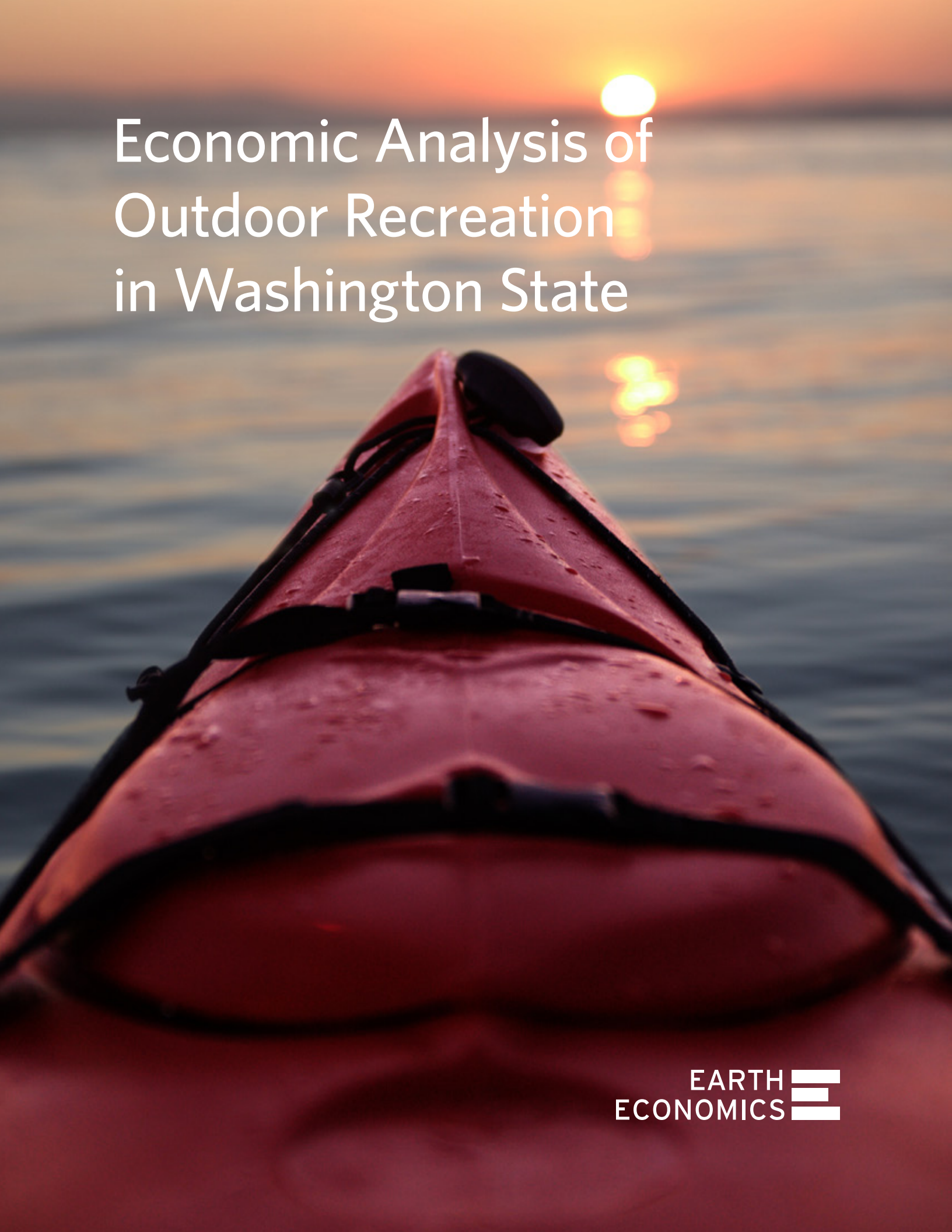


A close-up, low-angle shot of the front of a red kayak on a body of water. The kayak is covered in water droplets, suggesting it has been in the water. In the background, the sun is setting or rising, creating a warm, orange glow on the horizon and reflecting on the water's surface. The overall mood is serene and adventurous.

Economic Analysis of Outdoor Recreation in Washington State

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Glossary of Terms Used in this Study

Economic Terms

Recreation-related Expenditures—The total amount of money spent on outdoor recreation, including equipment, travel and lodging, entrance fees, and food and beverages, among others. In this study, all expenditures were calculated as estimates of Washington State recreational patterns. Most of these expenditures were made within Washington.

IMPLAN—IMPLAN is an industry-standard economic modeling software package that allows the user to estimate total economic activity generated by expenditures in a regional economy. County and statewide IMPLAN models were used in this report.

Economic Contribution—The portion of an initial expenditure that circulates through the local economy (in this case the state or county economy). Total economic contribution is the sum of direct contribution, indirect contribution and induced contribution.

Direct Contribution—Direct sales or margins of sales associated with the initial expenditure. Some expenditures are assumed to translate into purchases made outside the state, as determined by the IMPLAN model.

Indirect Contribution—Sales to the businesses where expenditures are made (e.g. intermediary inputs bought in the supply chain). A gas station buying gasoline refined in Washington State or a grocery store buying produce grown in the state creates an indirect contribution to the state's economy.

Induced Contribution—Sales of goods and services purchased by employees of directly and indirectly affected businesses. A Cabela's employee that buys locally-produced milk is creating an induced contribution for the Washington economy.

Economic Effect—Economic effects differ in a fundamental way from economic impacts. Economic effects can be generated by in-state recreation participants as well as out-of-state visitors. However, the in-state participants on public recreation land would likely spend some of their money elsewhere in Washington State if few or no recreational opportunities were available.

Economic Impact—The net changes in new economic activity associated with the sector analyzed (i.e. outdoor recreation economy). In this study, the economic impact is the portion of the total economic contribution that is the result of spending by out-of-state visitors.

Economic Multiplier—In this report the economic multiplier refers to the ratio between initial expenditures and total economic contribution (also called Keynesian multiplier). It shows how initial expenditures generate additional economic activity as the initial money is re-spent by other businesses and workers. An illustration of this follows below:

A hotel is paid \$150 to house a recreation participant for the night. The hotel owner keeps \$15 as profit, employees are paid \$85 and \$50 are spent importing goods from out of state (rent and taxes

are ignored for brevity). The employees spend \$85 on food. Most of the food is imported from out of state so only \$10 of the expenditure goes to wages and profit for the grocery store. The hotel owner sends his \$15 to his daughter in California creating no further economic activity in Washington. Currently there has been \$110 (\$15 profit + \$85 wages + \$10 to grocery store) in economic activity from the initial \$150. If no further activity occurs then the multiplier will be .73 (110 divided by 150).

Economic Sector—The economic sectors in this report come from IMPLAN’s 400+ sector database. Each sector produces a unique good or service (gasoline, transportation, food and drink, medical care etc.). Each sector also has unique products, services, wages and profits that businesses in that sector purchase in order to operate. The intricacy of this model allows IMPLAN to output very detailed economic data.

Economic Activity—Economic activity refers to different types of economic exchanges as they circulate through a region’s economy. In this study, the direct, indirect, and induced contributions represent total economic activity (e.g. sales, production and consumption of goods and services, employment, tax payments, etc.) associated with outdoor recreation. Gross domestic product (GDP) is a common measure of economic activity.

Economic Leakage—Money that leaves the regional economy when an expenditure is made by a consumer. Leakages generally result because a portion of the expenditures is made outside the local economy or because producers get their inputs from outside the state. For example, if a recreational boat has to be repaired in Washington, some of the parts needed for the repair may be ordered from California.

Economic Benefit—An economic benefit is the wellbeing a consumer derives as a result of her consumption of a specific good or service, expressed in monetary terms. Economic benefits are generally associated with the goods and services people obtain from ecosystems.

Ecosystem Service Value—The measurement of economic benefits that people derive from ecosystems, many times expressed as non-market values or market value equivalents.

Consumer Surplus—Consumer surplus is the value a person realizes from engaging in an outdoor recreational activity that is above the expenditures incurred.

Recreational Terms

Participant Day—A singular visit to a recreational land or a one-time engagement by one individual in a recreational activity.

Visitors—Recreation participants from out-of-state that visit one of Washington State’s recreational areas.

Recreation Participants—Recreation participants are people that engage in recreation irrespective of the frequency in which they engage in the activity.

Local Parks—We assumed that recreation participants at county and city parks have very similar expenditures, therefore county and city parks are aggregated into the “local parks” category.

Events—Special events held on public lands such as youth sport tournaments, marathons, bike races, wildlife festivals, and other participatory sporting and recreation events. The majority of events are assumed to happen on local lands.

Types of Expenditures

Expenditure Category—Expenditures made by consumers of recreation, grouped into general categories. Assumptions made in order to appropriately allocate expenditures to IMPLAN sectors are detailed in Appendix E.

Government Fees—Any payment from recreation participants to government enterprises, typically access fees. This could be for using public boat launches, paying for a Discover Pass, or registering a snowmobile. Does not include expenditures paid to public agencies for overnight accommodations.

Fees to Private Recreational Providers—Payments made to private recreation providers such as downhill ski areas, private timberland owners, private golf courses and horse-riding businesses. A trip that is primarily to publicly owned land may also feature some use of private recreation providers such as a rafting company providing guided trips on public waters.

Equipment Expenditures—Equipment expenditures are calculated based on the number of participants and average lifespan of the equipment good. They are classified as retail sales and are based on U.S. Census data yearly sales. These expenditures are attributed to the home state or county of the recreation participant.

Trip Expenditures—Trip expenditures occur on nearly every trip that a recreation participant takes to recreational lands. The primary elements of this are transportation, food and beverages, and lodging. They are allocated to the destination site.

Tax Categories Used for Economic Contribution Analysis

Employee Compensation—Taxes that go towards social insurance programs, such as disability and unemployment programs.

Tax on Production and Imports—Taxes comprised of non-personal property taxes, licenses, sales, gross receipts, and excise taxes. Gross receipts taxes are levied on the gross income a business receives. Excise taxes are levied on particular goods and services like petroleum products, liquor, and public utilities.

Household Taxes—Taxes comprised of fines and fees paid to local and state governments. This includes recreational motor vehicle licenses, property taxes, and fishing and hunting licenses.

Corporations—Taxes on corporate dividends.

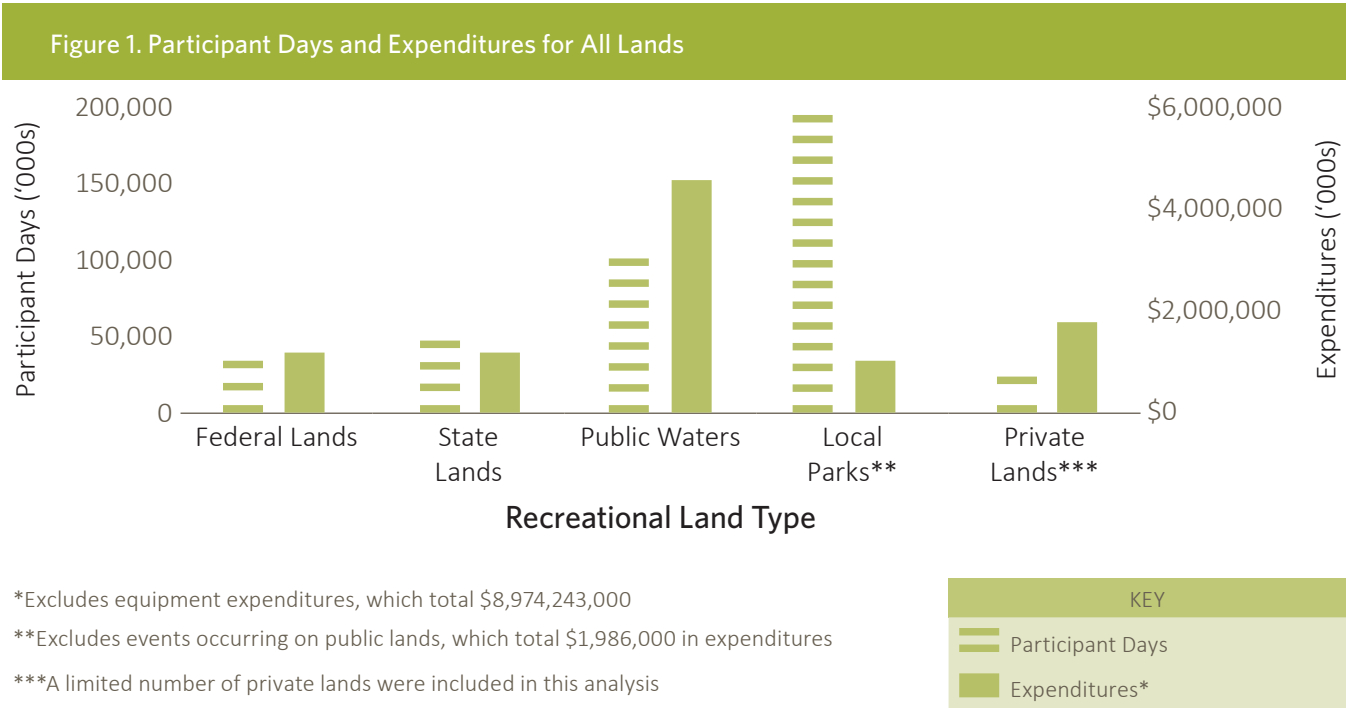
Executive Summary

From hikes in the desert to a ski run down a mountain side to clam digging at the ocean, Washington State residents have numerous choices when deciding what to do outside. The state’s rich outdoor recreation choices also provide jobs to many families and businesses. This study quantifies the contribution of outdoor recreation to Washington State’s economy and way of life. This report was written as required by the 2013-2015 biennial operating budget (Chapter 221, Section 304, Laws of 2014).

The benefits of Washington’s outdoor recreation industry go beyond supporting jobs to include creating a way of life. It is estimated that Washingtonians, on average, spend 56 days a year recreating outdoors. According to the recreation surveys and public land records used in this study, there were a total of about 446 million participant days a year spent on outdoor recreation in Washington, resulting in \$21.6 billion dollars in annual expenditures.

Expenditures were highest for recreation associated with public waters. Water recreation includes a number of activities with high trip and equipment expenditures, especially motorized boating. Ranking second were special events such as sports tournaments and races, which generally involve fees and attract overnight stays. Ranking third was recreation on private lands, which includes expensive recreation activities such as golf, skiing, and off-highway vehicle riding and hunting, which often occur on private timberland. Local parks are the most common place for people to visit as well as the most accessible and least costly destination.

Figure 1 shows the total expenditures and total participant days for different recreational land types. Note that data was only available for a limited range of private recreation lands (ski areas, golf courses, private timberland, and horse-related businesses).

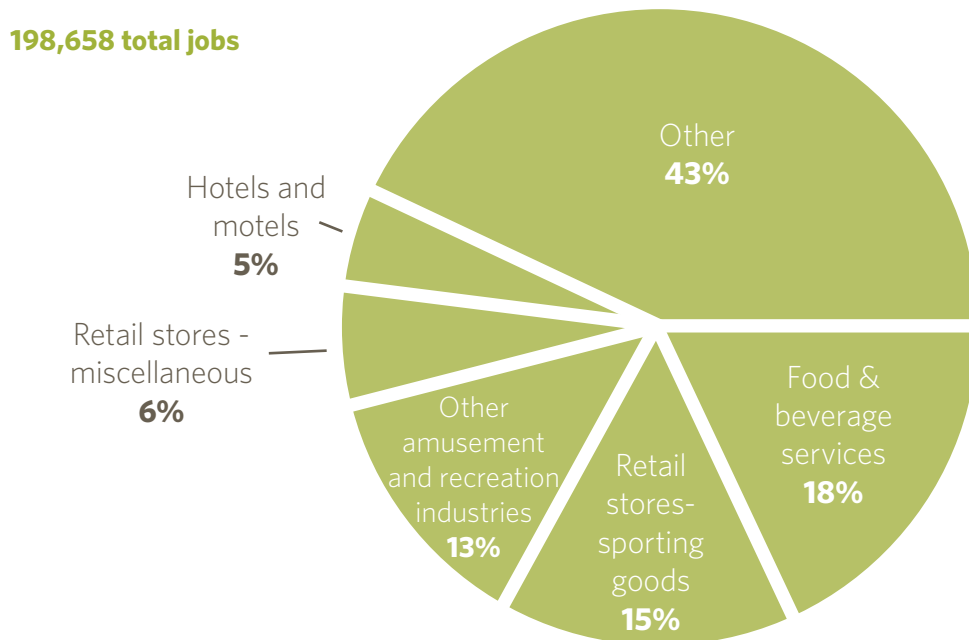


An economic contribution analysis, conducted through use of an economic modeling program known as IMPLAN, demonstrates how money spent on outdoor recreation flows through the local and state economies, promoting exchange from one business to another. Of the \$21.6 billion of outdoor recreation spending in Washington, about \$9.1 billion is transferred to out-of-state producers of related goods and services. This leaves about \$12.5 billion in direct sales to circulate through the local economy (direct economic contribution), producing, in turn, \$3.3 billion in supply chain activity to create outdoor recreation goods and services (indirect economic contribution) and \$4.7 billion in household wages that further stimulate economic activity (induced economic contribution). Thus, in total, economic contributions to the state economy amount to \$20.5 billion every year.

Nearly 200,000 jobs are supported in Washington State as a result of outdoor recreation spending. A total of about 122,600 jobs, or about 62 percent, are from expenditures associated with outdoor recreation on public lands. These numbers compare to other major employers in the state such as the information technology (191,000 jobs supported) or the aerospace industry (94,200 jobs supported). Outdoor recreation-related jobs include both full-time and part-time jobs in sectors such as food and beverage services, retail, and general recreational services (Figure 2). In general, these sectors are made up of many businesses ranging from small local shops to large retailers such as REI.

Detailed results for recreation-related expenditures by land type are provided for Washington State as a whole, as well as for counties and legislative districts. These results show that outdoor recreation markets play an important role bridging urban and rural communities. The recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building sustainable jobs in rural Washington State. Out-of-county visitors create a redistribution of wealth between the place of origin and the destination for recreation. For example, Seattle residents going to Leavenworth for outdoor recreation redistributes income from Seattle to Leavenworth. These dynamics are important to many rural counties.

Figure 2. Employment Supported By Outdoor Recreation by Sector



Out-of-state visitors play an important role in the economics of outdoor recreation. Out-of-state visitors accounted for an estimated 12 percent of all participant days and 27 percent of total outdoor recreation spending. Every dollar spent by an out-of-state traveler in Washington generates \$1.36 in economic impacts, resulting in a total of \$4.6 billion in new money circulating in the state's economy. A total of 46,430 jobs or 23 percent of total outdoor recreation supported jobs in Washington are a result of expenditures by out-of-state visitors. The results of the out-of-state visitor impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

In addition to the monetary contribution of outdoor recreation to Washington's economy, there are a number of other benefits not accounted for within traditional economic analysis. These benefits include the satisfaction and increase in general quality of life people get from engaging in outdoor recreation and from the ecosystem services recreational lands provide. Trees, water, and animals provide ecosystem goods and services such as swimmable water, habitat, and aesthetic beauty. Washington's 23 million acres of public land provide many of these benefits. The combined total estimated value of these non-market benefits is between \$134 billion and \$248 billion a year.

There is much more to the story of outdoor recreation and its importance to Washington State than is revealed in the economic analyses presented in this report. Outdoor recreation markets help connect urban and rural communities and, as identified by the Governor's Blue Ribbon Task Force on Outdoor Recreation in its final report (2014), the benefits of outdoor recreation translate into "healthier kids, lowered health care costs, less absenteeism in the work place, and decreases in juvenile crime." The Task Force also recognized that "recreating outside leads to people placing a value on natural places and believing it is important to keep them available for today's and future generations." For those reasons and all of the others presented in this report, investment in outdoor recreation yields tremendous returns.



Kayaks at the San Juan Islands, image credit: creative commons image by Jeff Clark, Bureau of Land Management

CHAPTER 1

Introduction, Methods and Concepts

The Outdoor Recreation Economy in Washington

The recreation economy of Washington State is vast. Walking, hiking, biking, birding, boating, fishing, hunting, swimming, skiing, 4-wheeling, horse riding, snowboarding, sail boarding, whale watching—Washingtonians head out on weekends and weekdays for healthy fun engaging in hundreds of recreational activities all across Washington State from local parks to wilderness areas and the open ocean. Outdoor recreation brings us together with friends and family, or allows for moments of solitude. Oddly, and perhaps precisely, because it is so closely tied to life enjoyment, the value of the recreation economy, and the land and seascapes that produce it, have often been underestimated in economic analysis.

The purpose of this study is to quantify and qualify the economic characteristics of outdoor recreation in Washington State. We investigate the magnitude and distribution of economic contributions, economic impacts, and ecosystem services based on geography, demography, and recreational behaviors. Expenditures and contributions are calculated for different public and private land types, participant types, and recreational activities. Results are presented at the state level, by county, and by legislative district. The distribution of outdoor recreation economic activity is presented in the context of regional economies, recreational land ownership, and recreational behavior preferences.

It is estimated that the average Washingtonian spends 56 days per year doing some kind of outdoor recreation. According to the recreation surveys and public land records used in this study, there were a total of about 446 million participant days spent on outdoor recreation in Washington State. The total number of days spent on outdoor recreation would be even larger if one counted other spaces where outdoor recreational activities take place such as private rural areas, sidewalks, backyards, school playing fields, and tribal lands. These trends result in money spent on, income derived from, and employment associated with outdoor recreation.



Tolt river angler, image credit: RCO

The results from the economic analyses conducted illustrate how diverse and far-reaching the recreation economy is in Washington State. Every year millions of people spend at least \$21.6 billion dollars associated with outdoor recreation in Washington. After accounting for leakages of spending on items not produced in Washington, these expenditures generate about \$20.5 billion in economic contributions through Washington State. Of that \$20.5 billion contribution, \$4.6 billion is flowing into the economy from out-of-state visitors coming to enjoy Washington's outdoor recreational lands. The way in which outdoor-recreation related expenditures trickle down through different types of economic contributions is analyzed in detail in this report.

In addition, the economic benefits, or wellbeing generated by outdoor recreation and by recreational lands, are also calculated. The land and waters that provide recreation also provide other valuable goods and services including clean water, habitat for wildlife, aesthetic attributes, and enhanced recreational experiences. It is estimated that economic benefits amount to at least \$134 billion to \$248 billion for these four ecosystem services annually. The economic value of nature's goods and services tied to the recreation land and seascape remained uncounted in Washington until this report.

An illustration of the economic activity measured in this report is provided in Box 1.

Box 1. A Day out at Mount Rainier: An Illustrative Story

Sarah sets out for a day hike in Mount Rainier National Park and stops to purchase some supplies. On her way out of Seattle, she spends \$20 to put enough gas in her car to drive up and back. This money not only supports the gas station and its employees, but all the businesses the gas station buys from and the fees and taxes it has to pay. The transportation and refining may be done by Washington businesses, but the oil will have to be imported from out of state.

As Sarah gets closer to Mount Rainier her stomach rumbles and she realizes she left her lunch at home! Fortunately, she finds a grocery store as she is driving through Graham. She purchases a sandwich, a bag of chips, an apple, and a drink (\$13). Again, while a portion of her spending stays within the local economy, much of it goes to out-of-state wholesale suppliers and transport services. Sarah also realizes that the weather is going to be cooler than she anticipated; she stops at a shop and buys a warm hat to wear on her hike (\$12).

Now that she is fully prepared, Sarah drives to the park entrance and purchases a park pass for the day (\$10). After consulting maps, Sarah hikes nine miles, enjoying the beautiful views, sounds, and smells of alpine meadows and mountain vistas. Sarah is grateful that she can have this kind of experience only a few hours from her home in a bustling city. Only here, can she decompress from all the cares and concerns of her busy life in Seattle.

At the end of the day, Sarah returns to her apartment in Seattle feeling rejuvenated. She has spent \$55 on the day trip. However, the enjoyment she experiences on her trip cannot be measured merely by the amount she spent on the trip; connecting with nature and recreating in the mountains is part of the reason she lives in Washington State.

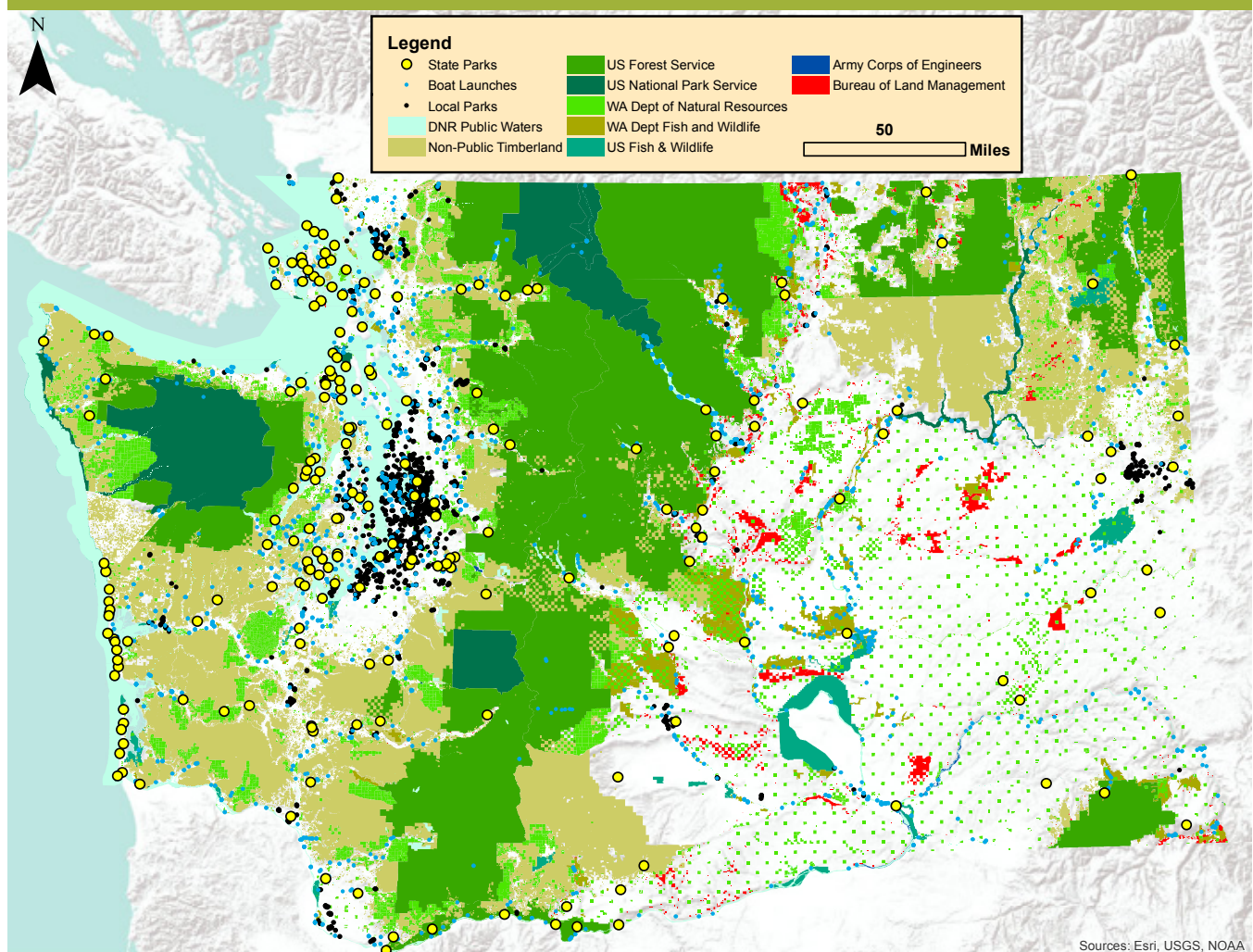
Recreation Land Types Studied

The recreational lands studied here are federal and state managed lands, public waters, county and city lands (referred to as “local”), public lands used for special events, and a set of private lands and activities for which data was available. The study is not exhaustive of all the spaces available for outdoor recreation. Certain categories of lands had more data limitations than others. Data limitations, assumptions, and estimations are outlined in more detail in each chapter and in Appendix B.

The distribution and relative size of the recreational lands included in this study can be seen in Figure 3. For the purposes of visualization some lands are exhibited as areas and others as points.

Following is a brief overview of the general recreational land types studied. A full list of the recreation lands managed by each agency and their specific characteristics are presented in Appendix A.

Figure 3. Recreational Land Types in Washington State



Federal lands: Federal agencies play an important role as managers of recreational lands across the country. In Washington State, the following federal lands were included: National Park Service managed areas, National Forests and Monuments managed by the U.S. Forest Service, National Wildlife Refuges and Monuments managed by U.S. Fish & Wildlife Lands, and recreation projects or areas managed by the U.S. Bureau of Land Management and the U.S. Army Corps of Engineers.

State lands: State agencies manage a large number of areas for recreation, resource extraction, and conservation of critical natural spaces. The lands under state jurisdiction included in this analysis are the following: Washington State Parks; Washington Department of Natural Resources' state forest lands and conservation areas; Washington Department of Fish and Wildlife's Game Management Units and State Wildlife Areas, which are located within Game Management Units but host recreational activities other than hunting.

Public waters: Water bodies used for recreation were categorized under public lands. Washington's Department of Natural Resources

has jurisdiction over most public waters including the Puget Sound, coast, and freshwaters. The Washington Fish and Wildlife Department and Washington State Parks manage boat launches and water access sites. Water access sites are also managed by port districts and other local land managers.

Local lands: Local lands include county parks, city parks, parks managed by special districts, and municipal golf courses. Special events held on public lands such as youth sport tournaments are included as a separate category in this study, although most of these happen on local lands.

Private lands: A limited number of private lands are included in this analysis. The lands for which data was available are private skiing areas, private golf courses and facilities, private timberlands, and private horse-related businesses. Results for private lands should be interpreted as only a portion of economic activity generated by these lands. Examples of other types of private recreation lands not included in this study are private campgrounds, shooting ranges, vacation cabins, water parks and even backyard exercise and sports.



Obstruction Point Trail in the Olympic National Park, image credit: Angela Fletcher

Methodology Overview

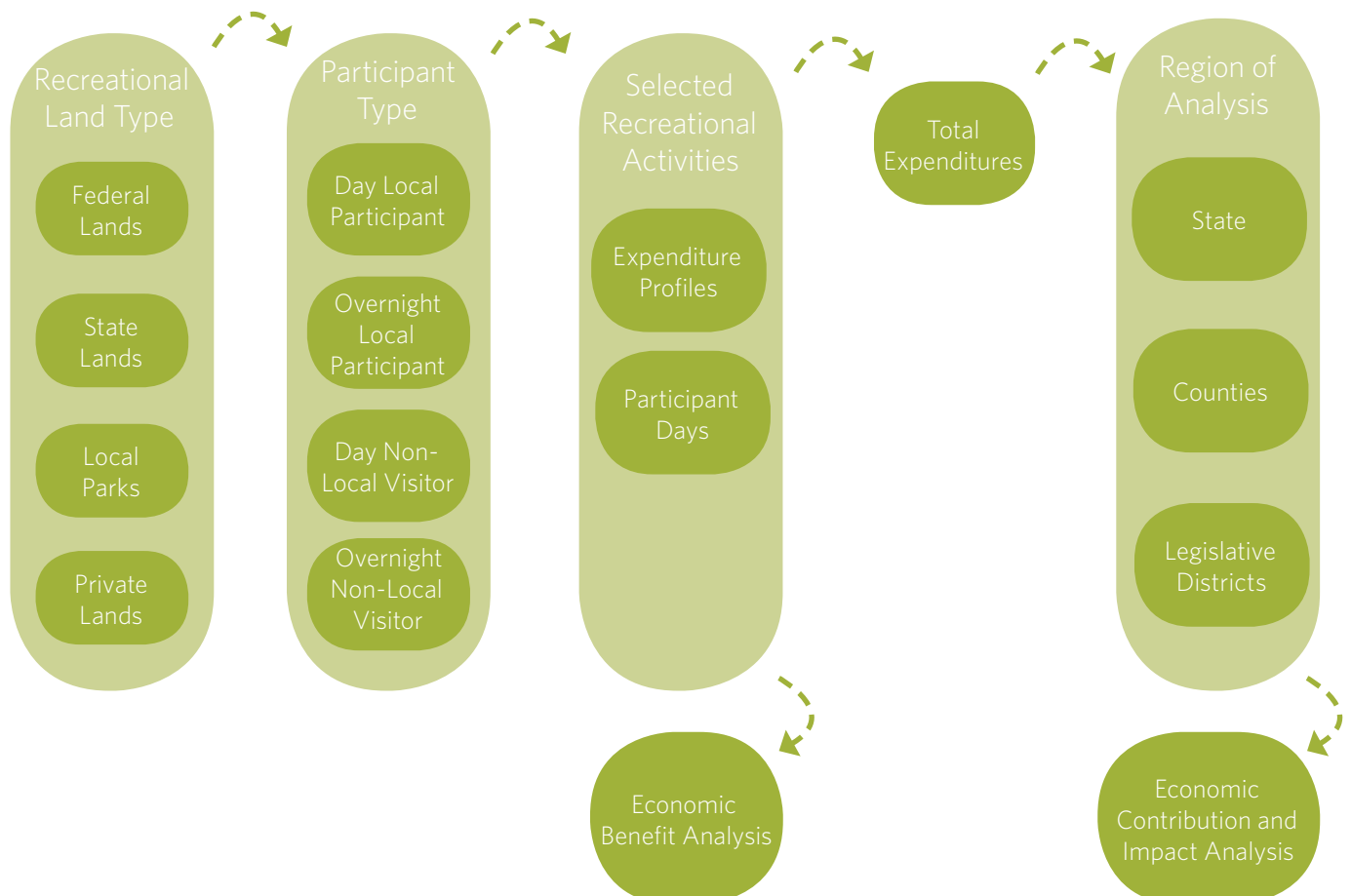
Methodology Structure

The economic analysis was carried out by estimating visits to different recreational destinations and the incurred expenditures. The economic contribution and impact analyses are based on the calculated expenditures. Figure 4 shows a schematic of the data components and general path of the methodology for calculations. The process is outlined beginning with data collection at the land type level, the identification of participant types, the creation of expenditure profiles, the calculation of total participant days and expenditures per destination, and finally the economic analyses at different geographical levels. Data sources include existing studies on recreation, data recorded by destination sites,

local surveys on recreation behavior, licenses and permits issued for specific activities, and when necessary, modeling of location-specific trends. Data sources and methodology are outlined in Appendix B. GIS methods assisted in allocating expenditure results to counties and legislative districts. All expenditure estimates are based on data of various vintages and are all converted to 2014 dollars using the Bureau of Labor Statistics' consumer price index. Similarly, yearly participant data was derived from estimates from various years and adjusted to Washington's current population.

