



**The Economic Impact of
State Parks, Forests and Natural Resources under the
Management of Department of Environmental Protection**

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Executive Summary

The parks and state forests that the Department of Environmental Protection (DEP) manages deliver significant economic benefit to Connecticut residents and park visitors. In 2010, resident and nonresident visitors to Connecticut's 107 State Parks and 32 Forests spent 8.5 million visitor-days touring within the state. Of those days, at least 4.6 million days were spent partially at for-fee parks and forests managed by DEP. DEP activities generate the following direct and indirect economic impacts:

- 8.8 thousand jobs currently, that in the absence of DEP managed parks and forests and activities would be reduced to 6.7 thousand in 2020 as personnel found alternative employment;
- \$343 million in personal income growing in current dollars to \$595 million in 2020;
- \$253 in personal disposable income, that generates choices for citizens, increasing to \$471 million by 2020; and,
- Net present value in state revenues over expenditures of \$30 million in constant dollars.

In addition, owners of single residences in Connecticut derived amenity values of \$270 million annually from overlooking DEP managed venues. If not preserved, alienation of any of that green space from pestilence, such as Western North America has experienced from mountain spruce budworm, or harvesting of the forests and industrialization would erode those benefits.

In establishing the net benefits of DEP services, CCEA estimated the total number of visitor days, the value that these visitors placed on various key activities net of fees paid (measured as consumer surplus), the value adjacent property owners derived from their location, and the aggregate expenditures inclusive of direct, indirect and induced expenditures and employment that result from these activities. These benefits are then aggregated into annual estimated benefits derived from DEP managed state venues¹. As noted above, both the economic impact of expenditures and the economic value people derive from the parks, vastly exceeds the annual cost to the state of husbanding nature's assets for Connecticut citizens and out-of-state visitors.

In 2010 visitors to these venues spent an estimated \$544 million in general tourism activities in Connecticut. In addition, 189,000 sportspersons, holding 293,600 licenses and permits issued by DEP, spent additional funds to pursue their specific sporting activities:

- \$264 million for angling, of which 90% came from Connecticut residents;
- \$100 million for hunting, of which \$95.1 million came from Connecticut residents;
- \$36.8 million for recreational boating, attributed to DEP-managed boat launches and training activities, net of anglers' boating expenditures;
- \$26.2 million for skiing and attending educational and other venues;

¹ "Venues," is used usually herein to refer to state parks and forests as well as those areas outside of the parks governed by DEP issued licenses for hunting, fishing, boating and any commutations and permutations thereof. Occasionally, the context will limited its meaning to state parks and forests.

- Participation in other sports located in the parks and forests or to attend them.

Visitor fees at the parks and forests, including late day visitors, were in the \$3.0 to \$3.3 million dollar range from 2005 to 2009. Increasing rates in 2010 set the stage for an increase to \$5.2 million in future years. These same visitors are estimated to have spent \$94 million in Connecticut. DEP charges visitors: entrance, parking, and camping fees, cabin and pavilion rents, ice and firewood sales and related sales taxes. These revenues all flow to Connecticut's General Fund.

Recreational activities also generated licensing and permit fees as well as training and educational revenues. 2010 revenues generated from DEP licensing and permitting of key activities included angling (\$3.8 million), hunting (\$2.3 million), and combined hunting and angling licenses (\$1.6 million). Recreational boat training, testing, and licensing generated a further (\$3.2 million.)² Including camping and all activity fees, DEP collected \$18.3 million from fees paid by participants and attracted \$5.4 million in federal transfers from the federal Sport Fish Restoration (SFR) and Wildlife Restoration (WR) programs. These direct revenues indicate that Connecticut residents, nonresidents and the Federal Government valued DEP managed state venues. Before taking account of a one-time \$1.1 million credit program to assist adjusting to the higher fees, direct revenues and transfers in 2010 covered all but \$2.6 million of Connecticut state expenses of \$26.3 million including parks, forest, and hatchery operations. Property taxes stemming from vistas dependent on DEP managed venues added a \$4.2 million to state revenues, more than sufficient to cover DEP operating and capital expenditures. In addition, indirect revenues from other taxable tourist and sporting expenditures further contributed to state revenues.

The well known downward slope of demand curves for each activity implies that all but the least enthusiastic person undertaking each activity derives quality of life benefits over and above expenses incurred, what economists refer to as "Consumer surplus". CCEA has estimated consumer surpluses accruing to Connecticut citizens by major activities:

- Camping (\$124.1 million)
- Hunting (\$17.8 million)
- Inland Angling (\$67.4 million)
- Marine Angling (\$36.9 million)
- Swimming at four parks (\$570,000).

In addition to the \$246.9 million accruing to residents in consumer surplus, out-of-state visitors undertaking these activities derived a further \$25.1 million in consumer surplus, led by campers at \$18.4 million. Total estimated consumer surplus for campers at DEP venues is 26% of Connecticut tourism expenditures made by them.³ In-state estimates of consumer surplus remain modest due to the close proximity of venues to the population. CCEA did not extrapolate its consumer surplus

² These revenues were partially offset on a one-time credit totaling about \$1.14 million.

³ Charles H. Strauss and Lord, Bruce E. A. Case Study The economic impacts of a heritage tourism system, *Journal of Retailing and Consumer Services* 8 (2001) 199}204.

estimates for people using these parks for alternative purposes or accessing fee-free parks, such as non-developed ones.

Consumer surpluses in addition to their expenditures suggest that, in recent years, visitors to DEP managed venues derived more than \$1.25 billion dollars in annual benefits. CCEA's very conservative approach to estimating consumer surpluses underlines the significance of these estimates.

Another source of benefit is the value that owners of homes adjacent to the parks and forest derive. Connecticut residents overlooking the parks from single family dwellings realized annual amenity benefits most days of the year of a further \$258 to \$309 million. Positive attributes of these residences, captured in the assessed value of their properties, generated \$3.1 to \$5.4 million annually in government revenues, but did not account for the value of the vistas of overlooking DEP managed parks and forests. The expected long-term net present value of this possible revenue stream to the state discounted at 5% over 20 years is \$390.2 to \$679.7 million in 2010 dollars. The net present value may also be viewed as placing a capital value on the assets that DEP maintains in its management of Connecticut parks and forests. More fully assessing amenity values, from their currently unassessed status on 12-13% of properties overlooking green spaces, would significantly increase property tax revenues.

Because DEP operations and related government revenues already exist in the economy, the method for assessing their economic impact is to withdraw those activities. That is, to assess the impacts of their hypothetical immediate cessation in 2012, and then to project longer term economic adjustments and reactions. The resulting differences from the current case represent economic impacts of DEP-managed venues in Connecticut. With closure of all DEP-managed facilities and elimination of all public access to DEP-managed forest and park lands, the resulting impacts would mean losses in employment and incomes, as well as losses in tax revenues. As noted at the outset of this Executive Summary, the harshness of such losses in the near term is stark, but the dynamic elements of the economy which REMI captures adjust to the loss of those resources. Over time, the economy adjusts and ameliorates, to a degree, economic impacts through emigration and some movement into alternative jobs. Rather than depict these losses as negatives, this report treats these as the positive impacts that DEP operations have on the Connecticut economy.

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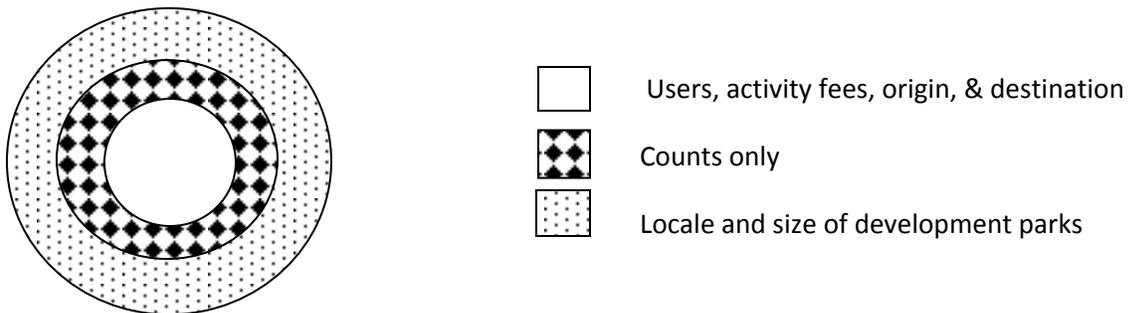
1. Introduction

1.1 Purpose

This report documents the Connecticut Center for Economic Analysis (CCEA) analysis of the economic impact of parks, forests, and outdoor recreation licensing operations of the Connecticut Department of Environmental Protection (DEP). This research investigated general tourism as well as specific key activities such as camping, angling, hunting, swimming, recreational marine, education, and accommodation activities at the Harkness Memorial State Park. Aside from attendance data, this study does not cover other related activities such as hiking, bird watching, biking, horse-back riding, etc. DEP collects entrance and various activity fees at 32 parks; it records the number of park visitors at 43 sites out of the 107 parks and 32 Connecticut state forests under its management.

CCEA’s ability to project benefits from DEP data is most substantial when based on DEP data sets for the 32 parks with visitor days and activity fees paid by a large proportion of attendees, represented by the center of the circles in Chart 1.1.1. Fees cover both venue access and some specific activities. This core data set also includes park users who may be counted but avoid fees because they arrive during off-hours or out-of-season. An additional component of this core data set includes zip codes for hunters, anglers, boaters and campers. The middle-ring, checker-board surface represents park visitors to 12 sites where DEP maintains counts but does not charge for its services. The external ring, polka-dot surface covers the remaining 63 parks where access may occur but is not measured. Analysis of the two outer rings required developing assumptions with which to estimate annual visitor activities, and tourism expenditures in Connecticut.

Chart 1.1.1 Data Quality and Extrapolations



Not included in Chart 1.1.1 are the 32 state forests, where attendance data is collected at twelve and fees charged at four, to form quite a small database. In this research, the park and forest venues are treated separately as are the Harkness Memorial State Park and DEP’s three education venues.

Recreational boaters also benefit from 112 fee-free boat launch sites throughout the state, training and licensing.

CCEA has calculated the direct economic benefit of visitors to DEP-managed facilities from both recorded and extrapolated data. The database differentiated major visitor activities by campers, hunters, anglers, and swimmers, in order to derive consumer surpluses for each group, providing an opportunity to allocate direct economic impacts for each user group.⁴ CCEA has exercised a fair amount of caution in developing its extrapolations, to avoid exaggerating the economic impacts of DEP-operated state parks and forests. In addition, CCEA has assessed the amenity benefits accruing to owners of properties overlooking and adjacent to DEP-managed properties.

The next chapter focuses on DEP operations at State Parks and State Forests as they cater to residents and attract nonresidents to the state, particularly campers. The third chapter examines benefits accruing within the state from specific recreational activities and other DEP operations including marine training seminars, leasing of Mohawk Mountain Ski Area, DEP operations at the Harkness Memorial State Park, and several educational venues. The next two chapters concentrate on additional social benefits with the fourth chapter covering consumer surpluses accruing to visitors and the fifth, amenity benefits accruing to property owners who overlook parks and forest green spaces via higher residential sales prices and the related impact on property assessments and taxes and therefore government revenues. The penultimate chapter utilizes Regional Economic Analysis Inc's Model "REMI" to assess the total impacts and fiscal implications. Direct and indirect impacts on state government revenues are also included within the REMI analysis. The final chapter contains conclusions.

1.2 Benefits

Benefits from DEP's State Park and Forest operations accrue to Connecticut from resident tourists staying within the state to camp and nonresidents who undertake other out-door recreational activities including many athletic endeavours offered by state parks and forests. In addition, parks have been designed to appeal to tourists interested in history from ancient dinosaurs through to more up-to-date navy facilities.

In addition, residents overlooking vistas provided by state parks and forests reap amenity benefits. Such benefits normally occur throughout the year and are captured through higher land prices for residential homes. As such, the amenity benefits may be partially monetized through higher assessed and selling values that add to the Connecticut's property tax base. These additions to the tax base create revenue flows for state and local governments. A second major source of amenity benefits is the increased safety stemming from training and licensing of boaters resulting in reduced boating accidents⁵.

⁴ Sun, Ya-Yen, Wong, Kam-Fai, and Lai, Hsein-Chung, Statistical properties and survey design of tourism expenditures using segmentation, *Tourism Economics*, 2010, 16(4), 807-832.

⁵ In 2010, 150,000 recreational boaters resulted in 10 deaths in Connecticut.

Other studies of larger jurisdictions have excluded resident participation in recreational activities from impacts on local economies on grounds that residents would undertake alternative activities within the area so that expenditures by residents are not incremental⁶. While there is some truth to such assertions they do not ring true for either residents of a relatively small state with ready access to similar venues in nearby states or avid sportspersons. This study takes the opposite approach and includes all participation by residents in order to identify expenditures by residents and benefits accruing to citizens. Without survey data to know alternative uses of funds currently allocated to activities at DEP-managed venues, it is left to the reader to mentally make such adjustments.

2. Tourism Activities

2.1 Introduction

The Connecticut Center for Economic Analysis (CCEA) has derived tourism activities in DEP-operated Connecticut state parks and forests from visitor data provided by DEP and other sources. Appendix A documents CCEA's estimating procedures carried out on these data. The first section describes DEP revenues from fees and services charged by it and tourism expenditures at DEP for-fee venues. The second expands these modest expenditures to cover the entire spending at venues where visitor counts are kept and then by park and forests users at DEP venues within the state. The next chapter adds to the above by including activities where DEP licenses are deployed both within and outside of its parks and forests boundaries by using licensing data for hunting, angling, boating, skiing, educational activities, and special events at the Harkness Memorial State Park that contribute to DEP's economic impacts.

2.2 DEP Tourism Revenue Sources

Annual data are extrapolated from information by park on daily activities paid for by residents and nonresidents. Full-day parking and campsite data apply to fee-paying **parties** of residents and nonresident whereas data on walk-in attendees apply to **individuals**. To be additive, this mixture of parties and individuals were converted to estimates of individuals utilizing DEP venues by using average sizes of parties from the 2008 intercept survey⁷ of 3.5 persons for resident parties and 4.2 persons for nonresident parties. Utilizing these data CCEA attained estimates of the number of parties and people using each park. Aggregated among the 29 state parks and 4 state forests included in the database, the annual number days visitors parked or camped is presented in Table 2.2.1 and is split between parks and forests in Appendix B. Due to their exceptional roles, educational centers and the Harkness Memorial State Park are excluded and assessed elsewhere. Outcomes are expressed as "Visitor days." This term is deployed because the same individual may park or camp several times within a year so that these data

⁶ Bergstrom, John C. H. Cordell, Ken, Watson, Alan E. and Ashley Gregory A. The Economic Impacts of State Parks on State Economies in the South, Southern Journal of Economics Dec. 1990.

⁷ Witan Intelligence Strategies Inc. **Vision Intercept Study Connecticut edition 2008**, Table 5.

do not count the number of individuals making use of DEP venues. In total, by 2010 4.6 million visitor days were spent by fee paying customers in DEP parks and forests.

Table 2.2.1 Park and Forests Paid Visitor Days: Camping, Parking both Full Day and Late Day (1,000s)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Residents	3,132.5	2,842.8	3,262.2	3,735.1	3,143.7	3,331.7	3,797.2	3,635.6	3,876.1	3,525.2	3,451.3	3,522.8
Nonresidents	932.1	746.3	833.7	948.3	738.6	712.9	904.5	791.0	815.7	722.0	798.4	1,044.7
Walk-ins	-	-	-	-	-	1.1	22.7	28.0	32.1	27.7	21.5	23.3
Total	4,064.6	3,589.1	4,096.0	4,683.4	3,882.2	4,045.7	4,724.4	4,454.6	4,724.0	4,275.0	4,271.2	4,590.8

Source: CCEA estimates assessed on DEP records.

A special group of visitors included above are those who pay late fees, mostly for parking at beaches. Because the average distance travelled by residents paying late-day fees is short⁸, their expenditures, over and above parking fees, are applied to transportation only. Because they are half-day visitors rather than full-day ones, no expenses for meals in Connecticut have been included.

Late day fees were instituted in 2003 and have been a fixture since. The estimate of visitor days by residents can be gained by multiplying the total residents paying late day fees by 3.5 the average occupancy of Connecticut vehicle from the intercept survey. By the same token, half-days of use by nonresidents may be attained using a 4.2 occupancy rate. Parties paying late parking fees are shown in Table 2.2.2 with total visitor days appearing in the last row in 1,000s of persons. Comparing that line with the previous indicates that late day visitors comprise a small percentage of total visitor days.

Table 2.2.2 Parties Paying Late Day Parking Fees 2003-2010

Residence and Timing	2003	2004	2005	2006	2007	2008	2009	2010
Resident Week Day	6,071	5,959	4,819	5,140	6,071	5,959	4,819	5,140
Resident Weekend	7,545	7,695	7,222	6,890	7,545	7,695	7,222	6,890
Nonresident Week Day	1,533	1,040	1,427	1,662	1,533	1,040	1,427	1,662
Nonresident Weekend	1,615	1,678	1,879	1,735	1,615	1,678	1,879	1,735
Total Resident	13,616	13,654	12,041	12,030	13,616	13,654	12,041	12,030
Total Nonresident	3,148	2,718	3,306	3,397	3,148	2,718	3,306	3,397
Grand Total Parties	16,764	16,372	15,347	15,427	16,764	16,372	15,347	15,427
Visitor Days (1,000s)	60.9	59.2	56.0	56.4	65.1	66.2	79.6	78.3

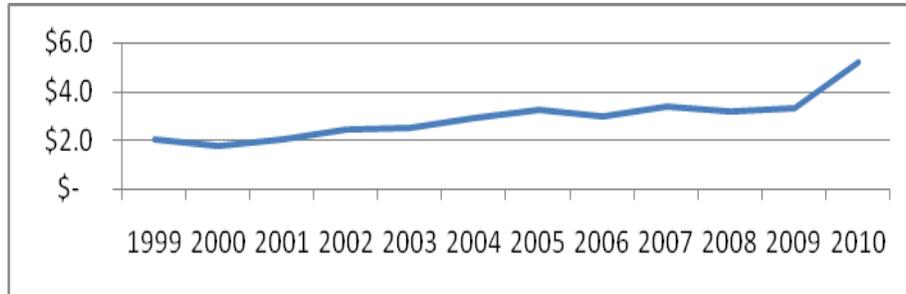
Late Day attendees are concentrated among those utilizing beaches. Given the natural warmth of the afternoon and optimal levels of exposure to the sun, these beach goers are treated as enjoying benefits similar to full day visitors.

Annual visitor fees at the parks, including late day visitors, were in the \$3.0 to \$3.3 million dollar range from 2005 to 2009. Fees have risen due to rate increases in 2009, and introduction of pavilion user fees. The rate and facilities changes have set the stage for annual revenue to rise to \$5.2 million in future years. Also note that DEP fees for parking, camping, occupying cabins and pavilions and consuming ice

⁸ See chapter 5.

and firewood and related sales taxes are deposited in Connecticut’s General Fund. Chart 2.2.1 captures annual variations in these fees for visitors to state parks and forests.

