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2012 Pennsylvania Recreational Water Trails Economic Impact Study A Four-Trail Case Study

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2012 PENNSYLVANIA RECREATIONAL WATER TRAILS ECONOMIC IMPACT STUDY

A FOUR-TRAIL CASE STUDY

DRAFT REPORT

Submitted to:

Pennsylvania Legislative Budget and Finance Committee

Room 400, Finance Building

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EXECUTIVE SUMMARY

The Pennsylvania Legislative Budget and Finance Committee (LB & FC) contracted with ICF International to conduct a case study of the economic impact of Pennsylvania's water trails on the state economy. Four trails of the state's 21 water trails were selected for the study: the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers. This study is part of an ongoing effort to promote, maintain, and expand the large network of designated water trails across the Commonwealth of Pennsylvania.

The Study of the Economic Impact of Pennsylvania's Recreational Water Trails (2012 PA Water Recreational Water Trails Economic Impact Study) was conducted from the end of July to September 2012, a total of six weeks. The results are weighted according to the visitation numbers acquired during the sampling timeframe. The condensed sampling period was taken into consideration within the analysis; therefore, the results present the total weighted expenditures and visitation numbers based on the sampling timeframe of six weeks.

The goals of the study were to:

- Increase knowledge of the economic impact of the Commonwealth's 21 water trails on the state economy.
- Estimate and gain a better understanding of the direct, indirect, and induced economic impacts of expenditures by water trail visitors.

We used an innovative iPad® Computer Assisted Personal Interviewing (CAPI) system to estimate the economic impact of water trails at the state level. Over a period of 40 days, through in-person interviews and a multi-stage, cluster sampling design, we collected 352 interviews from water trail visitors. The survey captured important information about visitor trip characteristics, trip expenditures, and visitor knowledge of water trails.

The results of the survey reflect a six-week sampling period from July 27 through September 3, on the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers water trails. Due to the seasonality of water trail visitation, we cannot assume that these results represent yearlong visitation patterns; therefore, this study provides the total weighted economic impact for the sampling period. Additionally, it should be noted that the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers represent only four of Pennsylvania's 21 water trails; however, this four-trail case study did survey water trail visitors about their annual trips to all state water trails, and visitor counts were taken during the survey process.

This summary provides an overview of the study's overall findings:

- Based on the weighted survey results there were approximately 3,530 visitors to Pennsylvania's four surveyed water trails during the six-week sampling period. Roughly 38 percent of all visitors to the four water trails during the sampling period were first-time visitors.
- Nearly half of all visitors said they learned about the water trail from living nearby. Nearly one-quarter mentioned that they read about the trail in a guidebook, and another 17 percent said that word of mouth or information from family or friends encouraged their visit.
- Canoeists, kayakers, paddlers, and anglers also most commonly knew of the trail because they lived nearby. Guide books and water trail maps were cited as one of the top five ways to find out about the water trail for each activity.

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- The Schuylkill River was the most visited of the four surveyed water trails in Pennsylvania over the survey period. There were nearly 6,000 visitor-days spent on the trail during this time. Based on the information captured during the survey timeframe, the Susquehanna River – the second most visited of the surveyed water trails – attracted over 5,000 visitors in this time, followed by the Three Rivers and Juniata Rivers, which attracted approximately 2,000 and 1,000 visitors, respectively.
 - Almost 40 percent cited fishing as their principle reason for visiting. Anglers overlapped with other visitor categories as well. Over 70 percent of visitors cited their reason for visiting as fishing, canoeing, kayaking, or paddling, or motor boating. Nearly 30 percent cited other tourism activities as their reason for visiting the water trails. Among those reasons were picnicking, relaxing, enjoying the river scenery, photographing, and watching wildlife.
 - Visitors reported spending the most days per year (approximately 17.8 days) on average, fishing.
 - When asked about concerns when visiting the water trails, 40 percent of visitors most frequently cited water quality as their main interest or concern. Nearly 30 percent of all visitors did not express any concerns when prompted with this question.
 - The length of the trip for 85 percent of all visitors during the study period was one day (i.e., non-overnight day trip); 13 percent of visitors planned trips longer than one day.
 - Of the visitors planning to stay longer than one day, over 50 percent planned a three-day trip. Another 21 percent of visitors planned a two-day trip.
 - The total economic output generated by all visitors to the four surveyed water trails over a six-week period was \$731,000. This is the standard measure for determining the overall economic impact of a recreational resource.
 - The total Gross State Product (GSP) generated by all visitors during the six week period was \$593,000.
 - The total employment generated from the weighted impact of the water trail visitors over the six-week period was estimated to be 11 full-time, year-round jobs.
 - The median expenditure per paddler group during the survey period was \$40. Motor boaters and anglers each had a median expenditure of \$35. Visitors to the water trails whose primary purpose were other recreational activities, such as tubing, swimming or photography had a median expenditure of \$10.

STUDY BACKGROUND & PURPOSE

The economic impact of recreation water trails has been documented by a number of studies since the late 1990s. For example, in 2006 the Outdoor Industry Foundation using the IMPLAN model, estimated that the national active outdoor recreation economy, including resources such as hiking trails and water trails, contributed \$730 billion to the U.S. economy.¹ In a 2009 study of the economic impact of the Rogue River in Oregon, ECONorthwest found that river-based recreation contributed at least \$30 million to the local economies surrounding the Rogue River.² In 2008, the North Carolina Paddle Tourism Study estimated that paddlers spent more than \$1 million dollars on paddle trips in North Carolina.³

An economic impact analysis can provide many benefits to trail organizations, local municipalities, and state agencies. Current data on users, usage patterns, and expenditure patterns can provide powerful evidence for funding requests and grant applications supporting the maintenance of existing trails and the development of additional trails.