Publicly managed recreation destinations typically track their attendance by day and overnight use as well as by participant place of origin. Some destinations and activities involve a higher frequency of overnight stays (e.g. national forests,

Figure 4. Schematic On Data Components and Methodology



special public events, and windsurfing) than others (e.g., local park recreation, state park visits, and ball sports). These differences have an impact on expenditure patterns.

Most public land managers also provide GIS polygon or parcel datasets for their jurisdiction. When these were not available, destinations were geocoded from Google Earth search results (e.g. “horseback riding”) or expert recommendation (e.g. surfing beaches). In these cases, we utilized a GIS-based allocation model (see Appendix B) that calculated attendance probabilities given the destination’s proximity to populated areas. It should be noted that some double counting may exist with public water accessed through public land types, as water recreation was estimated as a separate category and could not always be differentiated from certain land types (e.g. county parks).

Each participant day involves different types of expenditures depending on where it happens and what activities it involves. Expenditure profiles were created for an average recreational outing spent in each land type. Expenditure profiles were also derived for a set of 42 recreational activities (See Appendix B). Expenditures on equipment were calculated based on U.S. Census consumer data and data available from previous research as outlined in Appendix B and E. Adjustments were made for activities that have a different participation rate in Washington than the U.S. (e.g. snowmobiling). Equipment expenditures were only included in the analysis for all recreational lands and assigned to the assumed place of residence of the participant.

Economic Analysis Structure

The first part of the analysis identifies the type of expenditures associated with outdoor recreation. These expenditures are the purchases you make to enable a recreation experience and can include gasoline, food, lodging and equipment, among others. Most expenditures are made within Washington State. The amount of money spent on purchases will vary based on location and the

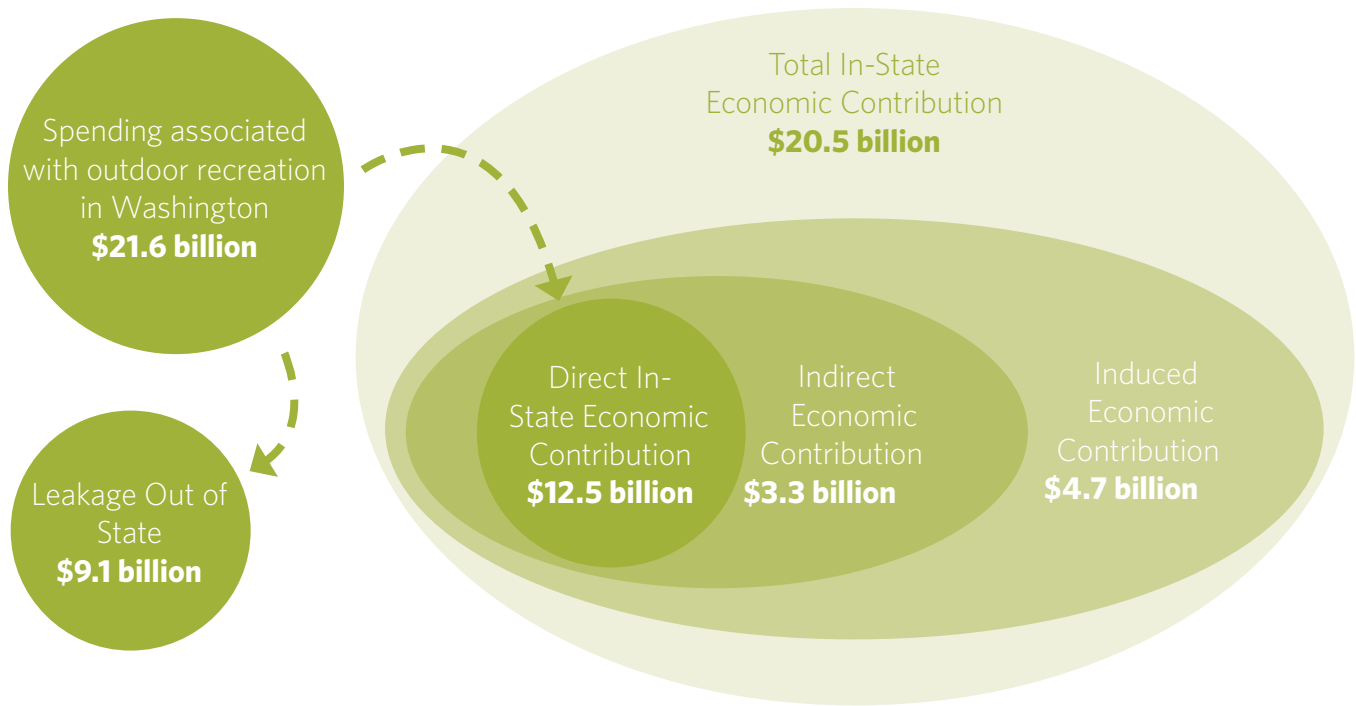
activity chosen. The data collected in this study yielded a range of expenditures for each visit type. These were organized into general expenditure categories in order to calculate economic contributions.

The economic contribution analysis identifies the portion of the expenditures that stays in Washington State and that trickles through the economy to supply goods and services, provide jobs and income, stimulate producers, and generate tax revenue. All of these economic activities are different types of contributions. Contributions are also calculated by the economic sector in which they happen (e.g. hotels, food and beverage places, etc.). Figure 5 illustrates the relationship between expenditures and economic contribution.

The analysis for calculating economic contribution and economic impact is done through IMPLAN, which is widely used in recreational economic analyses (see Box 2 for details). This tool uses local data on economic and industry relationships to predict revenue flows to existing businesses (direct contributions), effects on related industries from which purchases are made (indirect contributions), and effects from expenditures made through the affected household incomes and salaries (induced contributions). Local economic models are derived using data from the U.S. Bureau of Labor Statistics (BLS), U.S. Bureau of Economic Analysis (BEA), U.S. Census Bureau and other sources.

Economic benefits beyond expenditures are also calculated (see Chapter 6). These reflect the value placed on recreational opportunities beyond direct market expenditures. They include the total wellbeing provided to recreationalists as well as ecosystem services provided to other beneficiaries. Ecosystem services include water quality improvements, aesthetic values, and habitat maintenance. The data for these modules was obtained from the National Land Cover Dataset (NLCD) and Earth Economics’ proprietary database of primary ecological economics sources called the Ecosystem Valuation Toolkit (EVT).

Figure 5. The Relationship Between Expenditures and Economic Contribution



Box 2. IMPLAN: A Brief Primer

This study utilizes IMPLAN (IMPact Analysis for PLANning) which was developed by MIG, Inc. The IMPLAN modeling system has been in use since 1979 and was originally developed by the U.S. Forest Service. The modeling system is primarily based on the U.S. Bureau of Economic Analysis' Input-Output Benchmarks, which are based on industry survey data. Using this data, IMPLAN constructs regional trade flow models to capture how spending in one industry impacts all other industries. This data captures regional relationships between the economic output of industries, jobs, income, and taxes. Based on these models, IMPLAN can calculate how an economic activity such as consumer spending on a specific industry will impact jobs and income for an entire region's economy.

This study used IMPLAN models for the entire state of Washington and for each of the 39 counties. Each of these models can capture the response of that regional economy to a change in demand or production in a given industry or group of industries. When a consumer expenditure is entered, IMPLAN models how it will translate into jobs and incomes for the region. The model estimates how the expenditure will "ripple" through the economy. The industry experiencing the change in sales will need to purchase additional inputs from its suppliers (indirect contributions). Household spending also changes due to wage impact and job creation (induced contributions).

The economic contribution models factor in geographic and demographic nuances including consumer spending patterns, local production capacity, and general trade flows to yield an estimate of in-state sales from the total expenditures made. In-state sales subtract the portion of purchases that ultimately flows out of the state (called economic leakage). In turn, the in-state sales are used to model tax revenues, ripple effects for local industries, and labor market effects. The sum of these ripple effects (also known as multipliers) yields the total economic contribution of an activity. In a separate calculation, the economic impact analysis identifies the influx of new money into the local economy as a result of outdoor recreation opportunities by out-of-state visitors.

CHAPTER 2

Expenditures and Contributions of All Outdoor Recreational Land Types

Chapter 2 Highlights

- \$21.6 billion is spent every year on outdoor recreational trips and equipment across all recreational land types in Washington.
- These expenditures generate about \$20.5 billion in state economic contributions after deducting out-of-state leakages and including multiplier effects.
- Washington residents average 27 visits per year to local parks, making local parks the most visited land type for outdoor recreation.
- Recreation associated with public waters generates the highest expenditures.

Participation and Expenditure Analysis of All Recreational Lands

We estimate that residents and visitors to Washington State spend about \$21.6 billion per year on outdoor recreation trips and equipment. This estimate is based on spending across all the recreational lands included in this report (more detail in Appendix A). In total there were 446 million participant days per year in outdoor recreation.

Total expenditures for each recreation land type were obtained by multiplying participant days by appropriate expenditure rates. Total expenditures were highest for recreation in or on public waters, which included motorized and non-motorized boating, fishing, swimming, surfing/windsurfing, inner tubing/floating, and scuba diving in most marine and freshwaters. Water recreation

includes a number of activities with high trip and equipment expenditures, especially motorized boating.

Ranking second in total expenditures were events like youth sports tournaments and races, which attract high spending rates and overnight stays. Ranking third was recreation on private lands, which includes expensive recreation activities like golf, skiing, off-highway vehicles, and hunting.

In terms of participant days, local public lands have the highest number of participant days with 189 million participant days per yearⁱ. Federal lands have 32.8 million participant days per year and state lands had a slightly higher number with 49 million participant days per year. Private lands had the lowest number of participant days with 27.9 million days per year (see Table 1, Figure 6 and Figure 7). As explained later, there was limited data available for private lands.

ⁱ Although an effort was made to use current data as much as possible, some participation estimates are based on studies from previous years adjusted to Washington's current population.

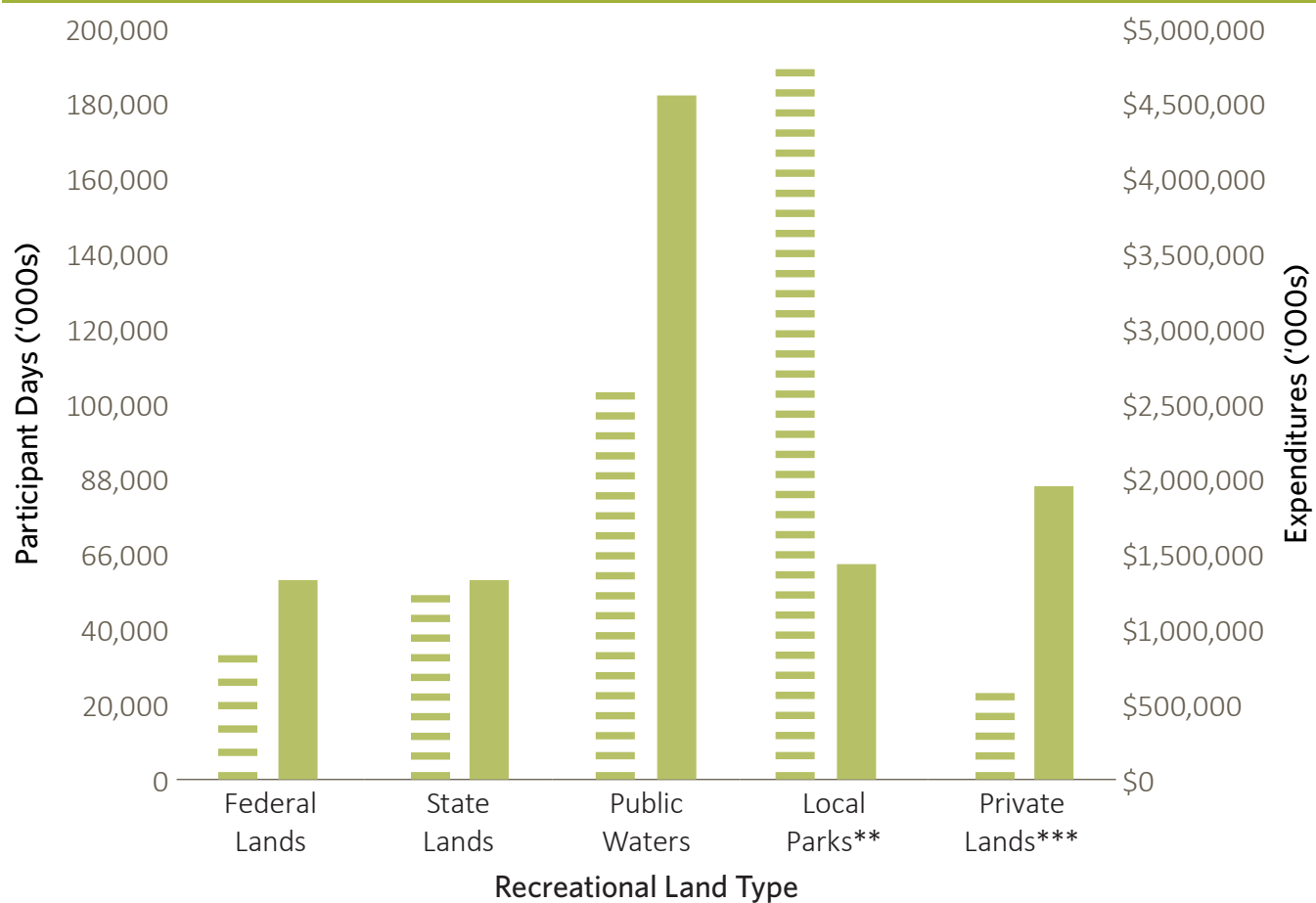
Land Type	Participant Days ('000s)	Expenditures*** ('000s, 2014 USD)	Per-Person Per-Day Expenditures (2014 USD)
Federal Lands	32,853	\$1,323,545	\$40
Washington State Lands	49,095	\$1,347,192	\$27
Public Waters	101,701	\$4,630,986	\$46
Local Parks	189,915	\$1,439,096	\$8
Events*	44,516	\$1,986,312	\$45
Private Lands**	27,946	\$1,933,961	\$69
Total	446,027	\$12,661,092	

*Events occurring on public lands

**A limited number of private lands were included in this analysis

***Excludes equipment expenditures

Figure 6. Participant Days and Expenditures for All Lands



*Excludes equipment expenditures, which total \$8,974,243,000

**Excludes events occurring on public lands, which total \$1,986,000 in expenditures

***A limited number of private lands were included in this analysis

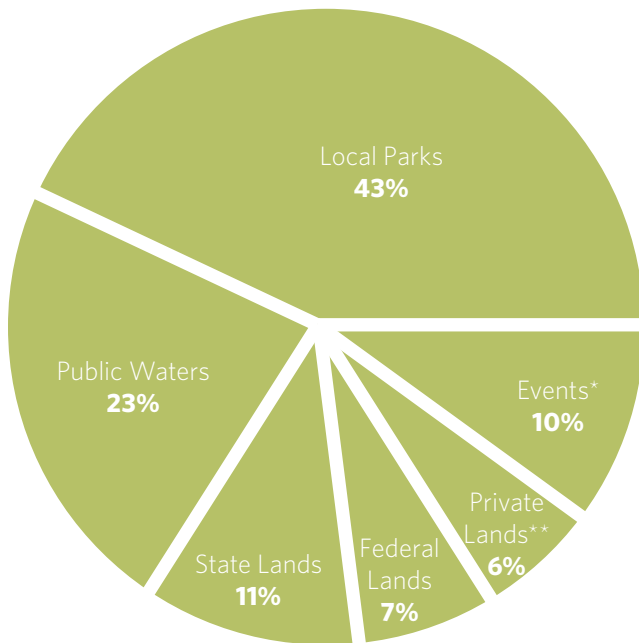
KEY	
	Participant Days
	Expenditures*

Outdoor recreation is characterized by many different types of expenditures across many businesses, depending on the activity and destination involved. These are grouped into general expenditure categories as outlined in Figure 8. Most of these expenditures are assumed to be made within Washington State.

Total equipment purchases make up 42% of all recreation expenditures. These include the purchase of sporting equipment (19%) and motor vehicles and boats for recreation (15%). Participant day expenditures are largely made up of gasoline (13%), food and beverage services (10%), and groceries bought at retail stores (9%).

Figure 7. Participant Days on all Recreational Land Types, Including Events on Public Lands

446,027,000 total participant days

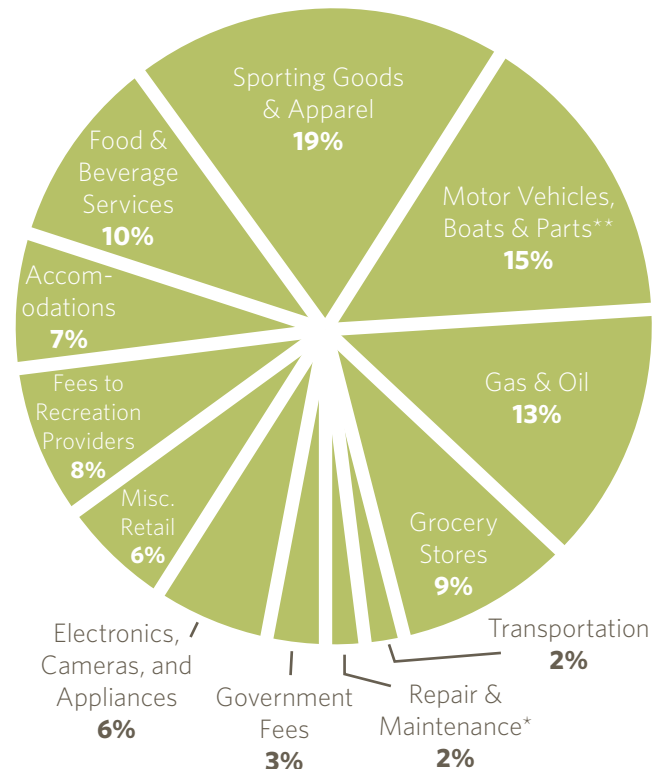


*Events occurring on all public land types

**A limited number of private lands were included in this analysis

Figure 8. Expenditure Categories for All Recreational Land Types

\$21,635,335,000 recreation related expenditures across all land types



*Repair & Maintenance on OHV, boats, and other recreational vehicles

**Represents OHVs, boats, and other recreational vehicles

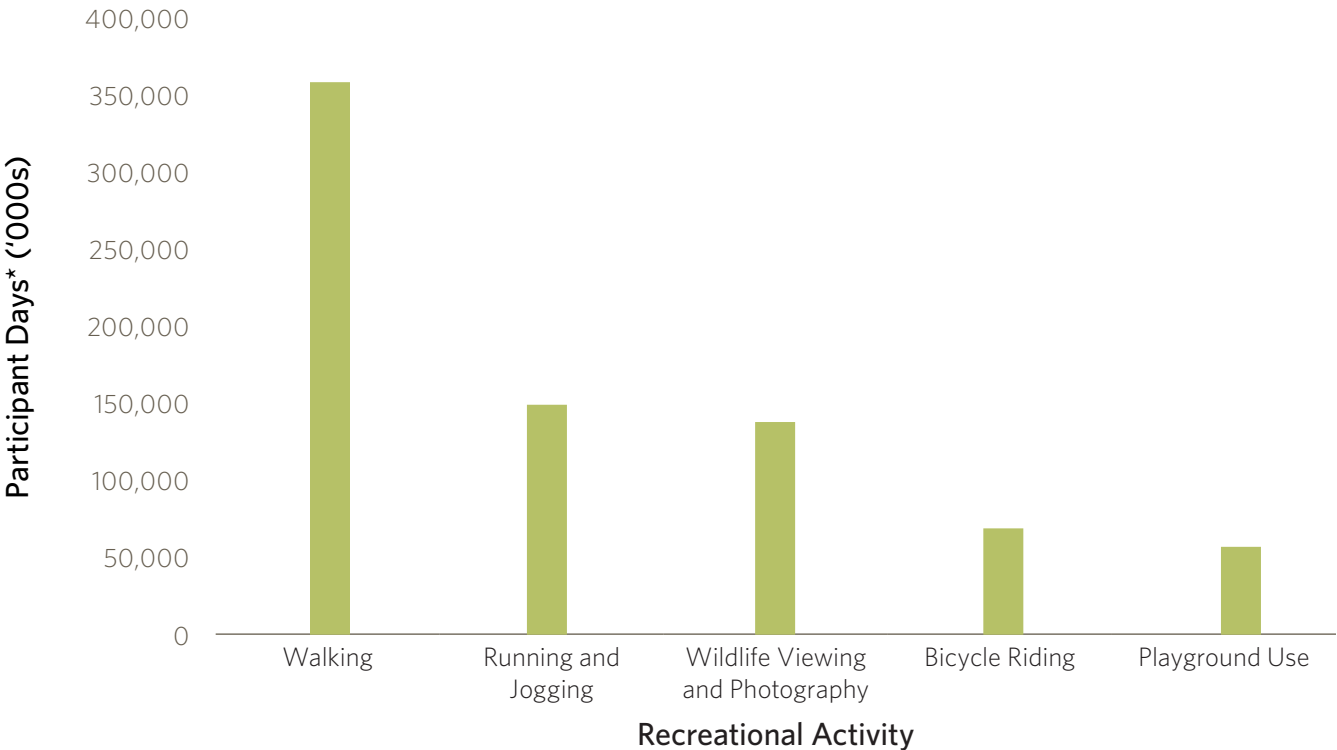
Activity-based expenditure analysis

A separate methodology was used to estimate participation and expenditures attributable to popular outdoor recreational activities in Washington. These expenditures were calculated based on participant days derived from the survey conducted for Washington’s Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013). The survey has data on participation rates (i.e. percent of residents participating in a recreational activity) as well as participation frequency (i.e. average numbers of days per year a resident participates in a given activity), which were used to calculate the total number of participant days for any activity. Out of a total of 300 activities studied in SCORP, 42 activities and activity groupings were chosen for this analysis.

Expenditure profiles were created for each activity based on literature searches, U.S. Census data, and communication with activity associations. The activities were chosen based on their popularity among adults in Washington, their existence within at least one of the recreational lands studied, and their potential economic contribution. Results by activity and the methodology used for this analysis can be found in Appendix D.

Overall, the analysis shows that certain activities are highly popular (by the number of participant days per year). Figure 9 illustrates the activities with the highest number of participant days. For example, there are 357 million participant days attributed to walking for outdoor recreation (most popular activity) and 151 million to jogging or running in outdoor settings (second most popular activity). These activities have relatively

Figure 9. Top Five Recreational Activities by Participant Days



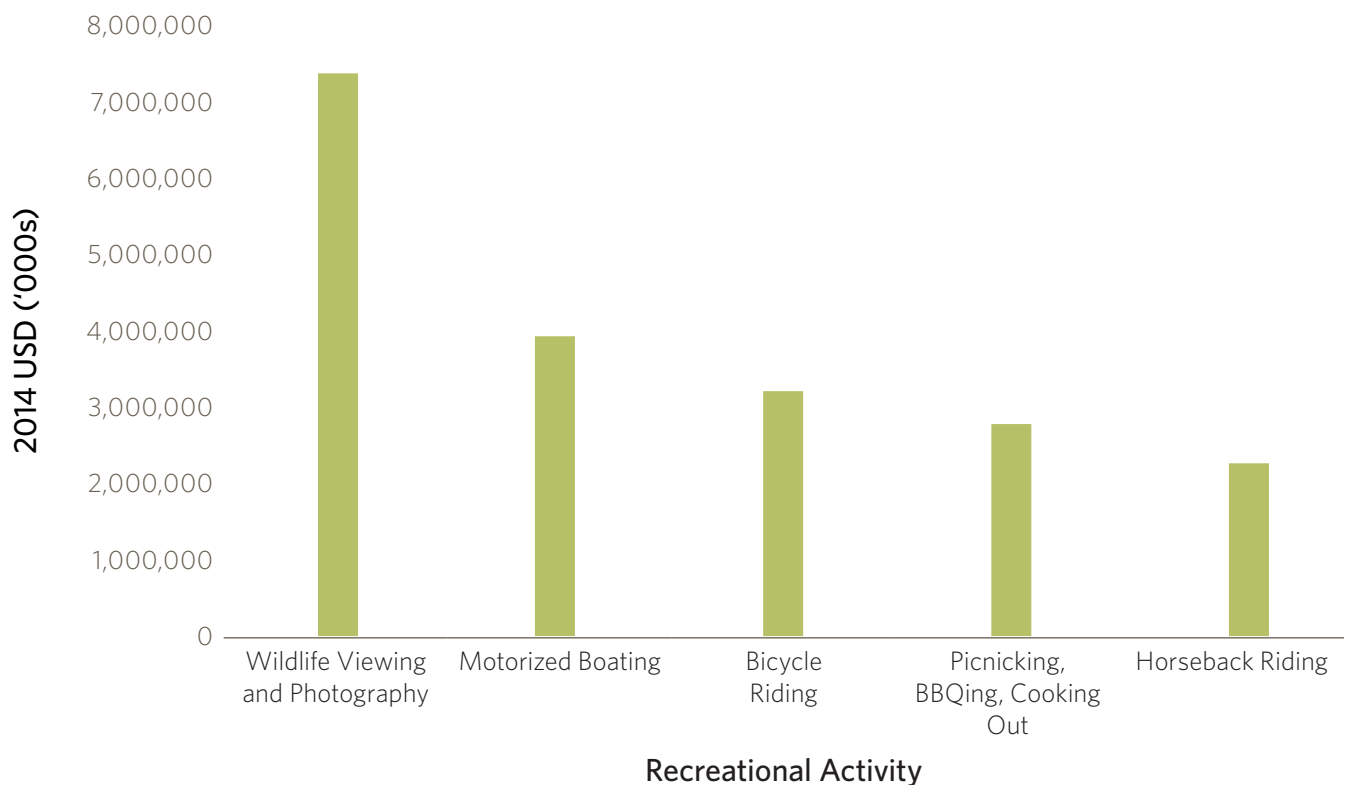
*Derived from SCORP participation rates

low expenditures (about \$5 per trip and about \$35 per person per year in equipment) but given their high frequency, they result in high total expenditures (a combined amount of \$2.7 billion per year). In contrast, windsurfing involves about 740,000 participant days per year but with trip expenditures of about \$90 per trip and about \$2,000 per person in yearly equipment expenditures, this activity results in about \$170 million in expenditures per year. Off-highway vehicle (OHV) recreation and boating are other activity types with high equipment and trip expenditures. See Appendix D for an analysis of relative trip and equipment expenditures as well as total expenditures by activity. Figure 10 illustrates the activities with the highest expenditures.



Hiking and wildlife viewing in the Mt. St. Helens National Volcanic Monument, image credit: © Cece Watkins

Figure 10. Top Five Recreational Activities by Total Expenditures



*Total expenditures include trip and equipment expenditures

Economic Contribution Analysis for All Recreational Lands

The \$21.6 billion spent in outdoor recreation across all land types in Washington cascades through different types of economic activities linked to these purchases. The economic contribution analysis estimates the portion of expenditures that register as sales retained in the state (direct contributions), as well as intermediate sales made from industry to industry purchases within the supply chain (indirect contribution). In addition, the contribution analysis includes the purchases made with the salaries and wages of those employed in the supply chain (induced contribution). All economic activity triggered by the initial expenditures is captured by region-specific economic IMPLAN models (See Appendix E for IMPLAN model details), the results of which are divided by county.

According to the model, after leakages are accounted for, total outdoor recreation-related expenditures generate \$12.5 billion in direct in-state sales (i.e. direct contribution), \$3.3 billion in supply chain activity to create outdoor recreation goods and services (i.e. indirect contribution) and \$4.7 billion in household wages which stimulate further economic activity (induced contribution). Thus, in total, economic contributions through the state amount to \$20.5 billion (See Table 2).

Table 2. Economic Contributions, All Recreational Lands	
Contribution	Total (000's, 2014 USD)
Direct	\$12,520,000
Indirect	\$3,300,000
Induced	\$4,701,000
Total	\$20,521,000

More than 400 IMPLAN-defined economic sectors are affected by outdoor recreation-related expenditures (See Appendix E for more detail on sectors). The top eight economic sectors receiving contributions resulting from outdoor recreation in Washington State are shown on Table 3. Together they receive half the total contributions generated by the outdoor recreation economy. Food and beverage places are the largest beneficiary of all outdoor recreation expenditures. Retail sales follow, largely due to the fact that equipment expenditures are taken into account here. Wholesale trade businesses include sales to other businesses and institutions. Sales within the category of "Other amusement and recreation industries" include access and entrance fees by private agencies, equipment rentals, or guided tours.

Table 4 shows some general categories of state and local taxes receiving revenue from the estimated expenditures. Taxes on production and imports represent the largest source of tax revenue. These taxes are comprised of business property taxes, sales and other excise taxes. Goods such as gasoline have especially high excise taxes. Household taxes are comprised of fees and fines paid to local and state governments for

Table 3. Economic Contributions by Economic Sector, All Recreational Lands	
Sector	Total ('000s, 2014 USD)
Food and beverage places	\$2,473,498
Retail Stores-Sporting goods, hobby, and books	\$1,606,277
Wholesale trade businesses	\$1,443,031
Other amusement and recreation industries	\$1,397,971
Hotels and motels	\$1,325,500
Petroleum refineries	\$1,103,919
Retail Stores-Motor vehicle and parts	\$666,613
Retail Stores-Miscellaneous	\$650,047

Table 4. Local and State Tax Contributions, All Recreational Lands

Tax	Total ('000s, 2014 USD)
Tax on Production and Imports	\$1,966,982
Households	\$30,980
Employee Compensation	\$11,712
Corporations	\$1,317
Total	\$2,010,992

motor vehicle licenses, property taxes, and fishing and hunting licenses. Employee compensation refers to taxes paid by employers and employees into Washington State's benefit trust fund and workers compensation system. Corporation taxes refer to taxes on net dividends. Total tax contributions are estimated at about \$2 billion.

Approximately 200,000 jobs are supported in Washington State as a result of expenditures related to outdoor recreation. This estimate includes both full-time and part-time jobs and does not distinguish between them or identify the number of hours worked within each job.ⁱⁱ

Table 5 identifies the sectors where most of this employment occurs.

The economic contribution analysis demonstrates how money flows through the local economy, promoting monetary exchanges from one business to another. Direct contributions, or in-state sales, are lower than total expenditures because they exclude revenue that flows outside the region of study. Therefore out of the \$21.6 billion dollars spent in Washington for outdoor recreation, about \$9.1 billion is transferred to out-of-state producers of outdoor-recreation related goods and services. This leaves about \$12.5 billion in direct sales to circulate through the local economy and generate a total of \$20.5 billion in total contributions.

ⁱⁱ It is expected that a high proportion of total outdoor recreation jobs are part-time jobs. For example, the U.S. Forest Service and National Parks Service hire many seasonal workers in the summer who are students the rest of the year.

Table 5. Employment Associated with Outdoor Recreation, by Sector

Sector	Employment
Food and beverage places	36,047
Retail Stores - Sporting goods, etc.	30,190
Other amusement and recreation industries	25,170
Retail Stores – Miscellaneous	12,000
Hotels and motels	10,046

Every industry and economic sector has a unique supply chain and economic network. However, some sectors tend to source more from outside the state, while others are more local. A significant proportion of retail sales are sourced from outside the state. For example, a substantial amount of expenditures on off-highway vehicles goes to purchase them where they are manufactured, resulting in lower economic contributions for the state. On the other hand, expenditures made in restaurants, for example, tend to trickle down more locally to pay for local staff and produce.