Chart 2.2.1 Annual Variations in Fees Paid by Visitors to DEP-managed Forests and Parks (Millions \$)



2.3 Park Related Tourism Expenditures

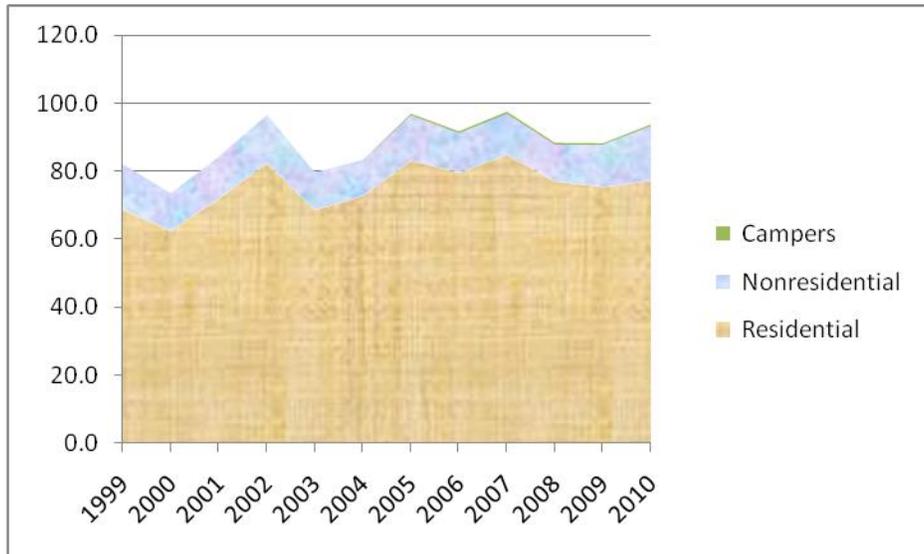
Estimates of DEP parks and forests related tourism expenditures are first derived for paying users at DEP’s facilities. Amounts for trip costs have been established by a 2008 intercept survey of Connecticut tourist established both average party sizes and average daily expenditures for each resident and nonresident. The average size of a Connecticut tourism party in 2008 was 3.5 people with a daily spend per party of \$233.45 inclusive of accommodation and \$175.24 net of average payments for accommodations. Parallel figures for daily tourist nonresidents for parties of 4.2 people were \$230.34 and \$183.99 net of their accommodation payments. Because only five percent of visitors in the intercept survey utilized campgrounds and because overnight campground fees are lower than hotel or motel accommodations, that part of expenditures was adjusted downward for campers.

Based on expenditures by all fee paying customers inclusive of those paying late day fees and those travelling in buses, Chart 2.3.1 illustrates that DEP administered fees are a relatively small percentage of total expenditures by parks and forests visitors in Connecticut. Fee-paying visitors spent \$88.4 million to \$97.7 million annually in Connecticut. The lion’s share of these annual expenditures, \$74.3 million to \$84.8 million for 2005 to 2010, was by Connecticut residents as illustrated by the burlap covered area in the Chart. Walk-in visitor expenditures appear as the minutely thin green line at the top of the graph.

Valued in 2008 dollars, daily per capita expenditures have been in the low to mid \$60 to \$63 range per visitor per day throughout the period. Substantiating evidence for the above per capita expenditures comes from a survey of overnight campers in U.S. national forests. In 2004, their average daily expenditures were \$66.68 and \$58.67 for non-locals and locals respectively⁹.

⁹ Daniel J. Stynes and White D.J. **Spending Profiles of National Forest Visitors, NVUM Four Year Report**, 2006 pp. 12 and 34. <http://www.fs.fed.us/recreation/programs/nvum/NVUM4YrSpending.pdf>

Chart 2.3.1 Expenditures in Connecticut of Paying Visitors Who Utilize For-Fee State Parks and Forests (Millions 2008 \$)



Source: CCEA Based on DEP records and Witan Intelligence Strategies Inc. **Vision Intercept Study Connecticut edition 2008.**

While the recent recession led to a downturn in total expenditures by paying visitors to state parks and forests in 2008 and 2009, expenditures recovered in 2010 albeit insufficiently to regain 2007 levels. Reflecting the increased number of users in each of the last two years, total expenditures have been expanding. Due to the opening additional parks and rising attendance and activity fees, expenditures at state parks and forests have more than doubled since 2002. As a share of total trip expenditures by these travelers fees remain a relatively small – below 3%.

Table 2.3.1 breaks out tourism expenditures by those who paid fees collected by DEP for their accommodation and other expenditures with the other expenditures being allocated among Connecticut residents and nonresidents. The preponderance of expenditures is clearly by Connecticut resident parties.

Table 2.3.1: Total Annual Expenditures by Paying Visitors (Millions 2008 \$)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Accommodations	19.3	17.4	20.0	22.9	18.9	19.8	23.1	21.9	23.2	20.9	15.2	16.6
Non-Accommodations												
Resident	51.9	47.3	54.4	62.3	51.9	55.0	62.9	60.2	64.2	58.4	62.4	63.4
Nonresident	10.7	8.7	9.9	11.3	8.8	8.4	10.8	9.4	9.8	8.7	10.4	13.5
Campers	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.6	0.5	0.4	0.4
Sub-total	62.6	56.0	64.2	73.6	60.7	63.5	74.1	70.1	74.6	67.6	73.2	77.4
Total	82.0	73.4	84.2	96.5	79.6	83.3	97.2	92.0	97.8	88.6	88.4	94.0

Source: CCEA Based on DEP records and Witan Intelligence Strategies Inc. **Vision Intercept Study Connecticut edition 2008.**

2.4 Extrapolations

CCEA has extrapolated the above in three stages. Paying clients represent only a portion of park visitors. Out-of-season and off-hour visitors are captured in gate counts but did not pay. For that reason the number of park visitors exceeded those who paid to use attributes of many for-fee parks. This group of visitors is larger than the uninitiated reader might expect because some DEP venues charge only on weekends, so that weekday visitors to those facilities do not pay for parking. In addition, other parks and forests do not offer camping or established parking facilities and/or do not require fees but are included in the attendance counts. There is then a second group of counted park visitors benefiting from the use of these other “fee-free” parks. A third set of parks and forests while still under development offer activities and attract visitors. DEP keeps no counts of this third set, albeit some of the activities offered require licenses discussed elsewhere in the analysis so that care has to be taken to avoid double counting.

2.4.1 Connecticut Expenditures by Visitors to State Parks

Park visitors are assumed to spend the average amounts and experience the average length of stays for tourists in Connecticut dependent on their residency. Because the sample coverage is better for those utilizing state parks rather than state forests, this analysis is broken out for parks and forests.

For 2005, CCEA estimates total visitors to be the 2004 total visitors from DEP’s 2005 SCORP (Statewide Comprehensive Outdoor Recreation Plan) report assumed to grow at rate of growth in paying visitors 1999 to 2009¹⁰. This process adds 182.1 thousand visitors in 2005 in order to cover development parks devoid of visitor counts. That benchmark is adjusted proportionately to known visitor counts annually out to 2010.

This level of adjustment for parks under development is justified by their numbers and available activities, not covered elsewhere. The 39 fee-free state parks provide venues for 120 activities of which 49 are covered by licensing revenues and other estimated expenditures covered elsewhere in this report. Table 2.4.1 outlines these and the remaining main activities are outlined in. Of the 71 venues not covered elsewhere, 52 involve walking or jogging activities. The number of venues provided at state forests was lower with the same emphasis on hunting and hiking and related activities.

¹⁰ Gate counts covered 6,116 thousand visitors in 2005 compared to SCORPs 6,223 thousand in 1964 to all parks (SCORP p.16) in 2004 and 1,112 to State Forests compared to 1,759 (SCORP p.16).

Table 2.4.1 Activity Venues Provided at Fee-Free State Parks

Activities Covered	State Parks Venues	State Forests Venues
Hunting	13	8
Angling	21	3
Boating	6	1
Boat Launching	5	1
Historic	3	1
Downhill Skiing	0	1
Group Youth Camps	1	1
Total Covered before Adjusting Attendance Data	49	16
Activities x Venues Not Covered by Data	71	36
Hiking	34	13
Biking	8	5
Bird Watching	7	3
Letterbox Guided	11	7
Other	11	8
Total Activities x Venues	120	52

By 2010, visitor days at all state parks reached 6.8 million persons using this methodology. This figure is extrapolated conservatively from 2009 at the average rate of growth 2005-2009, at a miniscule 0.76%. In contrast, visitor days at State fee-charging parks 2009 to 2010 were up 5.59%. By 2010, paid fees covered 1.5 million visitor days at state parks. Another 3.6 million visits occurred in the same parks but these visitors did not pay fees another 1.6 million were counted at not-for-fee parks. In addition, developing parks are estimated to have reached 182.1 thousand by 2010 undertaking activities not covered elsewhere.

Table 2.4.2 lays out the extrapolations for expenditures in Connecticut by visitors to state parks. By 2010, expenditures in Connecticut by state park visitors reached \$425.1 million in 2010 dollars, down \$7.2 million from the recent peak in 2007. This estimate assumes that non-paying visitors had similar average length trips and were divided in the same proportion of residents and nonresidents as were fee-paying visitors. Accommodation expenses have been estimated conservatively by using rates paid by the average non-resident person. Because both resident day-trippers who paid late fees and bus travelers are included in the base numbers, this process leads to lower than average lengths of stays for tourists captured in the intercept survey. Expenditure estimates using the average length of stay for tourists would be \$13.0 million higher than the above 2010 estimate.

2.4.2 Expenditures in Connecticut by Visitors to State Forests

Among nine state forests for which attendance is tracked, only three forests and the Pachaug Campground are included. For this reason the sample is not as strong as it is for state parks, albeit there is little difference between the per capita expenditures between state park and state forest visitors. That lack of difference engenders confidence in the forest data despite the small sample. By 2010, 22.2 thousand

Table 2.4.2 Extrapolated Connecticut Expenditures by Visitors to State Parks

(Millions 2008 \$)

	2005	2006	2007	2008	2009	2010
Fee-Paying Visitors						
Residents	81.7	78.3	83.3	75.7	74.4	75.9
Nonresidents	13.4	11.6	12.1	10.8	12.5	16.1
Camper Walk-in	0.4	0.5	0.6	0.5	0.4	0.4
Total Fee-Paying	95.5	90.4	96.1	87.0	87.2	92.5
Out-of-Season & Off-Hour Visitor Days at Fee-Paying State Parks	201.0	233.2	232.1	216.8	226.5	222.3
Counted Visitors to Not-For-Fee State Parks	88.8	92.1	91.7	89.7	96.8	98.1
Visitors to Development State Parks	11.1	12.0	12.1	11.4	11.9	11.9
Direct Trip Expenditures	396.8	428.1	432.3	405.2	422.6	425.1

Source: Visitor days from DEP based on park gate records except for total for 2010 which is a log-linear extrapolation of the series. Fee paying Visitors are from individual park records.

visitors paid attendance fees while 388.7 thousand accounted for unpaid attendance. Based on the number of total forest visitors counted, augmented by 50% to capture visitors to DEP forests where no counting occurred including 14 development forests, and to be consistent with visitor data in SCORP visits to DEP forests, another 1,287.6 thousand visited not-for-fee state forests. In total 1,669 thousand visited DEP forests. Table 2.4.3 shows these visitors' trip expenditures amounted to \$119.3 million down by \$4.9 million from the previous year's peak in 2009.

Table 2.4.3: Extrapolated Connecticut Expenditures by Visitors to State Forests

(Millions \$)

	2005	2006	2007	2008	2009	2010
Fee-Paying Visitors						
Residents	1.4	1.3	1.5	1.3	0.9	1.2
Nonresidents	0.1	0.1	0.1	0.1	0.1	0.2
Walk-ins	0.0	0.0	0.0	0.0	0.0	0.0
Total Fee-Paying Days	1.5	1.4	1.6	1.4	1.1	1.4
Out-of-Season & Off-Hour Visitor Days at Fee-Paying State Forests	31.8	32.4	31.2	31.5	29.5	27.3
Counted Visitors to Not-For-Fee Forests	46.5	47.4	49.7	44.0	52.1	50.7
Visitors to Development State Forests	40.0	40.6	41.4	38.6	41.4	39.8
Direct Trip Expenditures	119.9	121.8	123.9	115.6	124.2	119.3

Source: Visitor days from DEP based on park gate records except for total for 2010 which is a log-linear extrapolation of the series. Fee paying Visitors are from individual park records. Data on total visitor days at

forests was adjusted upwards to cover unlisted forests based on SCORP data. These adjustments also impacted estimated expenditures of those visiting not-for-fee forests.

2.4.3 Visitor Expenditures

Total estimated direct expenditures for each type of visitor are the sum of the above appearing in Table 2.4.4. Valued in 2008 dollars, 2010 trip expenditures by DEP-managed parks and forests generated \$544.3 million in direct expenditures in Connecticut.

Table 2.4.4: Extrapolated Connecticut Expenditures by Visitors to State Parks and Forests
(Millions 2008 \$)

	2005	2006	2007	2008	2009	2010
Fee-Paying Visitors	97.4	92.1	98.0	88.7	88.6	94.2
Out-of-Season & Off-Hour Visitor Days at Fee-Paying State Parks and Forests	232.8	265.6	263.3	248.3	256.0	249.6
Counted Visitors to Not-For-Fee State Parks and Forests	130.6	133.6	135.6	128.5	151.0	148.6
Visitors to Development State Parks	51.2	52.7	53.5	49.9	53.3	51.7
Direct Trip Expenditures	494.6	525.8	532.4	498.7	549.0	544.3

Sources: See notes to Table 5a and 5b

2.5 Conclusions

Combining the expenditures for the state parks and forests sizes the total direct tourism monies spent annually from 2001-2010. During 8.5 million tourism days in 2010, visitors to DEP parks spent \$544.3 million. The vast majority of these expenditures were generated by visitors to state parks rather than to forests and by Connecticut residents rather than nonresidents. The number of fee-paying visitors rose in 2010, while out-of-season visitors are estimated to have declined as did those visiting not-for-fee parks and forests in the last year. Less conservative projections could inflate these results by close to three percent. Of these expenses 17% to 18% were for accommodations including camping.

3. Other Direct Activities

3.1 Introduction and Overview

In addition to general tourism captured in the previous chapter, DEP management facilitates specific activities both within parks and forests and externally to them. Key among these activities are hunting, fishing and boating. Licenses are awarded to both hunting and angling whereas permits are only for hunting. The relative licensing effort devoted to hunting and fishing is clear from Table 3.1.1 below

provides basic data on the number of licenses and permits issued for the 2010 season starting on Dec 1, 2009, going through to December 31, 2010. It excludes December 1 to December 31 sales for the 2011 season and therefore represents DEP revenues for the single season. The vast majority of license and permit sales are to Connecticut residents.

Table 3.1.1 DEP Sportspersons' Licenses and Permits Issued: 2010

	Residents	Nonresidents	Total
Fishing	154,907	14,445	169,352
Hunting	88,079	5,684	93,763
Hunting & Fishing	29,472	283	29,755
Trapping	750	2	752
Total	273,208	20,414	293,622

Because many of the licensees above hold more than one license and/or permit, there are fewer sportspersons than licenses and permits issued. When holding of multiple licenses and permits is taken into account, the number of sportspersons is shown in Table 3.2. The number of anglers' licensees is then the number of those with licenses strictly for angling plus the number of sportspersons holding a combination license allowing both hunting and fishing. Of the 752 trapping licenses, all but 37 went to persons holding either a hunting, fishing or combination license. For this reason hunting activities are broadened slightly to include trapping in the rest of this chapter.

Table 3.1.2 DEP Sportspersons with Licenses: 2010

	Residents	Nonresidents	Total
Fishing	132,000	13,810	145,810
Hunting	17,916	2,543	20,459
Hunting & Fishing	22,073	214	22,287
Trapping	36	1	37
Total	172,025	16,568	188,593

Source: DEP licensing data with deletion of sequential same name and address deleted.

Contributing to the number of trips taken per hunter and per angler will be the number and diversity of licenses and permits held. That topic is discussed in greater detail in the following sections. The overlap is necessary because many anglers hold combination licenses or separate licenses covering multiple activities. Because the type of fishing, marine or inland, dramatically impacts costs of undertaking each activity inclusive of travel distances, marine and inland fishing are treated as two different but overlapping activities within the report.

3.2 Hunting

DEP contributes to the Connecticut hunts by both restocking and issuing licenses. In 2010 the DEP purchased a total of 15,775 pheasants based on revenues from the sale of pheasant stamps in 2009.”¹¹ It also controlled the hunt by issuing licenses that are specific by species and technique and in time.

The difference between licenses and permits issued and the number of hunters underlines the multiplicity of licenses and permits held by hunters. It is clear that much of this multiplicity will involve frequent trips to exercise licenses and each related permit:

- Licenses are specific to equipment deployed (shotguns, firearms, muskets of various types, and bows and arrows);
- With the exception of Connecticut’s Harvest Information Permits (HIP), permits are specific to certain game – migratory birds, deer etc.;
- Hunting techniques also differ among the types of hunts as illustrated by the blinds for migratory bird hunts versus tracking techniques for deer; and,
- Hunters hold permits for hunting in specific seasons, such as both a spring turkey and fall turkey hunting, requiring separate trips.

Table 3.2.1 reveals the size of the licensed hunting community in Connecticut. This enumeration of licensed hunters includes resident and nonresident hunters as well as the total. The first line indicates the number of permits, other than CT HIP. HIP aside, permits are for specific game and therefore time limited either by fiat or the seasonality of available game, each permit is likely to be matched by a trip for the permit holder. Because many licensed hunters hold in excess of one permit, it is necessary to establish the total number of hunting licenses, the sum of lines two and three of the table. The Bureau of the Census found that Connecticut hunters make 12.2 single day trips per resident licensee and three days for nonresident licensees.¹² Using this data facilitates estimating the number of hunting trips shown in the last line of Table 3.2.1.

Table 3.2.1: Resident and Nonresident Licensed Hunters Holding Permits: 2010

	Residents	Nonresidents	Total
Permits for Hunting	59,365	2,816	62,181
Hunting Licenses	33,644	2,987	36,631
Hunting & Fishing Licenses	29,472	283	29,755
Hunters and Hunting & Fishing Licenses	63,116	3,267	66,386
Number of Hunting Trips	770,024	9,801	779,825

Source: DEP licensing data.

The 3,267 non-resident hunting licenses issued in 2010 included hunting 1,468 archery, 96 junior licenses and 284 combination licenses.

¹¹ http://www.ct.gov/dep/cwp/view.asp?a=2700&q=394896&depNav_GID=1633

¹² The only permit holders treated as equivalent to licensees were those holding archery permits for deer who did not appear to need a license involving any type of firearms.

Most nonresident hunters originate in Massachusetts and elsewhere in New England accompanied by a strong contingent from New York, as noted in Chart 3.2.1. There is considerably less hunting in Connecticut by those originating in New Jersey, and Pennsylvania.

Chart 3.2.1: Origins of Nonresidents



Source: DEP Licensing Data.

An improved estimate of the number of trips comes from the average number of trips per hunter determined from a 2006 survey by the U.S. Fish and Wildlife Service. It indicates that resident hunters averaged 12.2 trips and nonresidents 3.0 trips in Connecticut¹³. Based on 2010 hunting licensees, resident hunters undertook 770.0 thousand trips and nonresident hunters 9.8 thousand. The resulting expenditures for those hunting in Connecticut are illustrated in Table 3.2.2. Per trip expenditures were similar for both residents (\$120.19) and nonresidents (\$470.10).