The Study of the Economic Impact of Pennsylvania’s Recreational Water Trails (2012 PA Recreational Water Trails Economic Impact Study) was designed to:

- Increase knowledge of the economic impact of the Commonwealth’s 21 water trails on the state economy.
- Estimate and gain a better understanding of the direct, indirect, and induced economic impacts of expenditures by water trail visitors.

This report provides background about the PA Water Trails program and details the results of the economic impact study conducted by ICF on behalf of the Pennsylvania Legislative Budget & Finance Committee (LB & FC).

PA WATER TRAILS PROGRAM

The Commonwealth of Pennsylvania (PA) has an abundance of recreational trails and is recognized as a leader in water trail development. The PA Water Trails Program is a partnership of the Pennsylvania Environmental Council (PEC), the PA Department of Conservation & Natural Resources (DCNR), the PA Fish & Boat Commission (PFBC), and the National Park Service (NPS), which guides the development of water trails in Pennsylvania. The goals of this program are:

- Encourage and further the development of water trails in Pennsylvania;
- Strengthen the connections between and among existing water trails to promote a system of water trails;

¹ The Active Outdoor Recreation Economy. 2006. The National Outdoor Foundation.
<http://www.outdoorfoundation.org/pdf/ResearchRecreationEconomyStateArizona.pdf>. May 2012.

² Helvoigt, Ted L. ECONorthwest. 2009 Regional Economic Impacts on the Wild and Scenic Rogue River.
http://www.americanrivers.org/assets/pdfs/wild-and-scenic-rivers/RogueEconImpact_FinalReport1485.pdf.

³ Beedle, Jennifer. 2008 Paddle Tourism Study: North Carolina State Trails Program. 2008.
www.ncparks.gov/About/docs/paddle_report.pdf. June 2012.

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- Better market and promote Pennsylvania’s water trails as a recreational resource to residents and visitors alike;
 - Provide technical assistance to local project managers who are implementing water trail projects;
 - Promote the national recognition of Pennsylvania’s water trails;
 - Provide assistance to local project managers specifically with the long-term maintenance, stewardship and sustainability of water trails;
 - Promote the development and management of water trails as a means to enhance citizen stewardship of local water resources.

A local partner manages each water trail. For the trails included in this report the local project managers are:

- Juniata River Water Trail: Allegheny Ridge Corporation
- Three Rivers Water Trail: Friends of the Riverfront
- Schuylkill River Trail: Schuylkill River National & State Heritage Area
- Susquehanna River Water Trail—North Branch: Endless Mountains Heritage Region

WHAT IS A WATER TRAIL?

Water trails are specific recreational and educational corridors that can be used for both single and multiple day trips on a waterway. They are comprised of access points, boat launches, day use sites, and some overnight camping areas. They provide safe access to, and information about, Pennsylvania's waterways while also providing connections to the diverse history, ecology, geology, heritage, and wildlife of Pennsylvania.⁴

Pennsylvania Water Trails provide information about general boating safety and local information necessary for enjoying the specific water trail.

Water Trails positively contribute to local communities by providing economic stimuli and by protecting resources, such as waterways, forests, wetlands, and wildlife that are important to quality of life. Pennsylvania Water Trails embrace the “Leave No Trace” code of outdoor ethics that promotes responsible use and enjoyment of the outdoors.

Pennsylvania has adopted eight principles of water trail development; they guide water trail organizations in the development, expansion and maintenance of the water trails. These principles are instrumental to the PA Water Trails designation process.

PA Water Trail Principles*

- Partnerships
- Stewardship

⁴ PA Water Trail Partnership. PA Water Trails Program Report. 2011. <http://pawatertrails.org/2011/12/pa-water-trails-program-report-2011/>. June 2012

* These principles are adopted from early work that was done by North American Water Trails, Inc. which is no longer in existence, but many of the resources developed by this organization are still alive in the water trail work of other organizations.

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- Volunteerism
 - Education
 - Conservation
 - Community Vitality
 - Diversity
 - Wellness & Wellbeing

Across the state, Pennsylvania has established water trails to enhance public recreational access and to foster interest and stewardship in local water resources by residents and visitors alike.

HISTORY OF THE PENNSYLVANIA WATER TRAILS PARTNERSHIP

Modern water trail development in Pennsylvania started at the local level with the development of the Susquehanna River Water Trail – Middle Section. This project was initiated by a group of local stakeholders who were interested in promoting this 51-mile section of river from Sunbury to Pennsylvania’s capital (Harrisburg) for paddling. This happened in the mid-1990s (1996) at the same time as interest in water trails was popping up in other parts of the country. The Halifax to Harrisburg section of the Susquehanna River Water Trail – Middle Section, the first modern water trail in Pennsylvania, officially opened in June 1998.⁵

The PFBC was on the original committee that worked on the first water trail. Their interest in promoting water trails quickly grew as the PFBC saw this as a way to achieve their mission of promoting safe boating in Pennsylvania. They became the lead agency in developing the PA Water Trails Program and provided assistance to local organizations who wanted to develop water trail projects. Assistance included: providing official designation of PA Water Trails, layout and printing of water trail map and guides, assistance with boat access and signage and promotion of water trails through their web site. A recent accomplishment includes publication of the PA Fishing & Boating Access Strategy, which will help to guide increased access in the Commonwealth.⁶