County Expenditures and Contributions

The participation and expenditures attributed to outdoor recreational lands were allocated to counties and legislative districts. These calculations made use of local primary data available (e.g. fishing licenses or hunting permits issued by each county) and/or GIS modeling (see Appendix B for a detailed methodology description). The number of participant days for each county or legislative district differed substantially, depending on what types of recreational land were located within the county or legislative district. Total expenditures made within each county can be seen in Figure 11. The highest expenditures were made in King County (about \$5.4 billion). Those counties in lighter shades had lower total expenditures.

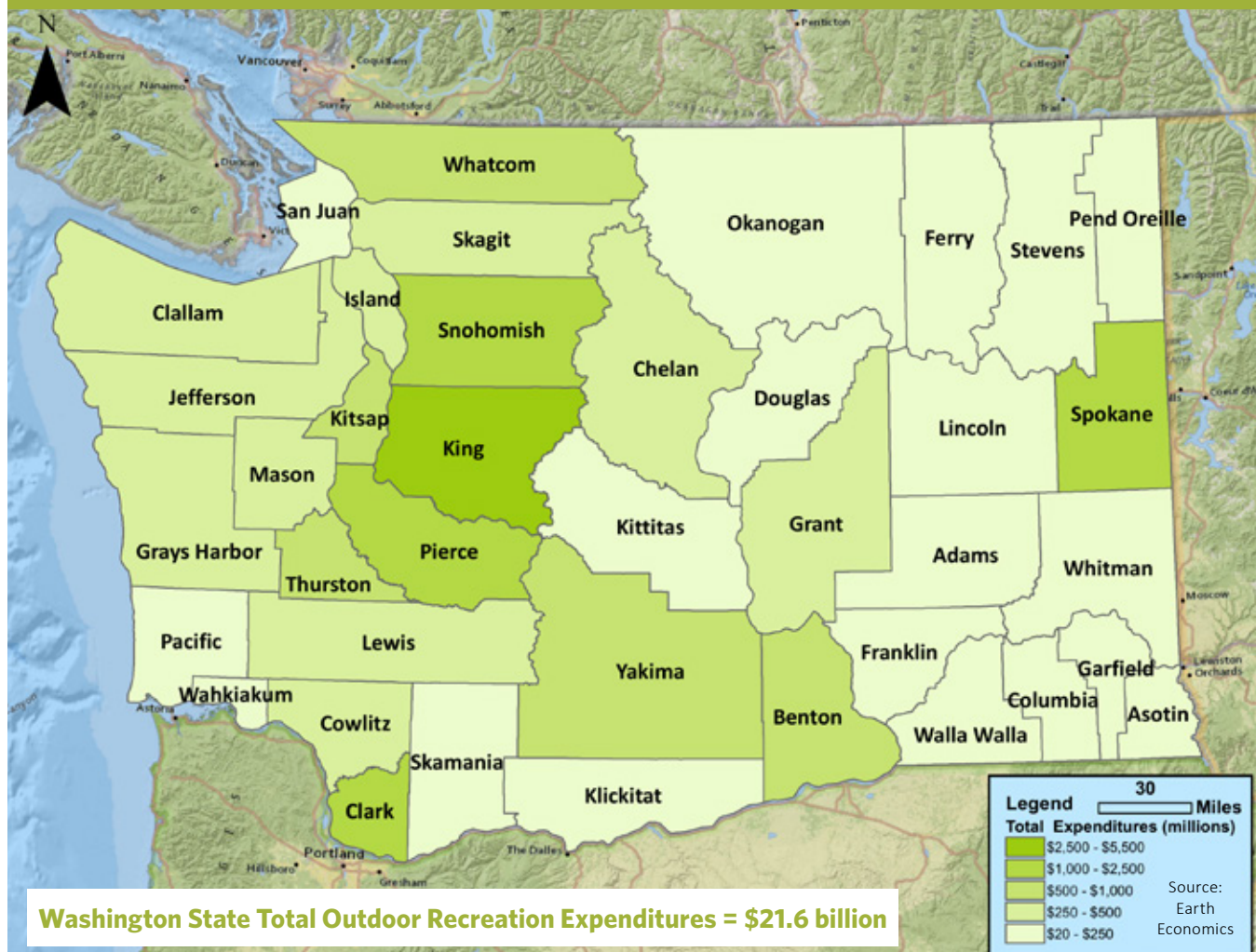
The contributions of these expenditures to the counties' economies are estimated based on county-specific IMPLAN data. Indirect and induced contributions as well as local jobs supported reflect the industrial make-up, expenditure patterns, and trade flows of each county. The results for each county are presented in Appendix F. The multiplier effects—expenditures recirculating within a county's economy—are smaller than for the state as a whole due to a higher number of supply industries being located outside county borders. Multipliers, defined as the ratio of total contributions to expenditures, range between a low of 0.29 in Pend Oreille County and a high of

0.9 in Spokane County. Job generation resulting from outdoor recreation expenditures ranges between a low of 100 jobs in Wahkiakum County and a high of 50,000 jobs in King County. Note that the sum of all of the counties' recreation-related economic contributions and employment does not equal the total for the state of Washington since county models do not take into consideration inter-county interactions.

Out-of-County Expenditure Patterns

The recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building jobs in rural Washington State. Out-of-county

Figure 11. Total Outdoor Recreation Expenditures by County



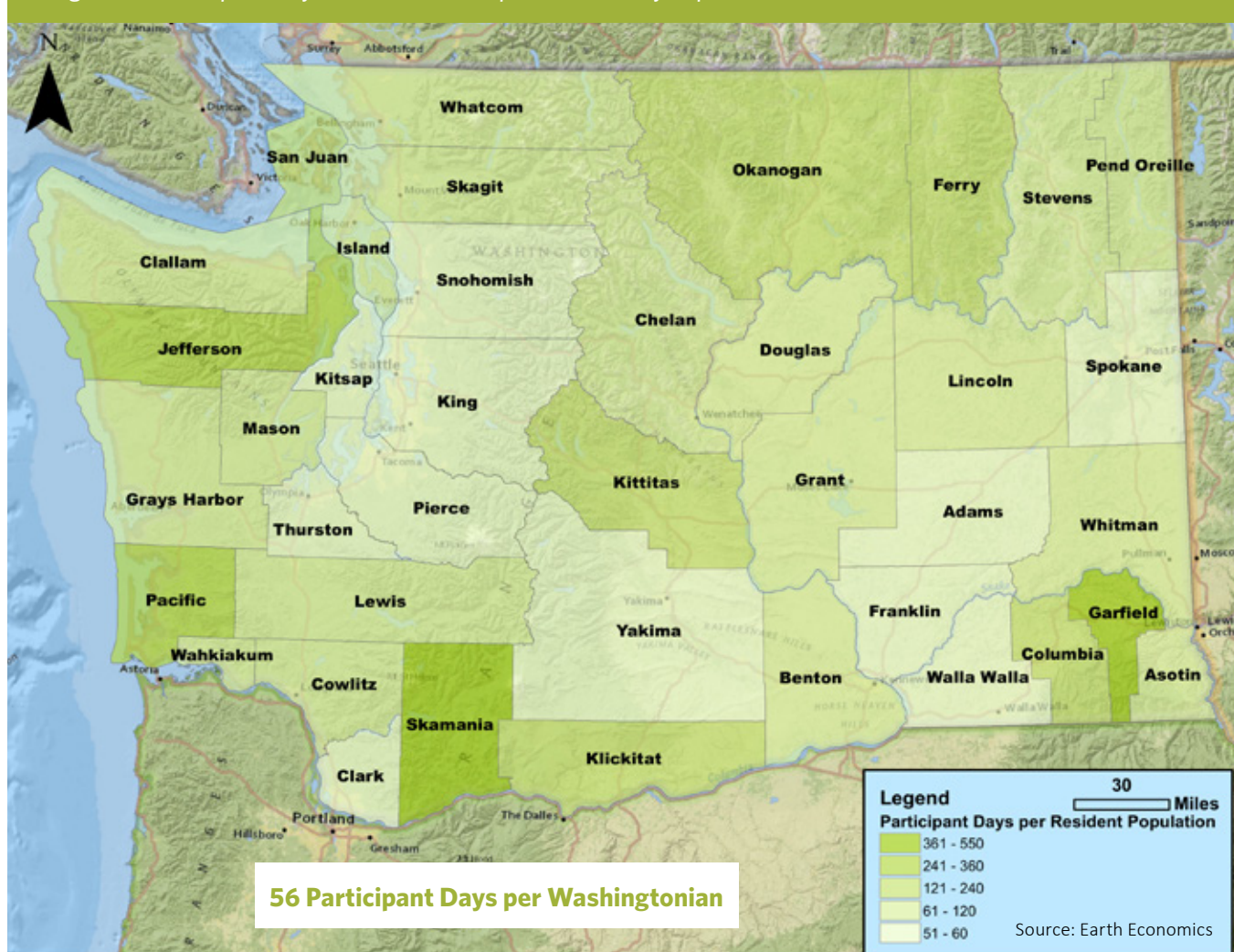
visitors create a redistribution of wealth between the place of origin and the destination for recreation. For example, Seattle residents going to Leavenworth for outdoor recreation redistribute income from higher income Seattle to Leavenworth. These dynamics are important to many rural counties.

Although out-of-county visitors were not accounted for in this study, an inference of their magnitude can be made by comparing total participant days in each county relative to the population of the county. We see that Washington State has a number of recreation hot spots (see Figure 12) where participant days surpass by far the average that would be

expected from county residents (56 days per year) and hence it is assumed that this is due to people traveling from outside the county. Figure 12 illustrates the ratio between participant days in the county and county population.

Many counties benefit from expenditures made by out-of-county visitors. For example, Skamania County hosts a number of state and local parks as well as national protected areas; with the Gifford Pinchot National Forest, Columbia River Gorge National Scenic Area, and Mt. St. Helens National Volcanic Monument. With a population of just 11,066, it hosts 5 million outdoor participant days per year. Total expenditures amount to almost \$200 million per year.

Figure 12. Participant Days in Counties Compared to County Population



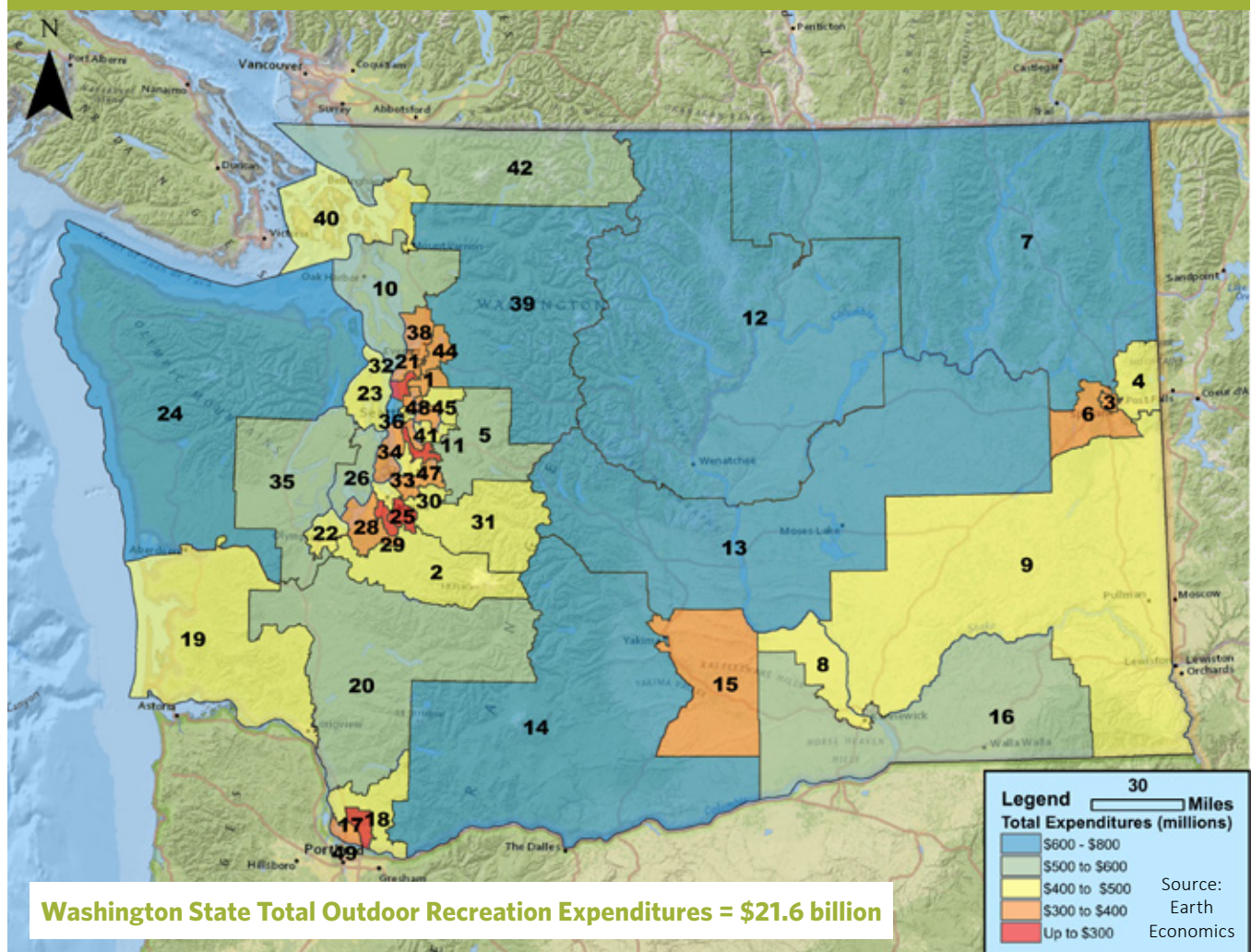
Legislative District Expenditures

Expenditures at the legislative district level were derived through a GIS overlay of recreational land areas and legislative district boundaries, controlling for landscape characteristics, existing facilities, and access points. The distribution of expenditures by legislative district can be seen in Figure 13. Many legislative districts located far from urban areas have high expenditure rates.

Expenditures at the legislative district level ranged from \$264 million in Legislative District 32 to \$775 million in Legislative District 7. Average expenditures per legislative district level were about \$441 million across all legislative districts.

There is not much variation in population sizes between legislative districts. However, some legislative districts benefited greatly from outdoor recreation because of out-of-region visitors. The total number of expenditures and participant days by recreational land type at the legislative district level can be seen in Appendix G. Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 13. Total Outdoor Recreation Expenditures by Legislative District

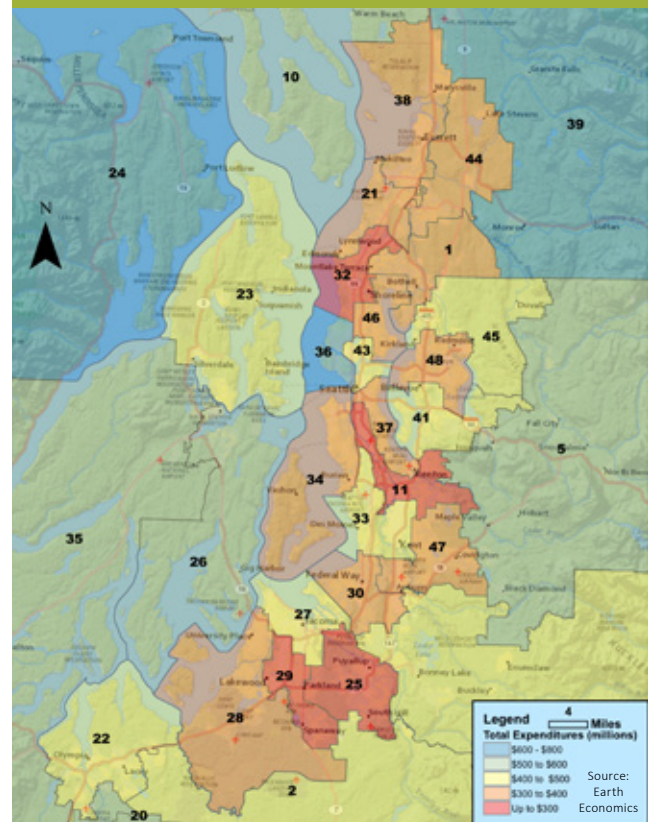


Out-of-Legislative-District Expenditure Patterns

Population of legislative districts does not vary much from one district to another. Therefore, the ratio of total participant days to population is already reflected in the map showing total expenditures by legislative district (Figure 13). This pattern suggests similar dynamics of travel from urban to more rural areas to experience outdoor recreation. More data is needed in order to understand out-of-legislative district participant days and trends.

Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 14. Total Outdoor Recreation Expenditures by Legislative District, Puget Sound Inset



Sailboats on Budd Inlet, image credit: © Kim Merriman

CHAPTER 3

Expenditures and Contributions of Outdoor Recreation on Public Lands

Chapter 3 Highlights

- The greatest amount of land available for outdoor recreation by acre is under federal jurisdiction.
- Visits to local parks and public waters are most common in terms of participant days.
- Trip-related expenditures (not including equipment) associated with recreation on federal, state and local public lands amount to \$10.7 billion per year. These expenditures generate \$13.6 billion in economic contribution.
- State lands account for \$1.3 billion of trip-related expenditures related to outdoor recreation (not including equipment).

Public lands and public waters available for outdoor recreation cover about 23 million acres. Federally-owned lands make up 58% of total public lands for outdoor recreation, state lands make up 29%, public waters make up 12%, and the remaining 1% of recreational land is made up by counties, cities, or other local jurisdictions (Table 6).ⁱⁱⁱ Within federal, state, and local jurisdictions there are different agencies managing specific land types. State lands include State Parks, lands managed by the Department of Natural Resources, and Washington Department of Fish and Wildlife. Public waters include marine areas, rivers, lakes and streams, which are all categorized as public, although a portion of these may be private.^{iv} Local lands include

county, city, and special district parks as well as publicly managed golf courses. Special events on public lands are not assigned any acreage since their location varies. In our solicitation for local outdoor recreation data, many counties cited the importance of local events, such as youth sports tournaments.

ⁱⁱⁱ Acreages were calculated by Earth Economics using Geographic Information Systems (GIS) and the National Land Cover Dataset (NLCD) in reference to lands used for outdoor recreation. They differ from RCO's Public Lands Inventory as these refer uniquely to areas for outdoor recreation and the measurement methods differ.

^{iv} Lakes, rivers, and streams are considered public if they are deemed "navigable." See The Revised Code of Washington (RCW), available on-line at <http://apps.leg.wa.gov/rcw/>.



ATV riders, image credit: Philip Wolff

Table 6. Acreage of Public Recreational Lands

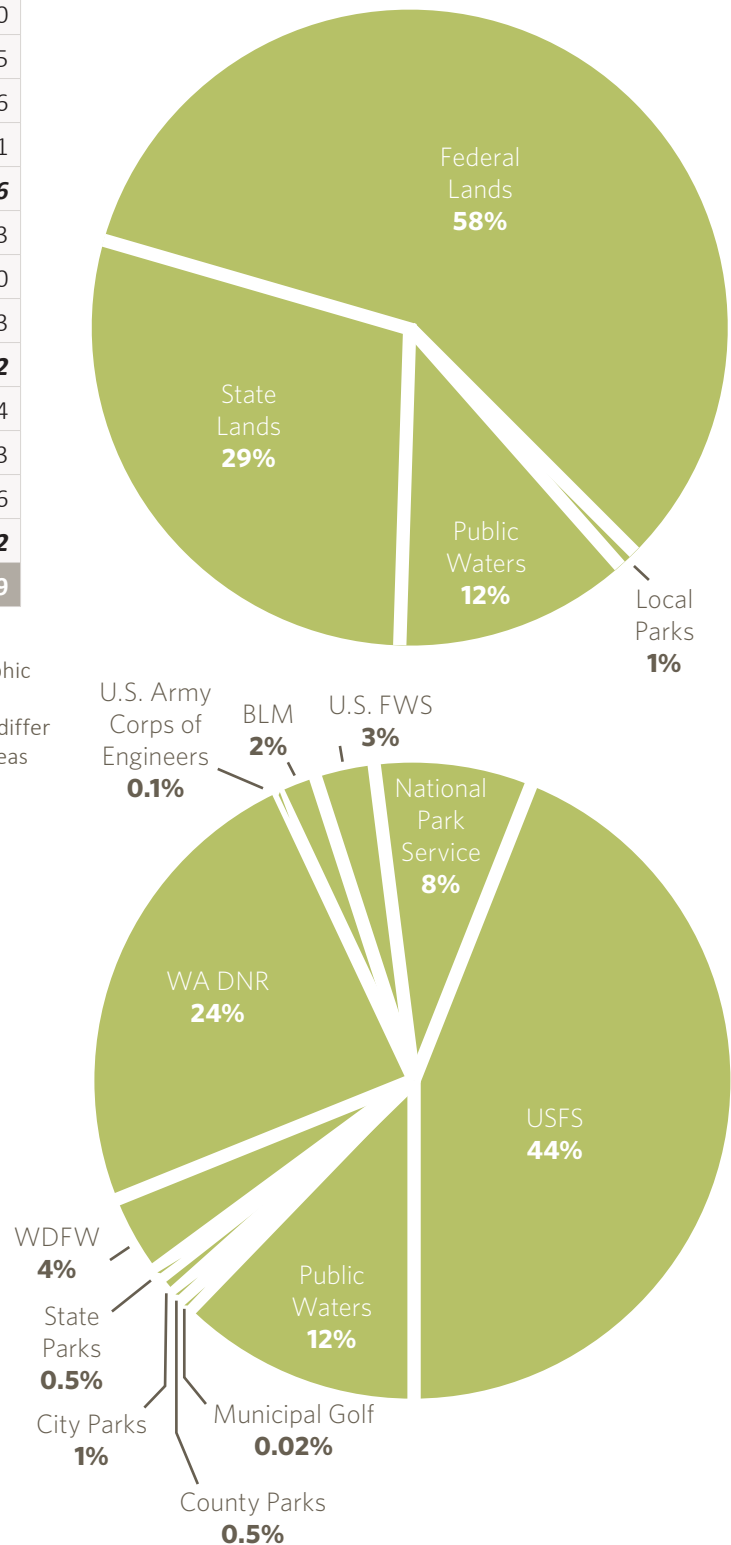
Sub-Category	Acres**
Total Federal Lands	13,627,359
National Park Service	1,958,406
United States Forest Service	10,437,470
United States Fish and Wildlife Service	761,275
Bureau of Land Management	438,126
United States Corps of Army Engineers	32,081
Total State Lands	6,802,286
Department of Natural Resources	5,737,633
State Parks	111,540
Washington Fish and Wildlife Service	953,113
Total Local Parks	326,452
County Parks	115,714
City Parks*	206,513
Municipal Golf	4,226
Public Waters	2,726,092
Grand Total	23,482,189

*Special district parks under city parks

** Acreages were calculated by Earth Economics using Geographic Information Systems (GIS) and the National Land Cover Dataset (NLCD) in reference to lands used for outdoor recreation. They differ from RCO's Public Lands Inventory as these refer uniquely to areas for outdoor recreation and the measurement methods differ.

Figure 15. Acreage of Public Recreational Lands, by Percentage

23,482,189 acres of recreational land total



Participation and Expenditures Associated with Public Lands

Overall, it is estimated that outdoor recreation trip-related expenditures associated with recreation on public lands in Washington amount to about \$10.7 billion per year (excluding equipment). Expenditures on equipment were not

included in this analysis as it is difficult to separate equipment purchases made for exclusive use on public lands. Expenditures by public institutions for construction and maintenance were also not included.

The estimates of participant days and expenditures associated with public lands are shown in Table 7. Recreation associated with public waters has the

Table 7. Participant Days and Expenditures by Public Land Type

Land Type	Participant Days (‘000s)	Expenditures** (‘000s, 2014 USD)	Per-Person Per- Day Expenditures (2014 USD)
Total Federal Lands	32,853	\$1,323,545	\$40
National Parks & National Recreational Areas	6,466	\$344,057	\$53
National Forests	12,279	\$535,494	\$44
National Wildlife Refuges	898	\$18,090	\$20
U.S. Army Corps of Engineers	12,748	\$405,772	\$32
BLM	462	\$20,133	\$44
Total State Lands	49,095	\$1,347,192	\$27
State Parks	33,059	\$699,289	\$21
State DNR Lands	10,281	\$448,359	\$44
WDFW Game Management Units	1,755	\$118,945	\$68
WDFW Wildlife Areas	4,000	\$80,600	\$20
Public Waters	101,701	\$4,630,986	\$46
Fishing	19,494	\$805,288	\$41
Motorized Boating & Sailing	19,171	\$1,641,007	\$86
Non-Motorized Paddle Sports	7,669	\$578,669	\$75
Inner tubing or floating	12,753	\$560,219	\$44
Non-Motorized Windsurfing/Surfing	1,399	\$123,153	\$88
Swimming in natural waters	26,624	\$525,818	\$20
Swimming (outdoor pools)	13,498	\$266,591	\$20
Scuba diving	1,094	\$130,242	\$119
Total Local Parks	189,915	\$1,439,096	\$8
County Parks	34,857	\$243,999	\$7
City and Special district Parks	153,371	\$1,073,597	\$7
Municipal Golf	1,687	\$121,500	\$72
Events*	44,516	\$1,439,096	\$45
Total	418,081	\$10,727,131	

* Events occurring on public lands

** Excludes equipment expenditures

highest expenditures. This category was studied by combining data from a set of activities taking place in Washington’s water bodies^v. In general, recreation in or on public water involves activities high expenditures. Visits to federal lands also involve high per day expenditures. Places like

^v Some adjustments were made to avoid double counting within the category. The number of fishing days was reduced by 25% in order to avoid double counting fishing days done from a boat. The actual number of fishing days in Washington is estimated at 26.3 million days per year. However, there may be some overlap with other categories (e.g. a lake may be located in a state park and hence swimming in natural waters may be double counted with state park visitor counts).

national parks and national forests are high profile destinations attracting visitors from far away and for longer overnight stays. Although state lands attract a large number of recreational participants, visits to these areas tend to be shorter with lower expenditures per day. Visits to local parks involved very low trip expenditures but a high frequency of visitation. Special events have a high per day expenditure rate due to a large number of overnight stays and access fees. Figure 16 through Figure 18 summarize the data for each public land type by subcategory.

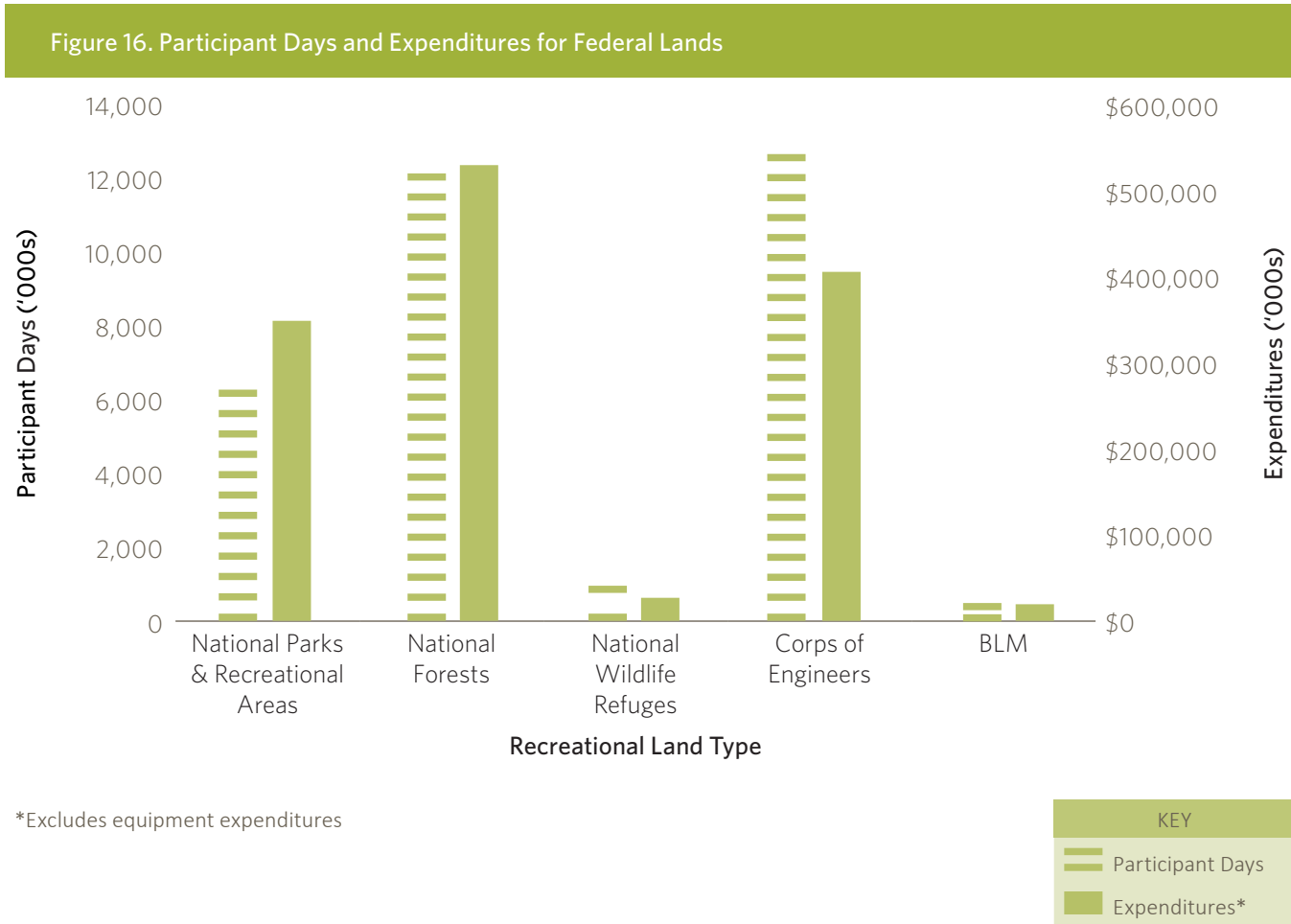


Figure 17. Participant Days and Expenditures for State Lands



*Excludes equipment expenditures

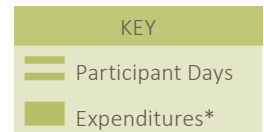
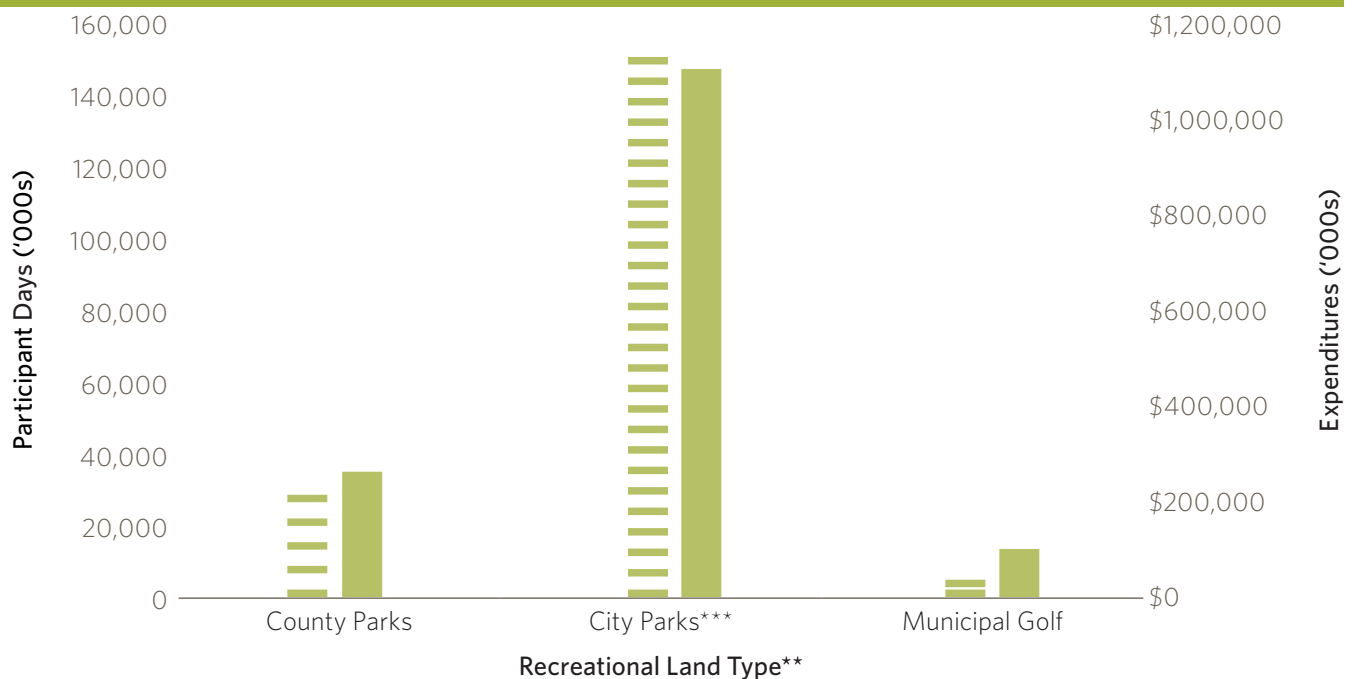


Figure 18. Participant Days and Expenditures for Local Lands



*Excludes equipment expenditures

**Excludes events occurring on public lands, which total \$1,986,000 in expenditures

*** Includes special district parks

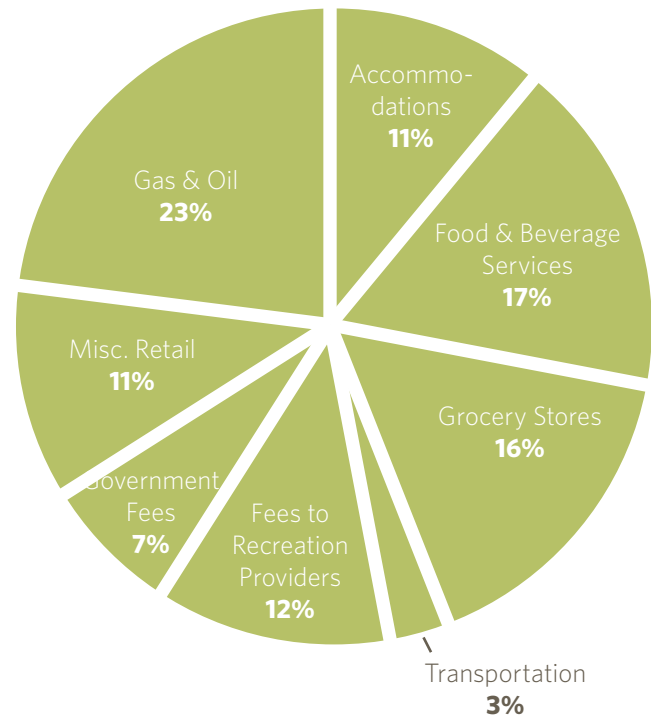


Federal and state agencies often record data on recreational use and its economic effects. For example, the U.S. Forest Service has published numerous studies on the economic characteristics of outdoor recreation in national forests. Most state parks in Washington also record numbers of visitors to each park as well as length of stay.^{vi} The number of visits to local parks and the associated expenditures were more difficult to quantify as there is often no formal attendance counts for these lands. Participant days for this land type were estimated using an average number of days that adult Washingtonians visit these types of facilities as well as primary data collected from a handful of counties and cities. Expenditure profiles were extrapolated from existing studies on specific park systems or recreational activities (for a description of the full methodology see Appendix B).