Table 3.2.2: Hunting Trips and Expenditures by Resident and Nonresident Hunting Licensees (1,000 s)

	Resident	Nonresident	Total
Total Number of Trips (1,000s)	768.1	9.8	777.9
Total Expenditures in Connecticut (1,000s 2006 \$)	92,317	4,607	96,924

Source: DEP Licensing Data and average spending data from U.S. Fish and Wildlife Service.

The U.S. Fish and Wildlife Service also breaks out all expenditures on hunting in Connecticut as noted in Table 3.2.3. That break out is shown in 2006, 2008 and 2010 dollars. The 2008 dollar values are used in REMI simulations while 2010 values are more readily comprehended than their 2006 counterparts. In all cases, the industry purchases have been adjusted through Consumer Price Indexes (CPIs) tailored to them. The last item included licensing fees so the 2010 number has been adjusted to include DEP's rate

¹³ U.S. Fish and Wildlife Service, 2006 National Survey of Fishing Hunting and Wildlife-Associated Recreation, Connecticut, Derived from Table 3.

increases. The small number of spenders indicates that many participating in the survey did not spend in all sectors and that the sample size is a little small. The number purchasing books and recreational magazines is small and the expenditures based on residual estimators from the rest of the data.

Table 3.2.3: Detailed Hunter Connecticut Expenditures by Licensees (1,000s \$)

	Spenders	2006 \$	2008 \$	2010 \$
Food and Lodging	40	2,520.3	2,751.7	2,801.5
Transportation	25	5,032.2	5,457.2	5,365.5
Other Trip Costs	32	920.7	1,105.2	993.8
Hunting Equipment	13	29,220.0	29,324.8	29,266.3
Auxiliary Equipment	30	5,886.4	5,860.1	5,773.8
Special Equipment	13	35,836.2	37,879.1	39,309.3
Magazines and Books		478.0	491.6	495.1
Membership Dues and Contributions	8	2,371.8	2,443.8	2,391.8
Other	7	14,658.1	15,102.9	22,898.4
Total	37	96,923.9	100,416.5	109,295.3

Source: (1) DEP 2010 Licensing data, (2) U.S. Fish and Wildlife Service Table 22 for the breakout of expenditures and (3) U.S. Bureau of Labor Statistics for CPI inflators.

The derived overall escalators for the hunting activity in 2008 and 2010 from the 2006 base are then 1.03 and 1.14 respectively. Total expenditures in Connecticut are in 2010 dollars are impressive at \$109.3 million in 2010 dollars.

3.3 Fishing

DEP supports both recreational and commercial fisheries by restocking lakes, ponds and rivers as well as controlling recreational fishing by licenses. For the 2010 season DEP issued 169,352 licenses strictly for fishing and another 29,755 covering both fishing and hunting, so that it issued a total of 199,107 licenses for fishing. There were three major types of fishing licenses – Marine, Inland Waters, and All Waters as shown in Table 3.2.

Table 3.3.1 DEP Issued Licenses and Licensees by Type of Fishery: 2010

	Marine	Inland	All Waters	Total
Licenses	53,308	81,325	64,474	199,107
Licensed to a Person Holding Another Specific Activity License	204	494	165	863
Licensees	53,104	80,831	64,309	198,244

As with hunting some individuals hold multiple licenses for each type of activity. Thus the 53,308 licenses classified as Marine only, were held by 53,204 licensees. Similarly, the 81,325 licenses specifically issued for the inland fishery were held by 80,831 licensees. Adding All Waters licenses and licensees to the fishery specific licenses and licensees means that 117,782 licenses for Marine fishing

were held by 117,413 licensees while 145,799 licenses issued for the inland fishery facilitated involvement of 145,140 licensees in inland waters.

For assessing travel distances and attribution of consumer surplus among anglers, it is useful to allocate both licenses and licensees between residents and nonresidents. Table 3.3.2 contains the results. Connecticut residents clearly predominate in both the marine and inland fisheries. Particularly in the inland fishery residents appear to have a better understanding of the licensing system than do nonresidents who hold the number of multiple licenses, especially for inland fishing. As a share of their participation in fisheries activities, non-residents place slightly greater emphasis on the marine fishery rather than the inland one.

Table 3.3.2 DEP Issued Licenses and Licensees by Type of Fishery, Residents and Nonresidents: 2010

	Marine	Inland	All Waters	Total
Residents				
Licenses Issued to Residents	47,930	73,027	63,422	184,379
Licensed Issued to Residents Already Holding an Activity License or Permit	131	154	162	447
Resident Licensees	47,799	72,873	63,260	183,932
Nonresidents				
Licenses Issued	5,378	8,298	1,052	14,728
Licensed Issued to Nonresident Already Holding an Activity License or Permit	73	340	3	416
Nonresident Licensees	5,305	7,958	1,049	14,312

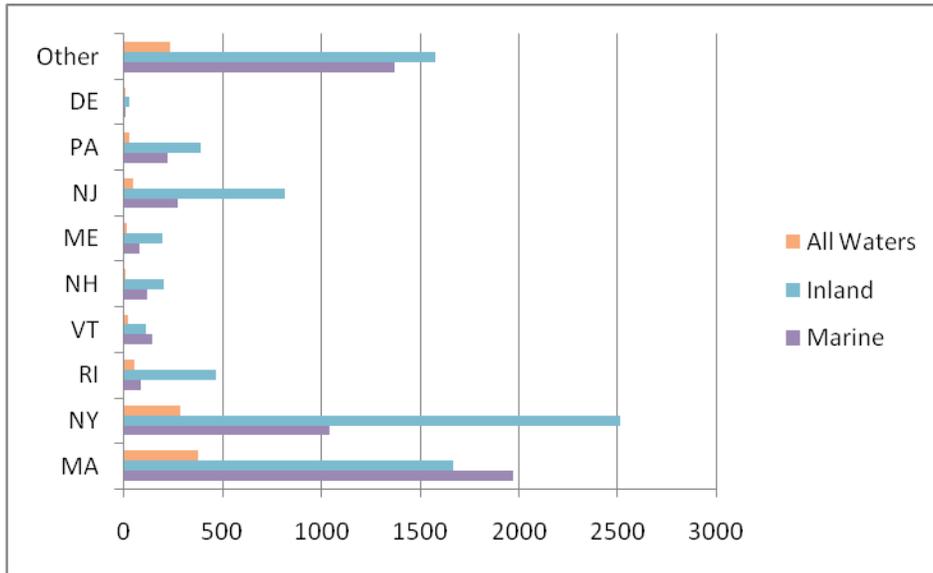
Source: DEP, Licensing Data

As Chart 3.3.1 illustrates, the origins of nonresident anglers licensed by Connecticut was primarily from New England albeit, New Yorker licensees (2,612) are almost as prevalent in the inland fishery as nonresident New Englanders (2,741). With relatively good access to their own marine waters, both New York and New Jersey residents showed stronger interest in Connecticut’s inland fishery than its marine fishery. There is reciprocity in the marine fishery for licensees from Connecticut, Massachusetts, and Rhode Island. Connecticut’s sale of marine angling license to Massachusetts’s anglers is a surprise and may be because where Massachusetts’s Western counties may find the Connecticut shore more accessible and /or appealing than the shoreline in their home state. Visitors from other states, many of which are land-locked, are more heavily licensed to enter the inland fishery rather than the marine one.

Connecticut waters are generally recognized as being safe. Among the 150,000 licensed personal watercraft licensees, operating 108,000 registered craft, there were 10 fatalities in 2009.¹⁴

¹⁴ Data provided by DEP.

Chart 3.3.1 Origins of Licensees for Marine, Inland and all Water Fisheries: 2010



In all cases the licensees constitute the base for estimating direct participation in each fishery. The U.S. Fish and Wildlife Service’s 2006 National Survey of Angling, Hunting and Wildlife-Associated Recreation identified more Anglers participating in the Connecticut fishery than are licensed by Connecticut to participate. This outcome is understandable from the survey techniques deployed by the U.S. Fish and Wildlife Service. A main determinant of Connecticut’s nonresident licenses issued in the marine fishery is that licenses between Connecticut, Rhodes Island and Massachusetts are reciprocal so that licensees from those states are not required to be licensed by Connecticut. Due to the reciprocity a Connecticut licensees have access to marine angling grounds in other participating states. Reciprocity is the main reason for the ratios of nonresident participating anglers relative to CT licensees are particularly high. The ratios of 2006 surveyed anglers to 2010 licensed ones in Table 3.3.3.

Table 3.3.3: Ratio of Anglers in Connecticut 2006 to Connecticut Licensed Anglers in 2010

	Marine Including “All Waters”	Inland including “All Waters”
Resident	1.09	1.31
Nonresident	5.67	2.89

Due to assembling data on the number of trips, the survey suggested more angling activity than do the minimums from the licensing data. These higher trip figures would set angler participation at the levels appearing in Table 3.3.4. Notice, the word “participation,” is deployed here to capture both licensees and anglers unlicensed in Connecticut. The first two columns cannot be added to get the total because those participating in both the Marine and Inland fishery would be double counted.

Table 3.3.4: Fishery Participants in 2010

	Marine Including "All Waters"	Inland including "All Waters"
Resident	121,000	178,000
Nonresident	36,000	26,000
Total	157,000	204,000

The inland fishery has a higher percentage of resident participants and the marine one a higher share of nonresident participants. Given the reciprocal use of licenses this outcome is to be expected.

A component of estimating average expenditures per participant is the number of trips taken by the average participant as well as the total number of trips. Not unexpectedly, residents make more trips to fish in Connecticut than do nonresidents. These results appear in Table 3.3.5.

Table 3.3.5: Trips per Participant 2010

	Marine Including "All Waters"	Inland including "All Waters"
Resident	8.8	18.2
Nonresident	5.5	3.9

Bearing in mind that nonresidents visiting Connecticut will spend while en route and returning home as well as the smaller number of trips to Connecticut fisheries relative to residents, nonresidents can be expected to spend somewhat less per participant in Connecticut than its residents. These lower expenditures by nonresidents are documented in Table 3.3.6. Per capita per day the average resident spends \$35.60 and average nonresident \$30.30.

Table 3.3.6: Expenditures by Participants in the Connecticut Fishery 2010 (Millions 2006 \$)

	Marine	Inland	Total
Expenditures (Millions 2006 \$)			
Resident	79.1	112.1	191.2
Nonresident	16.6	4.7	21.3
Total	95.7	116.8	212.5

The above expenditures cover only expenditures incurred in Connecticut to undertake angling activities, within DEP's sphere of influence. They exclude expenditures in Connecticut to undertake angling activities elsewhere than in Connecticut. The U. S. Fish and Wildlife Service provides a useful breakout of expenditures by industry for this larger expenditure inclusive of expenditures in Connecticut to pursue out-of-state angling. The breakout of expenditures is shown in Table 3.3.7 in 2006, 2008 and 2010 dollars. The 2008 dollar values are used in REMI simulations while the 2010 values are more readily comprehended than their 2006 counterparts. In all cases, the industry purchases have been

adjusted through CPIs tailored to them. The escalator applied to boat operations was the price of gasoline. The last item included park fees so the 2010 number has been adjusted to include DEP's rate increases. While there was significant escalation 2006 to 2008, there was a slight decrease for 2008 through 2010, despite the inclusion of DEP's fee increase.

Table 3.3.7: All Angling Expenditures in Connecticut (1,000 \$)

Purchases	Spenders	Expenditures		
		2006	2008	2010
Food	199	32,505	35,615	36,555
Lodging	22	5,405	5,719	5,397
Transportation	201	30,819	33,422	32,860
Privilege Fees	43	9,224	9,504	9,302
Boat Costs	67	38,836	49,047	42,167
Bait	175	9,674	10,359	10,502
Ice	100	4,049	4,336	4,395
Heating and Cooking Fuel		240	309	288
Angling Equipment	192	49,268	49,445	49,346
Auxiliary Equipment (Tents and clothing)	48	12,667	12,610	12,425
Boats, Campers		41,044	43,384	45,022
Magazines and Books	52	1,696	1,744	1,756
Memberships and Contributions	27	1,269	1,308	1,280
Other including Permits and Fees	147	6,856	7,064	10,710
Total Adjusted for Price Changes	199	243,552	263,865	262,004

Source: (1) DEP 2010 Licensing data, (2) U.S. Fish and Wildlife Service Table 16 and 19 for the breakout of expenditures and (3) U.S. Bureau of Labor Statistics for CPI inflators.

Inflation was a more important factor from 2006 to 2008 than 2008-2010 with prices showing a slight decline over the last two-years despite DEP increasing fees. This outcome reflects the minor role of licensing fees in the overall costs of angling.

3.4 Recreational Boaters

3.4.1 Introduction

DEP operates 112 boat launches of which 85 are for trailers. It is assumed that recreational boats launched at sites providing trailer access operate under power or sail, hereafter referred to as "power boat launches" in contrast with the launches for human powered or small motor craft from car roof tops. Further, of the 85 power boat launches 10 are on the coast and the rest on fresh water. Usage of seagoing boats and freshwater ones will differ in that seagoing recreational boats are more apt to remain in the water for the season than are freshwater boats where boaters may visit several boat launches over the season either for a variety of venues or for competitive events. The purpose here is to estimate the expenditures from these activities utilizing DEP venues and human resources. Estimates

of interest in assessing DEP park and forest activities do not cover the entire impact of the recreational activity throughout Connecticut, just by those using DEP facilities.

DEP provides training and operator licenses for recreational boaters. Currently, DEP assists anglers by stocking state lakes, ponds and rivers. There are currently 108,000 licensed recreational boats in Connecticut with at least 150,000 licensees holding safe boating personal watercraft certificates.

Due to higher fees, the PWCs licensing expenditures incurred by new licensees rose from \$148,285 in 2009 to \$288,500 in 2010. In 2009, DEP issued a further 2,232 licenses and certificates worth \$47,285 related to boat and boater safety and replacement of lost licenses. Parallel figures for 2010 include 1,607 licenses and certificates at \$37,465.

While anglers are involved in operating recreational boats not all recreational boaters are anglers and not all anglers are boaters. Because various angler licensees are including the overall data set for DEP, licensed boaters have been estimated as the residual of the above licensing activities.

3.4.2 Power Boats

Assuming the costs of operating recreational power boats in Connecticut are roughly line with those on the Great Lakes¹⁵, owners of Connecticut registered boats spend \$472 million on recreational boating of which \$173 million was spent on their crafts. Of this amount anglers spent \$43.4 million on their recreational boats so that amount is already included in the study leaving non angling recreational boats spending \$130 million on their craft and \$353 million in aggregate when their trip expenditures are included. Remembering that boaters' expenditures are not all attributable to DEP operations, even ten percent of the \$353 million or \$35.3 million is not out of line with its 112 boat launches.

This estimate is likely low because it takes very little account of the proliferation of Personal Water Craft (PWCs) on freshwater lakes and rivers.

3.4.3 Human Powered Boats

The remaining boat launches cater to boats carried on car roof tops. While some of these may involve the use of light electric motors (e.g. electrically driven trolling propellers) or even small easily portable outboards, they are treated here as human powered craft. Generally human powered recreational boating activities such as canoeing, rowing and kayaking constitute about 2-3 percent of the expenditures of the power boat and sailing recreational marine¹⁶. Given the number of launch sites in Connecticut and the distances being driven to them, the resulting estimate of \$1.5 million appears to be fairly conservative.

3.4.4 Boating Conclusions

The above data estimate expenditures on total boating activities in Connecticut. They are conservative in that the sea going capabilities, the average length of boat in Connecticut is likely longer than on the Great Lakes. In addition maintaining boats in freshwater is generally less expensive than in saltwater.

¹⁵ Great Lakes Boating's economic punch, Great Lakes Commission des Grands Lacs, <http://www.glc.org/recboat/pdf/rec-boating-final-small.pdf>

¹⁶ Goss Gilroy Inc. Economic Analysis of Recreational Boating in Canada: 2001, Executive Summary. And

Nevertheless with DEP’s emphasis on freshwater boat launches, the approximation based on 4.3 million Great Lakes recreational boats is reasonable. In addition DEP generates amenity benefits to boaters through its training and licensing programs in order to save lives.

3.5 Other DEP Activities

3.5.1 Introduction

This section looks at three DEP operations targeting specific activities, - skiing at Mohawk Mountain Ski Area, the Harkness Memorial State Park with its 230 acre grounds, and educational activities at 5 venues. These training venues are designed to assist both teachers and students in upgrading the quality of environmental education.

3.5.2 Mohawk Mountain Ski Area

Mohawk Mountain Ski Area attracts skiers from Connecticut and surrounding states. Since 1986, Mohawk Mountain gross revenues after deducting receipts for ski rentals have risen from \$1.7 million to \$4.3 million. By 2008 ski rentals amounted to \$4,700. While rentals have been added to gross revenues they are insufficient to notice after rounding. Projecting 2009 at the average growth rates for 1986 to 2008, gross revenues annual for the entire year of 2008 reached \$4.4 million with fees to DEP of \$80,851. In setting these fees Mohawk Mountain Ski Area utilizes a complex rate schedule noted in Table 3.5.1.

Table 3.5.1: Mohawk Daily Ski Pass Rates

	Adult (16 & older)	Junior/Seniors (5-15 yrs / 65 yrs & up)	Child (4 & under)
ALL DAY 8:30 - 6pm or 1 - 10pm	\$52	\$44	\$15
SUNDAY ALL DAY 8:30 - 4pm	\$52	\$44	\$15
MORNING 8:30 - 1pm	\$45	\$37	\$15
AFTERNOON 1 - 6pm	\$45	\$37	\$15
TWILIGHT 4 - 10pm	\$45	\$37	\$15
NIGHT FRI/SAT 6 - 10pm	\$24	\$24	\$15
SUNDAY SPECIAL 1 - 4pm	\$37	\$37	\$15

Source: http://www.mohawkmtn.com/lift_tickets.html.

This complexity is compounded by special ski packages, free ski lessons and veterans discounts¹⁷.

Two studies provide breakouts of skiers’ expenditures by activity that indicate about a quarter of their expenditures are for lift tickets as noted in Table 3.5.2. Utilizing the more up-to-date of these two, skier expenditures from Mohawk skiing activities would amount to \$13.8 million.

¹⁷ http://www.mohawkmtn.com/lift_tickets.html.

Table 3.5.2: Skiers' Expenditures by Activity (%)

Region	Midwest ²	North Carolina ³
Time	1968-69	2002-2003
Lodging & Meals	28.3	37.5
Lift Tickets	24.1	
Lift Tickets and Rentals		32.7
After-Ski Entertainment	8.5	1.7
Transportation	16.5	11.1
Other ¹	22.6	17.0

(1) For Midwest includes equipment rental and repairs, lessons, package plans, and, other miscellaneous items with rentals excluded for North Carolina. (2). W. A. Leushner and Herrington, R. B. *The Skier: His Characteristics and Preferences*. http://nrs.fs.fed.us/pubs/other/recsym/recreation_symposium_proceedings_135.pdf Table 10. (3) Steven W. Millsaps, Groothius, P. A. **The Economic Impact of the North Carolina Ski Areas on the Economy of North Carolina 2002-2003 Season**, Table 2 <http://www.goskinc.com/economics/2002-2003/NCSAA-Economic-Impact.pdf>.