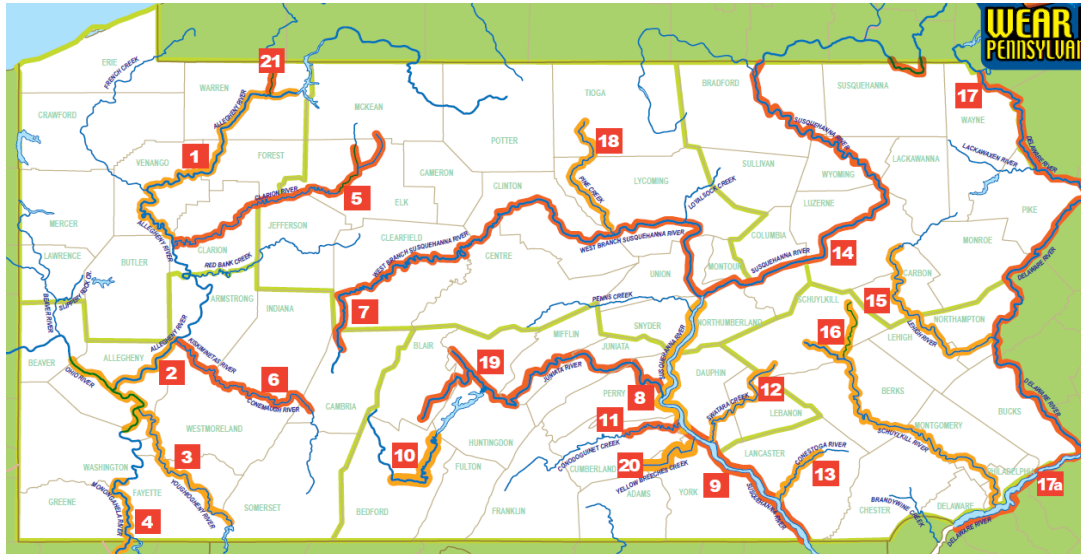
The PA DCNR was involved early on in Pennsylvania’s water trail development as a property owner. DCNR owns a majority of the islands that are a key feature on the Susquehanna River Water Trail - Middle Section. The DCNR – Bureau of Forestry developed guidelines for the development of island campsites that are available statewide. Because DCNR has been a consistent funder of water trail projects and partners with other state and federal agencies in promoting water trails in Pennsylvania, their support was again renewed as part of the recent State Comprehensive Outdoor Recreation Plan, which included several goals for strengthening the PA Water Trails Program.

The DCNR also manages the Pennsylvania River Sojourns Program with the PA Organization of Watersheds and Rivers (POWR), which provides support to water trail managing organizations to hold sojourns—multi-day paddling events that increase public awareness and appreciation for rivers and streams in Pennsylvania by giving local communities direct experience with the waterways.

^{5,6} PA Water Trail Partnership. PA Water Trails Program Report. 2011. <http://pawatertrails.org/2011/12/pa-water-trails-program-report-2011/>. June 2012

Water trails have been a focus of recreation development throughout the Chesapeake Bay watershed for over a decade. Dating from its 1998 authorization, the Chesapeake Bay Gateways and Water trails Network (CBGN) has been an impetus for water trail development in the Susquehanna River basin. The NPS has provided financial and technical assistance through both the CBGN and the Rivers, Trails & Conservation Assistance Program (RTCA).

PEC joined the program as a statewide, non-profit partner in 2003 when staff was hired to work on the Pennsylvania Water Trails Program. PEC is committed to the water trail program as a way to further their mission of “conservation through cooperation.” In addition to statewide responsibilities, PEC also manages water trails at the local level on the Youghiogheny River and Tidal Delaware River.⁷



- | | |
|---|--|
| 1. Middle Allegheny River Water Trail | 12. Swatara Creek Water Trail |
| 2. Three Rivers Water Trail | 13. Conestoga River Water Trail |
| 3. Youghiogheny River Water Trail | 14. North Branch Susquehanna River Water Trail |
| 4. Upper Monongahela Water Trail | 15. Lehigh River Water Trail |
| 5. Clarion River Water Trail | 16. Schuylkill River Water Trail |
| 6. Kiski-Conemaugh River Water Trail | 17a. Delaware River Water Trail |
| 7. West Branch Susquehanna River Water Trail | 17. Tidal Delaware River Water Trail |
| 8. Middle Susquehanna River Water Trail | 18. Pine Creek Water Trail |
| 9. Lower Susquehanna River Water Trail | 19. Juniata River Water Trail |
| 10. Raystown Branch Juniata River Water Trail | 20. Yellow Breeches Creek Water Trail |
| 11. Conodoguinet Creek Water Trail | 21. Conewango Creek Water Trail |

Courtesy of the PA Fish & Boat Commission

Each of Pennsylvania’s Water Trails is managed by a local water trail managing organization. The Susquehanna River Trail Association (SRTA), which was incorporated in 1999, led the way and is a model for other water trails as a volunteer-run membership organization. As water trails have changed and evolved so have management activities and entities. Several PA Heritage Areas manage water trails as

⁷ PA Water Trail Partnership. PA Water Trails Program Report. 2011. <http://pawatertrails.org/2011/12/pa-water-trails-program-report-2011/>. June 2012

part of their role in promoting regions (Susquehanna Gateway Heritage Area, Endless Mountains Heritage Region, Allegheny Ridge Corporation).

