million less than the $101

33. VALLES CALDERA TRUST, *supra* note 6, at 39–40.

34. *Id.*

35. Karen MacPherson, *Bingaman Takes up a Cause Started by Clinton Anderson*, ALBUQUERQUE TRIB., Sept. 24, 1997.

36. VALLES CALDERA TRUST, *supra* note 6, at 42.

37. *Id.*

38. *Id.*

39. *Oversight on the Baca Ranch Appraisal: Hearing Before the Subcomm. on Forests and Public Land Management of the Senate Comm. on Energy and Natural Resources*, 106th Cong. (2000) (statement of Jack Craven, Director of Lands, Forest Service).

million sale price.[40] Van Court and Company and the USFS contended that the appraisal procedures used by the GAO failed to account for the distinctive natural characteristics that made the Valles Caldera the "Yellowstone of the Southwest." Both the independent appraisal firm and the USFS found "that the highest and best use [of the Baca Ranch] would be its existing multi-use regime for ranching, private accommodation and outfitting (a "trophy ranch")."[41] The magnitude of this exclusion was only increased by the failure of GAO auditors to actually visit the area during the appraisal process.[42] To various supporters, the private appraisal firm, and the USFS review, the $101 million price tag represented a premium on an extremely unique landscape and high mountain trophy ranch.[43] Congressional appropriations for the purchase in 2000 came from the Land and Water Conservation Fund (LWCF).[44]

In addition to the issue of the sale price, questions pertaining to management also had to be resolved. Senator Pete Domenici (R-N.M.) was reluctant to expand the federal domain in the State of New Mexico without some significant management reforms.[45] The consensus resolution that was reached became the defining institutional characteristic of the VCNP: it would be managed by an independent trust rather than the USFS. The operational latitude and primary objectives of the VCT were set out in the Valles Caldera Preservation Act (VCPA) that was passed by the 106th Congress and signed by President

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40. GOV'T ACCT. OFF., FEDERAL LAND MANAGEMENT: LAND ACQUISITION ISSUES RELATED TO THE BACA RANCH APPRAISAL 35 (Mar. 2000).

41. *See Oversight on the Baca Ranch Appraisal: Hearing Before the Subcomm. on Forests and Public Land Management of the Senate Comm. on Energy and Natural Resources, supra* note 39. In terms of comparable ranch sales, the private appraisal (Van Court and Company) and the USFS review emphasized a more select set of transactions (16 recent sales in the Rocky Mountain West, with 2 direct comparisons to large, high mountain, trophy ranches) relative to the broader set (and lower mean per acre values) discussed by the GAO report.

42. *Id.*

43. Jessica Wehrman, *Baca Ranch Worth Its Price*, ALBUQUERQUE TRIB., Mar. 11, 2000.

44. Codified as 16 U.S.C. §§ 4601-4604 (2000), the LWCF is used for the federal acquisition of parks and recreational lands, to provide matching grants to states for recreation planning, acquisition, and development. Funding for the LWCF comes from the sale of surplus federal property, motorboat fuel taxes, recreation fees, and royalties from offshore gas and oil leases. Section 4601-4606a of the LWCF also contains provisions stating that federal land administrators can levy access fees for the purpose of resource protection. The use of the LWCF to purchase the VCNP, and the subsequent implementation of a fee structure on the preserve, is consistent with these provisions and the stated purposes of the fund itself—to provide recreational opportunities for the American public.

45. Robyn Morrison, *Baca Ranch Buy-Out Has Strings Attached*, HIGH COUNTRY NEWS, May 8, 2000, at 5.

Clinton on July 25, 2000.[46] Federal acquisition of the Baca Ranch brought to close a long history of private ownership and introduced a new experiment in public land management.[47]

The VCNP is the first federal land acquisition specifically purchased for the purpose of experimenting with the charter forest concept. The VCT is a nine-member board comprised of individuals representing a variety of interests. Two permanent members represent the USFS and the NPS; the seven remaining represent local and state interests.[48] Of the seven non-federal representatives, five must be current residents of the state of New Mexico.[49] Each board member is required to have expertise in one of seven areas: (1) livestock management, (2) wildlife management, (3) sustainable forestry (4) non-profit conservation, (5) financial management, (6) regional culture and history, and (7) state and local government.[50] Although the VCPA does not clearly define what is meant by expertise, board members typically have a combination of academic and practical training in their respective areas.[51] Each is appointed by the President of the United States, in consultation with the New Mexico congressional delegation, to staggered four-year terms that overlap presidential elections.[52] As envisioned, the VCT represents a wide array of interests and has considerable leeway to develop and implement management policy on the VCNP.

The primary mission of the VCT is to see to the ecological well-being of the preserve, protect cultural and religious sites, provide for the public interest, provide for sustainable resource extraction, maintain the preserve as a "working ranch," provide for public recreation, and strive for financial self-sufficiency.[53] The VCPA places the VCT in a unique position to test whether or not it is even feasible to balance these

46. Valles Caldera Preservation Act, 16 U.S.C. § 698v (2000).

47. VALLES CALDERA TRUST, *supra* note 6, at 39–40.

48. The two permanent federal representatives are the Superintendent of Bandelier National Monument and the Supervisor of the Santa Fe National Forest. Valles Caldera Preservation Act, § 698v-2(c).

49. *Id.* § 698v-5(a).

50. *Id.*

51. The background information and educational attainment of each board member is given in the 2003 fiscal year report. VALLES CALDERA TRUST, FISCAL YEAR 2003 CONSOLIDATED ANNUAL REPORT 9–10 (2004).

52. Valles Caldera Preservation Act, § 698v-2(c). As argued elsewhere, the concept of staggered appointments, "eliminates the possibility that a president would immediately appoint a new set of trustees." ANDERSON & FRETWELL, *supra* note 5, at 1, 7.

53. Valles Caldera Preservation Act, § 698v-6(d).

requirements. Each component of the mandate is equally important; trustees may not pursue one objective at the expense of another.[54]

Provisions for the termination of the trust, should the board fail, are also given in the VCPA. A report recommending the extension or termination of the trust must be submitted to the Secretary of Agriculture during the "eighteenth full fiscal year from the date of acquisition."[55] In the eventuality of the Trust being terminated, the VCNP will convert to federal control and become part of the Santa Fe National Forest.[56]

Public accountability is attained through a variety of means. The VCT must hold public meetings at least three times per year.[57] Any change in policy that pertains to land and resource management on the VCNP must be done at the public meeting.[58] The VCT must also provide an opportunity for the public to comment and give input regarding the management of the preserve.[59] Transparency is also ensured through the application of federal environmental and National Forest System (NFS) statutes.[60] However, the VCT has been exempted from the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 and the administrative appeal process of the Secretary of Agriculture.[61] The legislative requirements of the RPA require the Forest Service to develop resource supply and cost-benefit analyses every five years.[62] The administrative appeals exemption removes the Trust from the jurisdiction of the USDA National Appeals Division (NAD). Although administrative appeals are unavailable, individuals may still pursue legal action against the Trust.[63]

Management policy must continuously be tested, assessed, and adjusted to satisfy long-range goals. The VCT is using "science based adaptive management" to collect the information needed to formulate

54. VALLES CALDERA TRUST, *supra* note 6, at 45–49.
55. Valles Caldera Preservation Act, § 698v-8(b).
56. *Id.* § 698v-8(c).
57. *Id.* § 698v-5(g).
58. *Id.*
59. *Id.*
60. *Id.* § 698v-6(f). For example, in 2001 the VCT began developing the procedures needed to fulfill the requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321–4347 (2000); the process was completed in 2003. *See* Valles Caldera Trust, National Environmental Policy Act (NEPA) Procedures of the Valles Caldera Trust for the Valles Caldera National Preserve, 68 Fed. Reg. 42,460–72 (July 17, 2003).
61. Valles Caldera Preservation Act, § 698v-6(f).
62. LOOMIS, *supra* note 3, at 44–46.
63. Valles Caldera Preservation Act, § 698v-4(j).

balanced and effective policy.[64] Adaptive management should not be limited to the physical aspects of the VCNP mission but to the social dimensions as well.[65] Controlled experimentation, and outcome assessment, is a critical component of any adaptive management regime. In this regard, the VCT must endeavor to develop a systematic and fully integrated physical and social science research program. An argument can be made that early research efforts relating to the VCNP have focused on the physical science aspects (*e.g.*, assessing what is there); these include a wide variety of donated and hired investigations.[66]

To date, although there are a variety of program planning efforts, there is no systematic social science research program in place.[67] This is not to argue that the Trust and its professional staff are not aware of the need to develop these programs. For example, the current Draft Management Framework recognizes the need to implement visitor monitoring and, with respect to economic analyses, to subject all actions of the Trust to "rigorous economic evaluation."[68]

Of all the provisions found in the VCPA, the goal of financial self-sufficiency is, perhaps, the most distinctive and least understood.[69] While ecological preservation and conservation require access rationing to offset human impacts, financial self-sufficiency necessitates access rationing to generate revenues. Establishing an access fee structure that is "reasonable" is a complicated task.[70] In this context, the term reasonable has multiple meanings. From the standpoint of equity, reasonable is taken to mean setting fees at levels not prohibitive to the public and, especially, the economically less fortunate. Alternatively, reasonable is taken to mean establishing fees at levels that allow the

64. Adaptive management is based on the use of on-site scientific analysis to gather data (and information) that can be used to improve the quality of management decisions. VALLES CALDERA TRUST, *supra* note 6, at 58–59.

65. *Id.* at 129–31.

66. For a review of such efforts, see *id.* at 61.

67. Such research needs will become increasingly necessary as access programs are implemented and visitor use increases. For example, there is a need to randomly and programmatically sample participants (and online applicants) to collect expenditure (on site and in the region) and other basic socioeconomic information, as well as more detailed information on attitudes and preferences. Select, limited (1–2 page) surveys of small numbers of anglers and hikers have been collected to date by the VCT. Rather than serving as tools in a rigorous economic analysis, the surveys represent one example of how the Trust has given the public an opportunity to comment. The VCNP staff provided copies of the paper survey responses; descriptive statistics have been calculated and are available upon request.