3.5.3 Harkness Memorial State Park

The Harkness Memorial State Park on average hosted 65 events in the historic mansion, primarily weddings over the last three years. The average group size was 130 implying 8,450 guests. The average costs per capita at the site were \$250, of which \$175 is for food, beverages and accommodations and \$75 for incidentals, primarily entertainment. Of these guests about 75% used commercial accommodation for at least one night and immediate families of bridal parties two nights. Because most weddings occur during peak season local accommodation prices average \$175 per night.

There are a further 25 amphitheatre weddings a year at lower costs per capita and with fewer guests staying in commercial accommodations. Amphitheatre costs are \$375 per event and per capita costs about \$25. Their use of local accommodations is also lower at 25% of guests.

Additional costs for food then add to the total expenditures in Connecticut attracted by the Harkness Memorial State Park illustrated in Table 3.5.3.

The various food and beverage and off-site accommodation charges cover bridal parties and guests over one or two nights. The entertainment costs are for bands and other entertainment the weddings. The expenditures are significant because out-of-state wedding participants, particularly Boston and New York, dominate bookings at the Harkness Memorial State Park.

Table 3.5.3: Expenditures Attributable to Operations at the Harkness Memorial State Park

Activity	Expenditures
Weddings Utilizing the Historic Mansion	
Food, Beverages and Accommodation at the Site	1,803,750
Entertainment	633,750
Offsite Accommodations	1,109,063
Offsite Food	380,250
Travel	117,696
Wedding Deploying the Amphitheatre	
Food, Beverages and Accommodation at the Site	71,250
Entertainment	126,750
Offsite Accommodations	82,013
Offsite Food	28,125
Travel	26,116
Other Wedding Parties (Pictures only)	3,750
General Admittance	159,929
Total Expenditures	4,542,460
Donation	347,170
Total	4,889,630

Source: DEP staff.

Harkness accommodation fees are modest in per capita terms as noted from its fee schedule below;

Weddings & Parties:

The rental fee of \$4,450 includes exclusive use of the first floor of the mansion and south courtyard tent for 5 hours with an additional 2 ½ hours set up and breakdown. Purchase additional time for \$875 per hour to the midnight curfew.

Day Use Fees:

Seminars, conferences, luncheons and meetings have a four hour base rate Tuesday - Friday, 8 a.m. to 4 p.m. (March 1 to Memorial Day and Columbus Day to December 23)

- *Music Room: 80 guests maximum, base rate: \$565, additional time \$220 per hour*
- *Dining Room: 40 guests maximum, base rate: \$440, additional time \$160 per hour*
- *Breakfast Room: 30 guests maximum, base rate: \$375, additional time \$140 per hour.*

Visitors to its events however spend a considerable amount in Connecticut as noted in the table. Staff is noticing increasing number of parties from out-of-state so that increasing shares of the revenues are attributable to its presence in Connecticut as opposed to locale couples getting married elsewhere in lieu of availability of the Harkness Memorial State Park.

3.5.4 Enhanced Education

Data are available on the educational and training activities undertaken at three of five educational centers. Estimated expenditures in Connecticut by visitors to these centers are summarized in Table 3.5.4. From 2005-2010 they have been in the \$6.9 million to \$7.5 million range.

Table 3.5.4 Extrapolated Connecticut Expenditures by Visitors to DEP Managed Educational Centers
(Millions 2008 \$)

	2005	2006	2007	2008	2009	2010
Accommodation	1.8	1.7	1.8	1.7	1.8	1.7
Expenses Other Than Accommodation	0.0	0.0	0.0	0.0	0.0	0.0
Total Paying Parties	5.7	5.3	5.7	5.3	5.6	5.2
Residents (PV FD)	5.4	5.1	5.5	5.0	5.4	5.1
Non-Residents (PV FD)	0.3	0.2	0.2	0.3	0.2	0.2
Camper Walk-in	0.0	0.0	0.0	0.0	0.0	0.0
Total Non Accommodation	5.7	5.3	5.7	5.3	5.6	5.2
Including Accommodations	7.5	7.0	7.6	7.0	7.4	6.9

3.6 Conclusions

Connecticut visitors utilize DEP facilities to undertake a series of activities and in doing so create direct expenditures of at least \$409 million over and above the general tourism activities from visits to state parks for camping and swimming. This chapter has explored activities including boating, hunting, angling and skiing. They are all significant in generating direct expenditures. In addition DEP operates or licenses venues where additional activities occur such as special events, charity fundraisers, bird watching, hiking and horseback riding. *Inclusive of their other activities in Connecticut, direct consumer expenditures in relationship to undertaking activities at DEP-managed parks and forests would approach a billion dollars annually.*

4. Consumer Surpluses

4.1 Introduction

This chapter presents definitions for consumer surplus, a brief indication of the level of participation in key recreational activities covered in Connecticut and estimates consumer surpluses derived by participants. The multiplicity of possible techniques for estimating these values rests on visitors' return costs of travel from origin to destination and returning. Appendix C covers technical considerations for estimating consumer surplus concern for camping, angling, both in-land and marine, and camping as well as the resulting estimating equations and related statistical information.

Consumer surplus has also been derived for day trippers to beaches for this relative small user group described in considerably more detail than in the same appendix than in the following text in order to support and clarify the various approaches

4.2 Consumer Surplus

Consumers' surplus¹⁸ is the benefit derived by visitors to parks over and above what they pay for accessing parks. ¹⁹ These benefits, sometimes called non-pecuniary benefits, are particularly germane to public resources like parks because visitors pay either no fee or only a nominal fee to use these services. This follows from the unique characteristics of parks. Parks may be consumed by many individuals at once, without reducing the benefits to others (non-rival consumption). Also, it is generally costly to exclude individuals from using the good (non-excludability).²⁰ Pricing for these types of goods typically do not capture their full benefits. As the economist Frank Cesario stated over thirty years ago, "The Consumers' surplus criterion is gaining widespread acceptance as a way of estimating the primary economic benefits of outdoor recreation sites and facilities." (Cesario, 1976) And, indeed, this approach remains the most widely utilized and accepted today.

When considering public spaces, measuring consumers' surplus follows one of two methods. The first method uses a survey to elicit what people think they would be willing-to-pay to make the resource available.²¹ A second method is to estimate what people actually spend in order to access these resources in addition to any price they pay to enter. This report follows the later approach; know as the travel cost method (TCM). At a minimum, TCM estimates the costs associated with traveling to and from the park. The assumption is that individuals must value the resource at least as much as they spend on traveling to and from the resource. Some TCM analyses also additional non-pecuniary costs such as the time spent traveling to the park and the time spent at the park. Often, TCM uses intercept surveys as is basis; asking individuals how far they have traveled, how long they spend at the park and how many times a year they come to the park. Limitations to analyses are discussed in appendix C. Despite this, travel cost analysis remains our best tool for valuing the recreational experience.²²

Even in the presence of comprehensive data, obtaining a reliable measurement of consumers' surplus can be challenging. Other states have conducted intercept surveys to estimate the number of trips and travel time for park users (MD). Survey data are not available for Connecticut, but Connecticut collects

¹⁸ "Consumers' surplus" should not to be confused with, or substituted for, "consumer's surplus"; the former is a measurement of benefit to one individual, while the latter represents the benefits to an entire group. See Mas-Colell, Winston, & Green (1995) for additional information.

¹⁹ "[Consumers' surplus] measures the net benefits from consuming n units of the discrete good: the utility $u(n)$ minus the reduction in the expenditure on consumption of the other good." (Varian, page 353)

²⁰ For example, consider the difference between a 'public good', like public open space and a 'market good', like a piece of gum, which lacks these characteristics. Only one individual consumes gum at a time, whereas many people can simultaneously be in a park. Gum is readily excludable as the physical barrier of being in someone's mouth. Park benefits such as looking at natural vistas, preservation of biodiversity, etc. are available to all in proximity to the park.

²¹ "Washington State Parks Centennial 2013 Survey," Responsive Management, (2006)

<http://www.parks.wa.gov/Centennial2013/2006%20Survey.pdf>

²² Haab, TC and KE McConnell (2002) Valuing Environmental and Natural Resources: Econometrics of Non-Market Valuation USA: Edward-Elgar Publishing.

addresses for all individuals who reserve camp spaces and purchase licenses. Using spatial analysis, distances can be measured using visitor addresses and geocoded parks data. A small percent of visitor data were found to have invalid or “non-geocodable” addresses. These instances were mostly for non-residents accessing Connecticut attractions. Where addresses were obviously false, the information was deleted from the sample on which estimates were made but the numbers of omitted licensees reintegrated with the estimates based on the estimated averages in order to more fully capture consumer surpluses from these activities.

Individuals who are out of state can also purchase these licenses. In the case of marine angling licenses, Rhode Island, Massachusetts and New York offer reciprocity. CT residents may purchase marine angling licenses in other states and use them in Connecticut’s Marine fishery and vice versa. Because DEP’s database is limited to Connecticut, using Connecticut license purchases *only* necessarily leads to a lower bound estimate of the consumer surplus derived from Connecticut’s marine resources. Ideally the exercise would be conducted among all members operating under reciprocity agreements. The Connecticut data do not include addresses for individuals who attend parks for other sporting activities. This omission underestimates of the true consumer surplus for Connecticut’s state parks and forests.

Because DEP data contain only addresses of origin, exact distances traveled are unknown as are the potential for multiple destinations, number of people in each party, and the number of visits per person. For individuals coming from farther away (such as Texas), exact travel costs can be difficult to measure accurately. In addressing these issues the CCEA has remained conservative in its assumptions. CCEA has assumed that people travel directly from their origins to their nearest destination offering the activity and return the same way. This distance is ‘as the crow flies’ as opposed to road mileage. All visitors go to the nearest DEP location that offers their particular activity. Connecticut and its New England counterparts are physically smaller than most other states, leading to smaller distances traveled in-state to recreation facilities, and smaller travel costs. Given the relatively small portion of visitors from very distant states, their travel distance is included. Visitors not from the contiguous USA are excluded. This approach tends to understate local travel disproportionately to long-distance travel; thereby undervaluing Connecticut consumer surplus. CCEA has assumed travel costs of \$0.585 per mile and the average numbers of persons in parties for CT and the rest from the visitor’s survey. Where party sizes allow, it may be less expensive for more distant visitors to use alternative modes of transit. These estimates are for people going to state parks and forests specifically for camping or licensed activities. CCEA did not extrapolate its results to cover visitors going to other state parks and forests or visitors to the same state forests and parks for undertaking different activities.

4.3 Camping

In 2010, CCEA had complete data on 161,327 resident campers and 23,971 non-resident camper visitors who spent nights in DEP campgrounds. In doing so, each experienced the ambience and communed with nature and fellow travelers in ways that campgrounds facilitate. When the individual was gaining more satisfaction than he or she had paid for his or her trip that individual visitor was realizing consumer surplus. Based on established travel-distance methods (Appendix C) for deriving consumer surplus, CCEA estimate for the consumer surplus accruing to resident campers is at least \$124.1 million while

\$18.4 million accrued visitors to the state. The average consumer surplus per occupant was \$769, in-line with the range of earlier studies after adjusting for higher transportation costs²³.

There are some confounders in this estimating process. Individuals who travel from greater distances are more likely to have multiple destinations on their trip. For these consumers, only part of their travel expenses can be reasonably allocated to Connecticut's parks. Yet, without survey data, there is no basis to reasonably judge what percentage of their travel is based on their desire to engage in activities at Connecticut's parks. The farther the distance away, the fewer individuals make these trips. Statistically, they play only a small role in estimating consumer surplus.

Secondly, data are only available for individuals in parties who actually paid to attend parks. This information gap is a problem when trying to estimate consumer surplus for individuals who might come to the parks for fee-free activities, simply drive through them or if park amenities change. For this reason, the consumer estimates are limited to current conditions and those activities for which data is available. By the same analogy, drive through traffic is unaccounted for and also excluded from the estimates. These motorists may also be enjoying the scenic wonders of some of the parks.

4.4 Fishing

Because the costs of undertaking inland and marine fishing including travel are quite different a separate analysis has been undertaken on consumer surpluses for each group of anglers. While holders of all waters licenses belong to both groups, the satisfaction derived from deep sea fishing as opposed to inland fishing may be quite different even for the same person. In addition, the marine estimate is constrained. The existence of reciprocity among many Eastern seaboard states for the sale and use of marine fishing licenses means that the sale of Connecticut licenses to out-of-state offshore anglers may not reflect distances traveled to participate in marine activities. Taking these factors into consideration CCEA's sample included 98,264 resident and 8,825 nonresident inland anglers. The more expensive marine fishery attracted 65,974 resident and 6,201 nonresident anglers.

Under these conditions the estimate of the consumer surplus in the inland fishery is understated at \$67.4 million for residents with a further \$3.3 million accruing to nonresidents. Of those included in the estimate, this consumer surplus averaged \$500 per license. This estimate is high compared to the range of consumer surpluses summarized from the literature in the appendix at \$26-\$208 but consistent with the close proximity of housing to sites for angling that facilitates frequent use of licenses and higher fuel costs that underpin current rather than earlier estimates.

²³ With an average of 3 nights per stay per visitor, the average consumer surplus per night per visitor is \$256. A similar study of camping in three Maryland parks found camping consumer surplus per night per visitor ranged between \$194 to \$350 (in US\$2010) (Wienland and Horowitz, 2007). Our estimate is roughly half-way between their lower and upper estimates for visitors per night. A study of an Australian recreational area estimated consumer surplus to be \$158 per adult per visit per day (in US\$2010) (Rolfe and Dyack, 2010). Because this study did not differentiate between overnight and day visits, this value is lower than our camping value as expected, but supports the plausibility of this estimate.

Average distances used for estimating consumer surplus in this report for residents were eight miles with average distances expanding for non-residents coming from more distance states. Because fewer and fewer anglers travelled long distances, this process places less and less emphasis on them.

Earlier estimates suggest that CCEA distance assumptions are conservative. In their compilation of travel distance data collected from 1988-1995 at 85 sites on 53 streams located throughout the State of CT of 4,643 anglers Hagstrom *et al* found the average distance travelled by all inland anglers was 12.1 miles and that the 90% traveling the furthest drove 23.5 miles or more²⁴. Because out-of-state anglers are apt to travel further than residents, and only 2% of fishing trips are undertaken by non-residents, this survey suggests but does not substantiate a tendency for CCEA's distances assumptions for residents to be downward biased. A second survey data of 3,138 anglers encompassing five different fishing areas on the Farmington River suggest that distances travelled ranged from 7.8 to 25.6 miles depending on the site and the season²⁵. Average distance travelled to only one site in spring was lower than the eight miles assumed in this report indicating the report's travel distances for inland anglers are conservative as is the resulting estimate of consumer surplus.

Inland fisheries are assisted by DEP fish hatcheries through the restocking of lakes, ponds and rivers. In particular, the excitement of hooking and retaining a brown trout and other species on a line is fostered and perpetuated by their release. Inland angling has a faithful following of Connecticut residents who participate frequently as notes above. This level of participation drives up their collective consumer surplus derived from the marine fishery to \$36.9 million for residents and \$2.9 million for nonresidents. Consumer surplus estimates are for a modest \$370 per license.

The bottom line is DEP managed venues contribute at least \$104.3 million in consumer surplus to resident Connecticut anglers and a further \$6.1 million to other North Americans, part of the magnet that attracts them to spend their sporting dollars in Connecticut.

4.5 Hunting

According to the U.S. Fish and Wildlife Services, Connecticut residents spend \$100 million a year on hunting trips and related retail expenditures in the state. In addition, non-residents spend nearly another \$5 million in the state. Aside from licenses limited to one or three days, there are good reasons to expect that hunting licenses will be used on multiple occasions:

²⁴ Hagstrom, N. T., M. Humphreys, W. A. Hyatt, and W. B. Gerrish. 1998. A survey of Connecticut stream and rivers. Federal Aid in Sport Fish Restoration , F-66-R Final Report, State of Connecticut Department of Environmental Protection, Hartford, CT. Table 32

²⁵ Hyatt, W. A. 1986, An angler survey and economic study of the Farmington River fishery resource. Federal Aid in Sport Fish Restoration , F-59-R Final Report, State of Connecticut Department of Environmental Protection, Hartford, CT. Table 13.

- The Bureau of the Census found that Connecticut hunters make 12 single day trips per resident licensee and three days for nonresident licensees²⁶;
- Seasons for types of game, e.g. spring and fall turkey shoots, are different; and,
- Hunting techniques vary – shotgun or bow and arrow – and many of the permits under the licenses are for different hunting techniques – using blinds in hunting migratory birds to tracking deer – a hunter holding all these permits and/or tags would undertake multiple trips.

CCEA's initial estimates of consumer surpluses among hunters are conservatively \$17.8 million for residents and \$566,000 for nonresidents or \$268 per license. To the extent that hunters travel to different venues and/or extend their trips beyond a day, the consumer surplus would be larger than estimated.

4.6 Day Trippers

Since 2003, it has been possible to pay late fees rather than full-day fees, particularly at beaches. Such fees have been differentiated between residents and nonresidents and between weekday and weekend visitors. The advantage of such fees for both resident and nonresident visitor groups is that they afford visitors choices based on price ranges. Especially at beaches where characteristics derived from going to the beach may be quite similar for full day and half day visitors different behaviors may reveal their preferences. Lower fees, the brevity of exposure to the sun, convenience, and enhanced warmth available to late day visitors may be preferable to some visitors relative to the full-day experience. For others the length of time at the beach may be more important. Consumer actions reveal visitor preferences among these choices. Using this approach in lieu of data on distances traveled as well as linear approximation yield a relatively low assessment of \$570,000 in consumer surplus accruing to Connecticut consumer benefit from four beaches and \$80,000 to nonresidents.

In addition for resident day trippers, reverse engineering reveals estimates (See CC.5 in Appendix C) of the average distances traveled by various classes of visitors. The costs for late day resident parties visiting the beach are equal to their entrance fee and travel costs to get there and back. These visitors do not generally face costs for either meals or accommodation. They are simply driving to the beach from their points of origin and returning to them. They may decide to diverge from their most direct route in order to undertake other activities along the way, but those travel costs can be allocated to those other activities.

This choice has facilitated estimating demand elasticities relative to fees charged and transportation expenditures involved both within a given year and among years for 2009 and 2010 as described in Appendix C. CCEA estimated elasticities revealed by late day trippers for 2009 and 2010 as -0.98339 and -0.79571. These results suggest further rate reduction for late day trippers would erode rather than enhance government revenues.

Yet all other things remaining equal, these estimates would be expected to be roughly similar between the years. The response is that at all other things, including transportation costs were not similar.

²⁶ The only permit holders treated as equivalent to licensees were those holding archery permits for deer who did not appear to need a license involving any type of firearms.

These elasticities for residents are of particular interest because they can also be reverse engineered to provide a guide to distance driven. The difference in costs per mile is derived from a combination of government rates grant to employees per mile drive in 2009 of \$0.585²⁷ with an escalator for personal travel in the Northeast that grew by 8.7 percent from 2009 to 2010 thereby causing an increase of \$0.0509 per mile to move five cents a mile past the 2009 costs. This results in an estimated weighted round trip distance 6.4 miles. Using this distance to derive transportation expenditures per trip incurred in undertaking beach activities for residents and the estimate of 100 miles for nonresidents yields the transportation costs for this group. The results appear in Table 4.6.1.