Expenditures associated with recreation on public lands can be seen in Figure 19. Expenditures on equipment were not included in this analysis as it is difficult to separate equipment purchases made for exclusive use on public lands. Expenditures by public institutions for construction and maintenance were also not included since estimates were derived from a consumer perspective. Food and beverage expenditures (both at service places and at grocery stores) totaled about a third of expenditures. Another third was spent on accommodations, fees, and recreation services. A quarter of expenditures were in oil and gasoline mostly for private vehicle use. Public transportation expenditures made up a small percentage (3%) by contrast. The remaining 11% was made up of miscellaneous retail, which is above and beyond total state equipment expenditures.

Figure 19. Expenditures Associated With Recreation on Public Lands

\$10,727,131,000 recreation related expenditures on public lands*



*Excludes equipment expenditures

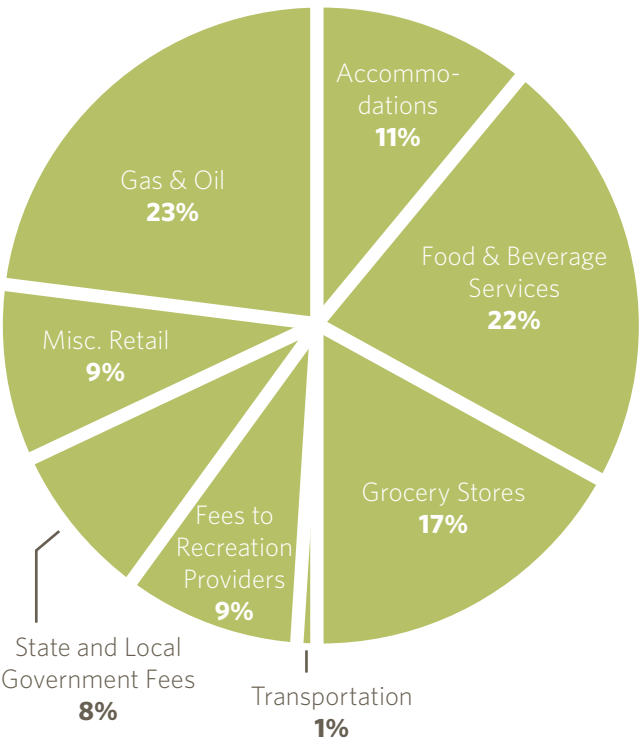
^{vi} Although visitation is reported, methods for estimating visitation vary. For some parks, visitation is estimated from a road counter, and for island state parks, it is estimated from the amount of trash picked up monthly.

A Closer Look at State Lands

Trip-related expenditures on state lands account for \$1.35 billion, about 13% of non-equipment recreation related expenditures on all public lands and 10% of non-equipment recreation related expenditures for all recreational lands. The analysis of state lands is similar to the analysis done for all public lands. Figure 20 illustrates recreation related spending on state lands. Some differences to be noted are the expenditures at food and beverage places (these are less than total public lands) and the fees to recreation providers (also less than public lands total).

Figure 20. Expenditures Associated With Recreation on State Lands

\$1,347,191,809 recreation related expenditures on state lands*



*Excludes equipment expenditures

Economic Contribution Analysis for Public Lands

The \$10.7 billion spent as a result of outdoor recreation on public lands (excluding equipment) generate substantial economic activity throughout the state. Equipment expenditures could not be included as they could not be solely attributed to recreation on public lands. According to the economic model used, trip-related expenditures on public lands in Washington State generate \$8.3 billion in direct contributions from in-state sales. This spending, in turn, results in other in-state sales of \$2.3 billion to support the production of the purchased goods and services (indirect contributions). The associated household wages result in additional sales of \$3 billion (induced contributions). In total, economic contributions resulting from outdoor recreation on public lands throughout the state amount to \$13.6 billion (Table 8). Multiplier effects are greater than that for all lands due in part to the exclusion of retail sales (equipment) characterized by significant leakages.

Table 8. Economic Contribution from Public Recreational Lands	
Contribution	Total ('000s, 2014 USD)*
Direct	\$8,297,740
Indirect	\$2,294,417
Induced	\$3,013,100
Total	\$13,605,257

*Excludes equipment expenditures

The top eight economic sectors benefiting from these expenditures, once margins and outflows of goods and services are taken into account, are shown in Table 9. These sectors make up more than half of the total in-state sales linked to the public land recreation economy of Washington State. Food and beverage places are the largest beneficiary of outdoor recreation expenditures, followed by wholesale trade, and by hotels and motels. The expenditures analyzed in this section do not include equipment expenditures.

Table 10 shows some general categories of state and local taxes receiving revenue from the estimated expenditures. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services. Total tax contributions to state and local governments amount to \$1.2 billion.

A total of 122,562 jobs, or about 62% of all outdoor recreation jobs, are associated with expenditures for outdoor recreation on public lands. This estimate includes both full-time and part-time jobs. Table 11 shows the sectors where most employment occurs.

Table 9. Economic Contribution by Economic Sector, Public Lands

Sector	Total* ('000s, 2014 USD)
Food and beverage places	\$2,018,404
Wholesale trade businesses	\$1,164,232
Hotels and motels	\$1,045,563
Other amusement and recreation industries	\$967,009
Petroleum refineries	\$910,951
Retail Stores – Miscellaneous	\$552,772
Retail Stores - Gasoline stations	\$547,002
Retail Stores - Food and beverage	\$534,936

*Excludes equipment expenditures

Table 10. Local and State Tax Contributions, Public Lands

Category	Total ('000s, 2014 USD)
Tax on Production and Imports	\$1,187,661
Households	\$19,856
Employee Compensation	\$7,496
Corporations	\$883
Total	\$1,215,897

Table 11. Employment Associated with Public Land Recreation, By Sector

Sector	Employment
Food and beverage places	29,415
Other amusement and recreation industries	17,411
Retail Stores - Miscellaneous	10,205
Hotels and motels	7,924
Retail Stores - Food and beverage	6,951

Expenditures and Economic Contributions in Counties Resulting From Recreation on Public Lands

Outdoor recreational activity on all public lands and their associated expenditures were calculated at the county level. The methodology for calculating these estimates was the same as that used for all the recreational lands, with an exclusive focus on public lands and the exclusion of equipment. Total expenditures for all public lands by county can be seen in Figure 21. Expenditures for total recreation followed a nearly identical pattern.

The contributions of these expenditures to the counties' economies were estimated based on county-specific models. Indirect and induced contributions as well as local job creation were estimated using IMPLAN data on industrial make-up, expenditure patterns, and trade flows of each county. The results for the counties are presented in Appendix H. Multipliers at the county level are lower because of the smaller size of counties' economies, resulting in many of the goods and services purchased within a county being sourced from out of the county. Multipliers for the ratio of expenditures to total contributions range between a low of 0.36 in Ferry County and a high of 1.24 in Spokane County. Job generation ranges between a low of 78 jobs in Wahkiakum County

Figure 21. Total Expenditures by County Resulting From Recreation on Public Lands



*Excludes equipment expenditures

and a high of 27,000 jobs in King County. The sum of all of the counties' contributions resulting from recreation on public lands is less than contributions for the public lands state-wide since county models do not capture inter-county and state level interactions.

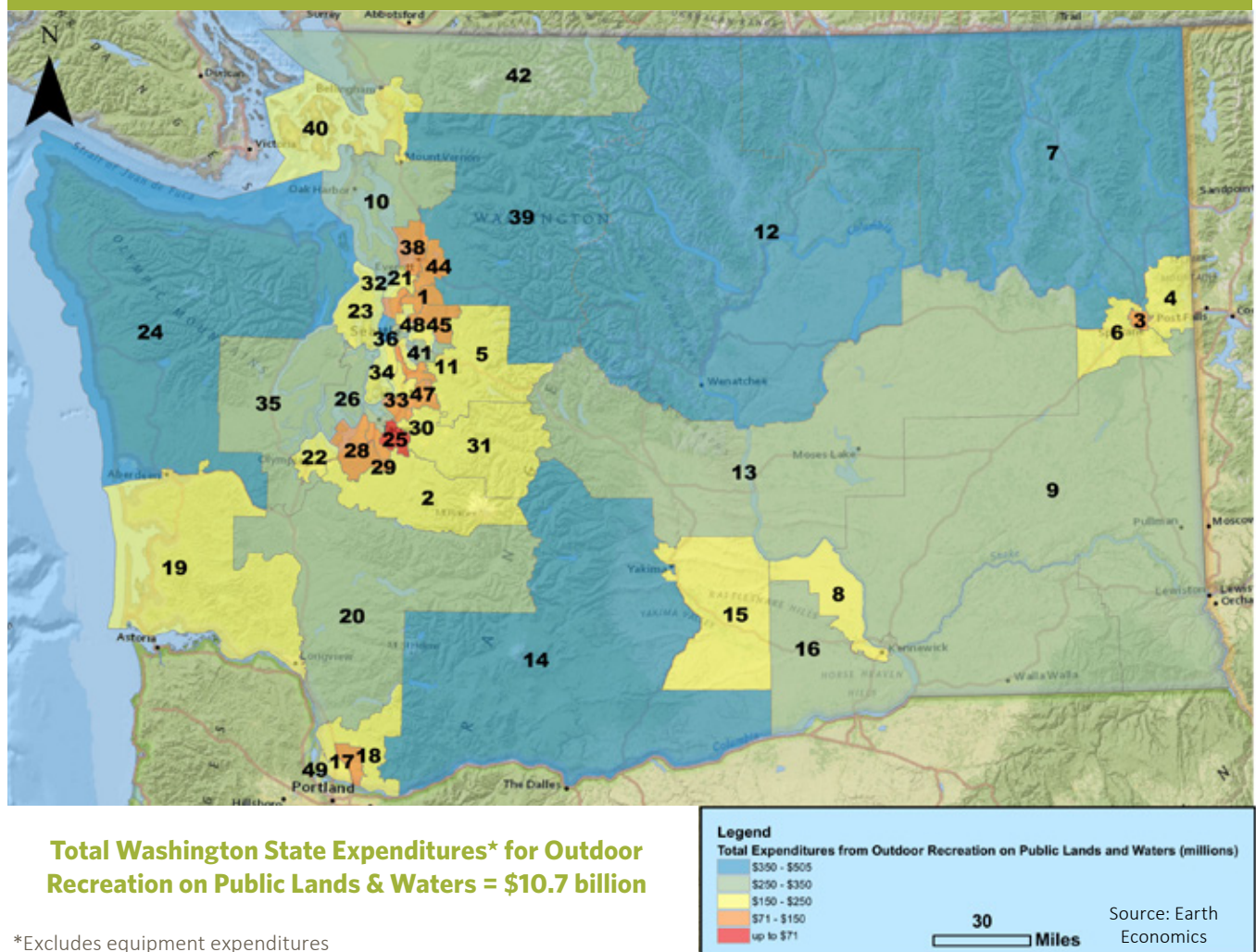
Legislative District expenditures in Public Recreational Lands

Recreational trip expenditures were also calculated at the legislative district level. Expenditures at the legislative district level were derived through a GIS overlay of legislative district boundaries on recreation jurisdictions. The distribution of expenditures by legislative district can be seen in Figure 22. Equipment expenditures are not included.

Expenditures by the legislative district level ranged from \$70 million in Legislative District 25 to \$503 million in Legislative District 36. Average expenditures at the legislative district level were \$219 million. There is not much variation in population between legislative districts, however, some legislative districts benefited greatly from outdoor recreation because of out-of-region visitors. The total number of expenditures by recreational land type at the legislative district level can be seen in Appendix G.

Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 22. Total Expenditures by Legislative District Resulting From Recreation on Public Lands



CHAPTER 4

Expenditures and Contributions of Private Outdoor Recreation Lands

Chapter 4 Highlights

- Only a limited number of private lands had data complete enough for this analysis: timberlands, private businesses for horse-riding, private golf sites, and ski areas.
- Outdoor recreation occurring on private campgrounds, private rural lands, private vacation properties, backyards, and other private property were not included in this analysis.
- A conservative estimate of \$1.9 billion is spent every year as a result of recreational trips to private lands (excluding equipment), which generates \$2.6 billion in total economic contribution throughout the state.

Participation and Expenditures in Private Recreational Lands

Figure 23 illustrates the breadth and ubiquity of private recreation providers in Washington State.¹ These and other privately held lands available for outdoor recreation total about 18 million acres.² About 70% of the marine shoreline is privately owned.³ Washington's Fish and Wildlife Department permits hunting access to 1 million acres of private land through land owner agreements.⁴ Other significant private recreation sectors are privately managed camping sites, water parks, private vacation properties, race tracks, gardening and landscaping, and the growing sector of agro-tourism. Unfortunately, data describing behavior and expenditures related to recreation on private lands is not easily available for public research. As a result, only a limited number of private lands were included in this study: private timber companies, ski

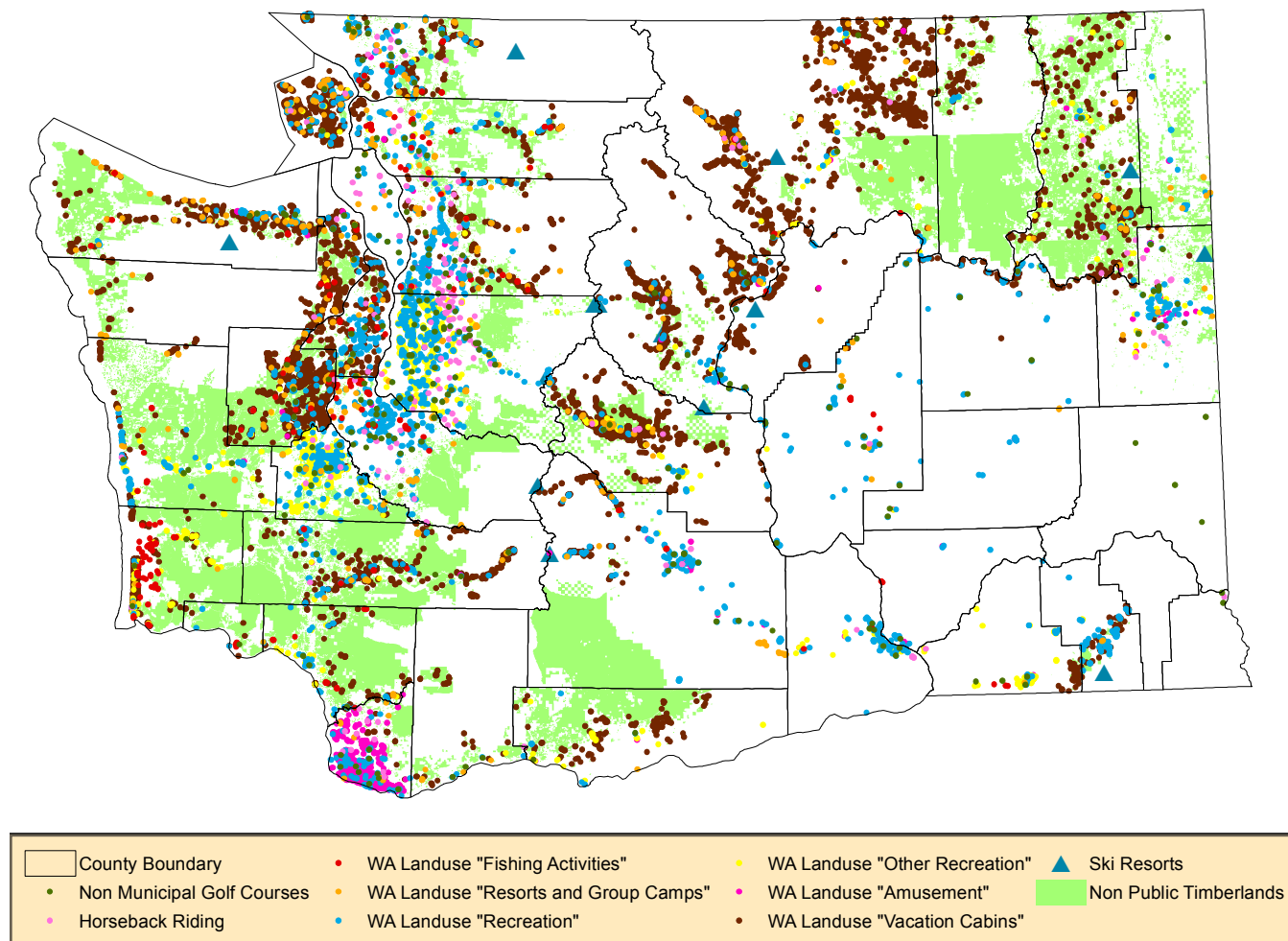
resorts managed by private entities,^{vii} horseback riding-related businesses, and non-municipal golf courses. Therefore the expenditure estimations and associated effects of private recreation in this study should be considered underestimations and interpreted with caution.

vii Ski areas are generally lands leased from national forests and managed by private entities.



Hiking in the snow, image credit: RCO

Figure 23. Private Lands Available for Outdoor Recreation in Washington



*Derived 2010 Washington State Landuse⁵ and Google Earth 2014

Table 12. Expenditures and Participation in Outdoor Recreation on Private Lands

Land Type	Participant Days ('000s)	Expenditures** ('000s, 2014 USD)	Average Per-Person Per-Day Expenditures (2014 USD)
Horseback Riding	12,633	\$757,992	\$60
Private Golf	8,357	\$601,714	\$72
Private Timberland Recreation	4,859	\$257,028	\$53
Skiing	2,097	\$317,226	\$151
Private Lands Total*	27,946	\$1,933,961	

*A limited number of private lands were included in this analysis

**Excludes equipment expenditures

This analysis estimates that this sample of private lands hosts about 27.9 million participant days per year. Expenditures on these private lands total about \$1.9 billion every year. Equipment expenditures are not included as they could not be assigned exclusively to private land use. The relative frequency and specific contribution of the different categories under private land recreation can be seen in Table 12.

Horseback riding, though allowed on some public lands, requires businesses and facilities managed by private agents. Golfing sites, regardless of public access or private membership, include only those that are managed by private entities (municipal courses were counted under “public lands”). Average expenditures for golfing were conservatively estimated at \$72 per day.

There are about 9.4 million acres of privately held timberland in Washington, which we estimate to host over 4.8 million participant days every year.⁶ These lands, which are often managed by large timber companies, offer a wide array of recreational activities. Some of the most popular activities include hiking, hunting, fishing, camping, and off highway vehicle (OHV) use. Expenditure calculations for private timberlands were based on expenditure profiles for national forests, leading to an estimate that, on average, each participant day on private timberlands generates \$53 in expenditures.

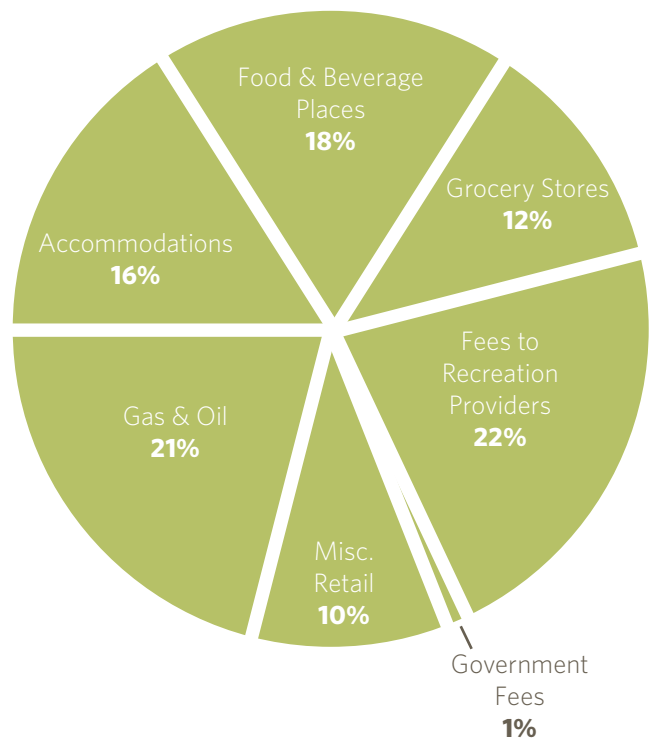
Downhill skiing generally happens on land leased from national forests managed by private entities. On average, a day of skiing attracted \$151 in expenditures. Skiing outside the thirteen major resorts is not included therefore the numbers estimated here are conservative.

Figure 24 shows the average type of expenditures incurred within private lands. Overall, recreation on private lands had the highest amount of recreational fees incurred. Skiing, golfing, and recreation in timberlands^{viii} tend to involve high access or entrance fees. Expenditures on gasoline were close behind, followed by food services and drinking places. These expenditures are aggregated in general categories here but in reality they involve a number of diverse actors and businesses.

viii Not all private timberland owners charge access fees

Figure 24. Expenditure Categories Resulting From Recreation Occurring on Private Lands

\$1,933,961,000 recreation related expenditures* on private lands**



*Excludes equipment expenditures

**A limited number of private lands were included in this analysis

The Economic Contribution of Recreation on Private Lands

The \$1.9 billion trip-related expenditures resulting from outdoor recreation on private lands in Washington State generates substantial local economic activity, as demonstrated by the economic contribution analysis. This analysis was carried out using region-specific IMPLAN models, depicting the industrial make-up of a region, trade flows, and spending patterns. According to these parameters, expenditures resulting from recreation on private recreational lands generate about \$1.6 billion in direct contributions from in-state sales. These resulted in \$444 million in indirect contributions. Indirect contributions include supply chain activities like the purchase of materials by manufacturers to produce final goods and services. Purchases made through household wages related to the affected industries totaled \$568 million (induced contributions). In total, economic contributions to the state totaled \$2.6 billion for the private lands included in the analysis (Table 13). Multiplier effects were larger for private lands (in comparison to all lands or public lands) as a result of higher expenditures on fees and accommodation services, which trickle more directly to the local economy.

The top eight economic sectors benefiting from expenditures associated with recreation on private recreation lands in Washington State are shown in Table 14. These are the sectors where purchases are flowing to once they enter the local economy. The sectors outlined make up more than half of the total in-state sales linked to the private land outdoor recreation economy. As illustrated below, recreational industries managing these activities were the largest beneficiaries, followed by food and beverage places, followed by hotels and motels. The expenditures analyzed in this section do not include equipment expenditures.

Table 15 shows some general categories of state and local tax revenues resulting from the estimated expenditures associated with recreation

Table 13. Economic Contributions from Private Recreational Lands

Contribution	Total* ('000s, 2014 USD)*
Direct	\$1,595,086
Indirect	\$444,009
Induced	\$568,815
Total	\$2,607,911

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.

Table 14. Economic Contributions by Economic Sector, Private Lands

Sector	Total* ('000s, 2014 USD)
Other amusement and recreation industries	\$427,863
Food and beverage services	\$384,513
Hotels and motels	\$278,540
Wholesale trade businesses	\$193,638
Petroleum refineries	\$149,448
Retail Stores - Miscellaneous	\$89,561
Retail Stores - Gasoline stations	\$88,504
Retail Stores - Food and beverage	\$77,051

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.

Table 15. Local and State Tax Contributions, Private Lands

Category	Total ('000s, 2014 USD)*
Tax on Production and Imports	\$254,723
Households	\$3,737
Employee Compensation	\$1,456
Corporations	\$167
Total	\$260,083

on private lands. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services at retail places. Total tax contributions are estimated to be approximately \$260 million.

A total of 25,817 jobs were supported as a result of expenditures associated with recreation on private lands managed for outdoor recreation in Washington State. This is 13% of the total number of outdoor recreation supported jobs estimated in this study. This estimate includes both full-time and part-time jobs. Table 16 shows the sectors where the most employment occurs. The category of “other amusement and recreation industries” refers to employment in private golf courses, ski resorts, timberlands, or private horse riding businesses.

The results presented here are reflective of the selected activities and types of lands included under this category and should be considered an underestimate. Behavioral surveys, real estate trends, and usage data concerning outdoor recreation on private lands would all be required for a more complete assessment.

Table 16. Employment Associated with Outdoor Recreation, Private Lands*

Sector	Employment
Other amusement and recreation industries	7,704
Food services and Beverage places	5,604
Hotels and motels	2,111
Retail Stores - Miscellaneous	1,653
Retail Stores - Food and beverage	1,001

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.



Horseback riders, image credit RCO

CHAPTER 5

Economic Impact from Out-of-State Visitors to Washington's Outdoor Recreational Lands

Chapter 5 Highlights

- Out-of-state visitors accounted for an estimated 12% of participant days and 27% of total outdoor recreation spending, not including equipment purchases.
- Every dollar spent by an out-of-state traveler in Washington generates \$1.36 in economic impacts.
- Visitors to National Park Service lands accounted for 48% of out-of-state participant days and 77% of total National Park Service related expenditures.
- Impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

The economic impact analysis differs from the economic contribution analysis in that it estimates the net change to Washington's economy attributed to the new money flowing into the state as a result of recreation related spending from out-of-state visitors. The impact represents the economic activity that would be lost if the recreational lands were not there.⁷ If the current outdoor recreational lands did not exist, it is assumed that these visitors would go somewhere else and the revenue flows from their visit would go with them. Spending by local residents is not included in the economic impact analysis since it is assumed that the money spent by residents would stay in Washington's local economy through direct substitutions to other types of local expenditures. The analysis does not include Washingtonians that would travel out-of-state in the absence of outdoor recreation opportunities.



River rafting, image credit: Mike Ramsey

Participant Days and Expenditures by Outdoor Recreation Visitors

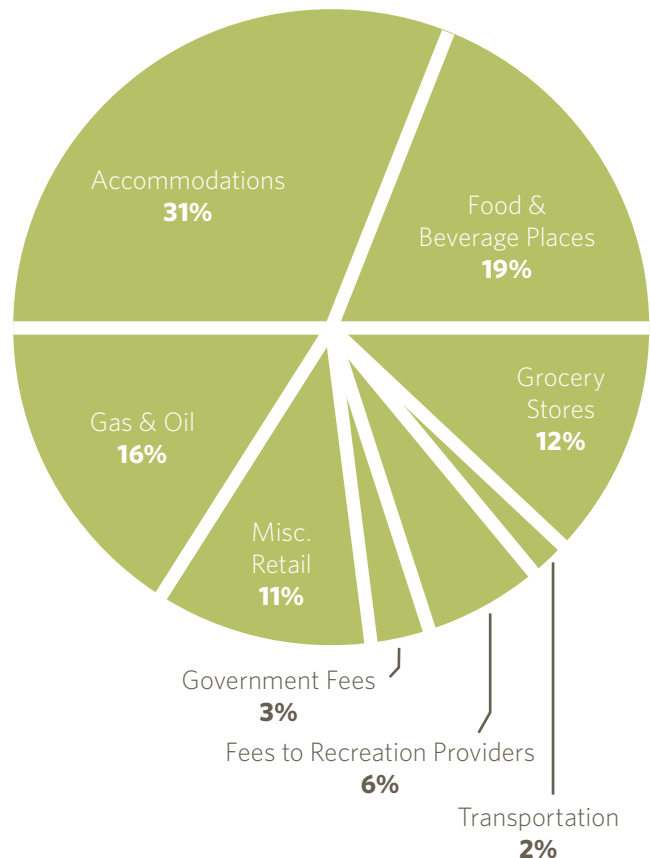
Out-of-state visitors spend an estimated \$3.4 billion per year in Washington State. These expenditures are made during an estimated 55.7 million participant days. Equipment expenditures are assumed to be made in the participant's home state. Out-of-state visitors account for about 12% of all participant days and about 27% of all trip-related expenditures.

Participant days and expenditures were estimated for each recreational land category studied (see Table 17). In some cases, land managers keep records of the origin of their visitors (most federal land and some state land managers). In other cases, the number of out of state visitors had to be extrapolated from studies or estimates provided by recreation activity associations (see Appendix G for full methodology). Expenditures often assumed overnight expenditure rates.

The types of expenditures these visitors make can be seen in Figure 25. It is not surprising that two thirds of total expenditures are for accommodations, food and beverage places, and gas and oil since out-of-state visitors are often away from home and on multi-day visits.

Figure 25. Expenditures by Out-of-State Visitors

\$3,441,158,000 recreation related expenditures by out-of-state visitors*



*Equipment expenditures are not included in the out-of-state calculations

Table 17. Out-of-State Visitors and Associated Recreation-Related Expenditures* by Land Type

Land Type	Total Participant Days (‘000s)	Expenditures* (‘000s, 2014 USD)	Per-Person Per-Day Expenditures (2014 USD)
Federal Lands Total	9,207	\$621,147	\$67
National Parks & National Recreational Areas	3,091	\$263,827	\$85
National Forests	2,487	\$208,730	\$84
National Wildlife Refuges	307	\$13,264	\$43
Corps of Engineers	3,276	\$130,854	\$40
BLM	46	\$4,473	\$97
Washington State Lands Total	6,227	\$369,775	\$59
State Parks	3,769	\$216,007	\$57
State DNR Lands	1,028	\$86,303	\$84
WDFW Game Management Units	70	\$8,713	\$124
WDFW Wildlife Areas	1,360	\$58,752	\$43
Public Waters Total	9,303	\$692,440	\$74
Fishing	1,657	\$244,193	\$147
Motorized Boating & Sailing	1,342	\$154,466	\$115
Non-Motorized Paddle Sports	767	\$77,814	\$101
Inner tubing or floating	1,275	\$75,329	\$59
Non-Motorized Windsurfing/Surfing	140	\$16,560	\$118
Swimming in natural waters	2,662	\$70,713	\$27
Swimming (outdoor pools)	1,350	\$35,851	\$27
Scuba diving	109	\$17,514	\$160
Local Parks Total	18,992	\$157,028	\$8
County Parks	3,486	\$24,400	\$7
City and Special District Parks	15,337	\$107,360	\$7
Municipal Golf	169	\$25,269	\$150
Events**	8,903	\$1,173,180	\$132
Private Lands Total***	3,102	\$427,589	\$138
Private Timberland Recreation	827	\$84,228	\$102
Skiing	176	\$72,457	\$411
Private Golf	836	\$125,136	\$150
Horseback Riding	1,263	\$145,768	\$115
Grand Total	55,734	\$3,441,158	

*Excludes equipment expenditures

**Events occurring on public lands

***A limited number of private lands were included in this analysis

Economic Impact from Outdoor Recreation Associated with Out-of-State Visitors

The \$3.4 billion spent in outdoor recreation in Washington by out-of-state visitors generates substantial economic activity that would otherwise not have occurred. The economic impact analysis illustrates the total increase of monetary flows in the state as a result of these expenditures. This analysis was carried out using region-specific IMPLAN models, depicting the industrial make-up of a region, trade flows, and spending patterns. According to these parameters, expenditures by outdoor recreation visitors to Washington State generate \$2.7 billion in revenue from in-state sales (direct impacts). These give way to other in-state sales of \$874 million to support the production of the purchased goods and services (indirect impacts). The associated household wages resulted in additional sales of about \$1 billion (induced impacts). In total, the economic impact to the state amounted to \$4.6 billion (Table 18). The total economic activity generated surpasses the expenditures made through its multiplier effects.