68. VALLES CALDERA TRUST, *supra* note 6, at 48.

69. Valles Caldera Preservation Act, 16 U.S.C. § 698v-6(d) (2000).

70. *Id.* § 698v-6(c).

board to recoup operating costs.[71] But clearly, the financial purpose of the Trust is not profit maximization; rather it is a kind of balanced revenue generation program that optimizes income. To be clear, the VCPA only states that the trust is to *strive* for financial self-sufficiency; it is not necessarily a hard constraint.[72] There is the expectation that some programs (*e.g.*, trophy hunting) would be expected to subsidize other public access opportunities on the VCNP. Public response and acceptance to access fees can be expected to vary by activity. For example, there is a general sentiment that public objection to fees on public lands has been strongest with respect to non-consumptive activities such as wilderness-type hiking. In addition to elk hunting, there are a variety of access fee programs for recreation on the VCNP that have been implemented.[73]

Being subject to the financial self-sufficiency goal and further requiring some programs capable of generating sufficient revenues to

71. For example, for fiscal year 2003, the VCT reported expenses of $3.4 million and revenues of $759,186, excluding a $3.1 million congressional appropriation. The recreation program provided $516,994 or 68% of preserve revenues. But this probably understates the case for outdoor recreation as a future source of revenue generation at the site. The total revenues include $200,000 from a timber harvest sale (also involving the Jemez Pueblo) that was negotiated prior to the creation of the VCNP. On the cost side, the total of $3.4 million can apparently be attributed to facilities development, with personnel and operating costs in approximately the range of $1.2 to $1.5 million. The elk-hunting program had operating costs of $200,000. Notably, a carefully managed grazing program on the VCNP had net losses of approximately $15,000. VALLES CALDERA TRUST, *supra* note 51, at 50–51.

72. Valles Caldera Preservation Act, § 698v-4(e).

73. Total recreation visitation at the VCNP for 2003 was 5217. Besides elk hunting, the VCT has also developed initial recreational programs for hiking, fishing, birding, van and wagon tours, snowshoeing, and cross-country skiing (to name a few). The Trust also runs additional public outreach programs that are offered free of charge. For recreational program information, go to www.vallescaldera.gov/recreation.html. To date, no attempt has been made in these programs at efficient pricing or to effectively ration by the use of pricing mechanisms. In most cases, limited access slots are rationed by sign-up (first-come, first-served or web-based). By way of example, the 2003 per-day fees for fishing were $20 for adults, $16 for seniors and $10 for children (65+ and 5+ years, respectively). Excluding two free hikes, fees are $10 for adults and $5 for children. Tour fees range from $10 to $30. To provide comparison, a 2001 meta-analysis generated statistical estimates from a large number of valuation studies for the average consumer surplus (CS) values for a recreational visitor day (RVD). Mean predicted CS per RVDs for the intermountain region (in 2004 dollars) were $36.15 for hiking, $43.62 for fishing, $29.88 for cross-country skiing, and $36.15 for wildlife viewing. *See* ROSENBERGER & LOOMIS, *supra* note 20, at 22. It appears that (1) there are significant CS or non-market benefits that are being generated and (2) there is significant room for revenue capture from the VCT recreational program, if desired, relative to even general CS value estimates. Further, prior studies have tended to indicate that outdoor recreationists are often relatively price insensitive (inelastic), which suggests that fee increases could generate additional revenue. *See* LOOMIS, *supra* note 13, at 295–304.

cross-subsidize other programs and access opportunities positions the Trust against some competitive forces and regulatory constraints not explicitly outlined in the VCPA. While some may think of the Trust as having unfettered management discretion (even monopoly power), the reality is that the VCT does not design and implement policy in a vacuum. Besides the requirements of the VCPA, the Trust must also contend with state regulations and both private and public competitors. For example, the VCT is a new entrant into a fully functional market for high-valued trophy hunting in New Mexico.[74] Nowhere are the regulatory constraints and competitive forces more apparent than for the VCNP elk-hunting program. In the next section, we use the elk-hunting program to illustrate the context in which the broader recreation program at the VCNP functions.

IV. THE VCNP ELK HUNT PROGRAM: SUCCESS AND UNEXPECTED DIFFICULTY[75]

The VCNP elk-hunting program began operation in the spring of 2002. Permits were allocated to individuals through both an auction and a lottery. Aside from introductory and highly limited van and hiking tours that started in 2001, the VCNP mature bull hunt programs were the first significant recreational programs developed and implemented by the Trust. There are three components to the program: a mature bull permit auction, a mature bull permit lottery, and a state-run lottery of cow and antlerless elk. Although the cow and antlerless elk hunts generate revenues for the Trust, the allocation of hunt permits is determined by the New Mexico Department of Fish and Game

74. There are two important legal considerations to this market: *Geer v. Connecticut*, 16 U.S. 519 (1896), and the Sikes Act, 16 U.S.C. § 670a-o (2000). First, *Geer v. Connecticut* confirmed State ownership of wild game and fish. Second, the Sikes Act allows the Forest Service (and other federal agencies) to enter into cooperative arrangements with State game management agencies to charge habitat preservation fees to individuals participating in state-run hunts taking place on federal lands. Under this arrangement, the State benefits from both its ownership of game resources and its ability to use federal land for its hunting programs, while the federal government typically receives only minimal recompense. In New Mexico, a state hunting permit on a game unit involving USFS or BLM lands requires purchase of a $5 Habitat Preservation Stamp. N.M. DEP'T OF GAME & FISH, BIG GAME AND FURBEARER RULES AND INFORMATION: 2004-2005 LICENSE YEAR 11 (2004), *available at* http://www.wildlife.state.nm.us/publications/index.htm (last visited Mar. 13, 2005). Thus, the state regulates hunting and fishing of game species, and these activities already occur on state, federal, and private lands.

75. The following uses lottery ticket sales data that have been provided by the Trust and then combined with 2000 Census and other data by the authors. All data are available upon request from the lead author. A more complete data description is provided in Appendix A.

(NMDFG) lottery system.[76] It is the mature bull auction and lottery combination that provides a unique insight into how the VCT has addressed the policy issues associated with the financial self-sufficiency requirement. More importantly, the design, operation, and evolution of the VCNP mature bull auction and lottery combination presents implications that will affect the design of other recreation programs on the preserve. We consider two aspects of the auction-lottery system, revenue generation and equity.

The mature bull auction and lottery combination is meant to generate revenues for the trust and satisfy the public access mandate of the VCPA. A stylized display of individual values, or maximum willingness to pay (WTP), for a mature bull elk permit on the VCNP is provided in Figure 1. The demarcation (A^*) represents the number of permits that will be auctioned off, with all other permits subject to lottery allocation. As a program choice, A^* could be assumed to represent an equity constrained, income maximizing combination of auction and lottery permits.[77] Successful auction bid values are represented left of A^*. As long as the auction is incentive compatible, maximum WTP is expressed through bid value. To the right of A^* are the remaining individual values for participants in the lottery. Although lottery participants value hunting access, their WTP is not high enough for them to successfully bid for a permit through the auction. For these individuals, the lottery is their only means to obtain a permit. In the presence of uncertainty, however, this WTP is only partially revealed through the ticket purchase. P^* represents the lottery ticket price, which does not guarantee a permit but only the chance at being drawn. P^* is also a program choice variable and has been set at $25 since the program's inception. The auction maximizes revenues through perfect price discrimination, while the lottery allows for the capture of some

76. NMDGF lottery ticket sales data for the cow and antlerless hunts on the VCNP are, at this time, unavailable. These hunts generated between $100,000-$110,000 per year. This calculation was made by subtraction of the 2003 mature bull auction and lottery revenues from the $429,525 of reported elk hunt receipts. VALLES CALDERA TRUST, *supra* note 51, at 50-51.

77. For theoretical insights into the determination of A^* and how resource managers can use some simple "rules of thumb" to identify income maximizing auction-lottery permit combinations, see Mary Evans & Nicholas Flores, Relative Economic Efficiency and the Provision of Rationed Goods 12-16 (Mar. 2001) (unpublished manuscript), *available at* www.colorado.edu/Economics/CEA/papers01/wp01-3/wp01-3.pdf (last visited Mar. 12, 2005). The VCNP elk permit auction provides an excellent opportunity to apply this methodology. However, the auctioning agencies (*i.e.*, Rocky Mountain Elk Foundation, Safari Club International, and Cabelas) did not retain much of the information needed to make such a calculation.

portion of individual WTP (through ticket purchase) and promotes public access.

Based on the ability to perfectly price discriminate, the permit auction is a pure revenue generator where equity is not a consideration. In both 2002 and 2003, the Trust allowed five permits to be placed up for auction.[78] Except for one permit that was sold on eBay, the VCT did not conduct the auctions. Organizations such as Safari Club International (SCI), the Rocky Mountain Elk Foundation (RMEF), and Cabelas sold the permits on the Trust's behalf. Based on a predetermined percentage in each case, auction proceeds were split between the VCT and the respective organizations. Figure 2 presents the auction proceeds and their split for the ten permits that were sold in 2002-2003.

The mean winning bid was $13,200 for the 2002 auction. Total revenues were $66,000, of which the trust received 71% or $47,100. For 2003, the mean winning bid was $13,500 and total revenues were $67,500, of which the trust received 67% ($45,500). It is important to note that in 2002 the single permit that was sold on eBay generated revenue of $12,000, which exceeded the Trust's per permit share of $9420 for that year.[79]

Over a two-year period, the auction generated revenues of $92,600 for ten permits. The substantial bid values seen in the auction point toward the potential magnitude of individual willingness to pay. Although the auctions produced considerable revenues, they do not address the public access and equity components of the VCT mandate.

The lottery, on the other hand, is meant to fulfill the Trust's obligation to provide fair and equitable access to the elk hunting program.[80] This is not to say that the lottery component of the elk hunting program disregards revenue generation. In 2002, ticket revenue from the elk-hunting lottery was $336,000 and $255,000 in 2003. No other recreation program at the VCNP currently generates near that amount of revenue.[81, 82]

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78. Table 1A in Appendix A presents a breakdown of winning auction bids by auctioning foundation.