Other water trails are managed by municipalities, watershed organizations or other non-profit organizations. Most of the local water trail managers have taken on water trail development as a secondary or tertiary interest. At their core they may be paddling enthusiasts, environmental advocates, storytellers, or they may have tourism and economic development interests. The PA Water Trail Partnership encourages local water trail managers to build partnership coalitions and capacity.

THE FOUR TRAILS CASE STUDY

This section provides a brief description of each of the water trails included in the four-trail case study for the 2012 PA Water Recreational Trails Economic Impact Study.

Schuylkill River

The 128-mile Schuylkill River is the spine of the Schuylkill River National and State Heritage Area. It is alive with a remarkable diversity of historic, recreational and cultural attractions. Visitors can shadow the birth of the United States from the fabled landmarks of Philadelphia to the huts and hollows of Valley Forge. Upstream there is a wealth of historic places, quaint river towns, parks and access to the river and trails.⁸

Susquehanna-North Branch

The serene, rural atmosphere of Pennsylvania's Endless Mountains Region is alive with a rich history and abundance of natural and cultural resources. The North Branch of the Susquehanna River runs 181 miles through this beautiful landscape and is a designated recreation water trail. The Susquehanna-North Branch water trail is managed by the Endless Mountains Heritage Region. Visitors to the water trail can explore the legacy of river gateways, state and county parks, rolling hills, family farms, river towns, historic districts and quaint rural villages, and unique natural resources and scenic corridors.⁹

Juniata River

The Juniata River Water Trail covers 142 miles of the Juniata, the Little Juniata and the Frankstown Branch, stretching from Tyrone on the Little Juniata, and Canoe Creek State Park on the Frankstown Branch to the river's confluence with the Susquehanna at Duncannon. The entire Water Trail is rated A-1, flat-easy water, perfect for beginner paddlers. Flowing through a predominantly rural landscape, the stream remains clean with good fishing. All sections of the Juniata and its branches can be paddled between February and late May and possibly a few weeks in December. The Juniata is managed by the Allegheny Ridge Corporation.¹⁰

⁸ Courtesy of Schuylkill River National Heritage Area. www.schuylkillriver.org/default.aspx. October 2012.

⁹ Courtesy of Endless Mountains Heritage Region. www.endlessmountainsheritage.org/index.php. October 2012

¹⁰ Courtesy of American Trails. www.americantrails.org/nationalrecreationtrails/trailNRT/Juniata-River-Water-Trail-PA.html. October 2012

Three Rivers Water Trail

The rivers that surround Pittsburgh on three sides comprise The Three Rivers Water Trail—a 38-mile recreational water trail developed by Friends of the Riverfront. The water trail contains access points among the 73 municipalities within Allegheny County and also has regular access to the popular land trail bordering all three rivers – The Three Rivers Heritage Trail, also developed by Friends of the Riverfront. From the water trail canoeists and kayakers can reach the SouthSide Works, the trendy Lawrenceville shopping district, the wide riverfront promenade on the North Shore with its baseball and football stadiums, and downtown Pittsburgh. The region’s many historic bridges are enjoyed best from the rivers, and the surrounding hills offer a quiet and remote feeling for paddlers as they float by a busy urban center into the countryside.¹¹

PURPOSE OF THE PA WATER TRAILS STUDY

An economic impact analysis can provide many benefits to trail organizations, local municipalities, and state agencies like those above. Current data on users, usage patterns, and expenditure patterns can provide powerful evidence for funding requests and grant applications supporting the maintenance of existing trails and the development of additional trails.

Through the PA Water Trails Economic Impact Study, the LB & FC sought to understand the impact of the Commonwealth’s 21 water trails on the local and state economies. Specifically, LB & FC wanted to understand the direct, indirect, and induced economic impacts of expenditures by canoeists and kayakers, motor boaters, anglers, hunters, visitors, and recreational visitors—all of whom either use, or are attracted to the water trails. The objectives were to assess the trip characteristics of paddlers and visitors recreating on Pennsylvania waterways and to estimate water trail visitors’ impact on the state’s economy.

¹¹ Courtesy of the PA Fish and Boat Commission and Friends of the Riverfront.
http://fishandboat.com/watertrails/three_rivers/three-guide-map.pdf. October 2012

METHODOLOGY

The LB & FC's goals informed the methodology for the PA Recreational Water Trails Economic Impact Study. ICF developed a systematic, random sampling approach to selecting water trail access points along the four water trails surveyed, and then collected data from water trail visitors via in-person interviews.

SURVEY DEVELOPMENT

We worked with the LB & FC to create a customized survey instrument that captured the information necessary to assess the direct, indirect, and induced economic impact of the Pennsylvania water trails on the state's economy. Together, we designed a 16-question survey to collect trip related expenditure data from visitors to the four water trails surveyed in the study. Trip characteristics and visitor frequency also were collected. The survey was conducted through in-person interviews at access sites for each of the four water trails: the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers.

QUESTION CONSTRUCTION

We developed questions that every potential respondent would interpret the same way, respond to accurately, and be willing to answer. The project management team evaluated each question to ensure appropriateness for the population, necessity for the research, and low interpretation or recall burden for the respondent.

Response options for all closed-ended questions were exhaustive ("other" captured responses that lacked a pre-determined category) and mutually exclusive (responses do not logically fit in more than one category, except for "select all that apply").