Table 4.6.1: Transportation Costs Related to Day Visitor Days (2010\$)

	2003	2004	2005	2006	2007	2008	2009	2010
Resident Week Day	17,867	17,681	15,079	16,309	40,478	44,223	59,524	53,144
Resident Weekend	1,529	21,973	19,471	24,442	54,259	13,672	7,803	7,218
Nonresident Week Day	97,480	66,131	90,739	105,682	131,562	87,152	112,203	233,978
Nonresident Weekend	102,694	106,700	119,481	110,324	28,805	4,815	4,446	8,914
Total Resident	19,395	39,655	34,550	40,751	94,737	57,895	67,327	60,361
Total Nonresident	200,173	172,831	210,220	216,007	160,368	91,967	116,649	242,892
Grand Total	219,569	212,485	244,770	256,758	255,105	149,862	183,976	303,254

5.7 Conclusions

CCEA has estimated consumer surpluses accruing to Connecticut citizens by major activities:

- Camping (\$124.1 million)
- Hunting (\$17.8 million)
- Inland Angling (\$67.4 million)
- Marine Angling (\$36.9 million)
- Swimming/day use at four parks (\$570,000).

In addition to the \$246.9 million accruing to residents in consumer surplus, out-of-state visitors undertaking these activities derived a further \$25.1 million, led by campers at \$18.4 million. Total estimated consumer surplus for camping is 26% of tourism expenditures made by campers in Connecticut.²⁸ Had there been sufficient survey data available to justify extrapolating the estimates of consumer benefits to other DEP venues where less detailed records and other activities are undertaken, it is highly likely that those estimates would indicate that DEP operations provide significantly more benefits to citizens of the state. These estimates take no account of the amenity benefits accruing to residents overlooking the “permanent” green space created by the parks. That task is left to the next chapter.

²⁷ This rate is particularly researched. Employee unions insist on their members not being under reimbursed and Auditor Generals ensure that government coffers are not being plundered.

²⁸ Strauss, Charles H. and Lord, Bruce E. A. Case Study The economic impacts of a heritage tourism system, Journal of Retailing and Consumer Services 8 (2001) 199}204

5. Amenity Benefits

5.1 Introduction

On Long Island the amenity value for overlooking green space is 12.8% relative to house values devoid of such vistas. Due to the abundance of green space in Connecticut, expectations are for a lower green space bonus but such expectations can be offset by the quality of Connecticut's green space, breadth of vistas, and permanence offered by state parks and forests. This chapter illustrates CCEA's derivation of this value and the total amenity values accruing to Connecticut residents overlooking DEP-managed parks and forests. Like all property evaluations, they are subject to change. Since 2007, the average value of housing permits in Connecticut has risen by 3.2517% while house prices have declined.

This green space bonus value has then been applied to CCEA's estimate of 6,158 residences overlooking state parks and forests. This estimate is based on enumerating all single detached residences surrounding state parks and forests. In purposeful samples of locales defined to be spread out across the state house selling prices were determined from OPM data for both those overlooking parks and the average selling prices in the same locale. The results were also tested against an estimate of those backing onto green belts along state trails based on a sample of a 100 mile stretch of trail to see if there is a difference backing onto state parks or forests. Of these sampled homes, 1,078 overlook parks and 1,024 state forests.

This process has involved identifying residences overlooking DEP-managed parks, forests and hiking trails using sophisticated GIS systems as well as any 2007 sales of both those houses and those in the same towns, thereby forming two sets of data. The first allows residents to enjoy vistas while the latter on average contains few properties without such access. Percentage differences in assessed values then provide an initial base for expecting residential selling prices to differ between residences overlooking DEP husbanded green spaces and those not overlooking them. After adjusting for those expected differences, residences overlooking DEP-managed green spaces still attracted a 12.2% to 13.3% pricing bonus.

Sections of this chapter address the methodology to identify the number of residences overlooking DEP-managed venues, methodology for assessing green space bonuses, amenity estimates, fiscal implications, and conclusions.

5.2 Number of Houses Overlooking Parks and State Forests

CCEA assessed the total number of houses overlooking State parks and State forests using visual recognition from GIS sources. CCEA research for residences with a direct access overlooking green spaces managed by the Connecticut DEP and designated as State Parks or State Forests. Visual recognition may not be the best procedure, although in this particular case it has been considered the only viable way in order to include only single residential buildings while excluding multiple unit buildings and non-residential ones.

Current Geographic Information Systems (GIS) software (e.g. Imagine) are based on light reflection/refraction samplings are useful in identifying buildings but do little to differentiate between commercial (especially small business) and residential buildings. These attributes are particularly germane for statewide studies. Furthermore, the characteristic of directly overlooking particular green spaces needed to be addressed with care, because similar structures (e.g. other houses) may create barriers that sample-based techniques cannot overcome. CCEA recognized residences by downloading the shapefile (.shp) provided by the DEP through its GIS on-line Data center²⁹. This file "... contains property that comprises DEP facilities such as state forests, parks and wildlife management areas"³⁰, with a 1:24,000 scale, NAD 1983 StatePlane Connecticut FIPS 0600 Feet coordinate system, 01/12/2010 release. CCEA then imported this file into ArcGIS 9.3.1, deployed for data preparation and selection.

DEP-managed state parks and state forests have been selected using the "Select by attribute" tool. By creating an SQL to extract the desired features, CCEA generated a new layer to show only the desired properties. The file has been subsequently transformed in to KML (.kmz), using the Toolbox provided in to ArcGIS, thus creating overlapping files in Google Earth. These overlapping files in Google Earth provide visible borders for the parks/forests as well as overlooking residences. Finally, the recognition process facilitated counting the number of houses overlooking DEP-managed green spaces and recording the information in an Excel File for at each park/state forests.

5.3 Assessing "Green Space Bonus" for Residences Overlooking DEP Parks and Forests

The premium price assessed for directly overlooking of DEP's managed green spaces in the state has been based on the use of different sources. The basic idea has been to extrapolate the additional price people are willing to pay for houses directly overlooking state parks and/or state forests and state trails. The files/sources used are listed in the table below. A brief description of the data preparation methodology follows.

Using the ESRI-based geocoding file of the USA, previously clipped for the State of Connecticut³¹ CCEA geocoded³² 2007 residential sales. Subsequently, the file showing town boundaries has been used to select and to extract data on towns which had sales of properties overlooking DEP parks and forests,

²⁹ http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707#Property

³⁰ http://www.cteco.uconn.edu/metadata/dep/document/DEP_PROPERTY_FGDC_Plus.htm

³¹ The file was derived from the original ESRI database, although reconfigured in NAD 1983 StatePlane Connecticut FIPS 0600 Feet, thus showing distances in feet. Therefore, the new feature has been reconfigured with same coordinate system by ArcGIS.

³² That is, ArcGIS has created a point feature for each of the properties listed, associating a geographical location

FILE NAME	SOURCE	CONTENT	JUSTIFICATION
Connecticut Towns for Clipping	DEP ³³	Towns' boundaries ready for clipping, shown as polygons.	Clipping areas of interest. Background for visual recognition.
2007 Properties Transactions	Office of Policy and Management State of Connecticut ³⁴	Houses/buildings/land sales occurred in 2007 with addresses, assessed and sale prices.	Used to assess the amenity price as difference between direct overlooking single-family residential properties and not-overlooking properties. Both Assessed and Sale Price used. As .dbf, Price recording and assessment at town level.
Connecticut Street	ESRI	Connecticut Streets and addresses	Geocoding and Street/Property matching
DEP Parks/Forests	DEP ³⁵	DEP properties	State parks and forests clipping and displaying for better visual recognition

creating different .shp files, corresponding to the number of datasets used. Each of these datasets contains cities in different areas of the State, divided by a geographical region, as listed below:

- SOUTH: including East Haven, East Lyme, Groton, Westport;
- CENTRAL EAST: including Chaplin, Ellington, Marlborough, North Stonington, Voluntown, Portland;
- CENTRAL WEST: including Bethel, Easton, Kent, Plymouth, Thomaston, Torrington;
- COASTAL SOUTH: including Beacon Falls, Colchester, Oxford, Rocky Hill, Woodbridge, Woodbury; and,
- CENTRAL-SPARSE: including Columbia, Coventry, Hebron, Naugatuck.

These areas and towns had a good number of transactions, transactions occurred in properties close to parks, and do not have significant sources that would distort prices, such as universities. Each of these .shp file has been used to clip (using the Clip tool in ArcGIS) the file containing the DEP state parks/forests and the transactions, thus showing only sales in towns where sales were also associated with residences overlooking parks and forests.

CCEA subsequently transformed files into KML (.kmz) files, and exported them to Google Earth for a visual recognition of transactions involving residential/single family properties directly overlooking state parks/state forests. CCEA then created .dbf files associated with each clipped house set, renamed in order not to alter the spatial files. For each set of towns, transaction values occurred at town and were sorted into properties directly overlooking DEP-managed green spaces (those of interest for the present

³³ http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707#PoliticalBoundaryCT

³⁴ <http://ct.gov/opm/site/default.asp>

³⁵ http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322898&depNav_GID=1707#Property

study) or not overlooking them. Both the Assessed and the Sale Price have been used to make the comparison and evaluate the amenity price paid for properties overlooking state parks/forests.

5.4 Amenity Estimates

This section derives reasonable market assessments and selling prices of market values of average residences allocated into two groups – those overlooking DEP-managed venues and those not overlooking them. For that reason apparent distressed sales and others influenced by non-market forces, documented by OPM,³⁶ were excluded from the analysis of either group of sales. In its database on real estate OPM has tried to eliminate non-market factors by purging non-representative sales. For a full list of OPM’s reasons for purging non-market entries see Appendix D. This process eliminated all sales where selling values were less than assessed values or where non-market considerations were known to influence prices. The valuations were limited to single residences in order to maintain comparability between groups.

Table 5.4.1 contains the comparisons of assessed and selling prices not overlooking DEP-managed venues with those which overlook them. While the overall averages indicate a significant green space bonus not all regions are positive. In particular the two with the smallest samples are negative. This outcome may arise from sampling problems or perceived negative characteristics outweighing the positive characteristics from the vistas afforded by DEP-managed venues.

Table 5.4.1: Average Values of Single Residences Sold in 2007

Area	Not Overlooking DEP Parks and Forests		Overlooking of DEP Parks and Forests	
	Assessed	Selling Price	Assessed	Selling Price
South (N=7)	308,470	467,290	448,943	798,000
South Net of Westport (N=6)	100,047	149,863	83,642	132,167
Central East (N=22)	180,098	268,095	203,842	318,160
Central West (N=25)	331,959	473,087	389,645	663,073
Coastal South (N=4)	206,408	328,127	142,525	227,750
Central Sparse (N=7)	166,095	268,111	141,767	227,863
Total (N=65)	252,442	372,086	291,242	487,206
Total Net of Westport (N=64)	232,027	340,840	254,531	419,928

Source OPM cleaned to exclude non-market and extraordinary market influences. The “N”s are the numbers of 2007 sales of single residences overlooking DEP parks and forests.

These data, particularly those for South are heavily influenced by a high priced outlier in the high-end market of Westport. For that reason the results are reported with and without that outlier. If anything

³⁶ Distressed sales can occur after fires or for quick recovery of assets by financial intermediaries following foreclosures that do not reflect true market values. Other sales can be influenced by transactions within families, auctions etc. Because CCEA utilizes the percentage differences between assessed and market values we have also purged sales which OPM has classified as involving significant improvement relative to assessed values.

these estimates are downward biased. For residences not overlooking DEP parks and forests, assessed values are based on average values of \$232,027 and selling prices of \$340,840 compared to state average assessment of \$334,556 and selling prices of \$435,718³⁷. In short, the assessment of the bonus is based on a downward biased sample.

While the overall results show a significant green space bonus, that conclusion does not hold in the South when the high-end property is eliminated. In addition, assessed values are lower for residences overlooking DEP parks and forests in Coastal South and the South net of the Westport outlier. In each of these the bonus for overlooking the parks and forests remains positive as noted in the next Table.

Table 5.4.2 captures the differences in average property values derived from the above. Because actual market values of properties normally exceed assessed values the percentage green space bonus is based on the selling price of properties overlooking DEP green space less the average value of those not overlooking DEP green space adjusted for the average differences in the assessed values of the properties. That process captures all the same characteristics off housing, but for the vistas. Also, because properties are assessed by uniform criteria at roughly the same time within a locale, excluding green space as a characteristic this process takes other characteristics influencing property values are considered in the assessed values, leaving the characteristic of overlooking DEP green space as a major contributing factor to the remaining market differences.

Table 5.4.2: Average Values of Single Residences Sold in 2007

Area	Differences (2007\$)		% Differences		% Bonus
	Assessed	Selling Price	Assessed	Selling Price	
South (N=7)	140,473	330,710	45.5	70.8	17.3
South Net of Westport (N=6)	(16,405)	(17,697)	-16.4	-11.8	5.5
Central East (N=22)	23,743	50,065	13.2	18.7	4.9
Central West (N=25)	57,686	189,986	17.4	40.2	19.4
Coastal South (N=4)	(63,883)	(100,377)	-30.9	-30.6	0.5
Central Sparse (N=7)	(24,328)	(40,248)	-14.6	-15.0	-0.4
Total (N=65)	38,800	115,120	15.4	30.9	13.5
Total Net of Westport (N=64)	22,504	79,088	9.7	23.2	12.3

The sample outside of the parks does include the normal share of property sales overlooking other green spaces. They may also be deriving similar amenities by deriving similar benefits. To the extent that happens, CCEA is understating the amenity values provided by DEP-managed resources.

By using the percentage bonus relative to the average selling price of residences not overlooking DEP-managed parks and forests, CCEA has attained an average bonus of \$41,961 to \$50,124, depending on whether the high-end Westport property is included or not. Based on the 6,158 residences, identified as overlooking of DEP parks, forests, and trails this bonus amenity value is \$258.4 to \$309.4 million valued

³⁷ Entire OPM single resident database for 2007 aside from exclusions for non-market considerations and improved quality excluded from the assessed values.

in 2007 dollars. Adjusted to 2010 dollars based on the 3.2517% increase in housing permits, the bonus amenity values would increase to \$266.8 million to \$319.3 million. Because they are outside of the assessed value of the properties they accrue to the owners or, where previous sales have captured the amenity values, the former owners of the overlooking properties.

5.5 Fiscal Implications

The average assessed value of houses is higher than those not overlooking DEP-managed parks and forests. This tendency to build larger homes with more appealing features already adds \$22,504 to \$38,000 per residence overlooking DEP-managed venues to the property tax base of the state. Total estimates of the above average assessed values of residences overlooking DEP-managed venues to the states' property tax base are the \$143.1 to \$246.7 million. At current average property rates of 2.2%, this increase in assessed property values adds \$3.1 to \$5.4 million (2010\$) in annual government revenues. Attributable to DEP's husbanding of and long-term commitment to parks and forests green spaces, the above average assessment values annually enhance state and local government revenues indirectly via the tax system.

Inflation aside, the expected long-term net present value of this revenue stream discounted at 5% over 20 years is \$390.2 to \$67.7 million in 2010 dollars. Any rebasing of property values to capture the currently uncaptured amenity values would further enhance DEP's contributions to government revenues. Attributable to DEP's husbanding of and long-term commitment to park and forests green spaces, this amenity value annually enhances state and local revenues indirectly via the tax system.

5.6 Conclusions

Assessed against selling 2007 prices adjusted to 2010 dollars for single residences either overlooking DEP parks and forests or not doing so, Connecticut residents reap amenity benefits of \$258.1 million to \$309.0 million in 2010 dollars. Residents tend to build relatively expensive homes overlooking green DEP venues that add another \$141.1 million to \$243.3 million to the assessed value of properties. The government shares in these revenues through property taxes in the range of \$3.1 million to \$5.4 million. The percentage increment estimates for these amenity values ranges between 12.3% to 13.5%, which is similar to the hedonically based estimate for Long Island of 12.8%. Given the greater availability of green space in Connecticut, initial expectations of lower percentage green space bonuses in Connecticut may not be warranted due to the vastness of Connecticut forests. Yet, that very vastness provides quality vistas complemented by the permanence of parks and forests and state trails under DEP management.

6. Total Expenditure Impacts

6.1 Introduction

The purpose of this chapter is to establish the economic impacts of DEP parks and forests on the state economy. Doing so depends critically on one's view of the appropriate counterfactual. Essentially establishing the counterfactual depends on one's answer to the question of, "What would be lost to Connecticut if DEP parks and forests operations did not exist?"

6.2 Counterfactual

At the extreme, green spaces could be alienated due to out-break of a disease akin to the Spruce Mountain Budworm that is ravaging fir in the West and moving inland thereby accelerating lumber salvaging operations to minimize forest fires and/or blight. Similarly, oil spills at seas are capable of adversely impacting marine recreational boating. Residents and nonresidents would camp, hike and pursue other outdoor recreational activities elsewhere. Further, recreational angling would be curtailed by eliminating hatcheries and the state's role in restocking the fishery. The angling excitement of hooking and landing a brown trout could be eradicated and with it, Connecticut's appeal to anglers threatened. Educational activities dependent on the parks and forests current physical resources would also be forced to relocate or be curtailed.

At a minimum, the perception of permanence related to DEP parks and forests would be eroded. Risks related to humans misusing what is now green space, managed by DEP, would rise, and unmanaged hunting and angling would lead to over exploitation and eventual eradication of some species.

To assess these impacts CCEA has utilized REMI a large dynamic econometric model of the state. Because DEP's current activities are currently part of the economy, CCEA has modeled their cessation by deleting their direct expenditures noted above from the business as usual base case. Readers may find this scenario overly dire, but it sets a benchmark for understanding the importance of DEP continuing to provide solid management of the states' parks, forests and other venues.

The impacts differ when the amenity values are included or not so that two scenarios are presented. The direr scenario assumes that there are catastrophic effects on forest and park land as described above and includes the alienation of amenity benefits on property owners and participant in all of the activities that have been shown to accrue to Connecticut participants. The second assumes that benefits of overlooking forests and park land remain intact so that amenity benefits and government revenues stemming from them remain.

To the extent that DEP type operations were pursued by other parties, such as conservation societies and commercial fishery associations restocking the fisheries, these results would be somewhat ameliorated. There is sufficient detail elsewhere in this report for readers to make judgments concerning such possibilities.

6.3 Direct Expenditures Dependent on DEP Park and Forests Related Activities

Operation of the REMI model to simulate the economic impacts involves converting all the above direct expenditures to 2008 dollar values, summarized in Table 6.3.1 using normally expected escalators or deflators. The economic impacts have been assessed initially with reference to the amenity benefits from consumer surpluses directly related to recreational activities attributable to DEP venues but not the larger ones related to land values. It simulates a case in which the foliage in DEP-managed parks and forests remains. The second scenario takes the land-based amenity benefits emanating from state parks and forests into account, by assuming that without DEP's husbanding they do not survive. Adjusted to 2008 dollars, total expenditures by visitors to DEP venues for the activities are specified in Table 6.3.1. Once converted to 2008 dollars these expenditures exceed a billion dollars annually for each of 2009 and 2010 even without including any of the amenity values. The amenity values accruing to Connecticut residents note in the Executive Summary and the previous chapter generate annual benefits of \$300 million annually.