79. The decision to not conduct the auction itself reflects a promotional cost the Trust was willing to incur to foster interest in the VCNP. Telephone Interview with Richard Engstrom, Business Director, VCNP (May 19, 2004).

80. VALLES CALDERA TRUST, VALLES CALDERA HUNTING DESCRIPTION, *at* http://www.vallescaldera.gov/comevisit/elk/index.aspx (last visited Mar. 22, 2005).

81. By comparison, the VCT reported recreation fee revenues of $60,550 for FY 2003. VALLES CALDERA TRUST, *supra* note 51, at 50-51 (2004).

82. Although open to debate, the significant decrease between the 2002 and 2003 ticket revenues, despite the increasing awareness of program existence, may likely be attributed to a combination of factors. First, and probably most important, 85 mature bull permits were allocated across five different hunts through the lottery in 2002, while 48 permits

Similar to state-run hunt lotteries, the VCNP lottery gives the public an opportunity to purchase a positive probability of obtaining a permit at a reasonable cost. Also, like state programs, the VCNP lottery is used to alleviate the excess demand that occurs when access quantities (permits) are fixed and prices are lower than would prevail in the market. A distinct feature common to more traditional state-run hunt lotteries is that access is rationed equitably, that is, independent of income. In the traditional state lottery model (*e.g.*, as in New Mexico), participants choose from a set of hunt sites and dates and are allowed a single application for each of their choices. [83] Under this format, each individual has an equal probability of winning with the chance of being drawn determined by the total number of applicants in the pool and the number of permits allocated. More complicated systems may employ preference points to achieve various policy objectives such as benefiting state residents or encouraging repeat participation.[84] Although preference point systems alter the win probability so that it is not uniformly distributed, the change is not due to individual income.

State hunt lotteries satisfy the public interest by providing a reasonable (and equitable) opportunity to individuals. In doing so, however, there is an incentive to manage for herd quantity rather than quality.[85] An example of such management would include basing the

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were allocated across four hunts for 2003. The Trust chose to decrease the number of permits in 2003 based on input from hunters who felt that "over harvesting" would negatively impact the quality of the elk herd. Information pertaining to the perception of potential "over harvesting" was obtained via telephone interview with Steve Mauer, Public Lands Information Association (PLIA) (May 26, 2004). The second change was the suspension of permit transferability in 2003. Permits issued through the 2002 lottery were fully transferable and a speculative market formed. A number of the 2002 lottery winners resold their permits to outfitters, guides, and others on the secondary market for a profit. Ironically, the Trust found that, when auctioning a permit on eBay, they were doing so along side many of the 2002 winners. The suspension of transferability in 2003 was a response to this speculation. Information regarding the suspension of transferability was obtained via telephone interview with Rich Engstrom, Business Director, VCNP (May 19, 2004). The authors reason that this change potentially reduced ticket demand by reducing the value of the lottery permit to some participants such as outfitters. It should also be noted that, despite ending transferability, no apparent attempt was made by the Trust to capture any additional program revenues itself (*e.g.*, by increasing A* or raising P*, which remained at 5 and $25, respectively).

83. Dave Scrogin & Robert P. Berrens, *Rationed Access and Welfare: The Case of Public Resource Lotteries*, 79 LAND ECON. 137, 137 (2003); David Scrogin et al., *Policy Changes and the Demand for Lottery-Rationed Big Game Hunting Licenses*, 25 J. AGRIC. & RESOURCES ECON. 501, 502 (2000). Please note that hunters are not restricted to only participating in a single year.

84. David E. Buschena et al., *Valuing Non-Marketed Goods: The Case of Elk Permit Lotteries*, 41 J. ENVTL. ECON. & MGMT. 33, 34 (2001).

85. John T. Wenders, *The Economics of Elk Management*, *in* WILDLIFE IN THE MARKETPLACE 89, 89 (Terry L. Anderson & Peter J. Hill eds., 1995).

number of permits on a maximum sustainable yield.[86] The fact that the public has perceived a decline in elk hunting quality in recent years exemplifies the problems associated with such management practices.[87]

The 2002-2003 VCNP lottery differed considerably from more traditional designs. Access coupons (tickets) cost $25 and there was no cap on the number that could be purchased. This gave participants additional chances at being drawn. Individuals selected from a small set of hunts that varied by weapon type and date.[88] If drawn, an individual had to remit an access fee of $175 to enter the VCNP. For safety purposes, winners were required to attend a one-day orientation. Given that many individuals are unfamiliar with the VCNP, the Trust has certified a number of guides and outfitters whose services could be purchased by lottery winners.[89] Finally, winners were allowed to bring a friend hunting with them.[90]

The VCNP lottery exhibits the revenue-generating characteristics common to a raffle. Because individuals can purchase more than one ticket, the probability of winning is a function of the number of tickets purchased and is not uniformly distributed across participants. For large numbers, this relationship is approximated by:[91]

$$\theta_i = \sum_{j=1}^{4} \frac{q_{ij}}{Q_j} A_j \qquad [1]$$

Where θ_i is the win probability for individual i, q_{ij} is the quantity of tickets purchased by individual i for hunt j, Q_j is the total number of tickets purchased for hunt j, and A_j is the total number of elk permits issued through hunt j. For traditional lotteries, q_{ij} would be capped at one and the win probability for a specific hunt uniformly distributed across entrants. In the VCNP lottery, q_{ij} is a choice variable that is dependent on the entrant's individual preferences.

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86. *Id.* at 91.

87. *Id.* at 92-93.

88. In 2002, there were five hunts: one archery hunt, one muzzleloader hunt, and three rifle hunts. For 2003, there were four hunts: one archery, one muzzleloader, and two rifle hunts.

89. Once certified, an outfitter must remit $300 and pay $50 per guide to the VCT. Telephone Interview with Dave Phillips, Staff Member, VCNP (May 27, 2004).

90. VALLES CALDERA TRUST, ELK HUNT PROGRAM RULES, *available at* http://www.vallescaldera.gov/comevisit/elk/elk_needtoknow.aspx (last visited Mar. 22, 2005).

91. A total of 10,206 tickets were sold for the 2003 VCNP elk hunt lottery (see Table 2A, Appendix A). The permit draws are done without replacement. Thus, the size of the ticket pool for each hunt will change as a winner's tickets are withdrawn prior to subsequent draws. Given the large number of tickets that were sold for each hunt, the formula provided in [1] gives a reasonable approximation of the win probability and is used to ease analysis.

Raffles are often used to raise funds for a variety of good causes such as school programs, hospital programs, and medical research.[92] Hunt raffles are also commonly used to raise funds for private hunting clubs and there are examples of state agencies marketing hunt raffles as a way of raising funds for habitat preservation. The allure of the raffle is that participants realize two benefits: a potential return on their ticket purchase in the form of a fixed prize and the benefit of the raffle revenue being used to provide a public good (*e.g.*, habitat preservation).[93] Revenues generated from raffles have been shown to dominate other public good provision mechanisms under certain circumstances.[94] While the prize provides an enticement to participate, it is not uncommon for the expected value of participation to be less than individual ticket expenditures and, in the extreme, negative. Economists typically employ an expected utility framework and judgments about risk to assess individual behavior with respect to risky choices. Such an approach can identify expected utility maximizing raffle expenditures even in what appears to be an unfair gamble.[95] There are a variety of plausible explanations for the fact that the expected value of participation in raffles is often less than expenditures: some participants may be incorrectly assessing win probabilities, some may be risk seeking, or participants may have sources of utility other than the fixed prize such as the benefit of supporting the provision of a public good.

There is considerable theoretical discussion and provision of examples of what are called the donation and dream components of raffle participation.[96] Although difficult to quantify, these components of individual value contribute significantly to the revenue generating capabilities of a raffle. An individual's satisfaction or utility derived from contemplating what they would do if they won represents the dream

92. Brian Duncan, *Pumpkin Pies and Public Goods: The Raffle Fundraising Strategy*, 111 PUB. CHOICE 49, 49 (2002); *see also* Kerry Fehr-Snyder & Susie Steckner, *Barrow's Deluxe Raffle Not Risk-Free*, ARIZ. REPUBLIC, Mar. 31, 2003.

93. Duncan, *supra* note 92, at 50.

94. Douglas D. Davis et al., Raising Revenues for Charity: Auctions Versus Lotteries 3 (Oct. 2003) (unpublished manuscript, *available at* http://gunston.gmu.edu/bwilson3/papers/drrw1003.pdf (last visited Mar. 22, 2005)); Duncan, *supra* note 92, at 49.

95. In this circumstance, the purchase of an additional ticket not only increases the win probability but also lowers the marginal price of contribution (in expectation). Thus, an individual's expected utility may increase but the expected value of participation may remain small (or negative). As noted by Duncan, "A quick assessment of the probability of winning compared with the estimated value of the prize reveals the truth about raffles: they are generally very unfair gambles." Duncan, *supra* note 92, at 49.