For each respondent's *current visit*, survey items ascertained the trip duration, including the number of nights and the type of accommodation (e.g., hotel, cabin, timeshare unit, bed & breakfast, or friends/relatives). We collected information on a number of standard spending categories, as well as additional information about water trail use and perceptions about trail conditions and maintenance.

For multi-person parties, we obtained information from each party member; our iPad® data collection system (See *Electronic Data Collection*) allowed the interviewer to collect information from multiple people simultaneously. We recorded this information as per-trip data to provide the LB & FC with typical trip characteristics.

QUESTIONNAIRE FORMAT

While question wording and question order directly influence data quality, the overall questionnaire structure influences the respondent's ability to complete an interview successfully. To this end, the project team ensured the introduction invited the respondent to participate and offered compelling reasons to do so.

The questionnaire began with general, easy to answer, non-sensitive questions to establish rapport between the interviewer and the respondent. The survey instrument was concise, including only the items necessary to meet the project goals. This minimized the time required to participate, thus improving the proportion of qualified individuals who participated in the study.

SAMPLING

The sampling approach we utilized supported an analysis of the four trails chosen for this study. The trails included in the study were geographically dispersed, reflecting different regions of the state. The sample size was sufficient to model the aggregated statewide impact of the four trails. The project timeline and resources precluded the ability to model county-level impacts.

SAMPLE DESIGN

For the PA Water Trails Economic Impact Study analysis, we used a multi-stage cluster sample of access points. The sample was spread over multiple days and multiple times. This sample design had many benefits:

- 1) It was a random sample of water trail users;
- 2) All access points were eligible for selection;
- 3) Multiple days and times were covered; and
- 4) Selected access points were geographically clustered to allow data collection efficiencies.

Points 1) and 2) combined to produce a representative sample of the population of water trail users—essential in estimating economic impact at the state and local levels.

AREA SAMPLE

We divided the water trails into area clusters, each with a radius of approximately 25–30 miles, and we determined the number of access points in each cluster. Then, using a systematic random sample with sites ordered geographically from the northeast to the southwest in a serpentine fashion, we selected a sample of clusters with probability proportionate to the number of access points. This ensured that the sample was dispersed randomly along the water trail.

ACCESS POINT SAMPLE

Within each cluster, we selected a sample of assignments: access point location, day of the week, and time of the day. We selected 116 assignments over six weeks. We distributed assignments across weekdays and weekends to ensure a representative sample. We divided days into three shifts covering morning to evening hours. We selected morning and evening shifts more frequently to take advantage of peak usage times. Once we selected the day and time, we assigned an access point.

We selected each access point for at least one assignment. Through our electronic data collection system and using the GPS capabilities of the iPad®, we were also able to track and check sampling points.

DATA COLLECTION AND ANALYSIS

To collect the data electronically, we utilized our innovative iPad® computer-assisted personal interviewing (CAPI) system; it allowed for effective quality control and secure data transfer directly to our server and database, without the need for transcribing paper surveys into an electronic format.

ELECTRONIC DATA COLLECTION

We often employ the CAPI data collection system for recreation, expenditure, and tourism studies because of its superior use for observational, field data collection where multiple people may be interviewed simultaneously. This “green” approach reduces paper consumption and eliminates shipping costs to ferry paper forms to a central data entry hub. Meanwhile, in-person interviews create face-to-face interactions that often increase awareness of the recreational resource among the target population. Transitioning from paper to CAPI also offered several important advantages beyond waste reduction. Among those were reduced time to produce data deliverables, improved data quality, and technological advantages such as GPS capabilities.

An important benefit of CAPI is that it allowed unusual or incorrect responses to be verified and corrected in the field—as the interview is taking place. The CAPI software can be programmed with internal skip logic and other checks that immediately alert the interviewer to an out-of-range response or potential error. The program also can prompt the interviewer to correct or confirm, and then document, the trail user’s response. This feature helps to ensure data quality because questionable records can be addressed immediately in the field.

FIELD INTERVIEWERS AND IN-PERSON INTERVIEWS

Local residents were hired as field interviewers to conduct in-person interviews with the water trails users. Using the iPad® CAPI system, interviewers were scheduled to complete four-hour shifts that rotated among randomly selected access points. We fielded seven interviewers at the sampling sites on weekdays and weekends, including holidays, for six weeks through Labor Day weekend, to maximize the sample size and ensure data were collected from as many different types of water trail users as possible. Using the iPad® data collection system, field interviewers were able to interview multi-person parties, collect survey information, and then transmit survey data directly to a secure database.

INTERVIEWER TRAINING

All field interviewers were trained on the study purpose, process, and methods to administer the PA Water Trails Economic Impact Study questionnaire using the iPad® data collection system. Interviewers received specific training on how to establish rapport with visitors and increase the number of successful completions, while protecting data quality and security. Field interviewers provided information regarding the survey background and purpose to each respondent.

DATA ANALYSIS

In two stages, the sample was drawn as a stratified cluster sample. In the first stage, time periods were drawn, stratified by shift and day type within each of the four water trails.

Access sites were grouped into clusters initially containing between two to four geographically proximate sites. At the second sampling stage, a cluster of sites was selected for each sampled time period. Within each cluster, a specific site was selected to measure visitor use data, with interviews conducted across all sites in the cluster. We conducted a total of 352 interviews, which was just under the target number of 360 interviews. The impact on the statistical significance of the study sample was minimal.

SITE CLUSTERING

Sites were grouped into clusters of between one to four sites that are in close proximity to each other. Clusters were built “by hand” to ensure that each site in a cluster can be accessed by an interviewer during a four-hour shift.