In addition to operating costs, DEP capital costs amount to about \$1.75 million annually. They too are foregone in both cases.

The results of both scenarios have to be treated with care. Without survey data CCEA has no ground on which to allocate visitor total trip expenditures to DEP-managed venues or other Connecticut attractions. What is modeled here are the total expenditures which would be true if the expenditures were wholly attributable to DEP-managed venues. To the extent that visitors come for other reasons – to see old friends and family, to tour New England beyond the realms of Connecticut and visit along the way – the results exaggerate impacts of the DEP-managed venues *per se*. Based on estimates of other multipliers using similar techniques allocating about a sixth of the impacts to DEP would appear to be appropriate. Yet if comparisons are being made to studies that claim a magnetic tourism site attracts more general spending, then the larger multipliers attained in the study are useful for comparison purposes. But the point is that without survey data to legitimately distribute trip expenditures in Connecticut to activities tied to DEP's actions from other activities that are not, drawing the fine line of attribution is well nigh impossible.

The main source of recreational expenditures tied to DEP operations is clearly general tourism followed by fishing, hunting, and boating utilizing DEP launch sites. Recreational boating is a major sporting activity in Connecticut but it is impossible to allocate all these expenditures to DEP, albeit it clearly plays a role in training in safe operations and licensing boaters and in facilitating recreational boat launches, and restocking the fishery. Connecticut's safety record in water-based recreational venues is very good.

Impacts on government revenues, again converted to 2008 dollars, are summarized in Table 6.3.1. The state government benefits from operating revenues generated both directly and via the tax system from DEP's undertakings. Key operating activities clearly focus on angling and hunting licenses followed by the parks and forests operations. The fee increases in 2010 have substantially increased revenues from those operations and are likely to continue to do so over the coming years. While the figure for licensing revenue is indicative of revenues to the government in forthcoming years, the 2010 annual revenues used in the model net out the \$1.2 million credit in operation until mid March of 2010.

Table 6.3.1 Major Visitor Direct Operating Expenditures Attributable to DEP Parks, Forests and Other Venues (Millions 2008 \$)

	2009	2010
General Tourism Non-Accommodation	451.8	446.5
Accommodation	95.1	97.8
Total General Tourism	546.9	544.3
Hunting	104.9	107.5
Fishing	278.3	282.5
Boating	57.6	54.0
Skiing	14.2	14.2
Harkness Memorial State Park Accommodated Activities	4.9	4.5
Educational	7.5	6.8
Total Activities	1,014.3	1,013.8
Amenity Benefits Derived from Tourism and Recreation	246.9	246.90
Amenity Benefits from Vitas	270.4	270.4
Realized Government Revenues from Amenity Benefits	4.2	4.2
Total	1,535.8	1,535.3

The values in the text have been normalized to millions of 2008 dollars by applying activity level price changes. The boating adjustment is particularly large due to prices escalations on fuel. The \$1.75 million in DEP annual capital cost have to be added to the operating ones above.

The direr scenario differs from the more likely initial one in that the last two items in the above table are included albeit they are excluded in the initial scenario so that the initial one envisages the green space continuing whereas the dire one does not.

Additions to the value of residential capital add more than a quarter of a billion dollars to those values. These numbers exclude incremental values on land overlooking DEP managed venues that is either unused or dedicated to use by other than single dwellings. Due to the perceived permanence of state green spaces, there is a direct contribution to these assessed values by DEP's operations. These enhanced assessments increase property taxes that flow annually to local and state revenues. At current average property rates of 2.2%, this increase in assessed property values add another \$3.1 to \$5.4 million (2010\$) in annual government revenues. Both the amenity values of overlooking DEP managed venues and the resulting tax revenues are included the Table the mid points of their two estimates discussed in Chapter 5.

Table 6.3.2 Revenues Accruing Directly to Connecticut’s General Fund from DEP Managed Parks, Forests and Other Venues Including Amenity Related Property Tax Revenue Contributions

(Millions 2008 \$)

	2009	2010
Operations		
Fees at Parks and Forests	3.3	5.2
Fishing and Hunting Licenses	5.7	7.7 12.9
Boating Licensing et al	1.6	3.2
Educational	0.7	0.7
Harkness Memorial State Park	0.5	0.5
Total Operations	11.8	17.3 22.5
Realized Government Revenues from Partial Amenity Benefits	4.2	4.2
Total	16.0	21.5 26.7

From 2009 to 2010, annual contributions to the state revenues by DEP increased from \$16.0 to \$21.5 million. In the future, the credit program will no longer apply, further boosting revenues by \$1.1 million. In addition, DEP activities were also supported by Federal Grants worth \$5.4 million dollars. The federal Sport Fish Restoration (SFR at \$3.1 million) and Wildlife Restoration (WR at \$2.3 million) programs contribute to the fish and wildlife funding stream. The federal funding source is a user pay-user benefit program which collects excise tax revenue from manufacturers of hunting and fishing equipment (and other related sportsmen sources) and is deposited into a dedicated account. The revenue is distributed back to the states to fund fish and wildlife restoration projects through SFR and WR grant programs administered by the U.S. Fish and Wildlife Service. These are not federal appropriated monies from general taxpayers allocated through the typical budget process. It is a permanent indefinite appropriation based on the collection of hunting and fishing equipment excise taxes, import duties, motorboat fuels tax and other revenues collected during the previous fiscal year and allocated back to the states through a formula based on land area, population and paid license holders. These are revenues generated solely from users, the sportsmen buying the equipment.

6.4 Economic Impacts

6.4.1 Introduction

Since these activities are already including in the REMI business as usual bass case, their full economic impacts are assessed by deleting them from the base forecast. To fully understand the dynamics of these impacts, all DEP activities are modeled by permanently deleting them from the economy. That is the 2012 loss is extended out to 2040.

Readers are forewarned that to the extent that visitors come for other reasons – to see old friends and family, to tour New England beyond the realms beyond Connecticut and visit along the way – the results exaggerate impacts of the DEP managed venues *per se*. Based on estimates of other multipliers using similar techniques allocating about a sixth of the impacts to DEP would appear to be appropriate. Yet if comparisons are being made to studies that

claim a magnetic tourism site attracts more general spending, then the larger multipliers attained in the study are useful for those purposes. Without survey data to legitimately distribute trip expenditures in Connecticut to activities tied to DEP's actions from other unrelated tourism activities, distinguishing that fine line of attribution is well nigh impossible.

The impacted industries used to describe activities undertaken within the parks and forests do not line-up precisely with those classified in REMI. For these reasons the activities at the Harkness Memorial State Park are treated as accommodations. As noted in the previous chapters only about 1% of park visitor expenditures occur at the parks per se. That one percent of visitor expenditures is allocated to government revenues in REMI thereby directly reducing government revenues. Other visitor activities are classified as recreational activities and withdrawn from the economy. The incremental assessed value of properties overlooking the parks is treated as a loss to the residential capital base and that portion included in the assessed value of housing declining to further erode government revenues. It too would disappear with the disappearance of the parks and forests. Reasonably, this process leaves the losses in accommodation to be expensed by park visitors, hunters, anglers and boaters, wedding parties, and other participating visitors to be allocated indirectly out of their classification in "recreational activities". Less reasonably, recreation activities in REMI include expenditures on gambling that may not be a large share of expenditures by anglers and hunters. Advantageously, "Recreational activities" excludes attending spectator sports and by implication includes all active sports undertakings. Similarly, other expenditures by hunters, anglers and boaters and skiers are all included in the impact assessment.

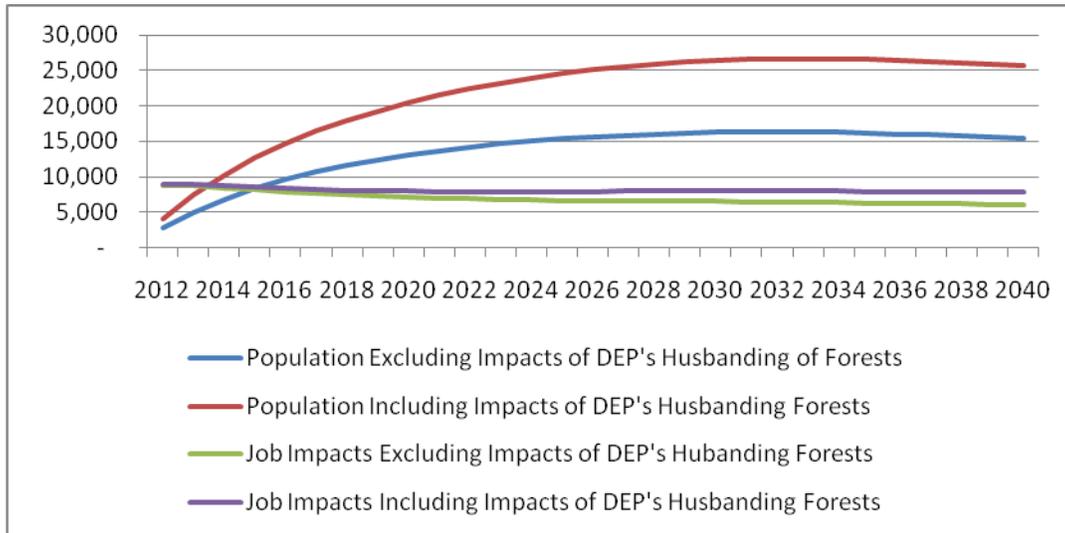
Since losses foregone by the discontinued operation of the parks delineate economic advantages of DEP continuing to operate them, the results are described positively as the economic impacts of DEP's state parks and forests operations.

DEP parks and forests operations have significant impacts on the economy, particularly employment, incomes, migration, and the state's fiscal operations.

6.4.2 Population; DEP and the Quality of Life Matters

Chart 6.4.2.1 illustrates that quality of life matters to Connecticut Citizens. Operations at DEP sites and the resulting access to recreational locales and husbanding vistas of overlooking DEP managed venues were preserved, over the long term retains about 26,700 people in Connecticut. Of these 10,400 are dependent of DEP's long-term husbanding of the vistas while the rest rely on the venues for sporting activities including camping and/or employment.

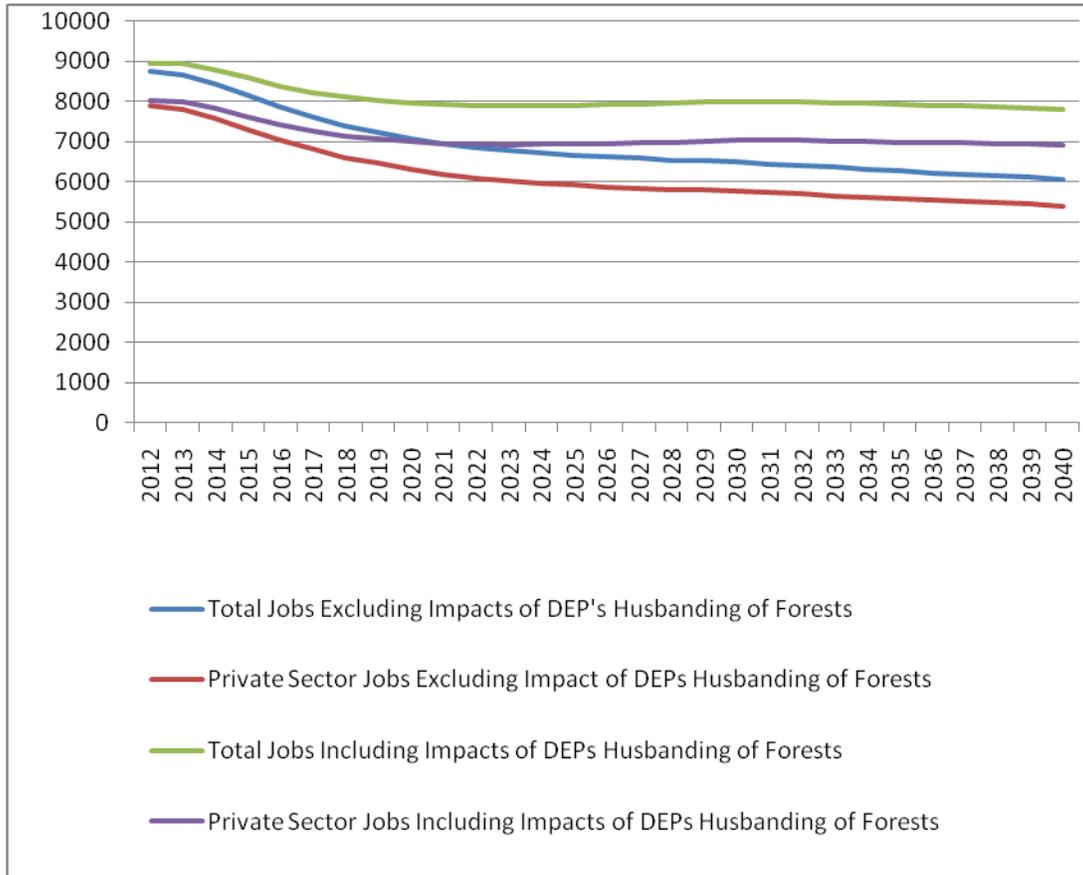
**Chart 6.4.2.1 Population and the Quality of Connecticut Life and DEP Managed Venues
(People)**



6.4.3 Jobs

As the previous chart suggests DEP not only provides direct jobs but also assists in generating indirect and induced ones through retaining Connecticut tourists and attracting out-of-state tourists. Both DEP expenditures and total expenditures by those tourists who attend DEP managed venues generate economic activity. Jobs needed to meet these demands appear in Chart 6.4.3.1. The dynamics behind this chart depict the levels of job creation attributable to those expenditures. These impacts are larger immediately than over time since without DEP managed venues the economy would slowly adjust as people find alternative jobs and occupations, visitors pursue other activities within the state and other economic and demographic adjustments occur.

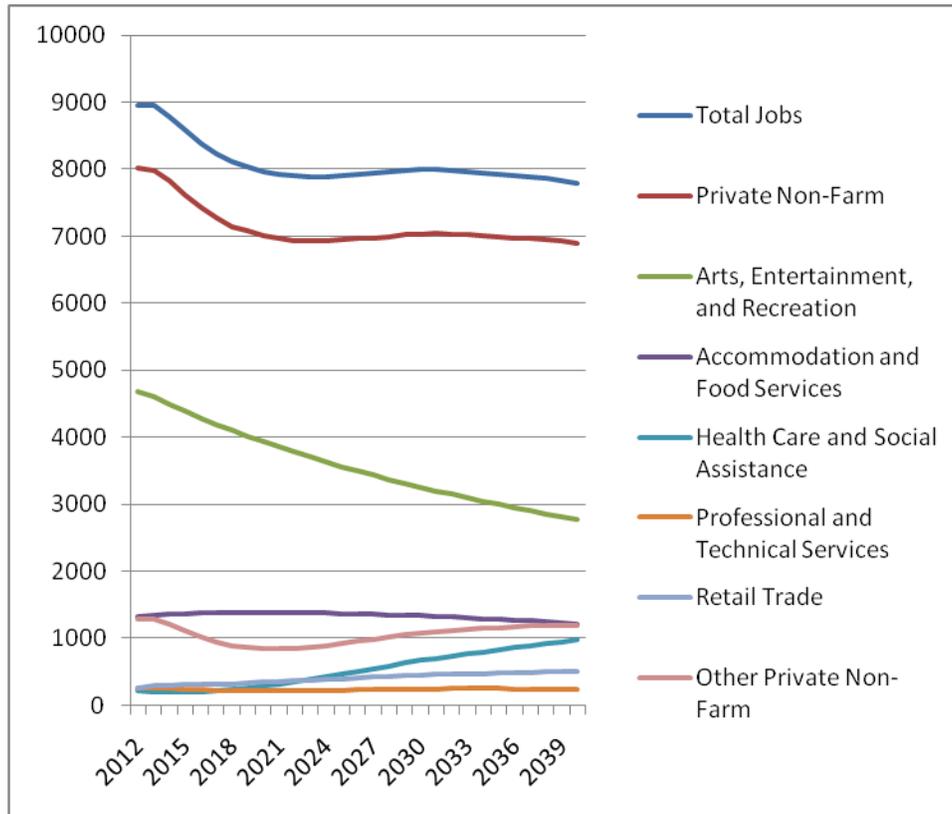
Chart 6.4.3.1: DEP and Related Expenditure Impacts on Connecticut Jobs



REMI results indicate that Connecticut jobs dependent directly and indirectly on DEP parks and forest operations and related tourist expenditures are 9.0 to 6.0 thousand. Most of the impact of this job creation is in the private sector. Albeit REMI estimates direct, indirect and induced short-term losses in the public sector are in the range of 900 to 1,000, including DEP jobs. These jobs are a mixture of full and part-time annual employment inclusive of those who serve DEP directly as well as those in other departments indirectly involved in meeting the needs of related tourists and sportspeople undertaking DEP related activities. Given seasonal hires for park and forest activities, the public sector job numbers are not unexpected. The dynamic elements of REMI, particularly DEP role in retaining the population all suggest that DEP's role is ongoing and positive.

As Chart 6.4.3.2 illustrates key sectors of the Connecticut economy are reliant on DEP's catalytic role in encouraging expenditures in Connecticut. Interestingly the dynamics are such that over time they do not recover particularly well. The recovery that does occur does so at differential rates with very little recovery in accommodations but slightly greater resilience in arts, entertainment and recreation.

Chart 6.4.3.2: DEP and Related Expenditure Impacts on Connecticut Jobs by Key Sectors: Vistas Impacted



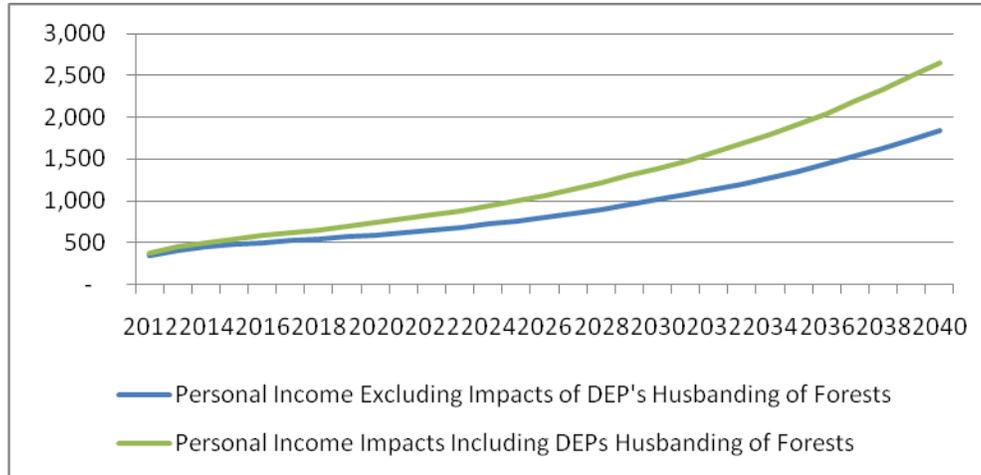
6.4.4 Current Personal Income

Dependence on DEP parks and forests operating jobs as well as the population stability associated with DEP’s operations also implies a positive role in income generation. DEP’s operations and participation in tourism activities enhanced by sporting activities generate significant personal income in current dollars as shown in Chart 6.4.4.1. These values are in current dollars and rise over time on the strength of the stronger economy generated by those expenditures over time.