96. Loyd R. Cohen, *The Lure of the Lottery*, 36 WAKE FOREST L. REV. 705, 712-17 (2001); Ian Walker, *Lotteries: The Determinants of Ticket Sales and the Optimal Payout Rate*, 13 ECON. POL'Y 357, 360-63 (1998); Davis et al., *supra* note 94, at 22.

component of individual value and a source of motivation for participating (or the level of expenditures).[97] An individual may also derive utility from donating to a good cause through the purchase of a ticket. For the VCNP lottery (raffle), ticket purchases may be motivated in part by the financial contribution the lottery revenue makes to the VCNP.[98]

To illustrate this point, we assume risk neutrality and that the donation and dream components of participating in the VCNP lottery (raffle) are zero. Under these circumstances, the expected participation value (EPV) for an individual in the VCNP lottery (raffle) is calculated under a wide variety of plausible parameter assumptions. The formula is:

$$EPV = \theta_{ij}(\beta^* - TC_{ij} - P^* q_{ij} - L_i) - (1-\theta_{ij})(P^* q_{ij}) \quad [2]$$

Where β^* is the personal hunt value for individual i, P^* represents the ticket price, q_{ij} represents the quantity of tickets purchased by individual i, TC_i represents the travel cost, and L_i represents relevant license fees.[99] Using the observed 2003 average permit value of $5300, mean estimated travel cost, mean win probability (1%) from the 2002 (prior) season as a proxy for the subjective probability, mean ticket expenditure, and relevant license fees, the expected participation value was -$18.96 for non-residents and -$3.71 for residents.[100] When broken down by winners and non-winners, the expected participation value (*EPV*) is -$146.46 and -$11.21, respectively. The negative values exemplify what is meant by an "unfair gamble." To clarify, negative values can be associated with a number of factors including the small probability of winning, increased travel costs, ticket expenditures, and out-of-state license fees. While it is possible to drive EPV to be greater than average ticket expenditures if we assume hunt values significantly greater than those actually observed in the permit auctions, under a wide range of assumptions for combined parameter values the results are negative (or close to zero). This is not

97. Cohen, *supra* note 96.

98. Walker, *supra* note 96, at 363.

99. Individual travel costs were calculated following a common formula. *See* Kalyan Chakraborty & John E. Keith, *Estimating the Recreation Demand and Economic Value of Mountain Biking in Moab, Utah: An Application of Count Data Models*, 43 J. ENVTL. PLANNING & MGMT. 461, 463 (2000). Instead of the $0.25 per mile cost used by these authors, an updated value of $0.35 was used. Round-trip travel distances (in miles) were compiled using the PC miler program and are measured as the distance between the "home" zip code and the VCNP.

100. Current, standard, mature bull license fees are $69 for residents and $481 for non-residents. Applicants must also remit a $5 habitat preservation fee with their application. N.M. DEP'T OF GAME & FISH, *supra* note 74.

uncommon in raffles and perhaps no other result better illustrates their ability to generate funds for public good provision.

In summary, analysis of the first two years of the combined auction and lottery elk hunt permit allocation program demonstrates significant capacity for revenue generation. Revenues were more than sufficient to cover the permit program costs and subsidize other programs at the VCNP. The Trust has developed a program with the potential to generate substantial operational funds and with the opportunity to further expand revenue using the auction lottery combination. This is not to argue that there are not ways to increase revenues from the mature bull elk permit program.[101] Given that the lottery did not impose a strict one ticket per person format, the equity performance of the elk hunt lottery remains an empirical question.

Equity has traditionally been viewed from the standpoint of economic status. In this context, fair access to the VCNP would imply that the fee structure would allow a wide array of individuals from differing economic backgrounds to participate in a variety of recreational programs. As stated previously, the auction does not satisfy this condition, leaving the lottery as the primary mechanism for equitable access. With regard to the lottery, two different approaches were taken to analyze the equity component. First, Gini coefficients measuring the distribution of income across different subsets of 2003 ticket buyers were calculated. Second, a set of ticket demand functions was estimated to identify the effect of household income on ticket sales. The VCNP staff provided the 2003 lottery ticket data set used in the analysis. The data included the number of tickets purchased per transaction, the name of the buyer, the hunt(s) (by weapon type) chosen, the date of the hunt, and contact information that included a zip code.[102]

Gini coefficients can be used to measure the dispersion of income across the sample. Values closer to zero indicate that household income is evenly distributed across groups, while values close to one

101. Such opportunities include (1) optimal auction design for incentive-compatible revelation of maximum WTP, (2) determining the optimal combination or split (A*) between the number of permits to auction and the number to make available to the lottery (raffle), (3) improving the percentage of surplus captured by the Trust itself on auctioned permits, and (4) determining a revenue-maximizing price for the lottery tickets.

102. Once again the authors would like to thank the VCNP staff for providing the lottery ticket data set. It should be noted that each transaction was given an order identification number (order ID) when the purchase was made. The order ID provided the clearest means through which ticket transactions could be tracked. More detailed explanations of the data are found in appendix A at the end of this article. A critique of basing these models on aggregate data is provided in Klaus Moeltner, *Addressing Aggregation Bias in Zonal Recreation Models*, 45 J. ENVTL. ECON. & MGMT. 128, 131-32 (2003).

indicate otherwise. Using the 2003 lottery data, the Gini coefficient for the entire sample is 0.183, which suggests that household income is fairly evenly distributed on the whole. When broken down by residency, the Gini coefficient for non-residents is 0.184 and 0.165 for New Mexico residents. This suggests that household income is reasonably distributed among these sub-samples. If broken down by permit winners, the Gini coefficient is 0.201 for successful participants and 0.182 for non-winners, once again indicating that household income is reasonably distributed across winners and non-winners. The comparable mean household incomes of the winners ($58,000) and non-winners ($57,500) further supports this finding. The calculated Gini coefficients provide a first insight but do not directly measure the role that household income is playing in the ticket purchase decision.

Using data on 2003 VCNP elk hunt lottery ticket transactions, raffle ticket demand functions were estimated to identify the impact that household income and other determinants have on ticket purchase transactions. Conceptually, the individual demand function is:

$$q=f(M, E(tv), Sub, Permits, SD, R) \qquad [3]$$

Where q is the quantity of tickets purchased (dependent variable); M is household income; $E(tv)$ is the expected ticket value, which (using 2002 objective probabilities) is a proxy for the level of expected net-benefits to a ticket given travel costs and relevant fees;[103] *Sub* is an indicator for substitute hunting opportunities; *Permit* is an index of available permits to a given weapon type (*e.g.*, archery, muzzleloader, rifle, or various combinations);[104] *SD* is a vector of socio-demographic characteristics; and R is an indicator of residency status (*i.e.*, New Mexico resident or nonresident). Note that we do not directly include ticket price (P*), since it has been fixed to date at $25. However P* does enter indirectly through $E(tv)$. Given the truncated, count data nature of the ticket purchases, a zero truncated negative binomial log-likelihood was maximized and is given by:[105]

103. For an example of a ticket demand function for a pari-mutuel lottery that uses expected ticket value as an explanatory variable, see Walker, *supra* note 96.

104. Alternatively, we can simply use a set of hunt-type indicator variables.

105. The maximum likelihood function presented in [4] derives from A. Colin Cameron & Pravin K. Trivedi, *Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators and Tests*, 1 J. APPLIED ECONOMETRICS 29, 30-33 (1986). The transactions data are truncated because there is no probability of observing a "zero" ticket purchase.

$$\ln L = \sum_{i=1}^{n} \left\{ \begin{array}{l} \ln(\Gamma(q_i + \frac{1}{\alpha}) - \ln(\Gamma(q_i + 1)) - \ln(\Gamma(\frac{1}{\alpha})) + \\ q_i \ln(\alpha\lambda_i) - (q_i + \frac{1}{\alpha}) \ln(1 + \alpha\lambda_i) - \ln(1 - (1 + \alpha\lambda_i)^{\frac{1}{\alpha}}) \end{array} \right\} \quad [4]$$

Where α represents an over dispersion parameter accounting for unobserved heterogeneity and λ_i is defined as the mean ticket demand ($E(q)$) and is equal to $e^{X'\beta}$ where X' is the vector of explanatory variables. Explanatory variables include (1) *E(tv)*, the expected value of a ticket; (2) *HHINC*, the average scaled household income of participant *i's* zip code tabulation area (ZCTA); (3) *PERMIT-INDEX*, a permit hunt index; (4) *DNM*, a New Mexico resident dummy variable; (5) *PHE*, the average private hunt expenditures for the state in which individual *i* resides and represents the substitute good; (6) *PERURB*, the average percentage of individuals in participant *i's* ZCTA that resides in urban areas; (7) *PERHSPLUS*, the average percentage of individuals in participant *i's* ZCTA with at least a high school diploma (or GED); (8) *AVGHHSIZE*, the average household size for participant *i's* ZCTA; (9) *TENURE*, the average percentage of homeownership in *i's* ZCTA,;(10) *DMUZZ*, a muzzleloader hunt dummy variable; and (11) *DARCH*, the archery hunt dummy variable.[106] Descriptive statistics are broken down by residency and by winner/non-winner in Table 1.

Four alternative specifications of the model were estimated and are shown in Table 2. The first model includes the permit index variable and excludes the vector of socio-demographic characteristics. The second includes both the permit index variable and socio-demographic characteristics. The third employs hunt dummy variables for archery and muzzleloader hunting and excludes the socio-demographic variables. The fourth uses the archery and muzzleloader dummy variables and includes the socio-demographic characteristics. As Table 2 indicates, each model is significant (0.05 level) overall and the negative binomial format is appropriate given the significant χ^2 test for over-dispersion. It should also be noted that estimation results are robust across each specification.

Since the ticket price does not vary, the estimated functions are not demand equations per se but rather functions representative of

106. More detailed explanations of the data and variables used in the analysis are found in Appendix A at the end of this article. See Moeltner, *supra* note 102, for a critique of basing such analyses on aggregate level data.

demand shifts.[107] The coefficient on *HHINC* when evaluated at the mean household income is interpreted as income elasticity. Given the limitation of observations at only one price, we are not able to evaluate the critical issue of price elasticity of demand for lottery tickets or whether price increases would raise or lower program revenues.