The top eight economic sectors benefiting from expenditures by out-of-state visitors in Washington State are shown in Table 19. These are the sectors where purchases are flowing to once they enter the local economy. The sectors outlined in Table 19 make up more than half of the total in-state sales linked to visitors. Hotels and motels were the largest beneficiaries, followed by food and drinking places. The expenditures analyzed in this section do not include equipment expenditures and represent expenditures across all land types.

Table 18. Economic Impact from Out-of-State Visitors

Impact	Total* ('000s, 2014 USD)
Direct	\$2,745,118
Indirect	\$874,705
Induced	\$1,048,627
Total	\$4,668,450

*Excludes equipment expenditures

Table 19. Economic Impact of Out of State Visitors by Economic Sector

Sector	Total* ('000s, 2014 USD)
Hotels and motels	\$932,101
Food and beverage places	\$670,431
Wholesale trade businesses	\$306,531
Petroleum refineries	\$235,289
Retail Stores – Miscellaneous	\$177,422
Other amusement and recreation industries	\$142,509
Retail Stores - Food and beverage	\$139,802
Real estate establishments	\$134,220

*Excludes equipment expenditures

Table 20 shows some general categories of state and local taxes receiving revenue from the observed expenditures. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services at retail places. Total state and local tax impacts currently stand at \$317 million.

A total of 46,430 jobs or 23% of total outdoor recreation jobs are supported in Washington State as a result of expenditures by out-of-state visitors. This estimate includes both full-time and part-time jobs and does not distinguish between them or identify the number of hours worked within each job. Table 21 shows the sectors where the most employment occurs. Food and beverage places generate the most jobs.

The economic impact analysis identifies new revenue brought into Washington State as a result of existing outdoor recreational lands. In this case, the total economic impact is greater than the gross expenditures made by out-of-state visitors (see Table 22). Expenditures in accommodation and service industries tend to trickle down to the local economy more than expenditures on other sectors such as retail stores (more common on the other contribution analyses). The impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

Table 20. Local and State Tax Impact from Out-of-State Visitors

Tax	Total ('000s, 2014 USD)
Tax on Production and Imports	\$307,483
Households	\$6,933
Employee Compensation	\$2,641
Corporations	\$273
Total	\$317,330

Table 21. Employment Associated with Out-of-State Visitors

Sector	Employment
Food and beverage places	10,555
Hotels and motels	8,288
Retail Stores – Miscellaneous	3,890
Other amusement and recreation industries	2,766
Other Federal Government enterprises	2,396

Table 22. Economic Impact Resulting From Recreation by Out-Of-State Visitors

	Total
Expenditures by out-of-state visitors	\$3,441,157,000
Total Economic Impact	\$4,668,450,000
Multiplier	1.36

CHAPTER 6

Ecosystem Services on Outdoor Recreational Lands in Washington

Chapter 6 Highlights

- Over 19 million acres of public land for outdoor recreation were included in an analysis of ecosystem services.
- The value of outdoor recreation as a singular ecosystem service in Washington State is estimated as a consumer surplus of about \$19.6 billion to \$31.2 billion per year beyond recreation expenditures.
- Three additional ecosystem services were valued, including water quality, habitat, and aesthetic beauty into this non-market analysis. These services are estimated to be between \$115 billion and \$217 billion per year.
- The combined total of these non-market benefits is between \$134 billion and \$248 billion per year.

Introduction to Ecosystem Services

In addition to the monetary flows associated with outdoor recreation in Washington's economy, there are a number of other benefits provided that are not accounted for within traditional economic indicators. These benefits are important to people's wellbeing and to their economic and behavioral decisions. For example, people value recreation above and beyond what they actually pay for it. This situation is generally referred to as consumer surplus in economics. Outdoor recreation also keeps us healthy and in some cases happy, aspects of wellbeing that go beyond economic accounting. These benefits are made possible by Washington's natural spaces where outdoor recreation happens.



View from a hike, image credit: Lola Flores

Ecosystem services are defined as the benefits people derive from nature, free of charge. Trees, water, and animals provide goods and services such as breathable air, drinkable water, nourishing food, flood risk reduction, waste treatment, and stable atmospheric conditions. These are all examples of ecosystem services.

In this chapter, the additional benefits that outdoor recreation provides are examined. These benefits include the satisfaction and increase in general quality of life people get from engaging in these activities. There are ways to translate their value into market value approximations, which are separate from the economic expenditures.

Earth Economics uses a framework of 21 ecosystem services across 4 broad categories adapted from the taxonomy laid out in de Groot et al.⁸ The four general categories include provisioning services, regulating services, supporting services, and information services (see Figure 26). See Appendix J for comprehensive definitions of all 21 ecosystem services.

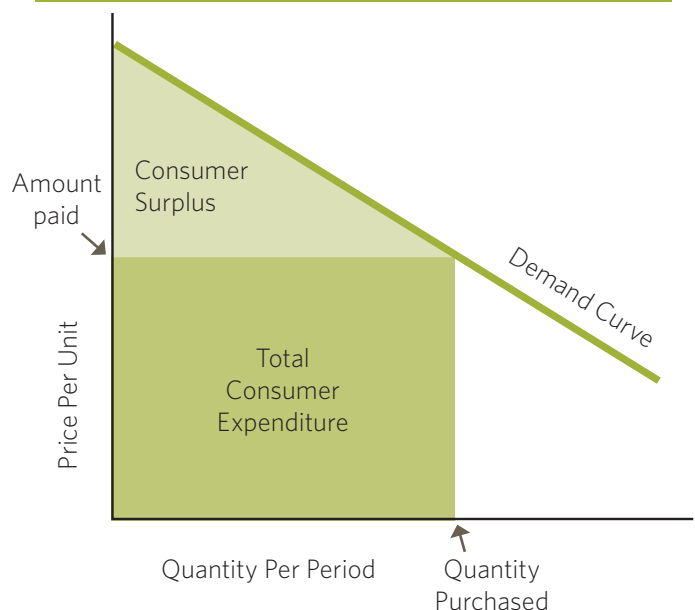
Figure 26. The Four General Categories of Ecosystem Services

PROVISIONING SERVICES	Provide basic goods including food, water and materials.
REGULATING SERVICES	Benefits obtained from the natural control of ecosystem processes.
SUPPORTING SERVICES	Provide refuge and reproduction habitat to wild plants and animals.
INFORMATION SERVICES	Provide humans meaningful interaction with nature.

Recreation as an Ecosystem Service

Though it is difficult to value non-market benefits, economists have developed many methods to estimate them. The value held by the consumer of recreation above what they may have to pay for it is what economists refer to as “consumer surplus,” which is the difference between the maximum price consumers would be willing to pay and what they actually pay for it (see Figure 27). This difference is a gain for the consumer since they are paying less than the value they place on that benefit. For example, a Washingtonian may be willing to pay \$50 to go hiking for one day on the Olympic Peninsula. If the actual cost of the hiking trip is only \$20, then the hiker gains a net economic benefit (consumer surplus) of \$30 per day. Even though they are obtained free of charge, the existence of extra benefits is strategic in their decision to visit an attraction or engage in an activity.

Figure 27. Consumer Surplus Versus Consumer Expenditures



Other Ecosystem Services

This analysis includes the valuation of three additional ecosystem services closely related to the recreational experience on public lands: aesthetic information, wildlife habitat, and water quality.

Aesthetic Information

Aesthetic Information is defined as enjoying the sights, sounds, smells, and presence of nature. This ecosystem service is often valued through property sales and hence reflects the added value to those who live close to outdoor recreational areas. Properties located on the edge of a pristine lake are often more expensive than non-lakeside properties in the same area. One half of the respondents to a National Association of Realtors survey reported they would pay 10% more for a house located near a park or open space, while the actual premium paid for homes directly adjacent to parks is 16% higher.⁹

Wildlife Habitat

Recreational activities like wildlife viewing or hunting would not exist without the ecosystem service of habitat and nursery. Ecosystems provide safe havens for species essential to the maintenance and appeal of recreation areas. Degraded habitats can negatively affect recreation experiences and park attendance. Habitat can be thought of as providing production value, which can be similarly valued to factors of production for a business or industry.

Water Quality

Water quality enhances recreation by providing clean water. No one wants to swim in coliform bacteria or red tides. Beach closures prohibit some recreational activities completely and can negatively affect an area's reputation in the long term. Some ecosystems and species, like shellfish, are able to provide clean water by removing pollutants and sediment from water or in the case of forests keeping sediment out of water in the

first place. Natural lands filter and control the flow of water in lieu of built infrastructure like water purification facilities, levies, and storm water systems. The cost of replacing these functions with built infrastructure, or replacement value, is one way to value water quality.

Methodology

The Benefit Transfer Method

We used benefit transfer methodology (BTM) to estimate the ecosystem service values for Washington State. BTM estimates the economic benefit of ecosystem services by applying derived values from previously published valuation studies to a new, sufficiently similar, study area. These published studies utilize a variety of primary valuation techniques. Some methods like Contingent Valuation or Travel Cost measure the benefits consumers derive above and beyond what they would normally pay (i.e. consumer surplus), while other methods value ecosystem services through market data. See Table 23 for a full list of primary valuation methods that were used in the transfer.

Additionally, the primary studies used in BTM are conducted in a number of different socioeconomic, biophysical, temporal, and geographic contexts. Because of these variables, care was taken to ensure transferred values accurately reflect the study area. Any study determined not to be a good fit with our study area was omitted from analysis.

Benefit Transfer Methodology for Recreational Values

Consumer surplus estimates for recreational activities were derived from a recreation value database developed by Dr. Randall Rosenberger, Professor of Environmental Economics at the Oregon State University.¹⁰ Primary valuation methods included stated preference and revealed preference methods, specifically travel cost and contingent valuation methods.

Table 23. Primary Valuation Methods			
Valuation Method	Description	Example	Value
Market Approaches			
Market Price	Valuations are directly obtained from the amounts people pay for the service or good on a private market.	Timber is often sold on a private market.	Total revenue
Replacement Cost	Cost of replacing ecosystem services with man-made systems.	The cost of replacing a watershed's natural filtration services with a man-made water filtration plant.	Value larger than the current cost of supply
Avoided Cost	Value of costs avoided or mitigated by ecosystem services that would have been incurred in the absence of those services.	Wetlands buffer the storm surge of a hurricane, reducing damage along the coast.	Value larger than the current cost of supply
Production Approaches	Service values are assigned from the impacts of those services on economic outputs.	Improvement in watershed health leads to an increase in commercial and recreational salmon catch.	Consumer surplus, producer surplus
Revealed Preference Approaches			
Travel Cost	Uses variations in travel cost to trace out the recreation demand curve, from which the consumer surplus is calculated.	Recreation areas attract tourists whose value placed on that area must be at least what they were willing to pay to travel to it.	Consumer surplus
Hedonic Pricing	The value of a service is implied by what people will be willing to pay for the service through purchases in related markets.	Housing prices along the coastline tend to exceed the prices of inland homes.	Consumer surplus
Stated Preference Approaches			
Contingent Valuation	Value for service demand elicited by posing hypothetical scenarios that involve some valuation of land use alternatives.	People are willing to pay for preservation of wilderness for aesthetic and other reasons.	Consumer surplus

The annual economic benefit of recreation as an ecosystem service was calculated in two steps. First, values per participant day were determined for a set of activities happening in natural landscapes (see appendix D for the full analysis). Secondly, values by land type were calculated based on the number of participant days in each land type under public jurisdiction. As we did not have data supporting activity participation per land type, we used the average value for all participant days per land type, applying it to the total number of participant days.

Economic Value of Other Ecosystem Services

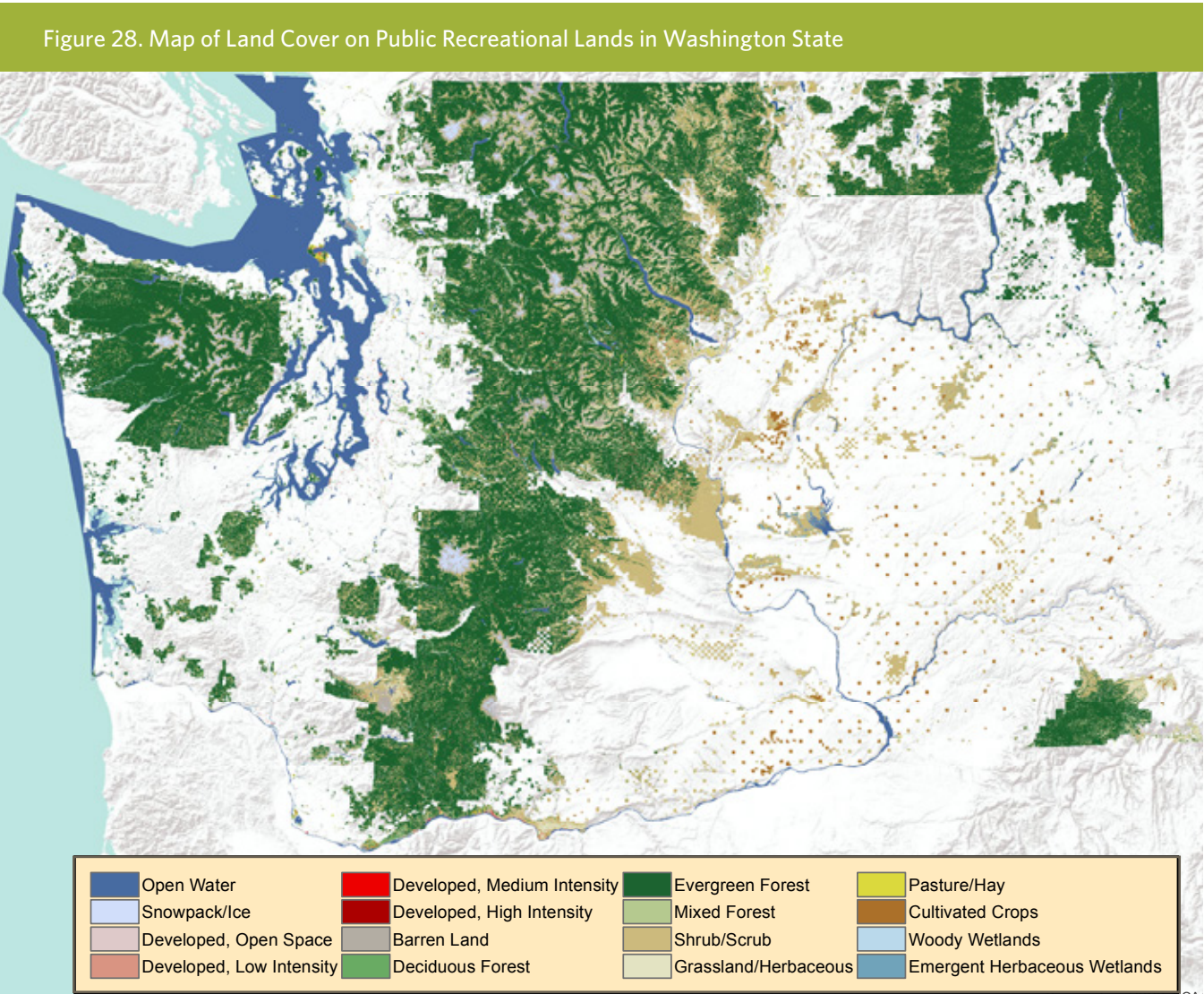
The values of other ecosystem services which support recreation were estimated using Earth Economics' Ecosystem Valuation Toolkit (EVT). EVT is maintained by Earth Economics and is a comprehensive database of published, peer-reviewed primary ecosystem valuation studies. The unit of valuation used in this database is U.S. dollar per acre per year for ecosystem services which occur on specific land cover types.

Geographic Information Systems (GIS) was used to determine the number of acres of different ecosystems on each public recreational land type studied (federal, state, and local lands) (Table 24). These ecosystems, or land covers,

were categorized using the National Land Cover Dataset (NLCD).¹¹ Public waters and beaches were also calculated separately (Table 25). Private lands were not included in this analysis due to limited data availability within this category.

Table 24. Area of Land Cover Types Divided Among Federal, State, and Local Jurisdictions in Washington State				
Ecosystem	NLCD Code(s)	Federal (Acres)	State (Acres)	Local (Acres)
Forest	41,42,43	9,021,096	2,019,224	194,260
Grassland	71	3,059,334	1,767,590	45,668
Cultivated Land	81, 82	49,339	207,366	7,253
Wetlands	90, 95	136,759	124,489	14,732
Total		12,266,528	4,118,669	261,913

Table 25. Freshwater, Marine, and Beach Areas in Washington State		
Ecosystem	NLCD Code(s)	Public Water Acres
Open Freshwater	11	2,378,537
Marine	11	238,676
Beach	31	108,878
Total		2,726,091



The greatest limitation to this analysis is a lack of primary valuation studies for Washington State representing the ecosystem services identified. Some land cover-ecosystem service combinations do not have any published data, therefore some services were omitted. Of course these ecosystem functions still produce value. See Appendix J for a full list of gaps in this analysis.

Ecosystem Service Value Results

The total value of recreation consumer surplus as an ecosystem service in Washington State is about \$19.6 billion per year, if estimated through land jurisdiction type (see Table 27). The results estimated by activity provide a high estimate of \$31.2 billion per year (see Appendix D). Ecosystem services that support recreation are valued between \$115 billion and \$217 billion per year. Together, recreation and the three related ecosystem services total approximately \$134 billion to \$248 billion annually in non-market benefits (Table 26). Note that these are non-market economic benefits, separate from the expenditures and contributions calculated earlier in the report.

Table 26. Summary of Non-Market Benefits on Recreational Lands in Washington State

	Low Annual Total ('000s, 2014 USD)	High Annual Total ('000s, 2014 USD)
Total Ecosystem Service Value	\$114,640,027	\$216,908,783
Total Recreation Consumer Surplus Value	\$19,573,370	\$31,192,437
Combined Total	\$134,213,397	\$248,101,220

Ecosystem Service Value of Recreation

Table 27^{ix} shows the average per day consumer surplus, participant days, and total consumer surplus per year for visits to public outdoor recreational lands in Washington State. As described previously, consumer surplus indicates the benefit consumers receive beyond what they pay.

The annual total economic benefit of recreation as an ecosystem service with this methodology is about \$19.6 billion dollars. Our results show that the consumer surplus of most activities and/or land participant days is almost the same as the economic expenditures. In other words, Washingtonians seem to value recreational activities almost twice as much as what they actually pay to participate in those activities. This result is consistent with findings from another study of national wildlife refuges in Washington.¹²

Other Ecosystem Services

As mentioned previously, we include the valuation of three additional ecosystem services which support recreation. These include aesthetic, habitat and nursery, and water quality. Together with recreation, these services are closely linked and dramatically affect the recreational experience.

Table 28 through Table 31 show the total economic value of the three additional services included on each public land cover type per land class. The economic value of ecosystem services supporting recreation total between \$115 billion and \$216 billion per year across all public lands in Washington State.

^{ix} Note that some categories have no associated consumer surplus per day values. Because this chapter focuses on ecosystem services, swimming in outdoor pools and golfing were not given consumer surplus values as this activity did not take place in a natural ecosystem. As described previously, private lands were excluded from this analysis due to lack of data. Consumer surplus for events could not be calculated using the methods described.

Table 27. Consumer Surplus of Outdoor Recreation on Public Recreational Land Types in Washington State

	Participant Days* (‘000s)	Consumer Surplus per day (2014 USD)	Consumer Surplus per year (‘000s, 2014 USD)
Federal Lands Total	32,853		\$1,809,691
National Parks & National Recreation Areas	6,466	\$44	\$287,444
National Forests	12,279	\$53	\$645,631
National Wildlife Refuges	898	\$43	\$38,890
Corps of Engineers	12,748	\$64	\$813,452
Bureau of Land Management	462	\$53	\$24,274
Washington State Lands Total	49,095		\$1,872,298
State Parks	33,059	\$38	\$1,243,189
State DNR Lands	10,281	\$26	\$266,740
WDFW Game Management Units	1,755	\$61	\$107,131
WDFW Wildlife Areas	4,000	\$64	\$255,239
Public Waters	88,203		\$3,880,613
Fishing	19,494	\$66	\$1,293,072
Motorized Boating & Sailing	19,171	\$26	\$498,135
Non-Motorized Paddle Sports	7,669	\$38	\$292,731
Inner tubing or floating	12,753	\$50	\$641,694
Non-Motorized Windsurfing/Surfing	1,399	\$50	\$70,419
Swimming in natural waters	26,624	\$38	\$1,008,316
Scuba diving	1,094	\$70	\$76,246
Local Lands	188,228		\$12,010,768
County Parks	34,857	\$64	\$2,224,216
City Parks and Special Districts	153,371	\$64	\$9,786,552
Grand Total	358,379		\$19,573,370

* Note that events and private lands were not included in this analysis, so the total number of participant days in this table differs from previous tables.

Table 28. Combined Ecosystem Service Value of NLCD Classes on Federal Lands

Land Cover	Acres	Low Annual Total ('000s, 2014 USD)	High Annual Total ('000s, 2014 USD)
Urban Greenspace	123,410	\$59,216	\$369,685
Forest	9,021,096	\$56,874,090	\$111,340,214
Grassland	3,059,334	\$24,376,014	\$38,739,361
Cultivated Land	49,339	\$217,455	\$446,484
Wetlands	136,759	\$86,854	\$4,085,538
Total	12,389,937	\$81,613,630	\$154,981,283

Table 29. Combined Ecosystem Service Value of NLCD Classes on State Lands

Land Cover	Acres	Low Annual Total ('000s, 2014 USD)	High Annual Total ('000s, 2014 USD)
Urban Greenspace	67,397	\$32,339	\$201,893
Forest	2,019,224	\$12,619,075	\$24,809,412
Grassland	1,767,590	\$14,083,716	\$22,382,418
Cultivated Land	207,366	\$1,797,612	\$3,690,035
Wetlands	124,489	\$90,659	\$3,371,107
Total	4,186,066	\$28,623,401	\$54,454,866

Table 30. Combined Ecosystem Service Value of NLCD Classes on Local Lands

Land Cover	Acres	Low Annual Total ('000s, 2014 USD)	High Annual Total ('000s, 2014 USD)
Urban Greenspace	21,203	\$10,174	\$63,514
Forest	194,260	\$1,196,215	\$2,368,828
Grassland	45,668	\$363,868	\$578,274
Cultivated Land	7,253	\$17,841	\$36,646
Wetlands	14,732	\$9,473	\$436,619
Total	283,116	\$1,597,571	\$3,483,881

Table 31. Combined Ecosystem Service Value of NLCD Classes in Public Waters

Land Cover	Acres	Low Annual Total ('000s, 2014 USD)	High Annual Total ('000s, 2014 USD)
Rivers and Lakes	2,378,537	\$609,431	\$1,366,002
Marine and Estuary	238,676	\$2,195,994	\$2,622,752
Beaches	108,878	\$27,280	\$72,042
Total	2,726,092	\$2,805,425	\$3,988,753

Other Benefits from Outdoor Recreation

It is worth noting that just as ecosystem service values extend the benefits of recreation beyond conventional economic indicators, there are also other important benefits that are not captured by the analysis conducted here. This section describes a few of these additional benefits provided by outdoor recreation.

Health Benefits

Recreation benefits human well-being by improving health, providing social experiences, and increasing happiness. Many health benefits, including physical and mental health, have been attributed to outdoor recreation.

Activities such as hiking, organized sports, biking, diving, surfing, and kayaking provide exercise that keeps us physically healthy. Research has found that children who participate in outdoor recreation have high activity levels and lower levels of obesity.¹³ Even walking keeps us healthy by providing weight loss and lowers the risks for heart disease, stroke, type 2 diabetes, depression, and some types of cancers.¹⁴ Using recreation to stay active reduces public and private health care expenses. The average difference in annual medical care costs between active and inactive people is \$250 for adults under 65 years of age and \$500 for those over 65 years of age.¹⁵ One study estimated about \$64 million in total medical care cost savings being attributable to the Seattle Park system.¹⁶

Experiencing nature, enjoying local foods, and watching wildlife can reduce stress and keep us mentally healthy. Access to green spaces reduces stress and anxiety across all demographics.¹⁷ Studies have shown that outdoor activities in parks or open spaces can benefit children with ADHD by improving concentration. Outdoor use is also linked to reduced aggression¹⁸ and better social and life skills in children and adolescents.¹⁹

In 1912, the president of the Juvenile Protection Association stated, "Recreation is the antitoxin of delinquency and the sooner it is administered the milder will be the disease and the better it will be for all the children."²⁰ The same holds true today.

Social Benefits

A 2010 survey of Washington residents found that 84% of respondents listed spending time with family and friends as a very important reason for their participation in recreational activities.²¹ The outdoors provides a venue for community events, family reunions, and retreats. Because of this, outdoor recreation is a catalyst for building interconnected communities.²²

Washington State retains and attracts human capital. Indeed, Washington retains more of its college graduates than any other state in part because of quality of life.²³ Moreover, according to a recent Puget Sound business survey, almost half of the businesses interviewed had decided to locate in Washington State because of its "the environmental surroundings and quality of life."²⁴

Countless hours of volunteer work are invested in maintaining public recreation lands. State Parks found that over 275,000 volunteer hours are clocked by individuals every year a value of time estimated between 2 and 25 million dollars.²⁵ Other researchers have shown that exposure to nature can influence priorities and our perception of values to be more community and connection focused.

Ecosystem Services and Ecosystem Health

Ecosystem health and the recreational experience are directly related. Beach closures due to high levels of toxin or bacteria in the water completely inhibit some recreation activities. Oil, chemical, and other pollution spills severely impact activities such as swimming, fishing, and boating. Although major spills are rare, even small to moderate incidents can disrupt coastal activities for several months. Incidents like this result in

fewer days of outdoor recreation, discourage out-of-state visitors, and can negatively affect human health or a recreation area's reputation in the long term.

Suppose a beach is closed for swimming due to a chemical spill. If 1,000 people use the beach to swim each day, a one-week closure results in 7,000 participant days lost. Our analysis showed that the consumer surplus for swimming in

natural waters was \$38/day. This hypothetical one-week closure would then result in a loss of \$266,000 for users. Other activities like scuba diving, surfing and other water-related activities would also be banned, making the losses even higher. Meanwhile, habitat and the natural beauty of the beach are severely impaired, decreasing the value of other ecosystem services.



Shi Shi beach trail, image credit: creative commons no derivatives image by Brian Holsclaw

CHAPTER 7

Conclusions and Further Research

This study conducted an extensive review of existing literature and data on outdoor recreation in Washington State. Through primary and secondary data collection, GIS analysis, evidence-based extrapolation, and transparent assumptions we included nearly all major outdoor recreation activities and destinations. While this report quantifies significant and diverse consumer expenditures for outdoor recreation, it shows that people derive value from recreational experiences and areas far beyond what they pay for. Beyond recreation itself, we show that recreational land and waters also provide other outstandingly valuable goods and services including aesthetic beauty, clean water, and wildlife habitat.

Many of the graphs, maps, figures and results contained in this report have never been published before. This is a comprehensive study of both the market and non-market benefits of the recreation economy in Washington State. Previous studies have examined only part of the full outdoor recreation picture. For example the study conducted by the Outdoor Industry Association²⁶ estimated a similar economic contribution amount (total of \$22.5 billion for 2013) using models that extrapolate from U.S. national data. Our study gathered data specific for Washington State and used models specific to the state. We also analyzed different measures of economic activity beyond economic contributions.

However, results should be interpreted in light of data and scope limitations. The types of activities occurring in each recreational land type are not generally tracked by management agencies; therefore the association of activities to land types was based on informed assumptions when it was necessary. As noted throughout, the analysis of recreation on private lands was most limited in terms of data availability. Expenditures by public management agencies, including capital expenditures, were also not included in this contribution analysis. All of these aspects call for more data tracking and further recreational research.

Other common concerns with visitation data are the double counting of park visitors, double counting of people who engage in multiple types of recreation on a given day, the ability to estimate visitation at facilities with little or no access control, and differences in methods for estimation used by various facilities and management agencies. Some double counting may also be present with public water accessed through public land types. Since data for use of public waters was limited, it had to be inferred



Biking in the Wenatchee Foothills, image credit: RCO

through modeling and approximations. The primary limitation of expenditure data is often the lack of specific data for particular facilities or facility types. The values presented here can be interpreted as best approximations given the data available.

Expenditures at the county and legislative district were estimated through primary data collection and through best approximations derived from GIS modeling tools. Economic contributions associated with these expenditures were made at the county level through county-specific models. However, economic contributions at the legislative district level could not be estimated given that there are no existing economic models specific to each legislative district and the overlap with counties is imperfect. The construction of these economic models would be recommended in order to understand local economic dynamics at the legislative district level better.

There is much more to the story of outdoor recreation and its importance to the Washington State economy than is revealed in this report. Outdoor recreation markets bridge urban and rural communities. Outdoor recreation provides opportunities for physical exercise, which keeps us healthy. Indeed, the recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building sustainable jobs in rural Washington State. Most outdoor recreation related expenditures trickle down to local economic sectors. Overall, investment in outdoor recreation infrastructure yields high returns throughout the entire state.

Endnotes

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- 25 *Defining and Measuring Success: The Role of State Government in Outdoor Recreation*, A State Comprehensive Outdoor Recreation Planning Document.
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APPENDIX A

List of Recreational Lands Included in this Study

Federal Lands

National Park Service

3 National Parks; Olympic National Park, Mount Rainier National Park, North Cascades National Park; 3 Recreation Areas; Lake Roosevelt National Recreation Area, Lake Chelan National Recreation Area, Ross Lake National Recreation Area; National Historic Reserves and Parks (e.g. Ebey's Land National Historic Reserve, San Juan Island National Historical Park, Lewis and Clark National Historical Park, with some sites in Oregon).

National Forests

5 In-State forests; Colville National Forests, Gifford Pinchot National Forest, Mt. Baker-Snoqualmie National Forest, Okanogan-Wenatchee National Forest, Olympic National Forest; 2 Interstate Forests Umatilla National Forest, Idaho Panhandle National Forests; 1 Interstate Scenic Area; Columbia River Gorge National Scenic Area.

National Wildlife Refuges

28 Wildlife Refuges and Management Areas; Columbia National Wildlife Refuge, Conboy Lake National Wildlife Refuge, Copalis National Wildlife Refuge, Dungeness National Wildlife Refuge, Flattery National Wildlife Refuge, Franz Lake National Wildlife Refuge, Grays Harbor National Wildlife Refuge, Julia Butler Hansen Refuge for the Columbian White-tailed Deer, Lewis and Clark National Wildlife Refuge, Little Pend Oreille National Wildlife Refuge, McNary National Wildlife Refuge, Nisqually National Wildlife Refuge, Pierce National Wildlife Refuge, Protection Island National Wildlife Refuge, Quillayute Needles National Wildlife Refuge, Ridgefield National Wildlife Refuge, Saddle Mountain National Wildlife Refuge, San Juan National Wildlife Refuge, Sinlahekin Deer Winter Range and Wildlife Refuge, Steigerwald Lake National Wildlife Refuge, Toppenish National Wildlife Refuge, Turnball National Wildlife Refuge, Umatilla National Wildlife Refuge, Willapa National Wildlife Refuge, Marrowstone Wildlife Management Area, Colockum Game Range, Lenore Game Range, Sherman Creek Game Range, Sunnyside Waterfowl Management Area. Not included: National Fish Hatcheries, Public Fishing Areas.

Army Corps of Engineers Lakes

11 Lakes; Chief Joseph Dam, Ice Harbor Lock and Dam, Lake Crockett (Keystone Harbor), Lake Washington Ship Canal and Ballard Locks, Little Goose Lock and Dam, Lower Granite Lock and Dam, Lower Monumental Lock and Dam, Mill Creek, Mud Mountain Dam, The Dalles Lock and Dam-Lake Ceillo, Lake Wallula (counted from Oregon).