TIME PERIODS

A time period, or shift, was defined as a four-hour block, with three shifts covering the 12-hour period from 7AM to 7PM. Two day-types were defined, weekend and weekday. We defined 126 shifts over the course of the six-week period.

STRATIFICATION

The total number of shifts was stratified by week-part (weekend, weekday) and time of day (morning, mid-day, afternoon-evening), creating six time-based strata. Each of the four river trails constituted a geographic stratum.

RESPONSE RATE

We conducted the economic impact analysis on the aggregated survey results for the four trails included in the case study. *Table 1* shows the total number of interviews collected from each of the four water trails. The majority of access sites for the Schuylkill and Three Rivers water trails are somewhat more urban, while the Juniata and Susquehanna—North Branch have more rural access sites. The Three Rivers water trail is known to be a very active water trail, especially among motor boaters, however the level of activity during the sampling period did not reflect the normal level activity for this water trail. This was likely due to several factors, such as less activity at the public access sites versus the private boat docks and a lack of participation from trail users at the public access sites.*

Table 1. Total Completed Interviews by Water Trail

Water Trail	Completed Interviews
Susquehanna	116
Three Rivers	39*
Juniata	46
Schuylkill	151

DATA WEIGHTING

Analytic weights were computed to account for differential selection probabilities and non-response, and were calibrated to an estimate of visitor totals over the fielding period. These weights are designed to support the economic analysis by weighting the data to the total activity measured on the four water trails during six-week period from July 27 through September 3.

The base weight was set as the inverse of the selection probability for each interviewing assignment, thus accounting for sampling of both the time period and site cluster. This weight was then ratio-adjusted to account for non-responding assignments.

To provide an activity weight, the non-response adjusted sampling weight then was inflated to account for sub-sampling of site counts. Using this activity weight, visitor counts were used to estimate total activity levels. To obtain this reference point, we sub-sampled one particular site from the cluster/interview shift. At the sub-sampled site, we kept a count of visitors. Now, we know the selection probability for this site, so we can compute a sampling weight for the site. Using this weight, we estimate the total number of visits as the weighted sum of the visit counts at the sub-sampled sites.

Finally, the analysis weight was computed by calibrating the non-response adjusted base weight to the estimate of total activity levels using a ratio adjustment.

DISCUSSION OF INTERVIEW RESULTS

The discussion below provides results of our survey conducted during a six-week sampling period from July 27 through September 3 on the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers water trails. Due to the seasonality of water trail visitation, we cannot assume that these results are representative of typical yearlong or full season visitation study; therefore, extrapolation to an annual estimation could inaccurately inflate the economic impact. Thus, we present these results only for the sampling timeframe; we suggest that an additional study be run either for a full year or for a full spring, summer, and fall visitation season.

Additionally, it should be noted that the Schuylkill, Susquehanna—North Branch, Juniata, and Three Rivers water trails represent only four of Pennsylvania’s 21 water trails; however, this four-trail case study did survey water trail visitors about their annual trips to all state water trails, and visitor counts were taken during the survey process. These data were used to generate general findings about annual statewide visitation and economic impact; the reduced period and small sample was taken into consideration within the analysis.

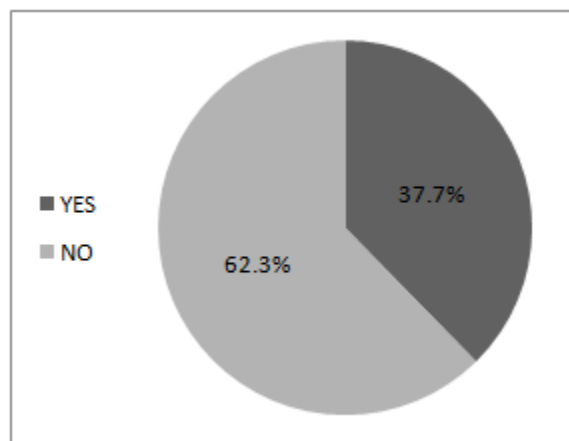
RESULTS BY THEME

This section provides a breakdown of the weighted results by themes and by user groups, activity type, and state of residence.

VISITOR CHARACTERISTICS

There were approximately 3,530 visitors to Pennsylvania’s four surveyed water trails during the six-week sampling period. This estimate was developed as a weighted estimate based on weighted visitor counts. As shown in the figure below, during this time, there were nearly 1,330 first-time visitors, accounting for approximately 38 percent of all visitors to the surveyed water trails.

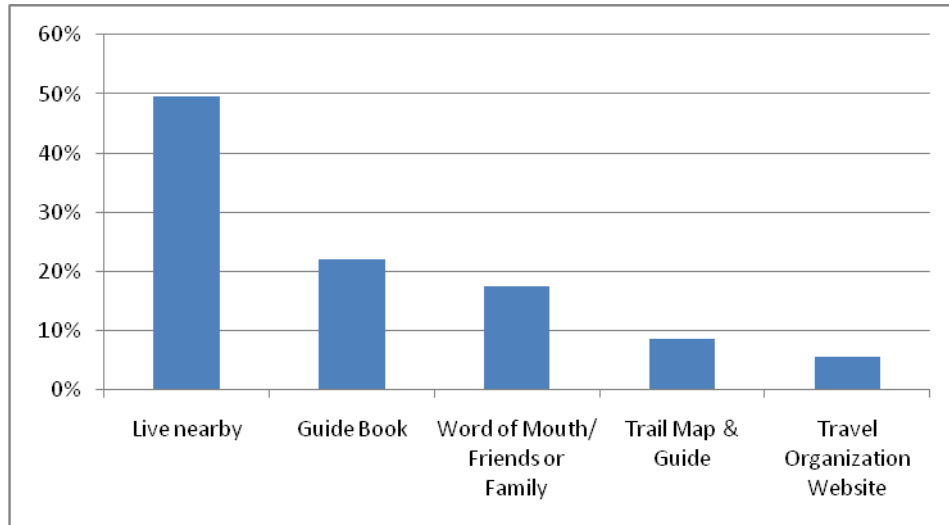
Exhibit 1. First Time Visitors to Water Trails