Across the four models, there are no differences in sign or significance level of the estimated coefficients for the variables common to all four models. In particular, the estimated coefficients on the income variable (HHINC) are of importance if program equity is to be addressed. The estimated coefficient on income is small but significant (0.10 level) for all four models, which suggests that participants with higher incomes did buy more tickets but the effect is not strong. This fact is made more readily apparent when the calculated income elasticities are used to identify the change in ticket expenditure that would occur should household income increase. Income elasticities can be estimated at the mean scaled household income for all four models. The elasticities range from 0.17 for the reduced model with permits to 0.25 for the expanded model with hunt dummies, which indicates that VCNP lottery tickets are viewed as a normal good. More succinctly, the elasticities suggest that a $575 increase in household income would result in an 11- to 18-cent increase in ticket expenditures.[108] If measured in terms of the 2003 observed probability for the mean ticket purchase, an 18-cent increase in expenditures would change the win probability by 0.002. Given these results, it appears that household income is not a dominant factor in the ticket purchase decision and, hence, the probability of winning access. When taken in conjunction with the calculated Gini coefficients, the findings suggest that, in terms of initial performance, the

107. Along with the reliance on aggregate (zip code level) socioeconomic data, the lack of price variation (P*) is reflective of the need for the VCT to broaden the scope of its data collection and analysis program. Specifically, contingent behavior surveys can be used to investigate demand responsiveness to proposed changes in fee levels or other lottery program design issues. For further discussion, see Robert P. Berrens & Richard M. Adams, *Applying Contingent Valuation in the Design of Fee Hunting Programs: Pheasant Hunting in Oregon Revisited*, 3 HUM. DIMENSIONS WILDLIFE 3, 11-25 (1998); Jeffery Englin & Trudy A. Cameron, *Augmenting Travel Cost Models with Contingent Behavior Data: Poisson Regression Analysis with Individual Panel Data*, 7 ENVTL. & RESOURCE ECON. 133, 133-47 (1996). For a recent contingent behavior application to proposed increases in fishing license fees, see DANIEL W. MCCOLLUM ET AL., U.S. DEP'T AGRIC. FOREST SERVICE, A SURVEY OF 1997 COLORADO ANGLERS AND THEIR WILLINGNESS TO PAY INCREASED LICENSE FEES (1999). Such analyses are entirely consistent with the adaptive management concept, where the use of surveys would allow the Trust to examine important social dimensions (attitudes, preferences, and values) and form testable hypotheses prior to enacting policy changes.

108. Figures are based on the mean household income of $57,500, mean ticket expenditure of $72.75 and mean permit index of 15.81.

VCNP lottery is not inherently favored toward participants with higher incomes.

The average state private hunting expenditures variable (PHE) was included to gauge the magnitude of substitutability or complementarity between private land and VCNP hunts. Average private hunt expenditures were shown to have a positive and highly significant (0.01 level) impact on the ticket purchase decision in all four models. This result suggests participants view private hunting in their home state as a substitute to the VCNP lottery.

Finally, state residency is shown to have a strong, negative impact on the ticket purchase decision for all four models. This result suggests that New Mexico residents purchase significantly fewer tickets than do non-residents.[109] The fact that New Mexico residents purchase significantly fewer tickets and are, hence, winning fewer permits raises potential policy concerns. These concerns are amplified when one considers that the fugitive elk resources that are on the VCNP are owned by the state. These concerns are also consistent with the recent unexpected regulatory actions taken by the State of New Mexico.

The State as Resource Manager and Competitor

For the 2004–2005 season, New Mexico Department of Game and Fish (NMDGF) will allocate 30,000 elk permits across 325 different hunts spread over 56 hunting units through the lottery system. Individuals are only allowed a single application per hunt choice and rank up to four sites on which they would like to hunt. Weapon types and license categorization differentiate hunts. The four license categories are (1) standard (S), (2) quality (Q), (3) high demand (HD), and (4) quality/high demand (Q/HD).[110] License fees vary by category and state-residency. New Mexico residents pay a fee of $46 for S, Q, and Q/HD antlerless/either sex hunts and $69 for S, Q, and Q/HD mature bull hunts. Non-residents pay $291 for standard antlerless hunts, $481 for standard mature bull or either sex hunts, and $766 for Q, HD, and Q/HD mature bull, antlerless, and either sex hunts. Thus, in summary, the

109. By way of comparison, the mean ticket transaction for New Mexico residents is 2.78 and 3.01 for non-residents. A t-test of means showed that the difference was significant at the 0.05 level.

110. The high demand designation is applied to hunting units where at least 20% of the applications come from out-of-state residents for at least two previous license years. The quality designation is given to a hunting unit at the discretion of the New Mexico Game and Fish Commission and is used to distinguish those units with a greater selection of mature deer and elk, lower hunter densities, and preferred dates. This information can be found in N.M. DEP'T OF GAME & FISH, *supra* note 74.

NMDGF is able to price differentiate in its elk permit lottery by residency status and hunt quality. The VCNP lottery is in the standard license category.

The VCT may have the right to ration public access to the VCNP but is limited in its ability to manage the game species that exist on the preserve.[111] At the request of State Senator William Payne (R-District 20, Bernalillo), the New Mexico Attorney General (NMAG) recently issued an opinion on the legality of the Trust's mature bull lottery.[112] The opinion stated that the VCNP mature bull lottery was in direct violation of a 1997 state law requiring that 78% of the elk permits issued through public draw be given to New Mexico residents.[113]

Besides the imposition of the resident quota, the VCNP elk hunt program was also impacted by a re-designation of the VCNP by the incoming New Mexico Game and Fish Commission (NMGFC). Prior to 2004, mature bull permits granted to the VCNP were essentially treated the same as the permits issued to private landowners. This designation allowed the Trust to allocate the permits at their own discretion. The incoming NMGFC re-designated the VCNP as a federal land unit, which effectively brought the mature bull elk program under the purview of the NMDGF. With the new federal designation, the Trust is no longer allowed to allocate state-owned wildlife resources through its auction.[114]

While the full basis for the suspension of the VCNP auction program is unclear, the revenue potential of a high-quality elk herd has become increasingly apparent to wildlife managers nationwide.[115] High-value auctions for bighorn sheep, mountain goat, moose, and elk have produced much needed revenues for game and fish agencies in many western states (*e.g.*, Oregon, Washington, and New Mexico). The revenue interest at stake in the allocation of fugitive resource rights is no small

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111. Valles Caldera Preservation Act § 105(f), 16 U.S.C. § 698 (2000). The inclusion of this provision relates directly to the federal government's recognition of state primacy in wildlife management.

112. 03 Op. Att'y Gen. 06 (2003).

113. N.M. STAT. ANN. § 17-3-16 (Michie 2001).

114. Telephone Interview with Dennis Trujillo, Preserve Manager, VCNP (June 22, 2004).

115. State game managers are using raffles and auctions to generate revenues for program operations. For example, the State of Oregon runs a variety of big-game raffle programs. Further, in one of the longest-running auctions, the Oregon Department of Fish and Wildlife has auctioned one Big Horn Sheep permit per year since 1987. Between 1987 and 2003 the program has generated revenues of approximately $987,000, which averages out to $57,941 per permit. OR. DEP'T OF FISH & WILDLIFE, BIGHORN SHEEP AND ROCKY MOUNTAIN GOAT MANAGEMENT PLAN 39 (2003). The State of New Mexico also auctions Bighorn Sheep licenses for the purpose of habitat restoration. N.M. DEP'T OF GAME & FISH, *supra* note 74.

matter to NMDGF. In the winter of 2004, a single mature bull permit netted $90,000 for the department.[116] These funds are to be primarily used for habitat conservation and hunter education within New Mexico. Thus, in effect, the VCNP auction allowed a federal body to benefit from a state owned resource.[117]

Private Land Competitors: Or "You Cannot Expect to Buy a Western Ranch and Pay for It with Income from Cows"[118]

Evidence, over the last decade, from a national survey suggests hunting participation and expenditures have been relatively flat or declining nationwide, with the apparent exception of big-game hunting. During this time, hunting participation and expenditures have been growing in New Mexico for big-game hunting. Between 1996 and 2001, there was a 25% increase in hunting days spent on private lands in New Mexico.[119] Total hunt expenditures rose 58% in New Mexico over the same time period.[120] Currently, 39% of all hunting in New Mexico takes place on private land.[121] This evidence is consistent with statistical market evidence for the rising value of private trophy hunt ranches in New Mexico, especially relative to traditional livestock operations.[122] While the VCT definition of a working ranch is rather broad, it is clear that a large (*e.g.*, greater than 10,000 acre), sustainable, working ranch in

116. Telephone Interview with Christy Bosworth, Director of Foundation Programs, Rocky Mountain Elk Foundation (RMEF) (May 25, 2004); *see also* Associated Press Wire Serv.. *Michigan Hunter Pays $90,000 for N.M. Elk Hunting License* (Mar. 21, 2004). The winning bidder has the right to hunt anywhere in the State of New Mexico between September and December of 2004.

117. The authors speculate that the NMDFG may have viewed the VCNP auction as setting a precedent for other federal agencies to request permits for auction purposes. In this context, such precedent could potentially undermine pre-existing agreements pertaining to state game management and hunt access on federal land.

118. A recent hedonic pricing analysis of New Mexico ranch sales prices is provided by L. Allen Torrell et al., New Faces and the Changing Value of Rangeland 1 (Oct. 2003) (unpublished manuscript, on file with the Natural Resources Journal).

119. PALLAB MOZUMDER ET AL., PAC. N.W. RESEARCH STATION, U.S. DEP'T OF AGRIC. FOREST SERV., & UNIV. OF N.M. DEP'T OF ECON., LEASE AND FEE HUNTING ON PRIVATE LANDS IN THE U.S.: A REVIEW AND SYNTHESIS OF THE ISSUES, WITH ANNOTATED BIBLIOGRAPHY 74 (2004). The data analyzed therein is drawn from U.S. FISH & WILDLIFE SERV., NATIONAL SURVEY OF FISHING HUNTING AND WILDLIFE-ASSOCIATED RECREATION (FHWAR) (1991, 1996, 2001), *available at* http://www.census.gov/prod/www/abs/fishing.html (last visited Mar. 22, 2005).