Exclusive of the amenity benefits attached to land values DEP’s operations enhance personal incomes by \$343 million in 2012 rising to \$1.8 billion by 2040. Inclusive of the amenity values attached to vistas attributable to DEP, Connecticut personal income is higher by \$367 million in 2012 rising to \$2.7 billion in 2040.

Chart 6.4.4.1: Personal Income Generated by DEP's and Attracted Tourism Activities

(Millions of Current \$)

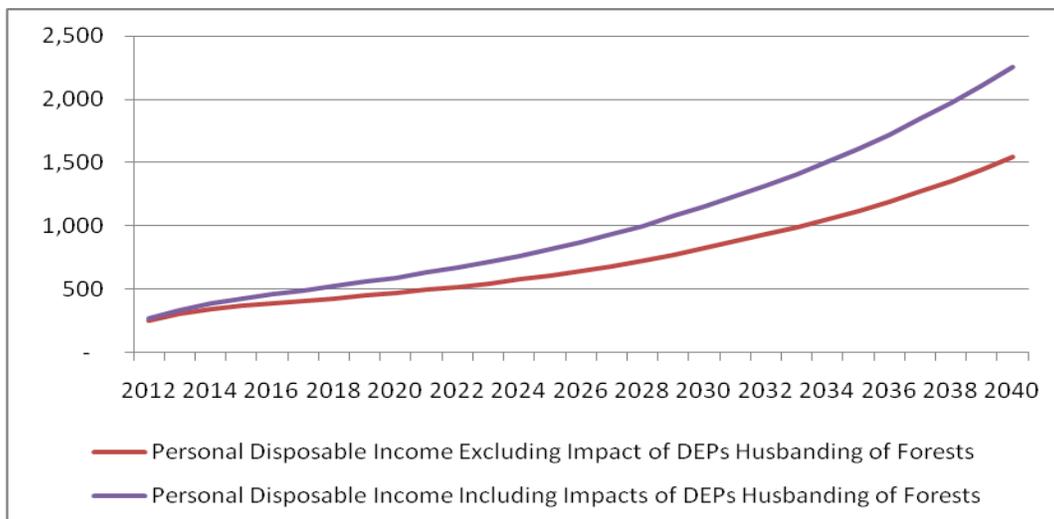


6.4.5 Personal Disposable Income

Personal Disposable Income is important because it expands the freedom of choice available to Connecticut consumers. Chart 6.4.5.1 illustrates that DEP operations and attracted tourism and sportspeople's expenditures stimulate that income stream. While following the same general pattern as personal income, the incremental PDI values are smaller with DEP operations adding to \$253 million in 2012 and \$1.5 billion by 2040 exclusive of the decline in vistas. Inclusive of the vista's DEPs preservations its impact on personal disposable income rises from \$269 million to \$2.3 billion across the years.

Chart 6.4.5.1: Personal Income Generated by DEP's and Attracted Tourism Activities

(Millions of Current \$)



6.4.6 Fiscal Impacts

Fiscal impacts work through a series of mechanisms on both government revenues and expenditures. DEP operations generate revenues for the state government and enhance revenues from the higher assessed value of properties overlooking DEP parks and forests. Indirectly the state government also receives funds through various taxes on tourism expenditures and indirect and induced transactions and incomes related to the expenditures undertaken by visitors to DEP managed venues inclusive of taxes on incomes from personnel at DEP and who are employed indirectly in the supply of goods and services to DEP facilities. The scenario that excludes DEP's husbanding of the states forests indicates that the net present value of DEP's revenues from 2012 to 2020 of \$337 million against expenditures of \$307 million for a net gain of \$30 million. These are not operating revenues and expenditures but the totality of direct, indirect, and induced impacts fiscal capacity.

The other scenario that includes the husbanding of vistas gives contrary results. It indicates that the net present value of DEP's revenues from 2012 to 2020 of \$628 million against expenditures of \$420 million for a net loss of \$208 million. This later scenario is also picking up the lack of assessment on the amenity benefits from overlooking DEP managed parks and forests. Assessing those values in the same proportions as market values are normally assessed elsewhere would more than reverse this finding.

Adverse impacts on government expenditures ebb as fraction of the initially unemployed find alternative employment and the population diminishes; thereby reducing unemployment and welfare expenses.

6.5 Conclusions

Leaving aside the amenity values of overlooking DEP's venues:

- **DEP managed venues initially generate the following direct and indirect economic impacts:**
 - **8.8 thousand jobs currently reduced to 6.7 thousand in 2020;**
 - **\$343 million in personal income growing in current dollars to \$595 million in 2020;**
 - **\$253 in personal disposable income, that generates choices for citizens, increasing to \$471 million by 2020; and,**
- **Net present value in state revenues over expenditures of \$30 million is in constant dollars.**

7. Conclusions

In 2010, resident and nonresident visitors to Connecticut's 107 State Parks and 32 Forests spent 8.5 million days touring within the state. Of those days, at least 4.6 million days were spent partially at for-fee parks and forests managed by DEP.

In 2010 visitors to these venues spent an estimated \$544 million in general tourism activities in Connecticut. In addition, 189,000 sportspersons, holding 293,600 licenses and permits issued by DEP, expended additional funds to pursue their specific sporting activities:

- **\$264 million for fishing, of which 90% came from Connecticut residents;**

- \$100 million for hunting, of which \$95.1 million came from Connecticut residents;
- \$36.8 million for recreational boating, attributed to DEP-managed boat launches and training activities, net of anglers' boating expenditures;
- \$26.2 million for skiing and attending educational and other venues;
- Participation in other sports located in the parks and forests or to attend them.

Visitor fees at the parks and forests, including late day visitors, were in the \$3.0 to \$3.3 million dollar range from 2005 to 2009. Increasing rates in 2010 set the stage for an increase to \$5.2 million in future years. These same visitors are estimated to have spent \$94 million in Connecticut. DEP charges visitors: entrance, parking, and camping fees, cabin and pavilion rents, ice and firewood sales and related sales taxes. These revenues all flow to Connecticut's General Fund.

Recreational activities also generated licensing and permit fees as well as training and educational revenues. 2010 revenues generated from DEP licensing and permitting of key activities included angling (\$3.8 million), hunting (\$2.3 million), and combined hunting and angling licenses (\$1.6 million). Recreational boat training, testing, and licensing generated a further (\$3.2 million).³⁸ Including camping and all activity fees, DEP collected \$18.3 million from fees paid by participants and attracted \$5.4 million in federal transfers from the federal Sport Fish Restoration (SFR) and Wildlife Restoration (WR) programs. Before taking account of a one-time \$1.1 million credit program to assist adjustment to the higher fees, 2010 direct revenues and transfers covered all but \$2.6 million of Connecticut state expenses of \$26.3 million including parks, forest and hatchery operations. Property taxes stemming from vistas dependent on DEP managed venues added a \$4.2 million to state revenues, more than sufficient to cover DEP operating and capital expenditures. In addition, indirect revenues from other taxable tourist and sporting expenditures further contributed to state revenues.

The well known downward slope of demand curves for each activity implies that all but the least enthusiastic person undertaking each activity derives quality of life benefits over and above expenses incurred, what economists refer to as "Consumer surplus". CCEA has estimated consumer surpluses accruing to Connecticut citizens by major activities:

- Camping (\$124.1 million)
- Hunting (\$17.8 million)
- Inland Angling (\$67.4 million)
- Marine Angling (\$36.9 million)
- Swimming/day use at four parks (\$570,000).

In addition to the \$246.9 million accruing to residents in consumer surplus, out-of-state visitors undertaking these activities derived a further \$25.1 million in consumer surplus, led by campers at \$18.4 million. Total estimated consumer surplus for campers at DEP venues is 26% of Connecticut tourism expenditures made by them.³⁹ In-state estimates of consumer surplus remain modest due to

³⁸ These revenues were partially offset on a one-time credit totaling about \$1.14 million.

³⁹ Strauss, Charles H. and Lord, Bruce E. A Case Study The economic impacts of a heritage tourism system, Journal of Retailing and Consumer Services 8 (2001) 199-204

the close proximity of venues to the population. CCEA did not extrapolate its consumer surplus estimates for people using these parks for alternative purposes or accessing fee-free parks, such as non-developed ones.

Consumer surpluses in addition to their expenditures suggest that, in recent years, visitors to DEP managed venues derived more than \$1.25 billion dollars in annual benefits. CCEA's very conservative approach to estimating consumer surpluses underlines the significant of these estimates.

Another source of benefit is the value that owners of homes adjacent to the parks and forest derive. Connecticut residents overlooking the parks from single family dwellings realized annual amenity benefits most days of the year of a further \$258 to \$309 million. Positive attributes of these residences, captured in the assessed value of their properties, generated \$3.1 to \$5.4 million annually in government revenues, but did not account for the value of the vistas of overlooking DEP managed parks and forests. The expected long-term net present value of this possible revenue stream to the state discounted at 5% over 20 years is \$390.2 to \$679.7 million in 2010 dollars. The net present value may also be viewed as placing a capital value on the assets that DEP maintains in its management of Connecticut parks and forests. More fully assessing amenity values, from their currently unassessed status on 12-13% of properties overlooking green spaces, would significantly increase property tax revenues.

Because DEP operations and related government revenues already exist in the economy, the method for assessing their economic impact is to withdraw those activities. That is, to assess the impacts of their hypothetical immediate cessation in 2012, and then to project longer term economic adjustments and reactions. The resulting differences represent economic impacts of DEP-managed venues in Connecticut. With closure of all DEP-managed facilities and elimination of all public access to DEP-managed forest and park lands, the resulting impacts would mean losses in employment and incomes, as well as losses in tax revenues. The harshness of such losses in the near term is stark, but the dynamic elements of the economy which REMI captures adjust to the loss of those resources; thus the economy adjusts and ameliorates to a degree those economic impacts over time through by emigration or some and movement into alternative jobs for others. Rather than depict these losses as negatives, this report treats them as the positive impacts that DEP operations have on the Connecticut economy. Leaving aside the amenity values of \$270 million annually for overlooking DEP's venues, DEP activities generate the following direct and indirect economic impacts:

- 8.8 thousand jobs currently, reduced to 6.7 thousand in 2020;
- \$343 million in personal income growing in current dollars to \$595 million in 2020;
- \$253 in personal disposable income, that generates choices for citizens, increasing to \$471 million by 2020; and,
- Net present value in state revenues over expenditures of \$30 million in constant dollars.

DEP managed venues create significant economic activity within Connecticut.

Appendix A: Data

A-1. Background

Three DEP data sets were the foundation for this research report:

1. Individual park users, rates and numbers of purchasers by activity – parking, camping or firewood or ice purchases, 1999 - 2010;
2. Total visitors by park, 2005 – 2009, including the above, plus out-of-season and off-hour visitors;
3. A 2008 survey of 3,000 tourists.

The objectives when analyzing available data are to discover per capita and total expenditures for those who visit Connecticut's parks. The data are sufficiently granular to be able to attain this information for state residents and out-of-state visitors, for state parks and state forests. With expenses in park camping facilities significantly lower than accommodation costs in paid lodgings, total per diem expenditures for campground users are adjusted to take these savings into account.

In addition to the three primary data sets identified above, a further round of extrapolations was made to acknowledge activities in fee-free parks and forests where no or attendance counts are kept, and for parks and forests which are under development, which also lack attendance data. In addition, explicit references are made to information from the Connecticut Statewide Comprehensive Outdoor Recreation Plan 2005-2010 (SCORP)⁴⁰.

A-2. Melding the Data Sets

Data set elements and their treatment are outlined in Table 1. The estimating procedures discussed in column one use both park User data and information from the intercept survey. In the interests of clarification, the references to the intercept survey are in *italics*. The resulting estimates and data appear in the text of the paper.

⁴⁰ DEP, Connecticut Statewide Comprehensive Outdoor Recreation Pan 2005-2010, 2006.

Table A-1: Data Set Elements for Park Users Other than Anglers and Hunters

Park User Data by Parks 1999-2010	Park Visitor Data 2005-2009	Intercept Survey Data 2008
Number of Users and Expenditures	Number of Attendees	Visitor Information
Days of Parking: Resident & Non-Resident	Total Gate Counts of Individuals	<i>Trip Length</i> or zip codes
Days of Camping: Resident & Non-Resident		<i>Average Numbers in Party</i>
Days of Sales of Ice & Firewood		<i>Expenditures by Type by Party</i>
Rental days for Cabins and Pavilions		
Coverage		
Each Included State Park (#=32)	Each State Park (#=43)	<i>Sample of 3,000 Tourist Parties of which 5% used campgrounds</i>
Each Included State Forest (#=4)	Each State Forest (#=12)	
Other ¹ (#=4)		
Enhanced Detail		
Parking and Camping Differed by Park, Vehicle Type – car, minibus, bus or Walk-Ins – over Weekdays and Weekends by Residents or Non-Residents. It was assumed the purchases of seasonal passes were economically rational and visited at least 12 times per year, the annual frequency needed to justify having a season pass rather than paying for parking on each visit.	These data exceeded the numbers of people from the park user data for each park included there due to the inclusion of out-of-season and off-hours attendees. Additional parks and state forests were also included.	<i>This data allowed us to separate accommodation and non-accommodation expenditures. There was separate information for residents and non-residents. DEP has confirmed that the information on, "Average/Spending /Party/Trip" is for average daily expenditures.</i>
Melding		
Number of Residents Days = (Resident vehicles + Camping Parties)*(Average occupants/Resident vehicle)+ Walk-in campers+ Other resident	Additional visitors to the 36 parks and forests = the number of visitors to each park less those included in Column 1; assumed to be the same proportion of residents and non-residents as in column 1.	
Number of Non-Residents from parallel equation.	Parallel to the above.	
Expenditures by Residents = (Number of Resident Parties)*(Resident Expenditures by Party less Average Accommodations Expenditures + Accommodation Expenditures for Camping)	Because out-of-season and off-hours resident attendees did not pay camping charges, the per capita costs from the data in column 1 less the accommodation charges were applied to those staying in the 36 parks or forests included in column 1.	
Expenditures by Non-Residents from parallel equation using non-resident data	Expenditures by Non-Residents from parallel equation using non-resident data.	
The above were derived in aggregate and in per capita terms and for both state parks and state forests. Because Pachaug is a state forest, state forests data include the three designated as state parks plus Mt Misery/Pachaug with the latter being deleted from the state park data. This approach is consistent with the Park Visitor data where Mt Misery is excluded.	Resident visitors to those parks excluded by the 36 included heretofore in camping and parking data, were treated similarly but with normal accommodation data included because these parks do not generally provide such facilities.	
	Non-resident data were treated as above.	
	Separate estimates were made by state parks and state forests.	

1. "Other" includes DEP operations of its Store & Conference Center, relatively minor items.

Appendix B: Campsites

Table B-1: Campsites

Park	Number of Campsites
State Forests	
American Legion	30
Pachaug	40
Total State Forests	70
State Parks	
Black Rock	91
Devil's Hopyard	21
Hammonasset	550
Hopeville	80
Housatonic Meadows	95
Kettletown	68
Lake Waramaug	78
Macedonia Brook	51
Mashamoquet Brook	60
Rocky Neck	160
Salt Rock	71
Total State Parks	1325
Grand Total	1395

Source: DEP website

Appendix C: Technical Considerations: Elasticities and Consumer Surplus

This section will define consumer surplus and describe the appropriate method for applying it to our data. We build the formula for defining the distance travelled by day trippers, an important component of consumer surplus for Connecticut parks and forests, and then describe, through the use of a proxy, how this relatively small user group benefits from this consumer surplus.

C.1 Consumers Surplus Definitions

Quantifying the benefits to an individual or a group of a highly-differentiated, somewhat subjective good is a notoriously challenging task for economists. Parks, recreation areas, and other similar venues are, to a considerable extent, such complex goods. While we do have some empirical survey data that indicates visitors' willingness to pay park fees, the full range of consumer benefits depends on a myriad of variables.

Consumers' surplus⁴¹ can be thought of simply as the benefits a visitor gets, in aggregate, from the use of some good or resource, in this case, recreation areas, beyond the payment required to obtain that benefit.⁴² That is why it is referred to as "Surplus". As the economist Frank Cesario stated over thirty years ago, "The Consumers' surplus criterion is gaining widespread acceptance as a way of estimating the primary economic benefits of outdoor recreation sites and facilities." (Cesario, 1976) This approach remains the most widely used and accepted methodology today.

Even in the presence of comprehensive data, obtaining a reliable measure of consumers' surplus can be challenging. In an "ideal" world, an economist could/would simply calculate the appropriate portion of the area underneath a suitable demand function to obtain the desired value.⁴³ Such an approach is not only accurate, but, depending on the functional form of the demand-function's equation, relatively easy to calculate. However, working with real-world empirical data is not formulaic but quite challenging.

The foundation for a demand function lies with a consumer's (or several consumers') preferences. However, as the economist and author Hal Varian correctly noted, "In real life, preferences are not directly observable." Therefore, we must – again in Professor Varian's words – "discover people's preferences from observing their behaviors."⁴⁴

⁴¹ "Consumers' surplus" should not to be confused with, or substituted for, "consumer's surplus"; the former is a measurement of benefit to one individual, while the latter represents the benefits to an entire group. See Mas-Colell, Winston, & Green (1995) for additional information.

⁴² "[Consumers' surplus] measures the net benefit from consuming n units of the discrete good: the utility $u(n)$ minus the reduction in the expenditure on consumption of the other good." (Varian, page 353)

⁴³ "Calculation of the consumers' surplus associated with any recreation site involves measurement of a relevant portion under the demand curve for the services of the site." (Cesario (1976))

⁴⁴ OpCit, p.535.

Most academic literature focuses on the “revealed preference approach”, tracing its roots to the seminal 1938 *Economica* paper by Paul Samuelson.⁴⁵ Since then, numerous authors have evaluated, augmented, and refined this approach. The primary assumption is “that people are choosing the best things they can afford – that the choices they make are preferable to the choices that they could have made.”⁴⁶ Or, in slightly different language, the revealed-preference approach assumes each individual is making rational, consistent choices – decisions that reflect their practical wants and desires.

The revealed-preference approach relies, therefore, on extracting a generalized set of aggregate preference relationships from available data.⁴⁷ There are two primary methods for collecting such observations: direct and indirect. (Smith, Desvousges, & Fisher (1986)) More specifically, the imputed demand curves for outdoor recreation are usually obtained via a “travel-cost technique”⁴⁸, by using survey data gathered from patrons⁴⁹, or by some combination thereof. (Englin & Cameron (1996), Adamowicz, Louviere, & Williams (1994))

When choosing from the three aggregate preference measurements (travel-cost, survey, and a combination thereof) for parks, forests, or other venues, the general benefits and limitations are actively debated by academic researchers – as well as the appropriate use-cases for each. (Smith, Desvousges, & Fisher (1986)) However, given the specific task at hand and the data available, we have chosen the travel-cost technique for this study. And in doing so, we have extracted a generalized, aggregated demand function (or curve) for recreational services in the State of Connecticut.

C.2 Consumers Surplus Estimates

Travel cost estimates of the value derived from outdoor recreation assume a *revealed preference* in the relationship between participants’ costs of traveling to a site and the number of trips they make. Individuals who live farther from a destination generally spend more time and money to visit the destination and typically make fewer trips than those in closer proximity. In simple terms: if people are

⁴⁵ See Samuelson (1948) for additional treatment of this topic.