Nearly half of all respondents said they learned about the water trail from living nearby. Nearly one-quarter mentioned that they read about the trail in a guidebook, and another 17 percent said that word of mouth or information from family or friends encouraged their visit. Trail maps, guides, and travel

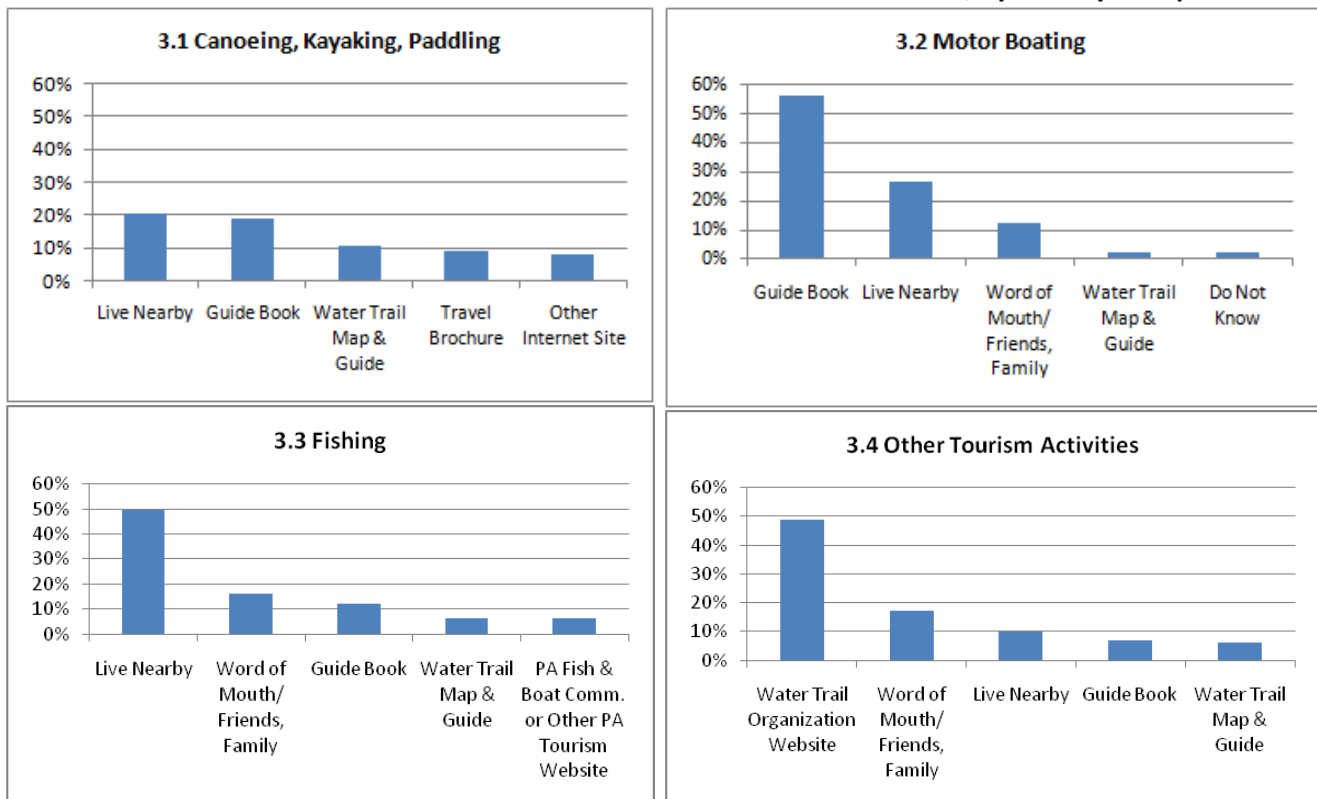
organization websites encouraged several visits, but fewer than 10 percent of respondents referenced each of those as sources of information where they learned about water trails.

Exhibit 2. How Visitors Learned About the Water Trail



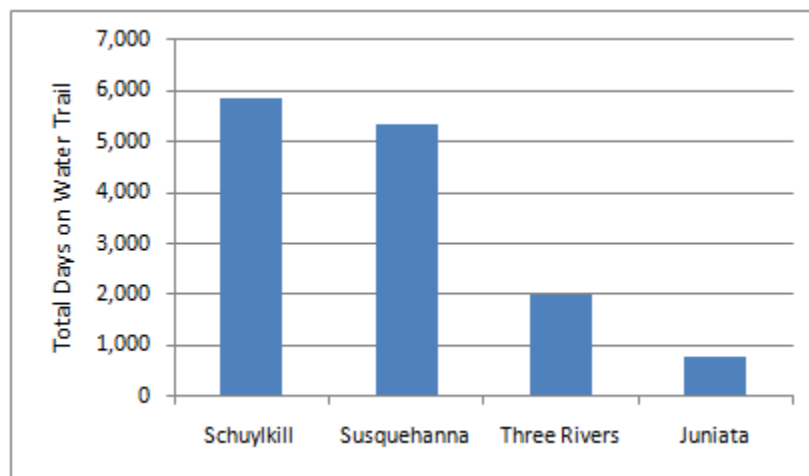
Exhibits 3.1 through 3.4 break down the ways in which visitors learned about the water trails by activity group. Canoeists, kayakers, paddlers, and anglers most commonly knew of the trail because they lived nearby. Respondents cited guidebooks and water trail maps as one of the top five ways to learn about the water trail for each activity.