120. *Id.*

121. *Id.*

122. Torrell et al., *supra* note 118, at 19.

any high-mountain area of New Mexico (*i.e.*, comparable in location and scale to the VCNP) is best characterized as a big game trophy ranch.[123]

The expanding market for private ranch hunting in the state has fundamentally shifted the value basis of ranch prices from livestock production to recreation. The addition of a single bull elk permit to a private ranch can increase the value of rangeland from $28,300 to $127,000 per acre.[124] When capitalized, the real land appreciation rates of private hunt ranches run between 5% and 7% per annum on average.[125] Hunting, not livestock production, is the single most important factor driving ranch prices in the State of New Mexico.[126] This is especially true for high mountain ranches with elk habitat.[127]

Consistent with the economic development gains associated with private land hunting, NMDGF has taken steps over the last decade to foster the growth of private land hunting through the Land-owner Sign-up System (LOSS) programs. LOSS allows landowners to register with the state and acquire the hunt authorizations needed for the provision of antelope or elk hunting on private land. Once granted, the authorizations can be allocated at the owner's discretion. In many cases, outfitters and guides purchase and then resell the authorizations to willing buyers. It is not until the final buyer approaches the state with the authorization, pays the appropriate licensing fee, and acquires the necessary permit that transferability is suspended.[128]

LOSS has aided greatly in increasing the availability of private land hunting in the state of New Mexico. In 2003, a total of 18,646 authorizations for elk permits were issued, 10,304 of which were converted to non-transferable permits.[129] Non-residents converted 52 percent of LOSS authorized permits; New Mexico residents converted

123. As any quick Internet web-search will show, there are dozens of such ranches advertising high-quality, guided elk hunts in New Mexico. By way of example, for the 2004 hunting season, a private-landowner, mature bull elk tag for a fully guided rifle hunt at the Lodge at Chama (near Chama, New Mexico) cost $8000. *See* RATES & RESERVATIONS FOR THE LODGE AT CHAMA, *at* www.lodgeatchama.com/home.htm (last visited Mar. 21, 2005). Additionally, the proprietors of Northern New Mexico Elk Hunts were offering a private landowner mature bull tag, room, board, and guide services for $5500 at an undisclosed ranch in New Mexico. *See* NORTHERN NEW MEXICO ELK HUNTS, *at* www.elkhunts.cc/prices/prices.htm (last visited Mar. 21, 2005).

124. Torrell et al., *supra* note 118, at 19.

125. *Id.* at 28.

126. *Id.* at 1-2, 19-20.

127. *Id.* at 19.

128. Telephone Interview with Ruth Anderson, Manager, Land-Owner Sign-up System for Elk and Antelope (June 9, 2004).

129. N.M. DEP'T OF GAME & FISH, AUTHORIZATIONS BY UNIT (2000-2003) (unpublished).

the remaining 48 percent.[130] Between 20 to 25 percent of authorized permits were for mature bull elk.[131] LOSS authorizations are not allocated through public draw and are exempt from the resident quota. This provides both residents and non-residents an opportunity to avoid the uncertainty associated with the NMDGF lottery system. The program significantly reduces the legal barriers to entry, which, subsequently, increases the number of hunt ranches operating in the state. LOSS serves to foster rural economic development by allowing ranchers to diversify their income sources with private recreational hunting.[132] LOSS also promotes economic development by creating forward economic linkages between authorized ranchers, outfitters, and guides.[133] The LOSS program provides the foundation for private ranch hunting in New Mexico.

The final participants in the New Mexico elk hunting market are the tribes and pueblos. For example, the Mescalero, Zuni, Jicarilla, and Navajo tribes all offer mature bull and cow elk hunts on their lands. Given their status as sovereign nations, NMDGF has no regulatory authority over tribal hunts. In most cases, tribal elk permits are issued through a lottery similar to the state's format. However, the tribes also offer a variety of market allocated hunts, with some permits going for $9500.[134]

The VCT, the State, and the Ranches: An Identified Market Structure

A monopolistically competitive market is one where firms compete primarily through quality differentiation for similar goods. It is monopolistic because substantial barriers such as high-fixed or set-up costs may limit entry into the market, and, to the extent that they can quality differentiate their product, producers may have price setting power so that price exceeds marginal cost and economic profits are positive. It is competitive because the number of suppliers will increase if existing firms are earning a positive economic profit. Once economic profit has been dissipated, entry ceases. At that point there may be either

130. *Id.*

131. *Id.*

132. Anderson, *supra* note 128.

133. *Id.* Recall that LOSS authorizations are given directly to certified ranchers, who allocate the permits to whomever they choose. This process frequently involves outfitters and guides, who resell the permits to private individuals on the secondary market. *Id.*

134. There are a variety of hunts available; the $9500 value is for an elk-hunting package on the Mescalero reservation. For a brief description of some of the tribal hunts, see N.M. OUTDOOR SPORTS GUIDE, HUNTING BY REGION, *at* http://www.nmosg.com/Hunting/ (last visited Mar. 21, 2005).

a small or relatively large number of firms competing in the market. Monopolistically competitive firms commonly use various price discrimination strategies in an attempt to expand market share and capture revenue. The key to the monopolistically competitive firm's price setting power is the residual consumer demand they face and their ability to hold onto or add to this demand by quality differentiating their product (and preventing re-sale). The market for elk hunting in New Mexico exhibits many of the characteristics common to monopolistic competition.

Within this context, prior to the 2004 hunting season, the VCT offered high quality hunts (through auction and lottery) at its own discretion. Hunt quality is a significant contributor to consumer willingness to pay; as such, the access restrictions imposed by the auction-lottery serve to preserve the quality of the hunt site and elk herd.[135] Preservation of the hunt site and elk herd may induce individuals to submit a larger auction bid or purchase more lottery tickets and, in turn, increase revenues. Since private ranches and tribal entities also offer elk hunting in New Mexico, the VCNP elk program is only one of the options available for hunters to pursue. The revenues generated by the VCNP elk hunt program are not only affected by the residual hunt demand, but also by the NMDGF resident quota and private hunt ranches. By offering their own high quality/high success hunts, private and tribal competitors impact VCNP elk revenues by drawing potential auction and lottery participants away from the preserve. The VCT entered this market as the only federal entity that is an active participant.

A number of potential revenue and equity impacts emanate from the recent State decisions. After eliminating the auction, the resident quota effectively forces anyone wanting to hunt on the VCNP to participate in the lottery. Although income was not shown to have a substantial impact on the ticket purchase decision, the inclusion of high value auction participants into the lottery may result in a more inequitable allocation of permits. Also, the uncertainty associated with the purchase of a lottery ticket may induce individuals who purchased a permit through the auction to forgo the VCNP lottery and, instead, choose to pursue state or private hunt options. The quota also forces the Trust to allocate the majority of permits to the subset of lottery participants that display a considerably lower ticket demand for the VCNP hunt (New Mexico residents). While it may take time for both residents and non-residents to respond to these new conditions, it is

135. Davis, *supra* note 85, at 114–15.

likely that the 78% quota contributed to the significant decrease in ticket revenues (down 21% from $255,000 to $201,450) for the 2004 lottery. This decrease in revenue was realized despite the increase in available permits from 2003 (from 48 to 75).[136]

V. DISCUSSION AND CONCLUSIONS: WHERE DOES THE VCT STAND?

Critics of the charter forest and trust concepts argue that they are simply a smoke screen and represent a step along a devolution agenda to eventual privatization of as much of the public domain as possible. A primary concern with any privatization proposal is the failure to guarantee adequate protection for relatively large, pristine landscapes and wildlands. However, the more optimistic view of the charter forest and trust concepts is that they offer a balance between privatization and more traditional, centralized (federal) command and control arrangements. Such a view is offered by Daniel Kemmis, who states:

> Almost always there is someone invoking capital *N* national command and control and someone else just saying no to any form of control, and in the middle of it all is an increasingly compelling recourse to what almost no one is yet ready to recognize as the early stages of an emergent form of sovereignty.[137]

But as the economic and policy analysis presented here makes clear, the sovereignty wielded by charter forests and trusts will not come without constraints; will not be resolved without cooperative arrangements with local, state, and federal agencies; and will need to evolve based on adaptive management principles.

Much has been made of the Trust's apparent autonomy and *tabula rasa* for creating environmentally and economically sustainable programs within the confines of its charter.[138] To their credit, in the first few years the Trust implemented a successful auction and lottery (raffle) combination that generated significant net revenues and appeared to allocate hunt access in a reasonably equitable fashion. However, recent decisions by the State of New Mexico may have severely constrained the

136. Telephone Interview with Steve Mauer, Operations Manager, Public Lands Information Association (May 26, 2004).

137. Kemmis, *supra* note 4, at 17-18.

138. The Trust describes itself as "unconstrained by standard methods of the Forest Service...a new kind of administrative structure, freestanding, entrepreneurial and innovative in its approach." VALLES CALDERA TRUST, *supra* note 6, at 44.

latitude of the Trust in the operation of its largest revenue generating activity.

With respect to the elk hunts, the Trust now finds itself in a disadvantaged position. It can no longer use the auction to price discriminate and capture revenue from high-valued bidders. The Trust is also constrained by the New Mexico resident quota in how they draw raffle winners. The State of New Mexico is certainly aware of the opportunity to capture revenues with auctions of big-game trophy hunting. Further, private trophy ranches in New Mexico are relatively numerous and do not face the same constraints as the Trust. Thus, the trophy-hunting situation may be best seen through the lens of monopolistic competition. As such, the Trust can attempt to quality-differentiate its access opportunities and compete for high-valued bidders for trophy hunts with the State of New Mexico and the private trophy ranchers.

Many arguments in support of the trust concept emphasize the flexibility to innovate and adjust on the ground. Consistent with such a view, the VCT has several avenues of response. First, it might argue for re-instatement of the auction. If the state and private parties can implement first-degree price discrimination in some limited context, then it is unclear why the Trust would be legally prevented from doing so.[139] Second, it might attempt to generate substantial revenue from the raffle program by implementing an alternative raffle format. For example, it could implement second-degree price discrimination in the raffle where individual participants pay an entry fee and then a fixed-price per raffle ticket. More basically, there appears to be no constraint on the Trust from significantly changing the price (currently $25) on raffle tickets. At this point there is no understanding of the price elasticity of demand for the raffle tickets, but typically many outdoor recreation opportunities are relatively price inelastic and price increases can provide additional revenue; this issue can be assessed through contingent behavior surveys. Third, the Trust can look to bundling its permits with other services, capitalizing on its unique location, topography, and program stature to help quality-differentiate its trophy hunting opportunities.