Bureau of Land Management Recreation Lands

44 Areas and Sites; Boundary Dam Recreation Area, Coffeepot Lake Recreation Site, Crab Creek Recreation Area, “Dispersed-Border”, Fishtrap Lake Recreation Area, Govan Recreation Site, Hog Canyon Lake Recreation Site, Odessa Craters, Pacific Lake Recreation Site, Rock Creek Recreation Site, Rocky Ford Management Area, Telford Management Area, Twin Lakes Recreation Site, Juniper Dunes Recreation Area, Juniper Dunes Wilderness, “Dispersed Juniper Forest”, Saddle Mountains, “Dispersed Saddle Mountains”, Blind Island, Cattle Point, Chadwick Hill ACEC, Chopaka Lake, “Dispersed-Wentachee”, Douglas Creek, Duffy Creek, Iceberg Point ACEC, Indian Island, Kellet Bluff, Liberty, Palmer Mountain, Patos Islands, Point Colville ACEC, Posey Island, SJI Outer Islands & Headlands, Similkameen, Split Rock, Turn Point, Watmough Bay ACEC, Big Pines, Cowiche Canyon, “Dispersed Yakima River Canyon”, Lmuma Creek, Ringer Road, Roza, Umtanum.

State Lands

Washington State Parks

Alta Lake, Anderson Lake, Banks Lake, Battle Ground Lake, Bay View, Beacon Rock, Belfair, Big Eddy, Birch Bay, Blake Island, Blind Island, Bogachiel, Bottle Beach Natural Area, Bridgeport, Bridle Trails, Brooks Memorial, Burrows Island, Cama Beach, Camano Island, Cape Disappointment, Cape Disappointment, Centennial Trail, Clark Island, Columbia Hills, Columbia Plateau Trail, Conconully, Crawford, Crown Point, Curlew Lake, Daroga, Dash Point, Deception Pass, Doe Island, Dosewallips, Doug’s Beach, Ebey’s Landing, Federation Forest, Fields Spring, Flaming Geyser, Fort Casey, Fort Columbia, Fort Ebey, Fort Flagler, Fort Simcoe, Fort Worden, Ginkgo, Goldendale Observatory, Grayland Beach, Griffith-Priday, Harstine Island, Hope Island, Ike Kinswa, Illahee, Iron Horse Easton, Iron Horse Kittitas, Jackson House, James Island, Jarrell Cove, Joemma Beach, Jones Island, Joseph Whidbey, Kanaskat-Palmer, Kitsap Memorial, Kopachuck, Lake Chelan, Lake Easton, Lake Sammamish, Lake Sylvia, Lake Wenatchee, Lakeside Cottage, Larrabee, Leadbetter Point, Lewis & Clark Trail, Limekiln Lighthouse, Lincoln Rock, Long Beach, Loomis Lake Manchester, Maryhill, Matia Island, Matilda Jackson, McMicken Island, Millersylvania, Moran, Mount Spokane, Mystery Bay, Nolte, North Beach, North Jetty, Obstruction Pass, Ocean City, Olallie, Old Fort Townsend, Olmstead Place, Pacific Beach, Pacific Pines, Palouse Falls, Paradise Point, Patos Island, Peace Arch, Pearygin Lake, Penrose Point, Peshastin Pinnacles, Pleasant Harbor, Point Doughty, Posey Island, Potholes, Potlatch, Rainbow Falls, Rasar, Reed Island, Riverside, Rockport, Rothschild House, Sacajawea, Saddlebag Island, Saint Edward, Saltwater, Scenic Beach, Schafer, Sequest, Sequim Bay, Shine Tidelands, South Beach, South Whidbey, Spencer Spit, Spring Creek Hatchery, Squak Mountain, Square Lake, Squilchuck, St Helens Visitor Center, Steamboat Rock, Steptoe Butte, Steptoe Memorial, Stretch Point, Stuart Island, Sucia Island, Sun Lakes, Sun Lakes Resort, Tolmie, Triton Cove, Turn Island Twanoh, Twenty-Five Mile Creek, Twin Harbors, Upright Channel, Wallace Falls, Wanapum, Wenatchee Confluence, Westhaven, Westport Light, Willapa Hills Trail, Wolfe Property, Yakima Sportsmen.

State Department of Natural Resources (DNR) Lands

Major DNR sites include Ahtanum State Forest, Blanchard Forest, Capitol State Forest, Cypress Island Natural Conservation Resources Area, Elbe Hills and Tahoma State Forest, Green Mountain State Forest, Les Hilde Trail & Trailheads, Little Pend Oreille, Loomis State Forest, Loup Loup State Forest, Morningstar Natural Resources Conservation Area, Tahuya State Forest, Tiger Mountain, Yacolt Burn State Forest, and the Walker Valley ORV Riding Area.

State Game Management Units

152 Game Management Units managed by the Washington Department of Fish and Wildlife (WDFW) divide the whole state into hunting opportunities for Deer, Elk, Black Bear, Cougar, Wild Turkey, Bobcat, Coyote, Fox, Raccoon, Cotton Tail & Snowshoe hare, Red Fox, Upland Birds (Pheasant, Quail, Chukar Partridge, Gray Partridge, Forest Grouse); Waterfowl (Puddle Ducks, Diving Ducks, Sea Ducks, Geese), and Other Game Birds. Game Management Units divide the State into different hunting designations.

State Wildlife Areas

34 specific Wildlife Areas managed by WDFW are also included. These are contained within Game Management Units but are special plots of land not oriented for hunting. Participation and expenditure rates differed from WDFW Game Management Units and include the following: Asotin Creek, Beebe Springs, Chehalis, Chelan, Chief Joseph, Colockum, Columbia Basin, Cowlitz, Johns River, Klickitat, LT Murray, Le Clerc, Methow, Mount Saint Helens, North Olympic, Oak Creek, Olympic, Revere, Sagebrush Flat, Scatter Creek, Scotch Creek, Sherman Creek, Shillapoo, Sinlahekin, Skagit, Snoqualmie, South Puget Sound, Sunnyside-Snake River, Swanson Lakes, Teanaway, WT Wooten, Wells, Wenas, Whatcom.

Local Lands

Local Parks

Includes county parks, city parks, parks managed by special districts, and municipal golf courses. GIS data was obtained for county and city parks from the United States Geological Survey Gap Analysis Program Protected Area Database ("USGS PAD database"), which for Washington State, has 1,662 data points for city and special district parks and 874 county parks; the municipal golf course data included 49 municipal golf courses.

Events on Public Lands

Events on public lands do not refer to specific land areas. Events such as youth sports tournament, marathons, or bike races take place on a variety of local lands.

Public Waters

Includes 700 water access sites operated by WDFW. Also Includes 398 boat launches maintained by port districts and other local land managers. Some double counting in terms of participation rates may happen with other land managers accounted for in this study.

Private Lands

Data on private recreation lands is limited to the following activities and land types due to lack of data.

Private Timberlands

It is estimated that there are about 9.4 million acres of non-public timberland in Washington State. Calculations for participation and expenditures were based on an estimated 1,426 tracts totaling 4,610,00 acres of which 3,050,468 acres were modeled as having recreation access. Therefore a limited number of timberlands were included.

Skiing Areas

Northwest Ski Areas Association provided information on 13 major ski areas in Washington State. Ski areas that are privately managed on land leased from a public entity (usually national forests) are considered private lands for this report.

Private Golf Courses

244 golf courses managed by private entities were identified in Washington State.

Private Horse-related businesses

A total of 202 horseback riding businesses were identified in Washington State. All of these were assumed to be private.

APPENDIX B

Methodology and Data Sources for Participant Days and Expenditure Profiles by Land Type

Methodology for Participant Days and Expenditures by Land Type

The core methodology used to estimate total participant days, expenditures, and contributions was based on specific data for each land type. Every land type (federal, state, local, private) was studied in reference to various management entities and businesses. Data-gathering for estimating visits and geographic allocation involved outreach to the management agencies, extensive review of the literature and existing research, and GIS modelling.

All visitation data was converted to “participant days” as the common unit of analysis. A participant day denotes one person’s presence in a recreational area during the course of a 24 hour period. Overnight participants are counted as those who sleep onsite or near the site as a result of their visitation. When participation was estimated from specific activities for which there was no primary data or local study, the Washington’s Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013) survey of Washington adults was used. The survey estimates participation rates (i.e. percent of residents participating in a recreational activity) as well as participation frequency (i.e. average numbers of days per year a resident recreates in a given activity). The product of these two variables and the adult population of the state yields the total number of participant days for any activity. The SCORP survey does not allocate participation to recreation destinations. Thus, triangulation of attendance data, participant days, and GIS datasets was necessary to generate site-specific visitation data, when this methodology was necessary.

Expenditures per trip were borrowed from existing studies and surveys. This data has been generated from both management agencies and activity-specific interest groups. From these figures, activity-based expenditure profiles were created to divide a typical participant day’s expenditures into expense categories (e.g. gasoline and food, see Appendix D). Since individuals can engage in many activities in a single day or trip and thus result in “double counting,” some activities were eliminated, consolidated, or adjusted.

Common concerns with participation data are the double counting of park visitors, the ability to estimate visitation at facilities with little or no access control, and differences in methods for estimation used by various facilities. The primary limitation of expenditure data is often the lack of specific data for particular facilities or facility types. The values presented here can be interpreted as best approximations given the data available. Most public agencies applied some kind of control for double counting in their collection of primary data.

Where participation data had site-specific resolution (such as with State and National Parks) and where sites were wholly contained within the boundary of a county or legislative district, we were able to assign

participant days and economic expenditures to the specific site. However, when county or legislative district boundaries traversed land areas, we allocated participation data between “competing” areas based on ratios derived from population or land area. Both of these methods require assumptions that do not take into account irregular distribution of activities and visitation within each site, let alone routes taken to such sites. Some entrance points may be more popular than others and hence economic activity within the county with the popular entrance may be higher. For visitation figures derived from the SCORP survey (e.g. swimming) and for data sources that did not break out visitation by site, (e.g. Washington Department of Natural Resources and Washington State Department of Fish and Wildlife) we employed a GIS tool called the “Huff Model” adapted for ESRI ArcMap 10.2 (GIS software) to model distribution based on population density and the distance of population centers (census tracts) to sites of interest. Where point datasets did not exist (e.g. surfing and SCUBA sites), we geocoded site locations from address lists. We were then able to use boundary shapefiles for legislative districts and counties to divide these points and sum their respective weighted visitation probabilities.

Equipment Expenditures

Equipment expenditures were based on participant numbers for a set of activities selected from Washington’s Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013) survey. Participant numbers refer to whether an individual engaged in an activity regardless of the frequency in which they did it. Equipment is assumed to be needed in the same amounts whether the participant did the activity once per year or 100 times per year. Equipment expenditures per participant were obtained or extrapolated for each activity based on U.S. Census Data of yearly sales for specific equipment that could be associated to the activity, expert consultation, and use of results from other studies on a given recreational activity or destination. For more information on the selection of activities, see Appendix D.

Summary of Data Sources by Land Type

The table below summarizes data sources and use of this data by specific land types:

Table B-1. Data Sources and Site Allocation	
Type of Recreational Land Type	Data Source and Allocation Method
Federal Lands	
National Parks & National Recreation Areas	Public National Park Service-Managed Data, NRSS 2014, and Thomas et al. 2014 for visits, group size, and expenditures. Results for each area divided to county and legislative districts based on land area. The number used for visitation was updated by the NPS after analysis was conducted therefore current estimates are underestimates..
National Forests	Data obtained from the US Forest Service; National Visitor Use Monitoring System – NVUM- reports from each of the National Forests for visits. Stynes and White (2005) data was used for expenditures. Results were allocated to county and legislative districts based on land area.
National Wildlife Refuge	Banking on Nature 2004, 2006, 2013; US Fish & Wildlife Service for visitation and expenditure data; allocated to county and legislative districts based on land area.
Corps of Engineers	Corps of Engineers public data (plus Lake Wallula/Umatilla Dam, OR counted to Benton County) for visits; Chang et al. 2003 for expenditure profiles; allocated to county and legislative districts based on land area.
Bureau of Land Management	Freedom of Information Act Data Request for visitor data. Stynes and White 2005 for expenditures; allocated to county and legislative districts based on land area.

Table B-1. Data Sources and Site Allocation (continued)

Type of Recreational Land Type	Data Source and Allocation Method
State Lands	
State Parks	Public State park data for visit numbers at the park level; Dean Runyan 2002 for expenditures; Results allocated to counties/legislative districts by acreage where necessary.
State DNR	Visits based on data provided by DNR and noted to be slightly conservative (Millern 2014); 10.2 million visitors allocated based on GIS Huff Model using GIS point dataset derived from WADNR tract polygons.
WDFW Game Management Units	2011 USFWS for visitor data. National Visitor Use Monitoring (NVUM) Program data for expenditure profiles. Large game hunting days (deer, elk, black bear) and small game hunting days (turkey, water fowl, hare) calculated with separate expenditure rates and totaled per GMU then converted to county/LD based on land area with GIS.
WDFW Management Areas	Estimated 4 million visitors, distributed based on Huff Model of WADFW areas using acreage as an attractiveness measure; numbers validated with email correspondence. Expenditures based on Banking for Nature 2004.
Local Lands	
County	Validation of our assumptions for local lands was done with results from the SCORP Survey 2013 and the study commissioned by California State Parks 2011.
City	All counties were solicited for data and 5 responded (King, Pacific, Pierce, Snohomish, and Whatcom) with a weighted average of 4.15 visits per adult (total participation divided by total population); each county was attributed visitation based on the adult population.
City	Visitation of local recreation lands was projected from the Herbert Research Group study on MetroParks Tacoma, which conducted 769 surveys on a representative subset of parks (16) within the Tacoma MetroParks system (74 parks) estimating 29 participant days per capita - a more conservative estimate of 22 participant days per capita were attributed to city park systems; scaled to population. Note that city parks include parks managed by special districts.
Municipal Golf	All golf sites identified through GIS; participation based on SCORP survey; 16.8 % of total golf participant days attributed to municipal golf and evenly distributed to GIS data set for municipal courses and allocated to county/legislative district boundary.
Events on Public Lands	
	General lack of specific data for particular facilities and event types. Participation and expenditure data based on Avenue ISR 2012 and Pierce County outdoor participation estimates with 23.4% of total participant days due to events; scaled to population at each county and legislative district.
Public Waters	
	Data sources for categories below is for participation numbers only; for expenditure data see activity analysis source data in Appendix D.
Fishing	Licenses by WDFW and SCORP-derived fishing days; totals reduced by 25.9% (OIA 2013) to control for double counting with boating trips; distributed to counties based on ratios derived from 1-day fishing licenses issued in WA; distributed to legislative districts based on distribution of WADFW and RCO boat launches.
Motorized Boating & Sailing	SCORP-derived boating days; allocated to county/LD based on ratios of county boat registrations; for legislative districts the Huff Model was utilized with a combined RCO-WADFW boat launch point dataset.
Non-Motorized Paddle Sports	SCORP-derived activity days were allocated to county/LD based on Huff Model allocation to a combined point data set of RCO and WADFW boat launches.

Table B-1. Data Sources and Site Allocation (continued)

Type of Recreational Land Type	Data Source and Allocation Method
Inner tubing or floating	SCORP-derived activity days were allocated to county/LD based on Huff Model allocation to a combined point data set of RCO and WADFW boat launches that were within ¼ mile buffer of a river or stream.
Non-Motorized Windsurfing/ Surfing	SCORP-calculated number of windsurfing and surfing days distributed to county/legislative district by number of recreation destinations based on existing studies.
Swimming in natural waters	SCORP-derived swimming days were allocated to county/LD based on Huff Model allocation to a combined point data set of boat launches.
Swimming (outdoor pools)	SCORP-derived swimming days were allocated to county/LD based on population
Scuba diving	SCORP-calculated number of SCUBA days allocated with Huff Model to geocoded recreation destinations based on geo-coded scuba diving sites.
Private Lands	
Private Timberland Recreation	Only Weyerhaeuser responded to inquiries for data, yielding the number of permits allowed per acre on recreation permitted acres; this ratio was used for about half (4.5 million acres) of the total timberlands in WA (9.6 million acres) with an assumed activity frequency of 25.7 days per permit based on activities possible in timberlands; projected participant days were allocated to county/LD based on the ratio of private timberlands per county/LD.
Skiing	Number of ski days given by Northwest Ski Areas Association 2013 for thirteen resort sites, allocated using GIS data for ski sites.
Private Golf	All golf sites identified through GIS; participation based on SCORP survey; 83.2 % golf participant days evenly distributed to GIS data set for private courses and allocated by county/legislative district boundary.
Horseback Riding	SCORP-calculated number of horseback riding days allocated with Huff Model to the Top 200 Results for businesses in “Horseback Riding in Washington State” geocoded from Google Earth.

APPENDIX C

Literature Used for Participant Days and Expenditures Data

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APPENDIX D

Participation and Expenditures for Major Recreational Activities in Washington State

A separate methodology was used to estimate expenditures attributable to popular outdoor recreational activities in Washington. These expenditures were calculated based on participant days derived from the 3000-person survey conducted by Responsive Management to develop the Statewide Comprehensive Outdoor Recreation Plan (SCORP 2013). The results used a regional proportionate sample of respondents from 10 different multi-county regions across Washington State. Expenditure profiles were created for each activity based on literature searches, U.S. Census data, and communication with activity associations. The activities were chosen based on their popularity among adults in Washington, their existence within at least one of the recreational lands studied, and their potential economic contribution. From a total of 300 activities studied in SCORP, only 42 activities were selected and organized into 14 general categories.

Calculation of expenditures was based on: a) participation rate b) participation frequency, and c) average activity expenditure rates. Trip expenditures were calculated by total number of participant days and equipment expenditures were calculated based on participation rates. Total expenditures derived through the activity analysis methodology resulted in about \$41.6 billion in annual expenditures.

Double counting is not controlled for in this analysis and hence this contributes to the higher expenditure total obtained through this methodology. For example, if all participant days are added from the subset of activities analyzed, the average Washingtonian would recreate about 174 days per year. Other recreation studies have estimated ranges from 87 days per year (U.S.) to 96 days per year (California). The activity based calculation reflects the fact that several forms of recreation may happen simultaneously (e.g. boating and fishing, biking and swimming, hiking and camping). In addition the activity-based analysis is not limited to specific land types (e.g. public lands) and hence provides an estimate of all the outdoor recreation activities happening in Washington, regardless of where they happen.

The SCORP survey provides important insights into the relative popularity of various activities. For example, there are 357 million participant days attributed to walking for outdoor recreation and 151 million to jogging or running in outdoor settings. These activities have relatively low expenditures per trip but given their high frequency, they amount to high total expenditures (a combined amount of \$2.7 billion). In contrast, other activities, such as windsurfing, only have about 740,000 participant days per year but contribute as much as \$170 million in expenditures per year. In part, some of these high expenditures emerge from equipment needed for activities or high cost of trips to the site of the activity.

The results for participation and resulting expenditures based on the activity-based calculations are presented in the following table.

Table D-1. Activity Analysis

Activity	Total Expenditures	Equipment Expenditures	Trip-Related Expenditures	Number of Participants	Participant Days
<i>Sightseeing and Nature Activities Total</i>	<i>\$10,425,033,323</i>	<i>\$1,230,967,051</i>	<i>\$9,194,066,272</i>	<i>8,388,536</i>	<i>204,904,530</i>
Sightseeing	\$1,673,209,290	\$360,006,918.14	\$1,673,209,290	2,453,300	37,290,156
Visiting nature interpretive center	\$491,919,470	\$220,381,593.49	\$491,919,470	1,501,810	10,963,215
Wildlife viewing/ photographing/watching	\$7,412,499,661	\$445,291,575.89	\$6,181,532,609	3,034,480	137,765,380
Gathering/collecting things in nature setting	\$847,404,903	\$205,286,963.80	\$847,404,903	1,398,947	18,885,779
<i>Fishing or Shellfishing Total</i>	<i>\$1,547,453,670</i>	<i>\$460,695,126</i>	<i>\$1,086,758,545</i>	<i>1,753,826</i>	<i>26,307,396</i>
<i>Water-Related Activities Total</i>	<i>\$2,085,846,773</i>	<i>\$436,919,750</i>	<i>\$1,648,927,023</i>	<i>3,888,249</i>	<i>55,368,455</i>
Swimming in natural waters	\$575,252,008	\$48,102,701	\$527,149,306	1,836,117	26,623,702
Swimming (outdoor pools)	\$315,368,876	\$48,102,701	\$267,266,175	930,917	13,498,292
Surfboarding	\$277,226,834	\$216,013,812	\$61,213,022	108,007	658,842
Windsurfing	\$171,674,611	\$102,863,720	\$68,810,891	51,432	740,619
Inner tubing or floating	\$573,410,901	\$13,192,272	\$560,218,629	879,485	12,752,530
Scuba diving	\$172,913,543	\$8,644,543	\$164,268,999	82,291	1,094,470
<i>Boating</i>	<i>\$4,475,985,112</i>	<i>\$2,206,319,937</i>	<i>\$2,269,665,175</i>	<i>2,109,226</i>	<i>27,263,057</i>
Motorized	\$3,835,473,371	\$2,186,800,000	\$1,648,673,371	1,275,510	19,260,203
Non-motorized	\$588,428,495	\$9,759,968	\$578,668,526	766,855	7,668,547
Rafting	\$52,083,246	\$9,759,968	\$42,323,278	66,861	334,307
<i>Snow and Ice Activities Total</i>	<i>\$1,726,729,167</i>	<i>\$33,232,313</i>	<i>\$1,693,496,854</i>	<i>1,919,469</i>	<i>14,457,917</i>
Snowshoeing	\$62,244,625	\$396,990	\$61,847,635	344,593	1,378,374
Snowboarding	\$641,911,727	\$5,524,072	\$636,387,655	494,970	4,207,244
Skiing	\$840,706,347	\$7,233,601	\$833,472,746	725,026	5,510,199
XC Skiing	\$110,327,122	\$8,993,114	\$101,334,008	231,443	1,967,269
ATV snow/ice	\$71,539,346	\$11,084,536	\$60,454,810	123,436	1,394,832
<i>Camping, Hiking, Climbing, Mountaineering Total</i>	<i>\$3,979,727,445</i>	<i>\$75,848,897</i>	<i>\$3,903,878,547</i>	<i>\$5,467,207</i>	<i>\$79,612,919</i>
Hiking	\$2,164,952,296	\$38,459,600.78	\$2,127,027,847	2,772,177	47,404,231
Climbing/Mountaineering	\$250,237,224	\$7,135,361.93	\$212,312,775	514,319	4,731,731
Camping	\$1,564,537,925	\$30,253,934.57	\$1,564,537,925	2,180,711	27,476,957
<i>Bicycle Riding Total</i>	<i>\$3,136,644,285</i>	<i>\$113,494,490</i>	<i>\$3,023,149,796</i>	<i>1,897,836</i>	<i>67,373,165</i>
<i>Horseback Riding Total</i>	<i>\$2,292,986,614</i>	<i>\$1,534,994,148</i>	<i>\$757,992,466</i>	<i>396,025</i>	<i>12,633,208</i>
<i>Off-Roading for Recreation Total</i>	<i>\$2,292,961,301</i>	<i>\$1,416,433,424</i>	<i>\$876,527,876</i>	<i>786,907</i>	<i>20,223,522</i>
<i>Hunting & Shooting Total</i>	<i>\$1,883,052,842</i>	<i>\$860,690,884</i>	<i>\$1,022,361,958</i>	<i>1,100,642</i>	<i>17,500,205</i>

Table D-1. Activity Analysis (continued)					
Activity	Total Expenditures	Equipment Expenditures	Trip-Related Expenditures	Number of Participants	Participant Days
Ball Sports Total	\$1,024,511,198	\$107,446,795	\$808,813,264	3,934,537	62,312,270
Volleyball outdoor	\$66,146,479	\$11,938,533	\$54,207,946	298,305	4,176,267
Basketball outdoor	\$103,873,194	\$18,822,796	\$85,050,398	468,030	6,552,419
Tennis outdoors	\$123,263,495	\$19,380,509	\$103,882,986	468,030	8,003,312
Field Sports	\$114,746,706	\$11,938,533	\$102,808,174	565,750	7,920,506
Soccer outdoors	\$130,728,704	\$11,938,533	\$118,790,171	318,878	9,151,785
Baseball	\$54,385,306	\$3,915,839	\$50,469,467	277,732	3,888,249
Softball	\$78,535,329	\$5,634,987	\$72,900,341	401,169	5,616,359
Football	\$75,626,194	\$11,938,533	\$63,687,661	272,589	4,906,599
Frisbee	\$168,954,652	\$11,938,533	\$157,016,120	864,055	12,096,773
Golf Total	\$800,317,993	\$77,103,750	\$723,214,243	797,194	10,044,642
Other Recreation Total	\$5,903,020,121	\$344,248,028	\$5,558,772,093	9,957,208	620,827,296
Playground Use	\$343,433,351	\$38,830,731	\$304,602,619	1,897,836	60,920,524
Running/Jogging/Trailrunning	\$817,789,972	\$60,023,806	\$757,766,166	1,861,833	151,553,233
Picnicking, BBQing, Cooking Out	\$2,735,782,704	\$52,146,117	\$2,683,636,587	2,396,725	49,132,856
Skateboarding	\$108,251,139	\$81,147,166	\$27,103,973	149,152	2,088,134
Walking	\$1,897,762,956	\$112,100,208	\$1,785,662,747	3,651,662	357,132,549
Grand Total	\$41,574,269,845	\$8,898,394,594	\$34,132,162,037	44,577,574	1,218,828,582

Expenditures for activities were derived as described in Table D-2. All expenditures were taken from different data sources and adjusted to 2014 dollars based on the Bureau of Labor Statistics consumer price index.

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis		
Activity	Annual Equipment Expenditures (per year per participant or per year per capita)	Activity Expenditures (per activity day)
<i>Sightseeing and Nature Activities</i>		
Sightseeing	Assumed to be the same as wildlife viewing	Assumed to be the same as hiking (\$44.87)
Visiting Nature Interpretive Center	Assumed to be the same as wildlife viewing	Assumed to be the same as hiking (\$44.87)
Wildlife viewing/photographing/watching	\$405 based on inflation-adjusted "Wildlife Watching" in 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation	Assumed to be the same as hiking (\$44.87)
Gathering/Collecting Things in Nature	Assumed to be the same as wildlife viewing	Assumed to be the same as hiking (\$44.87)
<i>Fishing and Shellfishing</i>	\$263 based on inflation-adjusted "Fishing Total Equipment" 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation	Inflation-adjusted from "Trip related expenditures for all types of fishing" 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (\$41.31)
<i>Water Related Activities</i>		
Swimming in Natural Waters	\$6.90 per capita derived from per capita swimwear sales as cited by NPD Group in Sun Sentinel article split between both categories of swimming	Inflation-adjusted from "jogging/walking" in Economic Impacts of the 2013 Wisconsin State Park System: Connections to Gateway Communities (\$19.80)
Swimming (outdoor pools)	Same as "Swimming in Natural Waters"	Same as "Swimming in Natural Waters"
Surfboarding	\$2,000 per participant per year quoted from Casey Dennehy of Surfrider (August 2014)	Inflation-adjusted from "Coastal Visit" in "Non- Consumptive Ocean Recreation in Oregon" (\$92.91)
Windsurfing	Same as "Surfboarding"	Same as "Surfboarding"
Innertubing and floating	\$15 assumed for price of an innertube	Inflation –adjusted from average non-camping trip cost in 2009 The Economic and Social Values of Recreational Floating On The Niovara National Scenic River (\$43.93)
Scuba Diving	\$1.25 per capita per year for "2009 Skin diving & Scuba Diving" inflation adjusted from U.S. Census Table 1250	Inflation-adjusted from "Market Value Expenditure Estimates for Diving at Artificial Reefs" in "Understand the Potential Economic Impacts of Sinking Ships for SCUBA Recreation"; figure validated by Washington State SCUBA Alliance (\$150.09)

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued)		
Activity	Annual Equipment Expenditures (per year per participant or per year per capita)	Activity Expenditures (per activity day)
Boating		
Motorized boating	\$9,232.03 per registered boat owner per year from "Retail and Service Sales" in 2012 Recreational Boating Economy	From 2013 Wisconsin State Park System: Connections to Gateway Community; validated by Northwest Marine Trade Association (\$85.60)
Non-motorized paddlesports	\$1.40 per capita per year derived from one year of U.S. paddle sport sales as calculated from LeisureTrends.com	Calculated from OIA using per day and per night overnight average expenditure rates and the ratio of day versus night activity days (\$75.46)
Rafting	Assumed to be the same as non-motorized boating	Inflation-adjusted from "2009 Commercial River Use in the State of Colorado" (\$126.60)
Snow and Ice Activities		
Snowshoeing	\$0.06 per capita per year derived from \$137.49 for an inflation-adjusted price of snowshoes and 130,000 snowshoes as cited in Snowshoe Magazine and 2012 U.S. Census Population	Assumed to be the same as hiking (\$44.87)
Snowboarding	\$0.79 per capita per year based on inflation adjusted U.S. Census Table 1250 "Downhill skiing" multiplied by 43.3% for ski/snowboard ratio	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$151.26)
Skiing	\$1.04 per capita per year based on inflation adjusted U.S. Census Table 1250 "Downhill skiing" multiplied by 56.7% for ski/snowboard ratio	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$151.26)
XC Skiing	\$1.29 per capita per year based on "Cross Country Equipment Spending" Minnesota Trails: Economic Impact of Recreational Trail Use	Inflation adjusted figure from Minnesota Trails: Economic Impact of Recreational Trail Use(\$51.51)
ATV snow/ice	Assumed to be the same as OHV recreation	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$43.34)
Camping, Hiking, Climbing, Mountaineering		
Hiking	Assumed to be the same as camping	Assumed to be the same as hiking (\$44.87)
Climbing/Mountaineering	Assumed to be the same as camping	Assumed to be the same as hiking (\$44.87)
Camping	\$5.44 per capita per year 2009 U.S. Census Table 1250 expenditures for camping adjusted for inflation	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$56.94)
Bicycle Riding	\$16.28 per capita per year based on 2009 U.S. Census Table 1250 "Bicycle and Supplies" expenditures for camping adjusted for inflation	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$44.87)

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued)

Activity	Annual Equipment Expenditures (per year per participant or per year per capita)	Activity Expenditures (per activity day)
Horseback Riding	\$3,876 per horse per year from Maine Cooperative Extension Publications Bulletin #12004	In-house estimation (\$60)
Off-Roading for Recreation	\$1,800 per participant per year calculated from Idaho Economic Importance of Off-Highway Vehicles	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$43.34)
Hunting & Shooting	\$782 per participant derived from expenditures divided by hunter participants from "2011 U.S. Fish and Wildlife Survey"; excludes "other items" which are assumed to be implicit in activity figures	Weighted averages from "Updates Spending Profiles for National Forest Recreation" (\$58.42)
Ball & Field Sports		
Volleyball outdoors	Assumed average of other ball sports minus skateboarding (\$1.71 per capita per year); data unavailable	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Basketball outdoors	\$2.70 per capita per year 2009 U.S. Census Table 1250 expenditures for "basketball shoes" adjusted for inflation	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Tennis outdoors	\$5.57 per capita per year 2009 U.S. Census Table 1250 expenditures for "cross training shoes" adjusted for inflation	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Field Sports	Assumed average of other ball sports minus skateboarding (\$1.71 per capita per year); data unavailable	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Soccer Outdoors	Assumed average of other ball sports minus skateboarding (\$1.71 per capita per year); data unavailable	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Baseball	\$0.56 per capita per year 2009 U.S. Census Table 1250 expenditures for "baseball and softball" adjusted for inflation and ratio of baseball to softball participants	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Softball	\$0.81 per capita per year 2009 U.S. Census Table 1250 expenditures for "baseball and softball" adjusted for inflation adjusted for inflation and ratio of baseball to softball participants	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Football	Assumed average of other ball sports minus skateboarding (\$1.71 per capita per year); data unavailable	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Frisbee	Assumed average of other ball sports minus skateboarding (\$1.71 per capita per year); data unavailable	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)
Skateboarding	\$11.06 per capita per year based on calculations from SIMA 2012 Specialty Retail Distribution Study for "U.S. surf/skate industry" reduced to eliminate surf	Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact (\$12.98)

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued)		
Activity	Annual Equipment Expenditures (per year per participant or per year per capita)	Activity Expenditures (per activity day)
Golf		Figure from The Washington Golf Economy: Summary Report, 2010(\$72.00)
Other Recreation		
Playground Use	\$5.57 per capita per year 2009 U.S. Census Table 1250 expenditures for “cross training shoes” adjusted for inflation	Estimated between “local day visit” from Dean Runayn (\$12.98) and Trust for Public Land: Measuring the Value of a City Park System (\$3.05) = (\$5)
Running/Jogging/ Trailrunning	\$8.61 per capita per year 2009 U.S. Census Table 1250 expenditures for “running and jogging shoes” adjusted for inflation	Estimated between “local day visit” from Dean Runayn (\$12.98) and Trust for Public Land: Measuring the Value of a City Park System (\$3.05) = (\$5)
Picnicking, BBQing, Cooking Out	\$7.48 per capita per year “Grill Sales” estimated from HPBA: 2011 State of the Barbeque Industry Report	Figure from Forbes: Fourth of July by the Numbers which quotes BIGresearch “average cook out cost” (\$54.62)
Walking	\$16.08 per capita per year 2009 U.S. Census Table 1250 expenditures for “walking shoes” adjusted for inflation	Estimated between “local day visit” from Dean Runayn (\$12.98) and Trust for Public Land: Measuring the Value of a City Park System (\$3.05) = (\$5)

Correlations between Expenditures and Participation by Activity

The correlation of participation with expenditure patterns reveals some interesting results in relation to the relative economic importance of different activities as well as their economic accessibility. The scatter plots in Figure D-1 and Figure D-2 illustrate which activities have the highest total expenditures (as a consequence of both their popularity and their respective total expenditures) as well as which activities have the highest expenditures per trip and per yearly equipment expenditures. Considering the top three costs of recreation determined by our expenditure analysis (sporting goods/apparel 19%, recreational motor vehicles 15%, and gas and oil 13%) and given the context of in which many activities happen, some inferences can be made in regards to economic barriers to participation and opportunities for economic development.