⁴⁶ Varian (pages 120, 121)

⁴⁷ It should be noted that such an approach is challenging to implement, even under the best of circumstances. As such, considerable research has been done that highlights the practical issues underlying the estimate of a general demand function from empirical data. See Brown & Nawas (1973), Smith & Kopp (1980), and Common, Bull, & Stoeckl (1999).

⁴⁸ The most widely utilized version of which – following the nomenclature employed by Cicchetti, Fisher, & Smith (1973) – is the “Hotelling-Clawson-Knetsch” approach, commonly abbreviated as simply the “HCK method.” Or, as Garrod & Willis (1991) state, “Consumer surplus for outdoor recreation has traditionally been estimated by a Clawson-Knetsch travel-cost method.” A more accessible, user-friendly, contemporary summary can be found of Professors’ Dennis King (University of Maryland) and Marisa Mazzotta’s (University of Rhode Island) website. (http://www.ecosystemvaluation.org/travel_costs.htm)

⁴⁹ The use of survey input/data is one of the most frequently utilized types of contingent valuation methods (CVM), particularly when analyzing outdoor recreation areas. See, for instance, Mitchell & Carson’s book. Additionally, Professors’ King and Mazzotta’s web site also provides information on this topic. (http://www.ecosystemvaluation.org/contingent_valuation.htm)

willing to spend \$X per trip to visit and to visit a destination y times, they must be confident they are getting satisfaction worth at least y*\$X from doing so. The non-monetary value that visitors receive above direct expenditures is known as consumer surplus.

Several states (see section C.5, Literature, below) have conducted intercept surveys to estimate the travel time and number of trips for park users. Although survey data are not available for Connecticut, the state does collect addresses for all individuals who reserve camp spaces and purchase licenses and permits for hunting, and marine and inland fishing. Nonresidents can also purchase many of these licenses. In the case of marine fishing licenses, Connecticut, Rhode Island, Massachusetts and New York offer reciprocity. With DEP's database limited to Connecticut licensing, the estimate for consumer surplus results in lower values, particularly for the state's marine resources. Ideally research would be conducted among all members operating under reciprocity agreements. Connecticut DEP does not maintain addresses for individuals who engage in other activities than hunting and fishing. This management choice results in an underestimate of the full consumer surplus generated by Connecticut's state parks and forests.

To calculate the consumer surplus value, we start from auto fuel and vehicle costs. Federal per mile reimbursement is \$0.5865 per mile. Other studies have estimated time costs associated with travel and park participation and other out-of-pocket costs. (Weiland and Horowitz, 2007). The impact of out-of-pocket costs are estimated in the previous analysis,

Estimating the aggregate of non-pecuniary cost inputs, such as (a) time spent travelling and (b) enjoying park facilities, is problematic for two reasons. First, methodologies are unclear for valuing an hour of leisure or travel time. An opportunity cost approach would value that time at market wages, though recent discussions suggest leisure time should be valued at less than market rates. Further, because we include non-residents travelling, in some cases from long distances, it is unclear what cost value can be assigned to their travel time. For these reasons, only the cost of travel is included in this analysis. In doing so CCEA likely understates derived consumer surpluses.

The distance traveled by each consumer holding either a DEP license or permit from residence to the appropriate facility was evaluated by several functions in ArcGIS 10. DEP license data was organized into "CATEGORY" fields, whether a permit was for fishing (Marine or inland), hunting, trapping (counted with hunting), or the combo license, hunting and angling. Whenever a consumer purchased more than one permit belonging to the same category, we kept only one record in each category, to prevent double-counting for the same type of permit. Also, licenses issued to residents of Alaska and Hawaii, and to non-U.S. citizens were removed for the purpose of this project. Connecticut residents and non-residents were kept separate for several reasons.

DEP supports Geographic Information System (GIS) processing, providing down-loadable shapefiles of all DEP properties in the state through its GIS clearing-house⁵⁰. We selected those listed as State Forests and State Parks and others discussed in this report. Using DEP web-site list of facilities, we

⁵⁰ <http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322898#Property>

identified facilities that match our Category lists described above. Visitor addresses were geocoded, and Parks were selected using the “SELECT BY ATTRIBUTE” option in ArcGIS’s Attribute Table.

CCEA’s first attempt to extract a distance report as “miles traveled along roads”, using the ArcGIS function, required changing the GIS basis from a vector to a raster file. CCEA’s lesson was that a large data file does not process in this ArcGIS function. Please contact CCEA if you wish to learn the specifics of this roadblock. Next, CCEA tested the “NEAR” search function in ArcGIS, which matches each input feature (the consumer) to the “objective” (the DEP facilities of interest), providing output of the closest linear distance. Because a straight line is the closest distance possible, this approach is slightly conservative. Also, assuming the consumer attended the closest park adds another conservative component. This analysis uses a travel cost of \$0.5865 per mile for each round trip; i.e. twice the estimated distance.

In an “ideal” world, an economist would next calculate the consumer surplus area underneath a suitable demand function to obtain the desired value.⁵¹ Such an approach is not only accurate, but usually relatively easy to calculate, depending on the mathematical equation for the applicable demand-curve. However, as is virtually always true when working with real-world, empirical data, the research situation may be more challenging than the academic statement of the solution.

The foundation for a demand function lies with a consumer’s (or several consumers’) preferences. However, as the economist and author Hal Varian correctly notes, “In real life, preferences are not directly observable.” Therefore, economists discover people’s preferences from observing their behaviors.

The basic demand curve is estimated by variations on the following equation:

$$\ln q = \alpha C + \varepsilon$$

Where q is the number of trips, C is the travel cost and ε is the weighted error term. Consumer surplus is calculated by transforming

$$\ln q \rightarrow q \text{ (i.e. taking the exp \{taking the natural logarithm or the log linear function\})}$$

and integrating over C to estimate the area under the curve. The base function is an exponential functional form.

To estimate the consumer surplus, general linearized models (GLM) were fitted to each category of data. Models were tested as linear or quasi-linear, assuming underlying normal and Poisson distributions. In each instance, the quasi-linear normal model was either equivalent to the Poisson regression or superior based on ANOVA analysis. However, the quasi-linear models were adjusted for heteroskedasticity using iterative processes to develop weights. Because of the large data samples,

⁵¹ “Calculation of the consumers’ surplus associated with any recreation site involves measurement of a relevant portion under the demand curve for the services of the site.” (Cesario (1976))

CCEA chose Maximum Likelihood Estimation (MLE) for reporting consumer surplus. MLE out performs least squares in efficiency in large samples. Statistical details are available at the end of this appendix.

There are some limitations to this analysis. First, individuals who travel greater distances are more likely to include multiple destinations in their travel. For these consumers, only a portion of their travel expenses should be allocated to Connecticut’s parks. Without survey data on this concern, there is no basis for allocating the percentage of their travel within Connecticut’s parks and forests, and outside the state’s borders. The farther the distance away, the fewer individuals make these trips. Statistically, they play only a small role in this estimate of consumer surplus.

Secondly, data are only available on individuals who actually attended parks or purchased licenses. There are a large number of other park visitors. This is a problem when valuing consumer surplus for unlicensed/not-camping park visitors or when park amenities change. For this reason, the consumer estimates are limited to current activities for which data is available, as described above, rather than calculated against total visitor days.

Despite these limitations, travel cost analysis remains our best tool for valuing the recreational experience from available data (Haab and McConnell, 2002).

C.3 Statistical Findings

Table C-3.1: Consumer Surplus, Per Person, for State Residents and Out-of-State Visitors

Type	Per Person Consumer Surplus	Total In-State Consumer Surplus	Total Out-of-State Consumer Surplus	Total Consumer Surplus
Inland Fishing	\$500	\$67,436,500	\$3,294,500	\$70,731,000
Marine Fishing	\$370	\$36,916,296	\$2,850,000	\$39,766,296
Hunting	\$286	\$17,829,429	\$565,714	\$18,395,143
Camping	\$769	\$124,097,692	\$18,439,231	\$142,536,923
Total	na	\$246,279,917	\$25,149,445	\$271,429,362

Consumer Surplus estimates are per person rather than per trip. Licensees will utilize recreational facilities multiple times, while campers are assumed to camp only once per person. Camping and hunting consumer surpluses per person represents a per visit amount. The angling assessments include multiple visits per licensee.

Table C-3.2: Consumer Surplus – Calculated Intercept and Slope for our Licensed and Camp Reserved visitor groups

Statistical Slope and Y-Intercept, by Visitor Type			
Inland Fishing Licensees			
	Estimate	P- value	R-squared
Intercept	5.81	<0.0001	0.49
P	-0.0020	<0.0001	
Marine Fishing Licensees			
	Estimate	P- value	R-squared
Intercept	6.22	<0.0001	0.65
P	-0.0027	<0.0001	
Hunting Licensees			
	Estimate	P- value	R-squared
Intercept	6.75	<0.0001	0.57
P	-0.0035	<0.0001	
Camping Reservations			
	Estimate	P- value	R-squared
Intercept	6.32	<0.0001	0.50
P	-0.0013	<0.0001	

C.4 Estimating Elasticities and Travel Time for Late Day Trippers

Since 2003, it has been possible to pay late fees rather than full-day fees, particularly at beaches. Such fees have been differentiated between residents and nonresidents and between weekday and weekend visitors. The advantage of such fees for both resident and nonresident visitor groups is that they afford visitors choices based on price ranges. Especially at beaches where prolonged exposure to the sun is a concern, this choice is available over time periods that suggest a relatively similar experience. Lower fees, the brevity of exposure to the sun, and enhanced warmth available to late day visitors may be preferable to some visitors relative to the full-day experience. For others the length of time at the beach may be more important. Consumer actions reveal visitor preferences among these choices.

In addition for resident day trippers, reverse engineering reveals estimates of the average distances travelled by various classes of visitors. The costs for a late day resident party visiting the beach are equal to their entrance fee and travel costs to get there and back. These visitors do not generally face costs for meals or accommodation. They are simply driving to the beach from their homes and returning to them. They may decide to undertake other activities along the way, but those travel costs can be considered to be allocated to those other activities.

In short, day tripper’s expenditures can be expressed as

c.4.1) $P_t = F_t + T_t$

Where by definition:

P_t = Price paid by the visitor party per visit in time t ;

F_t = Park fees paid per party at time t ; and,

T_t = Round trip travel costs per party at time t express as miles travelled times the costs per mile of operating the average vehicle. There are of course distributions around these costs dependent on the size, vintage, and condition of the vehicle being used, but we ignore such complications and use average costs per mile determined by mileage charges paid by the state to people travelling on its behalf adjusted for changes in those costs based on national pricing series for vehicle operations.

It follows immediately that their annual expenditures will be:

$$c.4.2) E_t = P_t * V_t$$

Where V_t is the number of party visits in year t .

Totally differentiating this equation and setting dE_t , the change in E_t equal to zero obtains point estimates of the elasticities in year t and applied slightly differently among years. Using the average of travel costs within a given year as the estimate of travel costs within the year means that $dT_t = 0$ within any given year. Yet between years, dT will only equal zero if travel costs remain the same in both years. These conditions are useful to our analysis in that elasticity estimates for any given year are given by the rate of change in the number of visits divided by the rate of change in prices. For resident trippers elasticities within a year are expressed as:

$$c.4.3) e_t = (\text{Number of late day visitor parties})_t / (\text{number of day visitors})_t / (FD_t - LF_t) / FD_t$$

Because all the variables on the right hand side of the equation are known, CCEA estimated elasticities revealed by late day trippers for 2009 and 2010 as -0.98339 and -0.79571. Yet all other things remaining equal, we would expect these to be roughly similar between the years. The response is that at all other things, including transportation costs were not similar. Total differentiating the inter temporal version of the equations and reverse engineering to force equality of elasticities on expenditures per trip in 2010 to equal those in 2009, yields the amount by which transportation costs would have had to change to maintain the equality of the elasticities as in:

$$c.4.4) dT_{2010} = ((FD_{2010} * (LDV_{2010} / DV_{2010}) / e_{2009}) - (LF_{2010} - FD_{2010}))$$

Where LDV is late day visitor parties and DV is number of day visitors.

Because people are unapt to move to adjust to higher costs of driving short distances to the beach,

$$c.4.5) dT_{2009 \text{ to } 2010} = \text{differences in cost per mile} * \text{miles driven.}$$

The difference in costs per mile is derived from a combination of government rates grant to employees per mile drive in 2009 of \$0.585⁵² with an escalator for personal travel in the Northeast that grew by 8.7

⁵² This rate is particularly researched. Employee unions insist on their members not being under reimbursed and Auditor Generals ensure that government coffers are not being plundered.

percent from 2009 to 2010 thereby causing an increase of \$0.0509 per mile. This results in an estimated weighted round trip distance 6.4 miles. Using this distance to derive transportation expenditures per trip incurred in undertaking beach activities for residents and the estimate of 100 miles for nonresidents yields the transportation costs for this group. The results appear in Table c.4.1

Table C.4.1: Transportation Costs Related to Day Visitor Days (2010\$)

	2003	2004	2005	2006	2007	2008	2009	2010
Resident Week Day	17,867	17,681	15,079	16,309	40,478	44,223	59,524	53,144
Resident Weekend	1,529	21,973	19,471	24,442	54,259	13,672	7,803	7,218
Nonresident Week Day	97,480	66,131	90,739	105,682	131,562	87,152	112,203	233,978
Nonresident Weekend	102,694	106,700	119,481	110,324	28,805	4,815	4,446	8,914
Total Resident	19,395	39,655	34,550	40,751	94,737	57,895	67,327	60,361
Total Nonresident	200,173	172,831	210,220	216,007	160,368	91,967	116,649	242,892
Grand Total	219,569	212,485	244,770	256,758	255,105	149,862	183,976	303,254

C.5 Literature

Very little literature has been published on the consumer surplus of American parks. The table below summarizes the available literature.

Reference, Author, Date	What's Being Measured	Method	Outcome
"Washington State Parks Centennial 2013 Survey," Responsive Management, 2006	Use, opinions on management and funding, ratings, Funding for State Parks	Telephone Survey	"For the most part, they do not want less spending on parks, nor do they want some parks to close. Instead, they prefer a voluntary fee up to \$10" per visit. Note: Do not favor paying for parking.
"Valuing Impacts of Forest Quality Change: Recreation and New York's Allegany State Park," James F. Booker,	Benefit per day	Benefit transfer methodology to arrive at baseline estimates	With 1.2 million visitors annually, Allegany State Park generates almost \$20 million ('97 dollars) in non-priced benefits annually.
"The Economic Value of New Jersey State Parks and Forests", William J. Mates and Jorge L. Reyes, Revised 2006 Version.	Analysis of the Economic Benefits of New Jersey's State Parks	Total Economic Value (TEV): recreational services; direct and secondary economic activity; ecosystem services; property enhancements; consumption goods; and non-use values	New Jersey Economically Benefits between \$953 million and \$1.36 billion annually. Support and estimated 7,039 jobs.
"Estimating the Recreational Consumer Surplus at Maryland's State-owned Forests", Robert C. Wieland & Dr. John Horowitz, 2007.	Examine the recreational values of Maryland's State-owned forests.	Travel cost estimates derived from outdoor recreation that assume a revealed preference.	Estimated the average per-trip value for day visitors is \$96.

In addition, Wieland and Horowitz cited an unpublished manuscript by Kaval (2007). Kaval performed a meta-analysis of U.S. studies (1,200 observations) and determined that an average day of recreation at a park yielded surplus of \$60.50 per person per day (2006 dollars). For state parks, the figure was \$53 per person per day.

Appendix D: Reasons for Excluding Some Residential Sales from Fair Market Prices

Non-usable codes established by OPM to avoid bias in estimating market prices and their relationships to assessed value have been established to purge sales characterized by:

- 01 FAMILY Sale between members of the same family.
- 02 LOVE AND AFFECTION Sale in which "Love and affection" are part of the sales price. This is stated in the deed.
- 03 INTER CORPORATION Sales between a corporation and stockholder, subsidiary, affiliate or another corporation whose stock is in the ownership etc.
- 04 CORRECTING DEED Transfers of convenience; for example sales for the sole purpose of correcting defects in the title (a correcting deed), a transfer for the purpose of creating a survivorship, etc.
- 05 DEED DATE The date the deed was signed or date of agreement is more than six (6) months prior to the October 1st assessment date of the current sampling year. (That is, the deed date is prior to April 1st).
- 06 PORTION OF PROPERTY Sales of property conveying only a portion of the property assessed as a unit. For example, a one-acre parcel sold out of a ten-acre tract where the assessment is for a ten-acre tract- usually called a "split".
- 07 CHANGE IN PROPERTY Sales of property substantially improved or changed subsequent to the assessment date (new construction, very poor condition, fire damage, additions, and property line changes).
- 08 PART INTEREST Sales of an undivided or part interest in real property. For Co ops use this code.
- 09 Tax sale.
- 10 A WILL Conveyances made in accordance with an article of the decedent's will, a grantee that is a devisee.
- 11 COURT ORDER Judicial sale that is a sale from a court order.
- 12 NON BUILDABLE LOT Sale of a non-buildable lot to an abutting owner.
- 13 BANKRUPCY Sale in bankruptcy proceeding, receivership or assignment for the benefit of creditors, dissolutions, and liquidation sales.

- 14 FORECLOSURE Sale of a foreclosed property.
- 15 GOVERNMENT AGENCY Sale to or from a government agency (local, state or federal)
- 16 CHARITABLE GROUP Sale to or from a charitable, educational, benevolent or religious organization.
- 17 TWO TOWNS Sale of a parcel of real property assessed or located in more than one town or state.
- 18 IN LIEU OF FORECLOSURE Transfer to banks, insurance companies, savings and loan associations, mortgage companies, or any other lien holder, when the transfer is made in lieu of a foreclosure.
- 19 EASEMENT Sales, such as to or from public utility companies, electric, telephone, pipeline companies or individuals. (Right of way.)
- 20 CEMETERY Sale of cemetery lot.
- 21 PERSONAL PROPERTY EXCHANGE Sale of real property in exchange for any asset other than cash, such as other real estate, stocks or bonds, or other personal property.
- 22 MONEY AND PERSONAL PROPERTY Sale of real property, which includes household furniture, machinery, fixtures, equipment, inventories or goodwill, when the cash value of such items is indeterminable. (Note: This category does not apply to appliances or 'built-in' units, which are normally included in the sale, for example, stove, dishwasher, wall to wall carpeting etc.)
- 23 ZONING Sale of property, the value of which has been materially influenced by zoning changes effected since the last assessment date.
- 24 PLOTTAGE Combining two or more sites under a single ownership when each is separately considered.
- 25 OTHER REASONS Ratio is either way too high or way too low. Sale, which for some reason other than those categories enumerated above, is deemed not to be a transaction between a willing buyer (not compelled to buy) and/or a willing seller (not compelled to sell). Explain under REMARKS.
- 26 REHABILITATION DEFERRED (Section 12-65c to 12-65f C.G.S)
- 27 RESERVED FOR OPM USE ONLY
- 28 USE ASSESSMENT Code 600 Sale of a property which is under a use assessment (farm, forest, open space: Section 12-107a-f).
- 29 RESERVED FOR OPM USE ONLY
- 30 AUCTION Sales of property at a public or private auction.

Appendix E: Bibliography

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E-2: Databases

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