Importantly, the Trust can build on its experience with the elk hunts to significantly expand revenue generation from other outdoor recreation programs (*e.g.*, cross-country skiing, wagon tours, fishing, hiking, mountain biking, etc.). To date, the Trust has adopted a go-slow approach, introducing limited access programs and minimal fees. Pricing

139. Given that the 78 percent quota and the auction ruling/interpretation are primarily legal matters, any resolution of the conflict may require a political solution (*i.e.*, exemption or reclassification of VCNP within the context of the Sikes Act, etc.).

and packaging policies (auctions, raffles, two-part tariffs, bundling, etc.) available for big game hunting are also relevant to these other recreation programs. In addition, these other programs are not subject to the same state regulatory controls that have emerged unexpectedly for the case of allocating the elk hunt permits. The Trust has already adapted to the excess demand in 2003 for the fixed-fee, first-come, first-served (web sign-up) fishing program by allocating angling access in 2004 via a lottery (raffle). This policy change exemplifies the Trust's flexibility and ability to learn and quickly adapt to conditions "on the ground."

Such discussion of attempts to actively pursue revenue generation is not to argue that the Trust should pursue programs that somehow open the turnstiles and compromise or degrade the ecological integrity of this remarkable landscape. Rather, consistent with early articulations of program visions, the Trust can provide a range of high-quality experiences. But doing so will require restricting access both temporally across the year and spatially across the landscape, and this will further require allocation rules.[140] Some significant components of those allocations can be done through known revenue-generating mechanisms. It is also possible to pursue equity considerations by ensuring that some components of access allocation are accomplished through non-priced mechanisms (true lotteries; first-come, first-served, special assignments for youth and volunteers; etc.).

As 2017 approaches, should the Trust have been unable to develop programs that in combination fully satisfy financial self-sufficiency, there is likely to be increasing pressure to measure and identify the regional economic impacts (*i.e.*, market effects on employment and income) and the non-market consumer surplus benefits (*i.e.*, to the broad spectrum of visitors to programs that are not price rationed) generated by the VCNP. It would seem critical to begin to collect and assess the necessary economic data. As noted before, the financial sustainability objective is not a hard constraint and eventually there will be a need for public and congressional judgments about how well the Trust has pursued its mandated objectives, and whether or not the charter should be extended. This article argues that this judgment must be done with a clear view of the regulatory and competitive constraints that the Trust confronts.

It is exactly this attempt at balancing that must play out over the next dozen years on the VCNP that makes the charter forest experiment

140. In addition to revenue generation, pricing policies can also be used in aiding the dispersion of visitors across time and the landscape (*e.g.*, through peak-load pricing and differential site or trail pricing). In this way, pricing can be actively used to protect resource quality and visitation experiences. *See* Loomis, *supra* note 13, at 295–301.

so intriguing. As charter forests and trust concepts are discussed for implementation elsewhere, advocates of alternative institutional arrangements for managing wildlands and natural environments will undoubtedly be keeping a close eye on the VCNP. Staking out a middle ground between privatizing the public domain and reliance on federal control is clearly uncharted territory. If nothing else, such attempts deserve to be given a fair chance.

Figure 1: A Stylized Array of Individual Values for VCNP Auction/Lottery Combination.

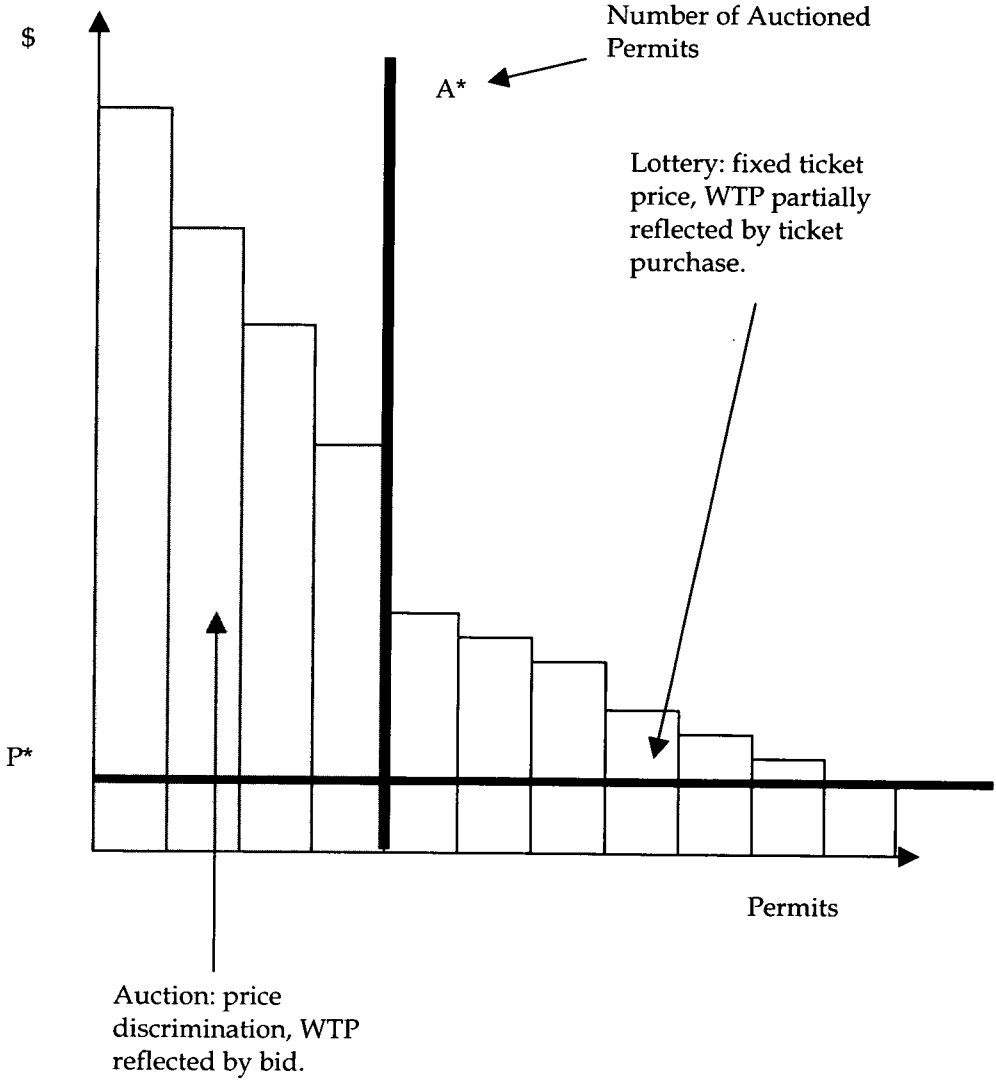

Figure 2: 2002–2003 Elk Hunt Permit VCNP Auction (Winning Bids)