Figure D-1. Comparison between Total Trip and Equipment Expenditures for Outdoor Recreational Activities

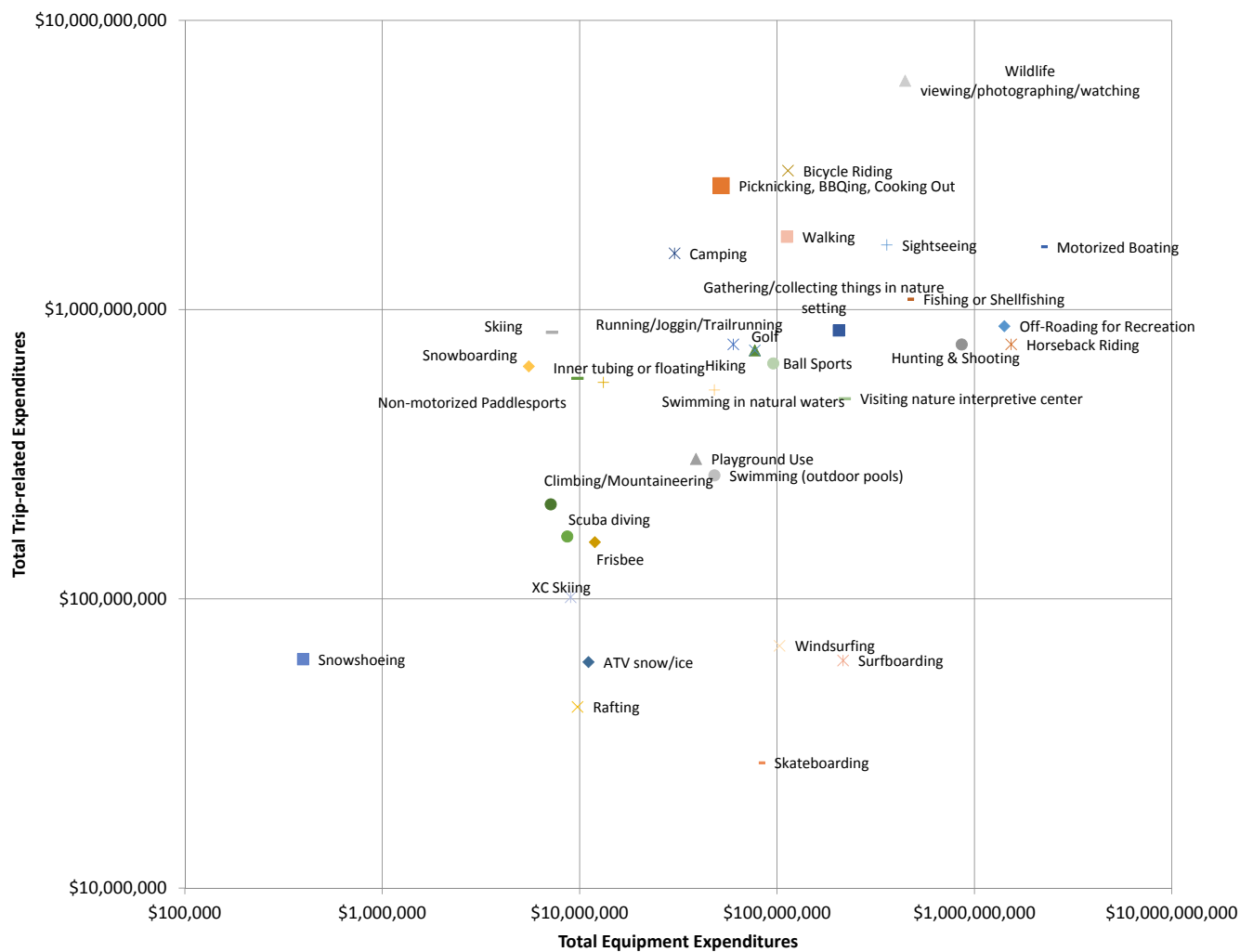
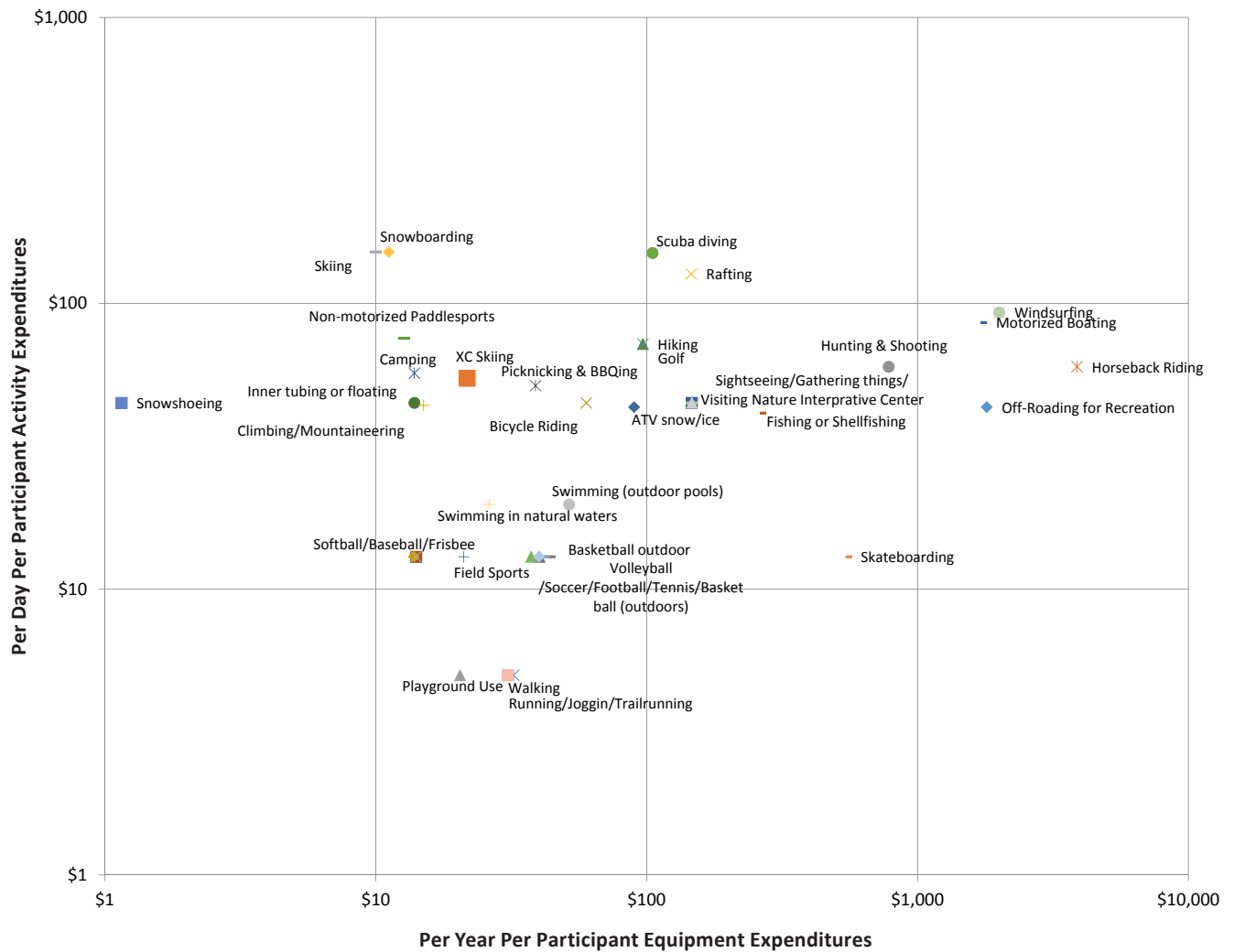


Figure D-2. Comparison between Per Year Per Participant Equipment Expenditures and Per Day Per Participant Activity Expenditures for Outdoor Recreational Activities



The Values of Recreational Activities as Ecosystem Services in Washington State

As explained in Chapter 6, recreational activities are an important ecosystem service that natural landscapes provide. In order to measure the additional value outdoor recreational activities provide, the concept of consumer surplus is used to indicate the benefit, expressed in economic terms, consumers receive beyond what they pay to engage in an activity. Table D-3 shows the average consumer surplus, participant days, and total consumer surplus per year for activities occurring in Washington State. The estimated annual total economic benefit of recreation as an ecosystem service with this methodology is \$31.2 billion dollars. Some of these activities may happen simultaneously, potentially affecting their combined value.

Table D-3. Consumer Surplus of Recreational Activities in Washington State			
Activity	Participant Days (000's)	Average Consumer Surplus per Day (2014 USD)	Consumer Surplus per Year (000's, 2014 USD)
<i>Sightseeing and Nature Activities Total</i>	204,905	-	\$7,771,734
Sightseeing	37,290	\$39	\$1,441,342
Visiting nature interpretive center	10,963	\$20	\$217,737
Wildlife viewing/photographing/watching	137,765	\$38	\$5,234,118
Gathering/collecting things in nature setting	18,886	\$47	\$878,536
<i>Fishing or Shellfishing Total</i>	26,307	\$66	\$1,745,036
<i>Water-Related Activities Total</i>	55,368	-	\$1,796,675
Swimming in natural waters	26,624	\$38	\$1,008,316
Swimming (outdoor pools)	13,498	-	-
Surfboarding	659	\$50	\$33,152
Windsurfing	741	\$50	\$37,267
Inner tubing or floating	12,753	\$50	\$641,694
Scuba diving	1,094	\$70	\$76,246
<i>Boating Total</i>	27,263	-	\$832,203
Motorized	19,260	\$26	\$500,462
Non-motorized	7,669	\$42	\$320,176
Rafting	334	\$35	\$11,565
<i>Snow and Ice Activities Total</i>	14,458	-	\$456,769
Snowshoeing	1,378	\$20	\$27,496
Snowboarding	4,207	\$55	\$231,645
Skiing	5,510	\$19	\$104,470
XC Skiing	1,967	\$20	\$39,244
ATV snow/ice	1,395	\$39	\$53,914
<i>Hiking, Climbing, Mountaineering Total</i>	52,136	-	\$3,286,291
Hiking	47,404	\$65	\$3,086,521
Climbing/Mountaineering	4,732	\$42	\$199,770

Table D-3. Consumer Surplus of Recreational Activities in Washington State (continued)			
Activity	Participant Days (000's)	Average Consumer Surplus per Day (2014 USD)	Consumer Surplus per Year (000's, 2014 USD)
<i>Bicycle Riding Total</i>	67,373	\$37	\$2,491,010
<i>Horseback Riding Total</i>	12,633	\$24	\$300,202
<i>Off-Roading for Recreation Total</i>	20,224	\$31	\$634,858
<i>Camping Total</i>	27,477	\$44	\$1,196,828
<i>Hunting & Shooting Total</i>	17,500	\$95	\$1,670,210
<i>Ball Sports Total</i>	64,400	-	-
<i>Golf Total</i>	10,045	-	-
<i>Other Recreation Total</i>	618,739	-	\$9,010,621
Playground Use	60,921	\$5	\$330,798
Running/Jogging/Trailrunning	151,553	\$5	\$755,019
Picknicking, BBQing, Cooking Out	49,133	\$23	\$1,150,488
Walking	357,133	\$19	\$6,774,316
Grand Total	1,218,829		\$31,192,437

Note: A dash indicates no estimate for this category.

Average consumer surplus per day ranges from \$5 to \$95 among recreational activities. Activities with low consumer surplus tend to be those that are inexpensive. High consumer surplus tends to occur with expensive activities; hunting and scuba diving have the two highest consumer surplus estimates.

Some activities are not associated with a consumer surplus. These activities were excluded for two reasons. One, the benefits people derive from these activities do not stem from ecosystems—rather, they are performed on very developed areas. As such, it is not appropriate to value them as ecosystem services. Some activities are also associated with high damage to ecosystems, which would also be inappropriate to value as an ecosystem service. For example, swimming in outdoor pools is excluded because it is not a benefit derived from nature.

APPENDIX E

Expenditure Profiles, Sector Mapping, & IMPLAN Assumptions

Methodology Summary

Completing an Input-Output Analysis in IMPLAN is a multi-step process. Total participant days and expenditures were calculated at the county and state levels for 26 land cover, activities, and equipment categories. For each category, we allocate expenditures into industry sectors based on survey data. Industries from supporting materials were mapped to specific IMPLAN sectors. The IMPLAN model calculated the direct, indirect, and induced contributions of these activities. Models were built for both total outdoor recreation expenditures and outdoor recreation on public lands at the county and state level. In this Appendix, additional details are provided on the assumptions for each step in this process.

Expenditure Profiles & Industry Allocation

Expenditures were modeled in Washington State in 26 different categories. These included expenditures resulting from recreation on federal, state, local, and private lands; water-based activity spending; and expenditures at events and on equipment. Each of these categories involves different average trip lengths, equipment requirements, and average distance to site. For example, the average participant day at a national park would have different purchases than the average participant day at a Fish & Wildlife recreation area, due to average length of stays and activities available. To account for this, different expenditure profiles were adopted for each activity or land cover category. These expenditure profiles were calculated based on a literature review (see references in Appendix C). These profiles are typically calculated using survey data from actual activity-participants.

IMPLAN Sector Mapping

After selecting expenditure profiles for each activity category, the next step was to map the spending categories to IMPLAN industry sectors. IMPLAN V3.1, which was used in this study, includes 440 industry sectors based Bureau of Economic Analysis' latest Benchmark Input-Output Study. North American Industry Classification System (NAICS) codes are 2-6 digit codes created by the U.S. Office of Management and Budget, with increasing specificity for longer codes. Using NAICS codes, research methodology descriptions in the source data, and previous IMPLAN studies, all spending categories in the expenditure profiles were mapped to one of the 440 IMPLAN sectors. In the end, all sectors were mapped to 1 of 18 IMPLAN categories. For example, the expenditure "Eat/Beverage in Premise" for Federal Lands (Source: Longwoods 2000) was mapped to IMPLAN Sector "413 Food services and drinking places," called "food and beverage services" in this report, based on its description. Table E-1 is the list of all sectors that were utilized in this analysis.

Table E-1. IMPLAN Sector List

IMPLAN Sector	Description
328	Retail - Sporting goods, hobby, book and music
320	Retail - Motor vehicle and parts
326	Retail - Gasoline stations
413	Food and beverage services
324	Retail - Food and beverage
410	Other amusement and recreation industries
330	Retail – Miscellaneous
411	Hotels and motels
322	Retail - Electronics and appliances
432	Other state and local government enterprises
418	Personal and household goods repair and maintenance
363	General and consumer goods rental except video tapes and discs
429	Other Federal Government enterprises
336	Transit and ground passenger transportation
412	Other accommodations
338	Scenic and sightseeing transportation and support activities for transportation
70	Soft drink and ice manufacturing
61	Seafood product preparation and packaging

IMPLAN Model Construction

In order to construct the county models, expenditures were summed across all activities by IMPLAN sector. This resulted in sector-based subtotals within each county and for the entire state. Totals were calculated for all expenditures, public lands, and private lands. IMPLAN sector expenditure sub-totals were entered into IMPLAN for each county model as well as the state.

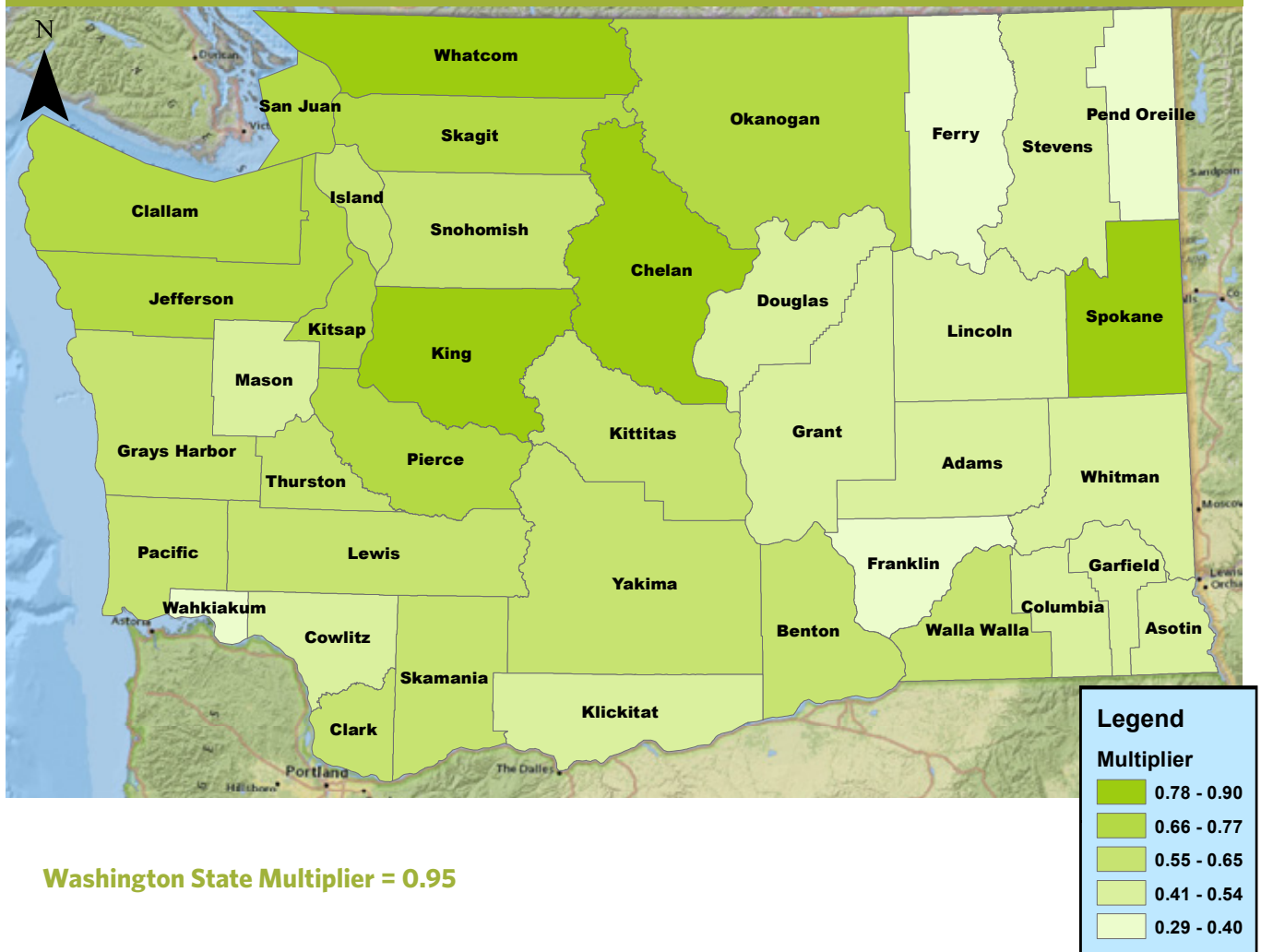
Retail purchases generally involve consumers purchasing goods from outlets that did not produce the product. Consumers will pay an amount above the original producer price due to transportation fees, wholesaler fees, and the retailer's markup. However, IMPLAN prices are in terms of producer prices. When entering retail or wholesale spending categories (such as purchases at a grocery or sporting goods store), IMPLAN provides the option of whether the amount represents total value or marginal value. This study utilized expenditure profiles that indicate the total value spent at retail outlets. Selecting to apply margins, IMPLAN will take that total value spent and apply wholesale, trade, and transport margins to appropriately capture how much of the retail purchase stays with the retail outlet. This ensures that consumer expenditure at the retail outlet is properly allocated amongst the supply chain participants. If the option to not apply margins was selected, IMPLAN would allocate 100% of the retail purchase to the retail outlet as opposed to its suppliers.

IMPLAN modeling also requires the selection of the appropriate Local Purchase Percentage (LPP). The LPP is used to determine what percentage of sales is applied to the county and state multipliers. The default LPP is 100%. However, not all industries are available in every county, and trips taken to one county (or the state) may involve purchases outside of that region. For this reason, we utilize the Social Accounts Multiplier (SAM) Model Value provided by IMPLAN. This value models the region's ability to meet local demand with local supply of a good, service, or commodity. We used LPPs of 100% for IMPLAN sectors hotels and motels, including casino hotels, other accommodations, and other amusement and recreation industries, as the methodology of allocating visitor days estimated that trips to a region were using such services locally.

For gasoline, the analysis captures the fact that Washington does a significant amount of refining. To do this, expenditures on gasoline were entered into IMPLAN as a Commodity Change for industry 3115 Refined Petroleum Products. IMPLAN then allocated these expenditures across the relevant supply chain industries including Refineries, Wholesale Distribution and Gasoline Stations. The allocation to gasoline stations was given a Local Purchase Percentage of 100%. This was more accurate than allocating all gasoline expenditures to Retail Gasoline stations because this does not distinguish gasoline from other gas station purchases. With all expenditures and assumptions properly entered into IMPLAN, the model was run separately for each region and group of activities.

Regional IMPLAN models exist for zip codes, counties, and the state. Zip code data may be inaccurate due to data suppression in the source County Business Pattern program data. When confidential data such as precise employment at a given firm might be interpreted from zip code level data, the U.S. Census Bureau suppresses that information. Due to the way Legislative Districts are drawn in Washington State, it was not possible to construct Legislative District models in IMPLAN. While Legislative District expenditures were calculated using a variety of methodologies (See Table "Allocation of Visitors To County and Legislative Districts"), this study does not calculate the Total Contribution Effects for Legislative Districts. It is possible to extract the multipliers from County-Level Regional Models (see Figure E-1) and apply them to Legislative District expenditures. However, County and Legislative District boundaries cross each other quite frequently, making these estimates imperfect.

Figure E-1. Multipliers for Counties in Washington State



APPENDIX F

County Economic Expenditures and Contribution Results for All Recreational Lands

The following tables do not include equipment expenditures. Counties do not total to the Washington State total due to region-specific modeling.

County	Total Expenditures* (000's)	Economic Contribution (000's)	Multiplier	Employment	State and Local Tax (000's)
ADAMS	\$49,305	\$21,760	0.44	342	\$2,133
ASOTIN	\$80,375	\$41,817	0.52	622	\$3,365
BENTON	\$743,771	\$451,326	0.61	7,074	\$32,518
CHELAN	\$341,811	\$298,912	0.87	3,843	\$22,942
CLALLAM	\$355,841	\$245,335	0.69	3,709	\$19,635
CLARK	\$1,186,068	\$719,141	0.61	9,229	\$54,096
COLUMBIA	\$29,925	\$15,049	0.50	220	\$1,227
COWLITZ	\$359,701	\$191,957	0.53	2,625	\$15,683
DOUGLAS	\$136,057	\$68,267	0.50	932	\$5,660
FERRY	\$82,572	\$26,855	0.33	381	\$2,438
FRANKLIN	\$205,464	\$81,959	0.40	1,114	\$5,942
GARFIELD	\$42,113	\$19,433	0.46	427	\$1,632
GRANT	\$301,300	\$161,617	0.54	2,187	\$13,094
GRAYS HARBOR	\$343,267	\$218,642	0.64	2,900	\$16,885
ISLAND	\$358,610	\$211,909	0.59	3,321	\$18,187
JEFFERSON	\$317,207	\$215,059	0.68	3,335	\$17,850
KING	\$5,441,083	\$4,552,283	0.84	50,191	\$310,612
KITSAP	\$694,367	\$467,113	0.67	6,461	\$37,533
KITTITAS	\$185,325	\$118,805	0.64	1,762	\$9,459
KLICKITAT	\$155,499	\$74,242	0.48	1,110	\$5,836
LEWIS	\$326,661	\$205,140	0.63	2,398	\$25,206
LINCOLN	\$48,343	\$23,397	0.48	272	\$3,179
MASON	\$255,196	\$118,927	0.47	1,614	\$16,272
OKANOGAN	\$222,002	\$151,343	0.68	1,819	\$18,646
PACIFIC	\$176,860	\$107,385	0.61	1,364	\$13,354

Table F-1. Economic Contribution Results, By County (continued)

County	Total Expenditures* (000's)	Economic Contribution (000's)	Multiplier	Employment	State and Local Tax (000's)
PEND OREILLE	\$68,066	\$19,736	0.29	250	\$2,829
PIERCE	\$2,252,445	\$1,612,372	0.72	17,243	\$176,352
SAN JUAN	\$121,776	\$94,363	0.77	1,134	\$10,557
SKAGIT	\$479,877	\$349,972	0.73	3,805	\$38,281
SKAMANIA	\$199,386	\$120,784	0.61	1,481	\$15,873
SNOHOMISH	\$2,073,726	\$1,225,092	0.59	14,926	\$150,405
SPOKANE	\$1,308,264	\$1,177,345	0.90	12,460	\$118,766
STEVENS	\$235,766	\$125,812	0.53	1,719	\$18,133
THURSTON	\$755,537	\$476,050	0.63	5,616	\$58,735
WAHKIAKUM	\$20,717	\$6,710	0.32	111	\$1,057
WALLA WALLA	\$159,949	\$94,593	0.59	1,133	\$11,504
WHATCOM	\$705,093	\$584,754	0.83	6,502	\$62,712
WHITMAN	\$146,083	\$67,389	0.46	926	\$9,417
YAKIMA	\$669,931	\$433,425	0.65	5,398	\$55,037
Washington**	\$21,635,336	\$20,520,858	0.95	198,658	\$2,010,992

*Includes equipment expenditures

**Counties do not total to Washington State due to region-specific modeling

Table F-2. Economic Expenditure* Results By County on Federal Lands, State Lands, Public Waters, and Local Parks

County	Federal Lands	State Lands	Public Waters	Local Parks
ADAMS	\$1,337,655	\$2,014,780	\$9,459,675.20	\$4,170,081.49
ASOTIN	\$2,044,130	\$3,700,573	\$30,161,750.68	\$4,236,776.43
BENTON	\$227,713,776	\$4,404,342	\$139,020,229.51	\$38,356,119.28
CHELAN	\$51,584,455	\$33,971,283	\$86,841,619.72	\$15,833,274.11
CLALLAM	\$64,526,785	\$11,424,439	\$119,940,692.32	\$13,990,786.85
CLARK	\$5,708,781	\$50,312,534	\$261,064,452.65	\$88,995,977.26
COLUMBIA	\$6,409,454	\$3,957,732	\$6,886,049.95	\$1,481,662.06
COWLITZ	\$2,808,403	\$10,484,724	\$126,138,645.54	\$22,481,758.73
DOUGLAS	\$6,693,440	\$7,362,428	\$45,059,513.95	\$8,162,947.14
FERRY	\$58,250,087	\$4,399,922	\$5,984,850.98	\$1,479,531.00
FRANKLIN	\$7,791,915	\$6,936,501	\$42,579,591.87	\$16,934,988.28
GARFIELD	\$31,946,502	\$1,305,092	\$4,021,116.15	\$1,062,755.77
GRANT	\$1,161,992	\$50,752,728	\$69,947,392.51	\$19,506,318.89
GRAYS HARBOR	\$7,230,862	\$64,870,346	\$120,223,555.98	\$14,263,729.07
ISLAND	\$12,630	\$91,944,551	\$92,662,146.07	\$15,382,341.50

Table F-2. Economic Expenditure* Results By County on Federal Lands, State Lands, Public Waters, and Local Parks (continued)

County	Federal Lands	State Lands	Public Waters	Local Parks
JEFFERSON	\$118,442,220	\$58,248,702	\$76,115,624.67	\$5,853,072.44
KING	\$44,429,081	\$232,397,012	\$1,003,029,219.54	\$422,645,574.74
KITSAP	\$0	\$26,397,482	\$147,630,032.24	\$53,643,150.00
KITTITAS	\$8,312,310	\$51,404,981	\$33,777,097.98	\$8,016,820.40
KLICKITAT	\$73,272,195	\$12,866,456	\$28,918,000.56	\$3,981,076.79
LEWIS	\$38,766,113	\$18,035,738	\$70,032,484.06	\$14,784,533.38
LINCOLN	\$934,646	\$3,570,947	\$21,802,640.15	\$2,071,069.09
MASON	\$6,069,028	\$27,845,364	\$80,216,923.06	\$11,893,266.08
OKANOGAN	\$56,865,568	\$27,548,385	\$41,611,094.39	\$8,056,987.78
PACIFIC	\$2,604,236	\$70,628,521	\$48,502,935.22	\$4,099,031.72
PEND OREILLE	\$12,600,829	\$5,741,557	\$25,657,508.79	\$2,547,395.38
PIERCE	\$70,149,236	\$79,284,844	\$418,634,928.81	\$172,263,115.28
SAN JUAN	\$593,626	\$36,895,707	\$47,704,583.95	\$3,089,752.92
SKAGIT	\$28,193,008	\$32,140,363	\$165,967,068.38	\$24,807,839.00
SKAMANIA	\$147,546,598	\$9,071,241	\$19,818,583.91	\$2,168,254.54
SNOHOMISH	\$50,878,780	\$74,788,351	\$456,480,071.67	\$153,522,011.57
SPOKANE	\$1,238,076	\$97,792,374	\$226,438,036.29	\$102,983,457.70
STEVENS	\$55,711,863	\$8,942,705	\$47,492,791.74	\$8,529,395.30
THURSTON	\$2,389,999	\$35,821,030	\$194,181,132.33	\$53,093,072.29
WAHAKIUM	\$12,630	\$393,488	\$10,009,778.01	\$779,443.03
WALLA WALLA	\$8,418,901	\$3,047,308	\$31,522,271.34	\$11,517,456.19
WHATCOM	\$68,695,018	\$46,785,893	\$145,532,305.26	\$42,538,822.53
WHITMAN	\$32,675,715	\$5,302,521	\$22,078,608.91	\$8,773,338.64
YAKIMA	\$19,524,742	\$34,398,864	\$107,841,072.92	\$51,098,742.12
Washington	\$1,323,545,284	\$1,347,191,809	\$4,630,986,077.27	\$1,439,095,726.75

*Does not include equipment expenditures

Table F-3. Economic Expenditure* Results By County for Events, Private Lands, Equipment, and Total

County	Events	Private Lands	Equipment	Total
ADAMS	\$5,555,482.20	\$1,773,995.06	\$24,993,476.45	\$49,305,145.47
ASOTIN	\$6,330,305.66	\$5,044,928.54	\$28,857,002.41	\$80,375,466.95
BENTON	\$51,870,194.69	\$48,623,842.77	\$233,782,690.28	\$743,771,193.82
CHELAN	\$21,448,981.22	\$35,438,784.39	\$96,692,244.18	\$341,810,641.40
CLALLAM	\$20,904,090.33	\$29,761,623.26	\$95,292,299.88	\$355,840,716.95
CLARK	\$125,349,293.84	\$86,968,687.73	\$567,668,737.81	\$1,186,068,464.94
COLUMBIA	\$1,293,027.12	\$4,454,758.26	\$5,442,300.14	\$29,924,983.00
COWLITZ	\$30,332,256.38	\$30,783,617.98	\$136,671,396.99	\$359,700,802.47

Table F-3. Economic Expenditure* Results By County for Events, Private Lands, Equipment, and Total (continued)				
County	Events	Private Lands	Equipment	Total
DOUGLAS	\$11,342,909.52	\$6,147,392.57	\$51,288,140.40	\$136,056,770.70
FERRY	\$2,210,615.46	\$169,491.81	\$10,077,196.75	\$82,571,694.94
FRANKLIN	\$23,118,146.09	\$3,790,643.68	\$104,312,532.01	\$205,464,317.88
GARFIELD	\$753,272.33	\$-	\$3,024,093.21	\$42,112,831.15
GRANT	\$26,387,549.62	\$14,608,785.72	\$118,935,210.43	\$301,299,977.32
GRAYS HARBOR	\$21,311,902.19	\$18,215,021.81	\$97,151,329.82	\$343,266,746.53
ISLAND	\$22,983,257.46	\$30,854,405.99	\$104,770,283.10	\$358,609,615.22
JEFFERSON	\$8,745,266.18	\$9,936,624.08	\$39,865,715.96	\$317,207,225.44
KING	\$571,814,929.85	\$589,416,093.04	\$2,577,350,832.66	\$5,441,082,743.03
KITSAP	\$74,165,653.77	\$57,380,903.32	\$335,149,867.60	\$694,367,088.82
KITTITAS	\$11,978,192.48	\$17,232,011.89	\$54,603,165.78	\$185,324,579.34
KLICKITAT	\$5,948,256.50	\$3,397,721.21	\$27,115,412.99	\$155,499,118.88
LEWIS	\$22,090,052.88	\$62,253,095.95	\$100,698,567.13	\$326,660,584.59
LINCOLN	\$3,094,451.78	\$2,762,612.21	\$14,106,207.07	\$48,342,573.21
MASON	\$17,770,116.22	\$30,395,139.43	\$81,005,928.39	\$255,195,765.19
OKANOGAN	\$12,038,207.86	\$21,005,078.79	\$54,876,748.80	\$222,002,070.84
PACIFIC	\$6,124,496.80	\$16,982,223.37	\$27,918,812.86	\$176,860,256.03
PEND OREILLE	\$3,806,146.41	\$361,948.13	\$17,350,501.24	\$68,065,886.53
PIERCE	\$235,197,741.36	\$215,646,104.23	\$1,061,268,544.81	\$2,252,444,514.03
SAN JUAN	\$4,616,500.48	\$7,831,430.58	\$21,044,539.20	\$121,776,140.88
SKAGIT	\$34,500,054.05	\$38,258,623.13	\$156,010,379.65	\$479,877,335.73
SKAMANIA	\$3,239,659.73	\$2,773,535.11	\$14,768,144.51	\$199,386,016.40
SNOHOMISH	\$210,832,204.80	\$175,242,065.28	\$951,982,140.17	\$2,073,725,625.01
SPOKANE	\$139,501,213.78	\$111,442,015.77	\$628,868,590.60	\$1,308,263,763.93
STEVENS	\$12,744,047.34	\$44,251,140.71	\$58,094,351.94	\$235,766,295.27
THURSTON	\$74,384,665.98	\$59,007,872.53	\$336,659,245.11	\$755,537,017.23
WAHIAKUM	\$1,164,591.22	\$3,047,927.70	\$5,308,845.01	\$20,716,703.34
WALLA WALLA	\$17,208,606.43	\$9,787,768.20	\$78,446,259.02	\$159,948,569.36
WHATCOM	\$59,339,687.52	\$73,769,449.21	\$268,431,645.26	\$705,092,821.32
WHITMAN	\$13,108,531.01	\$4,388,231.85	\$59,755,868.29	\$146,082,814.80
YAKIMA	\$71,707,583.54	\$60,755,798.57	\$324,604,243.36	\$669,931,046.15
Washington	\$1,986,312,142.09	\$1,933,961,393.86	\$8,974,243,491.27	\$21,635,335,924.06

Note: A dash indicates no estimate for this category.

*Does not include equipment expenditures

Figure F-1. Employment Associated with Expenditures across all Outdoor Recreational Lands Controlled for Local Population

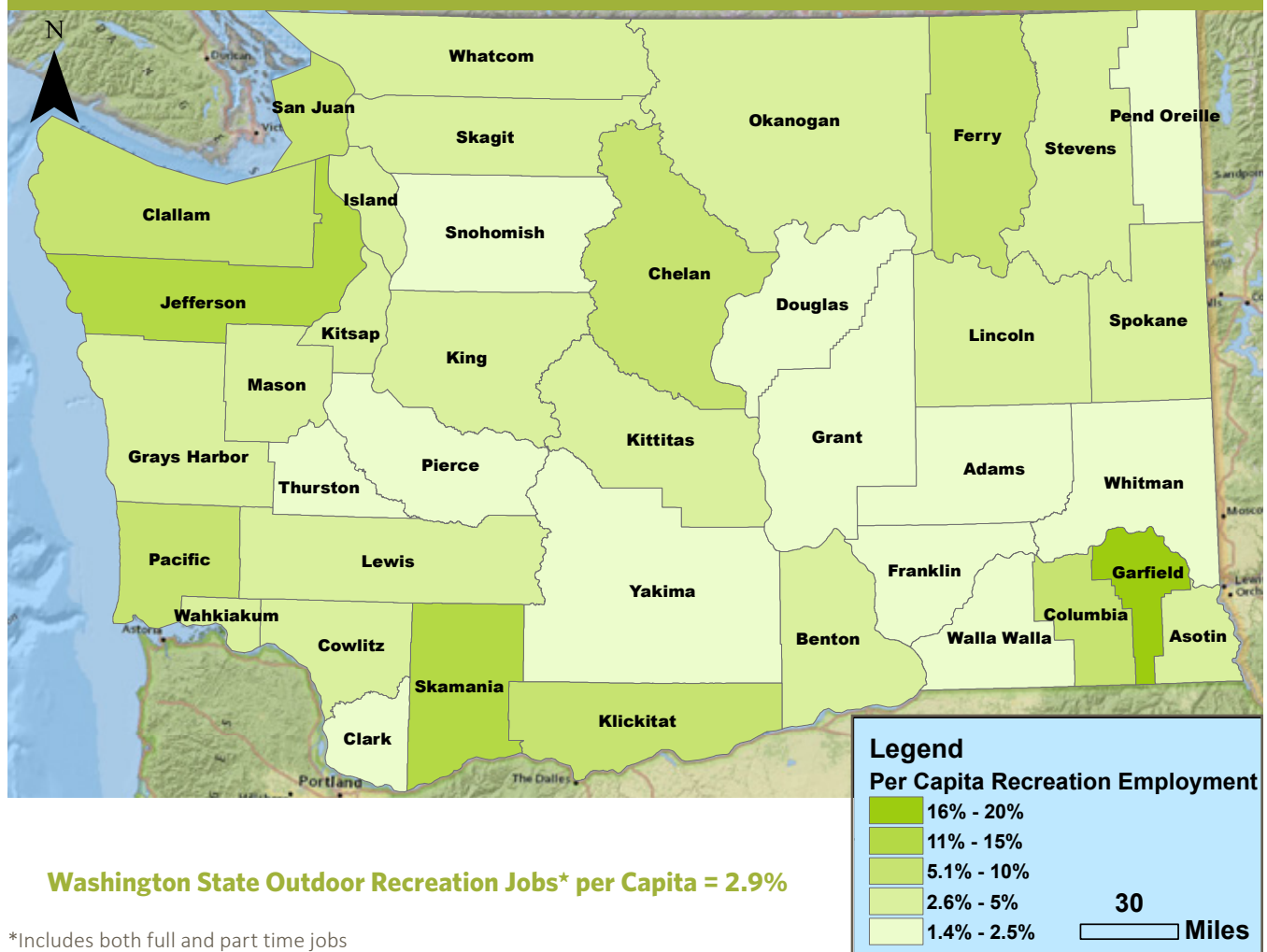


Figure F-1 shows the relative importance of outdoor recreation for county employment. The percentages were calculated by dividing the IMPLAN-modeled outdoor recreation jobs per county (numerator) by the total county population (denominator). The resulting percentages would likely be greater if the employed population or adult population were used as the denominator instead of total population, however this data was not obtained.

APPENDIX G

Legislative District Expenditures and Participant Days

Table G-1. Legislative District Expenditures* Resulting from Recreation on Federal Lands, State Lands, Public Waters, Local Lands, and Private Lands

Legislative District	Federal Lands ('000s)	State Lands ('000s)	Public Waters ('000s)	Local Lands ('000s)	Private Lands ('000s)
State Legislative District 1	\$7	\$13,284	\$8,812	\$51,649	\$54,475
State Legislative District 2	\$41,101	\$36,620	\$38,550	\$51,636	\$45,056
State Legislative District 3	\$5	\$63,088	-	\$56,044	-
State Legislative District 4	\$5	\$49,846	\$67,717	\$54,150	\$31,541
State Legislative District 5	\$12,086	\$67,906	\$58,278	\$53,987	\$129,124
State Legislative District 6	\$7.1	\$26,741	\$55,336	\$55,405	\$33,082
State Legislative District 7	\$122,150	\$57,238	\$146,031	\$51,659	\$199,636
State Legislative District 8	\$247	\$1,233	\$129,795	\$55,668	\$14,796
State Legislative District 9	\$83,861	\$26,986	\$99,001	\$52,763	\$26,525
State Legislative District 10	\$4,686	\$82,480	\$147,731	\$51,648	\$78,858
State Legislative District 11	\$1	\$3,198	\$23,853	\$62,245	\$2,466
State Legislative District 12	\$101,684	\$56,321	\$177,853	\$53,937	\$92,466
State Legislative District 13	\$43,106	\$86,073	\$136,214	\$53,710	\$123,929
State Legislative District 14	\$242,832	\$39,742	\$42,259	\$55,083	\$73,877
State Legislative District 15	\$297	\$12,158	\$86,337	\$51,645	\$20,246
State Legislative District 16	\$176,763	\$10,885	\$55,978	\$53,937	\$56,806
State Legislative District 17	\$10	\$4,322	-	\$51,647	\$14,027
State Legislative District 18	\$7,241	\$30,180	\$86,579	\$57,293	\$43,707
State Legislative District 19	\$2,440	\$89,999	\$76,614	\$54,063	\$34,592
State Legislative District 20	\$50,396	\$42,553	\$134,791	\$51,637	\$74,314
State Legislative District 21	\$6	\$1,753	\$89,336	\$51,658	\$2,466
State Legislative District 22	\$980	\$6,460	\$122,945	\$55,315	\$21,790
State Legislative District 23	-	\$14,860	\$139,682	\$51,642	\$29,529
State Legislative District 24	\$172,486	\$112,920	\$134,629	\$51,666	\$47,395
State Legislative District 25	\$1	\$2,812	-	\$51,649	\$13,732
State Legislative District 26	\$2	\$19,189	\$209,047	\$54,240	\$23,458
State Legislative District 27	\$1	\$6,307	\$186,408	\$51,645	\$4,932

Table G-1. Legislative District Expenditures* Resulting from Recreation on Federal Lands, State Lands, Public Waters, Local Lands, and Private Lands (continued)

Legislative District	Federal Lands ('000s)	State Lands ('000s)	Public Waters ('000s)	Local Lands ('000s)	Private Lands ('000s)
State Legislative District 28	\$845	\$8,232	\$59,584	\$57,431	\$44,486
State Legislative District 29	\$1	\$1,651	\$9,215	\$58,942	\$21,579
State Legislative District 30	\$1	\$7,091	\$54,806	\$51,658	\$26,396
State Legislative District 31	\$34,827	\$53,907	\$59,007	\$56,499	\$46,791
State Legislative District 32	\$3	\$2,152	-	\$55,941	\$7,398
State Legislative District 33	\$2	\$7,815	\$132,125	\$55,167	\$7,398
State Legislative District 34	\$4	\$8,807	\$112,794	\$54,897	\$8,445
State Legislative District 35	\$13,725	\$44,500	\$157,090	\$53,503	\$47,505
State Legislative District 36	\$44,747	\$2,514	\$384,675	\$55,360	-
State Legislative District 37	\$1	\$1,816	\$81,041	\$51,632	-
State Legislative District 38	\$15	\$4,151	\$52,000	\$58,284	\$7,508
State Legislative District 39	\$101,058	\$100,794	\$76,774	\$56,361	\$77,148
State Legislative District 40	\$645	\$42,195	\$130,262	\$54,785	\$29,835
State Legislative District 41	\$2	\$28,985	\$156,389	\$51,654	\$25,786
State Legislative District 42	\$65,172	\$30,867	\$90,740	\$51,647	\$83,221
State Legislative District 43	\$.4	\$985	\$198,493	\$56,156	\$2,466
State Legislative District 44	\$11	\$3,064	\$46,499	\$51,653	\$16,299
State Legislative District 45	\$3	\$6,852	\$35,320	\$51,666	\$129,114
State Legislative District 46	\$1	\$12,829	\$117,226	\$55,916	\$4,932
State Legislative District 47	\$2	\$4,272	\$31,485	\$54,899	\$30,555
State Legislative District 48	\$1	\$5,046	\$93,134	\$58,969	\$16,875
State Legislative District 49	\$83	\$3,512	\$98,552	\$51,652	\$7,398
State Total	\$1,323,545	\$1,347,192	\$4,630,986	\$2,652,293	\$1,933,961

Note: A dash indicates no estimate for this category.

*Does not include equipment expenditures

Table G-2. Legislative District Expenditures for Events, Equipment Expenditures, Public Lands, and Total

Legislative District	Total ('000s)	Public lands	Events ('000s)	Equipment Contribution ('000s)
State Legislative District 1	\$327,153	\$89,530	\$15,778	\$183,148
State Legislative District 2	\$411,840	\$183,681	\$15,774	\$183,103
State Legislative District 3	\$318,045	\$134,910	\$15,777	\$183,135
State Legislative District 4	\$402,249	\$187,500	\$15,783	\$183,209
State Legislative District 5	\$520,268	\$208,031	\$15,775	\$183,114
State Legislative District 6	\$369,442	\$153,262	\$15,774	\$183,098
State Legislative District 7	\$775,680	\$392,860	\$15,781	\$183,185
State Legislative District 8	\$400,617	\$202,718	\$15,774	\$183,103
State Legislative District 9	\$488,044	\$278,388	\$15,776	\$183,131
State Legislative District 10	\$564,324	\$302,322	\$15,778	\$183,144
State Legislative District 11	\$290,750	\$105,080	\$15,783	\$183,205
State Legislative District 12	\$681,259	\$405,579	\$15,784	\$183,214
State Legislative District 13	\$642,021	\$334,886	\$15,783	\$183,207
State Legislative District 14	\$652,693	\$395,691	\$15,776	\$183,124
State Legislative District 15	\$369,592	\$166,213	\$15,777	\$183,132
State Legislative District 16	\$553,241	\$313,337	\$15,774	\$183,098
State Legislative District 17	\$268,923	\$71,756	\$15,777	\$183,140
State Legislative District 18	\$423,899	\$197,069	\$15,776	\$183,123
State Legislative District 19	\$456,628	\$238,893	\$15,777	\$183,143
State Legislative District 20	\$552,571	\$295,151	\$15,774	\$183,106
State Legislative District 21	\$344,181	\$158,534	\$15,781	\$183,181
State Legislative District 22	\$406,420	\$201,478	\$15,778	\$183,152
State Legislative District 23	\$434,612	\$221,960	\$15,776	\$183,123
State Legislative District 24	\$718,085	\$487,483	\$15,783	\$183,207
State Legislative District 25	\$267,119	\$70,239	\$15,778	\$183,147
State Legislative District 26	\$504,917	\$298,260	\$15,782	\$183,199
State Legislative District 27	\$448,202	\$260,137	\$15,777	\$183,132
State Legislative District 28	\$369,475	\$141,867	\$15,776	\$183,122
State Legislative District 29	\$290,344	\$85,589	\$15,780	\$183,177
State Legislative District 30	\$338,916	\$129,338	\$15,781	\$183,182
State Legislative District 31	\$449,925	\$220,015	\$15,775	\$183,119
State Legislative District 32	\$264,405	\$73,873	\$15,777	\$183,134
State Legislative District 33	\$401,436	\$210,888	\$15,778	\$183,150
State Legislative District 34	\$383,832	\$192,276	\$15,775	\$183,111
State Legislative District 35	\$515,226	\$284,595	\$15,776	\$183,126

Table G-2. Legislative District Expenditures for Events, Equipment Expenditures, Public Lands, and Total (continued)

Legislative District	Total ('000s)	Public lands	Events ('000s)	Equipment Contribution ('000s)
State Legislative District 36	\$686,239	\$503,075	\$15,779	\$183,163
State Legislative District 37	\$333,353	\$150,263	\$15,773	\$183,090
State Legislative District 38	\$320,893	\$130,229	\$15,779	\$183,156
State Legislative District 39	\$611,012	\$350,762	\$15,774	\$183,102
State Legislative District 40	\$456,682	\$243,668	\$15,781	\$183,179
State Legislative District 41	\$461,763	\$252,810	\$15,780	\$183,167
State Legislative District 42	\$520,567	\$254,204	\$15,777	\$183,142
State Legislative District 43	\$457,049	\$271,413	\$15,780	\$183,170
State Legislative District 44	\$316,467	\$117,007	\$15,779	\$183,162
State Legislative District 45	\$421,947	\$109,624	\$15,783	\$183,209
State Legislative District 46	\$389,855	\$201,752	\$15,780	\$183,171
State Legislative District 47	\$320,102	\$106,433	\$15,775	\$183,114
State Legislative District 48	\$372,937	\$172,927	\$15,777	\$183,135
State Legislative District 49	\$360,135	\$169,578	\$15,779	\$183,159
State Total	\$21,635,336	\$10,727,131	\$773,114	\$8,974,243

APPENDIX H

Economic Contributions Resulting From Recreation on Public Lands, by County

Table H-1. Economic Contributions by County					
County	Total Expenditures* ('000s)	Total Contribution** ('000s)	Multiplier	Employment	State Tax ('000s)
ADAMS	\$22,538	\$15,624	0.69	231	\$1,419
ASOTIN	\$46,474	\$33,701	0.73	488	\$2,528
BENTON	\$461,365	\$318,670	0.69	5,073	\$20,220
CHELAN	\$209,680	\$211,333	1.01	2,663	\$15,341
CLALLAM	\$230,787	\$191,363	0.83	2,831	\$14,512
CLARK	\$531,431	\$496,869	0.93	6,242	\$35,343
COLUMBIA	\$20,028	\$10,810	0.54	162	\$820
COWLITZ	\$192,246	\$135,733	0.71	1,794	\$10,312
DOUGLAS	\$78,621	\$51,058	0.65	677	\$4,059
FERRY	\$72,325	\$26,208	0.36	373	\$2,378
FRANKLIN	\$97,361	\$63,660	0.65	862	\$4,180
GARFIELD	\$39,089	\$18,713	0.48	407	\$1,511
GRANT	\$167,756	\$125,438	0.75	1,625	\$9,475
GRAYS HARBOR	\$227,900	\$182,421	0.80	2,346	\$13,350
ISLAND	\$222,985	\$159,408	0.71	2,366	\$12,393
JEFFERSON	\$267,405	\$197,525	0.74	3,016	\$15,722
KING	\$2,274,316	\$2,543,776	1.12	27,130	\$158,256
KITSAP	\$301,836	\$270,498	0.90	3,589	\$19,249
KITTITAS	\$113,489	\$85,399	0.75	1,203	\$6,041
Klickitat	\$124,986	\$69,374	0.56	1,038	\$5,368
LEWIS	\$163,709	\$125,785	0.77	1,423	\$14,569
LINCOLN	\$31,474	\$19,986	0.63	218	\$2,617
MASON	\$143,795	\$86,908	0.60	1,123	\$11,156
OKANOGAN	\$146,120	\$117,353	0.80	1,354	\$13,655
PACIFIC	\$131,959	\$91,723	0.70	1,154	\$11,066
PEND OREILLE	\$50,353	\$18,467	0.37	235	\$2,659

Table H-1. Economic Contributions by County (continued)

County	Total Expenditures* ('000s)	Total Contribution** ('000s)	Multiplier	Employment	State Tax ('000s)
PIERCE	\$975,530	\$922,776	0.95	9,130	\$90,059
SAN JUAN	\$92,900	\$80,639	0.87	937	\$8,636
SKAGIT	\$285,608	\$251,514	0.88	2,556	\$25,375
SKAMANIA	\$181,844	\$117,108	0.64	1,422	\$15,275
SNOHOMISH	\$946,501	\$713,075	0.75	8,083	\$78,328
SPOKANE	\$567,953	\$703,765	1.24	7,013	\$64,450
STEVENS	\$133,421	\$84,638	0.63	1,131	\$11,594
THURSTON	\$359,870	\$285,425	0.79	3,158	\$32,790
WAHKIAKUM	\$12,360	\$5,185	0.42	78	\$757
WALLA WALLA	\$71,715	\$59,592	0.83	658	\$6,615
WHATCOM	\$362,892	\$382,270	1.05	3,947	\$37,193
WHITMAN	\$81,939	\$46,658	0.57	589	\$5,950
YAKIMA	\$284,571	\$249,554	0.88	2,847	\$28,160
Washington	\$10,727,131	\$13,605,257	1.27	122,562	\$1,215,897

*Does not include equipment expenditures

**Does not add to state total due to region specific modeling

APPENDIX I

Calculations for Out-of-State Visitors

The number of out-of-state visitors and their expenditures were calculated for every recreational land type. In some cases there was direct data available on the number of out-of-state visitors with places of origin while in other cases it had to be extrapolated from other land types for which data was available (see Table I-1). General statistics for the state of Washington on tourism and spending were also used when no data was available. Equipment was assumed to be made in the resident state or country so no equipment purchases were assumed for visitors. The table below summarizes the data sources and methodology for calculating visitor numbers, expenditures, and the distribution across sectors of these expenditures.

Table I-1. Data Source and Methodology for Out-of-State Visitors	
Land Type	Data source and general methodology
Federal Lands	
National Parks & National Recreation Areas (National Park Service)	Origin of visitors available from Public National Park Service-Managed Data, NRSS 2014, and Thomas et al. 2014. Spending profiles from Dean Runyan 2002, adopted from Longwood. Averaged types of overnight visitors from “National Park Visitor Spending Effects”; National Park Service lodge, national park service campground, motel outside of campground, campsite out of National Park, and other. Used weighted averages for dollar value spending per day.
National Forests	Data obtained from the US Forest Service; National Visitor Use Monitoring System – NVUM- reports from each of the National Forests for visits and from Styne and White 2005 for expenditures. Overnight visitors from NVUM “Four Year Report”; OVN National Forest, Overnight Other (assumed to be hotels and motels). Used ratio of total visitor spending to overnight visitor spending, then applied it to the in-state expenditure rate.
National Wildlife Refuge	Banking on Nature 2004, 2006, 2013; US Fish & Wildlife Service for visitation and expenditure data. Applied ratio of day use and overnight use to the in-state expenditure rate to get overnight expenditure rate. Used Corps of Engineers data for overnight non-boater spending profile percentages applied to overnight expenditure rate from “Banking on Nature” report.
Corps of Engineers	Corps of Engineers public data (plus Lake Wallula/Umatilla Dam, OR counted to Benton County) for visits; Chang et al. 2003 for expenditure profiles. Overnight spending profiles from “Recreation Visitor Spending Profiles and Economic Benefit to Corps of Engineers Projects”, excluding sporting goods (equipment is assumed to be purchased in state of residence).
Bureau of Land Management	Freedom of Information Act Data Request for visits data and Styne and White 2005 for expenditures. Calculated ratio of average total spending to non-local overnight spending. Applied ratio to in state daily expenditure rate.

Table I-1. Data Source and Methodology for Out-of-State Visitors (continued)

Land Type	Data source and general methodology
State Lands	
State Parks	State Park data for visit numbers per park and Dean Runyan 2002 for expenditures. Overnight expenditure profiles available. Used weighted average to find total overnight spending per-person per-night. Converted 8% for all accommodations to 7% hotels, 1% camping based on ratio of overnight hotel to camp visitors and relative expenditures.
State DNR	Utilized National Forest Profile for overnight visitors. Email confirmation from DNR that out of state visitors is 10%.
WDFW Game Management Units	Based on hunting as main activity. Percentage of out of state visitors taken from 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Overnight expenditure profiles from NVUM. Used ratio of average to overnight and apply it to the in-state daily expenditure rate.
WDFW Management Areas	Same as National Wildlife Refuge areas (Hunting in these areas is already accounted for by Game Management Units counts, so these are other types of visits).
Local Lands	
	Total visitation was projected from the Herbert Research Group study and responses from some individual counties. Validation was done with results from the SCORP survey 2013 and from the study by California State Parks 2011. Based on these a total of 10% of visitations were assumed for out-of-state visitors.
County Parks	Assumed no additional out of state travel expenditures. It is assumed that these visitors will visit another recreational land type where their expenditures will be counted.
City Parks	Assumed no additional out of state travel expenditures. It is assumed that these visitors will visit another recreational land type where their expenditures will be counted.
Municipal Golf	Used overnight spending profiles extracted from "Michigan Golf Tourists-Economic Impacts". Used ratio of average total spending to non-local overnight spending. Applied ratio to in-state daily expenditure rate.
Events on Public Lands	Expenditure profiles from Avenue ISR 2012. Adjusted to per-person per-day expenditures. Report estimates that 20.4% of people attending a special event are from out of state.
Public Waters	
	Methodology for total visit numbers assumed from SCORP 2013. Base expenditure data comes from methodology described in the activity analysis, Appendix D. The study by Wisconsin Department of Natural Resources 2013 was used to calculate the ratio of local to non-local spending and applied to all activities.
Private Lands	
Private Timberland Recreation	Used overnight national forest proportion of visitors and spending profiles from Stynes and White 2005. Allocated 4% directly to timber companies for permits bought.
Skiing	Percent of non-local visitors validated by Northwest Ski Areas Association. Non-local overnight spending profiles from Stynes & White.
Private Golf	Same methodology as municipal golf. Combined the two expenditure categories ("fees for golf" and "Recreation") into one category (fees to recreation agencies) instead of state and local enterprises.
Horseback Riding	Used profiles from Wisconsin Department of Natural Resources 2013 study. Overnight expenditures were allocated 2/3 of lodging to hotels and 1/3 to camping.

APPENDIX J

Ecosystem Service Valuation Methodology

Study Limitations of the Benefit Transfer Approach

Valuation exercises have limitations that must be noted, although these limitations should not detract from the core finding that ecosystems produce a significant economic value to society. A benefit transfer analysis estimates the economic value of a given ecosystem (e.g., wetlands) from prior studies of that ecosystem type. In this report, studies from Washington, Oregon, and British Columbia were selected first to ensure better comparability. If no study existed in this region for an activity, studies generalized from the US or similar sites were used. Some recreation activities' consumer surplus had to be derived from other activities due to lack of published data (Table J-1). The activities in the SCORP analysis were categorized differently than the consumer surplus database, as such; some activities had no consumer surplus estimates associated with them. The activities listed in Table J-1 were determined to have similar consumer-surplus to appropriately fill in the gaps in the data. The most similar categories were chosen based on the similarity in gear required, expenditures needed for the activity, and where the activity took place.

Table J-1. Consumer-surplus transferred activities

SCORP Recreation Activity	Transferred consumer-surplus activity
Surfboarding	Inner tubing or floating
Windsurfing	Inner tubing or floating
Snowshoeing	Cross-country skiing
Playground Use	Running, jogging, or trail running

That not all ecosystems have been valued or studied well is perhaps the most serious issue, because it results in a significant underestimate of the value of ecosystem services. More complete coverage would almost certainly increase the values shown in this report, since no known valuation studies have reported estimated values of zero or less for an ecosystem service. See the table below for a full list of ecosystem service-land cover combinations included in the analysis.

Table J-2. Ecosystem Services Valued on Land Cover Type			
National Land Cover Database (NLCD) Code and Name	Aesthetic Information	Wildlife Habitat	Water Quality
11 Open Water	X	X	X
12 Perennial Snow/Ice			
21 Developed, Open Space	X		X
22 Developed, Low Intensity			
23 Developed, Medium Intensity			
24 Developed, High Intensity			
31 Barren Land	X		
41 Deciduous Forest	X	X	X
42 Evergreen Forest	X	X	X
43 Mixed Forest	X	X	X
52 Shrub/Scrub			
71 Grassland/Herbaceous	X	X	X
81 Pasture/Hay	X	X	X
82 Cultivated Crops	X	X	
90 Woody Wetlands	X	X	X
95 Emergent Herbaceous Wetlands	X	X	X

Key	
Ecosystem service present on land cover type and valued in this analysis	X
Ecosystem service present on land cover type	
Ecosystem service not present on land cover type	

Other limitations include:

- **Selection Bias.** Bias can be introduced in choosing the valuation studies, as in any appraisal methodology. The use of ranges partially mitigates this problem.
- **Static Analysis.** It is important to note that the ecosystem service valuations presented in the report are static analyses. As such, they ignore interdependencies and dynamics, the omission of which is difficult to assess.
- **Increases in Scarcity.** The valuation also probably underestimates shifts in the relevant demand curves as the sources of ecosystem services become more limited. If ecosystem services are scarcer than assumed, their value has been underestimated in this study. Such reductions in supply appear likely as land conversion and development proceed.
- **GIS Data.** Since this valuation approach involves using benefit transfer methods to assign values to land cover types based, in some cases, on the context of their surroundings, one of the most important issues with GIS quality assurance is reliability of the land cover maps used in the benefits transfer, both in terms of categorical precision and accuracy.
- **Ecosystem Health.** There is the potential that ecosystems identified in the GIS analysis are fully functioning to the point where they are delivering higher values than those assumed in the original primary studies, which would result in an underestimate of current value. On the other hand, if ecosystems are less healthy than those in primary studies, this valuation will overestimate current value.
- **Spatial Effects.** This ecosystem service valuation assumes spatial homogeneity of services within ecosystems, i.e. that every acre of forest produces the same ecosystem services. This is clearly not the case. Whether this would increase or decrease valuations depends on the spatial patterns and services involved.
- **Price Distortions.** Distortions in the current prices used to estimate ecosystem service values are carried through the analysis. These prices do not reflect environmental externalities and are therefore again likely to be underestimates of true values.

Definition of Ecosystem Service Categories

Below is a table defining all 21 of the Ecosystem Services used by Earth Economics. Our classification is based on de Groot et al. (2002).ⁱ

Table J-3. Definition of Ecosystem Services	
Good/Service	Economic Benefit to People
Provisioning Services	
Food	Producing crops, fish, game, and fruits
Medicinal Resources	Providing traditional medicines, pharmaceuticals, and assay organisms
Ornamental Resources	Providing resources for clothing, jewelry, handicraft, worship and decoration
Energy and Raw Materials	Providing fuel, fiber, fertilizer, minerals, and energy
Water Supply	Provisioning of surface and ground water for drinking water, irrigation and industrial use
Regulating Services	
Biological Control	Providing pest and disease control
Climate Stability	Supporting a stable climate at global and local levels through carbon sequestration and other processes
Air Quality	Providing clean, breathable air
Moderation of Extreme Events	Preventing and mitigating natural hazards such as floods, hurricanes, fires, and droughts
Pollination	Pollination of wild and domestic plant species
Soil Formation	Creating soils for agricultural and ecosystems integrity; maintenance of soil fertility
Soil Retention	Retaining arable land, slope stability and coastal integrity
Waste Treatment	Improving soil, water, and air quality by decomposing human and animal waste, and removing pollutants
Water Regulation	Providing natural irrigation, drainage, ground water recharge, river flows, and navigation
Supporting Services	
Habitat and Nursery	Maintaining genetic and biological diversity, the basis for most other ecosystem functions; promoting growth of commercially harvested species
Genetic Resources	Improving crop and livestock resistance to pathogens and pests
Information Services	
Aesthetic Information	Enjoying and appreciating the presence, scenery, sounds, and smells of nature
Cultural and Artistic Inspiration	Using nature as motifs in art, film, folklore, books, cultural symbols, architecture, and media
Recreation and Tourism	Experiencing natural ecosystems and enjoying outdoor activities
Science and Education	Using natural systems for education and scientific research
Spiritual and Historical	Using nature for religious and spiritual purposes

ⁱ de Groot, R.S., Wilson, M.A., Boumans, R.M.J., 2002. A typology for the classification, description, and valuation of ecosystem functions, goods, and services. *Ecological Economics* 41, 393-408.

Comprehensive Ecosystem Value Tables

The following tables provide the values used in the ecosystems service analysis in detail. Total values for similar land cover types were combined and summarized in the report.

Table J-4. Ecosystem Service Values on Deciduous, Evergreen, and Mixed Forests

Ecosystem Service	Deciduous Forest		Evergreen Forest		Mixed Forest	
	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)
Aesthetic Information	5,917	11,214	5,435	10,732	5,435	10,732
Habitat and Nursery	22	63	829	877	22	63
Water Quality	50	742	50	742	50	742
Total	5,988	12,020	6,314	12,352	5,507	11,538

Table J-5. Ecosystem Service Values on Grasslands, Croplands, and Pastures

Ecosystem Service	Grassland/Herbaceous		Pasture/Hay		Cultivated Crops	
	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)
Aesthetic Information	1	1	0.4	7	9,189	18,398
Habitat and Nursery	35	93	0.1	3	509	1,509
Water Quality	7,932	12,569	5	5		
Total	7,968	12,663	5	15	9,698	19,907

Table J-6. Ecosystem Service Values on Urban Greenspace, Beach, and Fresh Water

Ecosystem Service	Urban Greenspace		Beach		Fresh Water	
	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)
Aesthetic Information	36	2,552	251	662	252	515
Habitat and Nursery					3	57
Water Quality	444	444			2	2
Total	480	2,996	251	662	256	574

Table J-7. Ecosystem Service Values on Saltwater, Woody Wetlands, and Emergent Herbaceous Wetlands

Ecosystem Service	Saltwater		Woody Wetland		Emergent Herbaceous Wetland	
	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)	Low (\$/acre/year)	High (\$/acre/year)
Aesthetic Information	4	1,776	37	10,106	37	10,106
Habitat and Nursery	9,197	9,212	63	12,778	472	505
Water Quality			430	10,149	430	10,149
Total	9,201	10,989	530	33,033	939	20,760

EARTH ECONOMICS