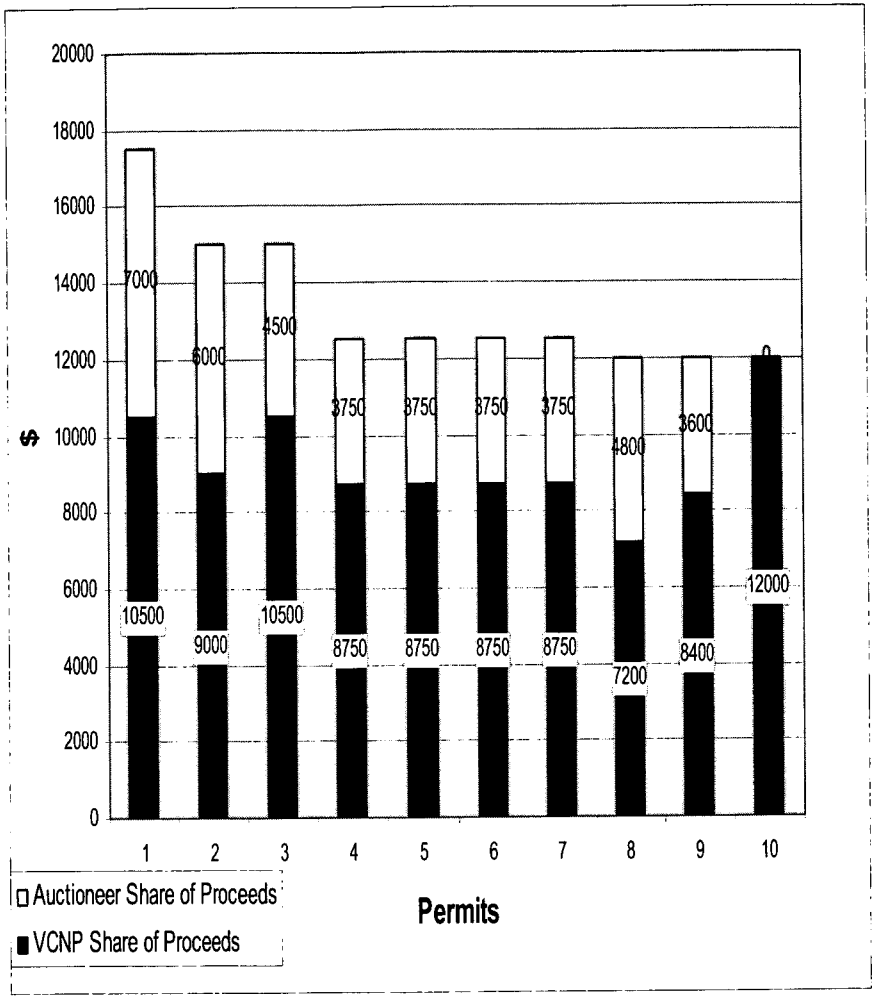

Table 1: Descriptive Statistics for 2003 Elk Hunt Lottery

VARIABLE	Total	Residents	Non-Residents	Winners	Non-Winner
	Mean	---	---	---	---
	(S.D.)				
EXPENDITURE	73.424	69.553	75.461	241.41	70.273
	(95.356)	(83.446)	(101.021)	(298.781)	(84.113)
TICKETS	2.937	2.782	3.018	9.656	2.812
	(3.814)	(3.338)	(4.041)	(11.951)	(3.365)
E(tv)	6.808	12.969	3.567	6.597	6.812
	(5.097)	(0.467)	(3.009)	(5.156)	(5.097)
DISTANCE	829.56	144.336	1190.078	840.456	829.366
	(647.532)	(98.169)	(507.699)	(625.618)	(648.023)
PERMIT-INDEX	15.811	15.603	15.92	19.25	15.74
	(7.424)	(7.117)	(7.576)	(9.039)	(7.376)
PERURB	0.675	0.725	0.648	0.704	0.674
	(0.346)	(0.343)	(0.344)	(0.335)	(0.346)
AVGHHSIZE	2.677	2.651	2.690	2.694	2.676
	(0.314)	(0.304)	(0.318)	(0.288)	(0.314)
HHINC	57.5	51.39	60.72	58.0	57.49
	21.195	(15.96)	(22.84)	(24.634)	(21.13)
TENURE	0.736	0.740	0.734	0.738	0.736
	(0.124)	(0.106	(0.132)	(0.126)	(0.124)
PERHSPLUS	0.834	0.820	0.842	0.821	0.835
	(0.095)	(0.103)	(0.090)	(0.119)	(0.095)
PHE	96.203	109	89.470	82.75	96.456
	(65.350)	(0)	(79.919)	(49.484)	(65.59)
DMUZZ	0.112	0.114	0.113	0.113	0.112
	(0.282)	(0.283)	(0.281)	(0.250)	(0.282)
DARCH	0.193	0.179	0.206	0.387	0.197
	(0.375)	(0.366)	(0.383)	(0.448)	(0.377)
OBSERVATIONS	3475	1198	2277	48	3427

Table 2: Estimation Results for Ticket Demand Functions
(Truncated Negative Binomial)

Variables	Reduced Model w/Permits	Expanded Model w/ Permits	Reduced Model w/ Hunt Dummies	Expanded Model w/ Hunt Dummies
E(tv)	0.014 (1.05)	0.016 (1.21)	0.019 (1.29)	0.022 (1.45)
HHINC	0.0029 (1.75)*	0.0038 (1.66)*	0.0034 (1.78)*	0.0044 (1.65)*
PHE	0.0021 (4.00)***	0.0022 (4.11)***	0.0023 (3.72)***	0.0024 (3.77)***
DNM	-0.296 (2.18)**	-0.323 (2.32)**	-0.314 (2.09)**	-0.333 (2.17)**
PERMIT-INDEX	0.063 (13.11)***	0.063 (13.11)***	---	---
AVGHHSIZE	---	-0.074 (0.65)	---	-0.074 (0.59)
PERURB	---	0.014 (0.13)	---	-0.074 (0.60)
PERHSPLUS	---	-0.390 (0.91)	---	-0.242 (0.50)
TENURE	---	0.214 (0.66)	---	0.097 (0.27)
DARCH	---	---	0.566 (5.85)***	0.566 (5.82)***
DMUZZ	---	---	0.374 (2.74)***	0.374 (2.74)***
CONSTANT	-1.938 (6.74)**	-1.640 (3.10)**	-2.618 (2.06)*	-2.284 (1.72)*
χ^2(Model)	251.46***	252.53***	71.14***	69.51***
$\chi^2(\alpha)$	4967.99***	4963.48***	5420.64***	5414.14***
OBS.	3475	3475	3475	3475

Notes: Numbers are estimated coefficients; numbers in parentheses are z-statistics; *** indicates significant at 0.01 level; ** indicates significant at 0.05 level.; * indicates significant at 0.10 level.

APPENDIX A: DATA CATALOGUE AND DESCRIPTION

The VCT and its staff generously provided the VCNP elk hunt data presented in this article. The data sets that were provided by the Trust include (1) 2002-2003 elk hunt lottery ticket data, (2) 2002-2003 elk hunt auction data, and (3) 2002-2003 elk hunt lottery winners lists. The elk hunt lottery data contains the names, contact information, expenditures, and ticket quantities purchased by hunt type for program participants. Observations are recorded by an individual order ID number. The lottery data also include the number of mature bull permits allocated through each hunt type. The explanatory variable PERMIT-INDEX is an index created by summing the hunt permits for which the individual can be drawn.[141] To maintain consistency, a total of 21 foreign participant observations were dropped from the lottery data.[142]

The 2002-2003 elk hunt lottery winners check-in list provides the contact information and hunt type for each lottery winner. This information was merged with the lottery data so that descriptive statistics could be calculated for the sub-sample.

The 2002-2003 auction lottery data provides only the name of the organization that auctioned the permit and the winning bid amount. Although auction winners are identified on the check-in list, there is no way to match these individuals to their bid amounts. The Rocky Mountain Elk Foundation (RMEF) auctioned two permits in 2002 and one permit in 2003.[143] Safari Club International (SCI) auctioned two permits in 2002.[144] The VCT auctioned one permit on eBay in 2002. Cabelas auctioned four permits in 2003.[145]

The Trust does not collect micro-level socio demographic data from program participants. Examples of socio-demographic data that could be collected and utilized by the VCT when designing recreational programs include gender, age, race/ethnicity, educational status,

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141. For example, if an individual had purchased tickets for the archery and muzzleloader hunts, their permit index would equal 20 since there were 12 permits issued for the archery hunt and eight for the muzzleloader hunt. Basically, the individual's ticket choice gives them 20 chances at being drawn for a permit.

142. This was done because of the difficulties associated with obtaining socio-demographic data from their home nation's census.

143. The RMEF auctioned one permit each at the 2002 and 2003 national conventions. One permit was auctioned at a regional convention in 2002. Telephone Interview with Christy Bosworth, Director, Foundation Operations, RMEF (May 25, 2004).

144. SCI auctioned one permit at the 2002 SCI national convention; the other was auctioned at a regional convention. Telephone Interview with Ed Beardsely, Director of Operations, SCI (May 24, 2004).

145. Cabelas auctioned a total of four permits in 2003; no information on individual bid values is available. Telephone calls to the organization are, as of yet, unreturned.

hunting experience, family size, and personal income. Given that this data is unavailable, the analysis presented relies on aggregate data drawn from the 2000 U.S. census zip code tabulation areas (ZCTA).[146] Aggregate data that were collected include (1) population in urban and rural locales,[147] (2) aggregate household income (in 1999 dollars),[148] (3) tenure of housing units (owner/renter),[149] (4) number of households,[150] (5) educational attainment (25+ years of age),[151] and (6) total population.[152] The census data was then used to construct the vector of explanatory variables used in the analysis. These variables are (1) AVGHHSIZE (average household size),[153] (2) PERHSPLUS (percentage of the population 25+ years with a high school degree or better),[154] (3) PERURB (percentage of population living in an urban area),[155] (4) TENURE (percentage of housing that is owner occupied),[156] and (5) HHINC (scaled average household income).[157]

In the interest of identifying potential substitution effects, average private hunt expenditures (PHE) on a state-by-state basis were compiled. Where unavailable, a mean value of $93.64 was entered for that state.[158]

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146. This was possible because elk hunt lottery participants are required to include their zip code in their contact information. The use of aggregate level data introduces the possibility of aggregation bias influencing the econometric analysis. For a description of the problem and possible solutions, see Moeltner, *supra* note 102, at 131–32. Aggregation bias is especially a problem when dealing with socio-demographic variables such as race and gender. For this reason, census data on the average race/ethnic/gender composition of the ZCTA was not included in the analysis.

147. U.S. CENSUS BUREAU, 2000 CENSUS OF THE UNITED STATES SUMMARY FILE 3, tbl. P5, *at* http://www.factfinder.census.gov/servlet/DTGeoSearchByRelationshipServlet?_ts=129028108270 (last visited Mar. 16, 2005).

148. *Id.* tbl. P54.

149. *Id.* tbl. H7.

150. *Id.* tbl. H16.

151. *Id.* tbl. P37.

152. *Id.* tbl. P1.

153. Calculated as total ZCTA population divided by number of households.

154. Calculated as total ZCTA population (25+ years) with a high school degree or better divided by total ZCTA population (25+ years).

155. Calculated as the number of individuals in ZCTA reported to be living in an urban area divided by total ZCTA population.

156. Calculated as ZCTA owner occupied housing units divided by ZCTA total number of housing units.

157. Calculated as ZCTA aggregate household income divided by ZCTA total number of households. This value was then scaled by dividing by 1000 to ease analysis; thus, a value of $57.5 should be read as $57,500.

158. Average private hunt expenditure data was taken directly from table 2.8 of MOZUMDER ET AL., *supra* note 119, at 29. The $93.64 represents the mean value of the private hunt expenditure data presented in the report.

The 2002–2003 auction data is presented in table 1A. This table includes the name of the auctioning foundation and the winning bid. The 2002–2003 lottery permit breakdown, by hunt, is provided in table 2A. Also included in this table is the number of tickets purchased and expenditures for each hunt.

Table 1A: 2002–2003 Auction Bids and Revenues Accrued by VCT

Organization	Bid	Net to VCNP	VCT Share
2002			
RMEF-National	15,000	9,000	60%
RMEF-Regional	12,000	7,200	60%
SCI-National	15,000	10,500	70%
SCI-Regional	12,000	8,400	70%
eBay	12,000	12,000	100%
2003			
Cabelas (four permits)	50,000	35,000	70%
RMEF-National	17,500	10,500	60%
Total	133,500	92,500	70%

Table 2A: 2002-2003 VCNP Lottery Ticket Sales, Revenues, and Permits

Hunt	Hunt Date	Tickets Sold	Revenue	Permits
2002				
Muzzleloader	Oct. 26-30	1,330	33,250	10
Archery	Sept. 10-20	3,276	81,900	20
Rifle B	Oct. 5-9	2,765	69,125	15
Rifle C	Oct. 12-16	3,494	87,350	20
Rifle D	Oct. 19-23	2,579	64,475	20
Total	---	13,444	336,100	85
2003				
Muzzleloader	Oct. 18-22	1201	30,025	8
Archery	Sept 9-18	2453	61,325	16
Rifle 1	Oct. 4-8	4293	107,325	12
Rifle 2	Oct 11-15	2259	56,475	12
Total	---	10,206	255,150	48