Exhibit 3.1 –Exhibit 3.4. How Visitors Learned About the Water Trail, by Activity Group



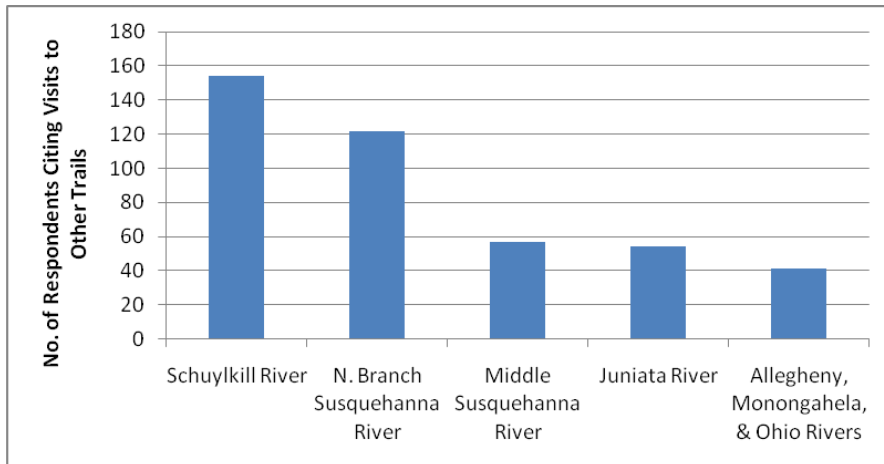
Based on weighted visitation counts taken by field interviewers during the survey period, we calculated a weighted estimate of the number of visitors days spent on each of the water trails. To do this, the number of days visitors reported during the survey was weighted by the visitation counts completed during the study. These numbers produced a weighted estimate of visitor days. The Schuylkill River was the most visited of the four surveyed water trails. As shown in the figure below, there were nearly 6,000 visitor-days spent on the trail in this time. The Susquehanna River—the second most visited of the surveyed water trails during the survey period—attracted over 5,000 visitor-days in this time, followed by the Three Rivers and Juniata Rivers, which attracted approximately 2,000 and 1,000 visitor-days, respectively. The Three Rivers water trail is a very active water trail, however the lower visitation counts may be due to the large number of private marinas and boat docks, as well as lower visitor participation in the study, causing visitor estimates to be lower than might be representative of the trail’s actual usage.

Exhibit 4. Visitor-Days for the Four Surveyed Water Trails



Interviewers asked visitors to name other rivers that they had visited in the last 12 months. Some visitors mentioned visiting multiple water trails in addition to the one where they were interviewed. Nearly half of all visitors also had visited the North Branch of the Susquehanna River, and over one quarter had visited the Juniata River, as well. The Susquehanna River, Juniata River, and the Schuylkill River were among the top five trails visited by visitors in addition to the trail they were visiting at the time of the survey. Although these were the top five responses from visitors, many other water trails were named. Those included the Conestoga; Conewango; Delaware; Kiski-Conemaugh; Lehigh; Lower Susquehanna; Middle Allegheny; Pine Creek; Raystown Branch; Swatara Creek; Tidal Delaware; Upper Monongahela; West Branch Susquehanna; and the Youghigheny.

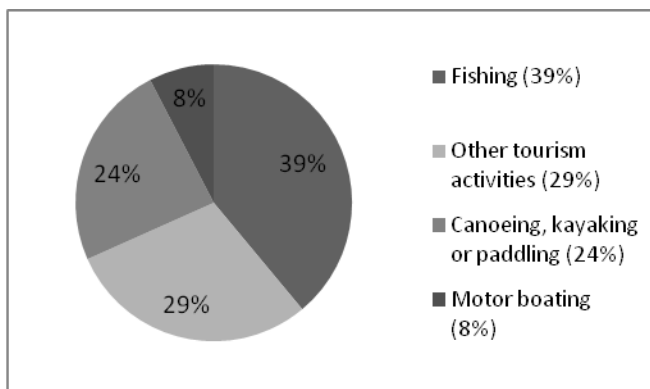
Exhibit 5. Other Water Trails Visited in Addition to Trail Visited at Time of Survey



Survey visitors were asked to cite the primary reason for their visit to the specific water trail that day, and they were given five options: fishing; canoeing, kayaking, or paddling; motor boating; other tourism activity; or, don't know. Almost 40 percent cited fishing as their principal reason for visiting. Those respondents who mentioned having motor boating expenses also identified fishing as their primary purpose for visiting the water trail. We discussed with LB & FC that there might be some overlap between motor boaters and anglers; however, we have analyzed the data based on primary purpose. While some visitors certainly visit water trails purely to motor boat, the interviews we collected happened to reflect fishing as the primary reason for their visit.

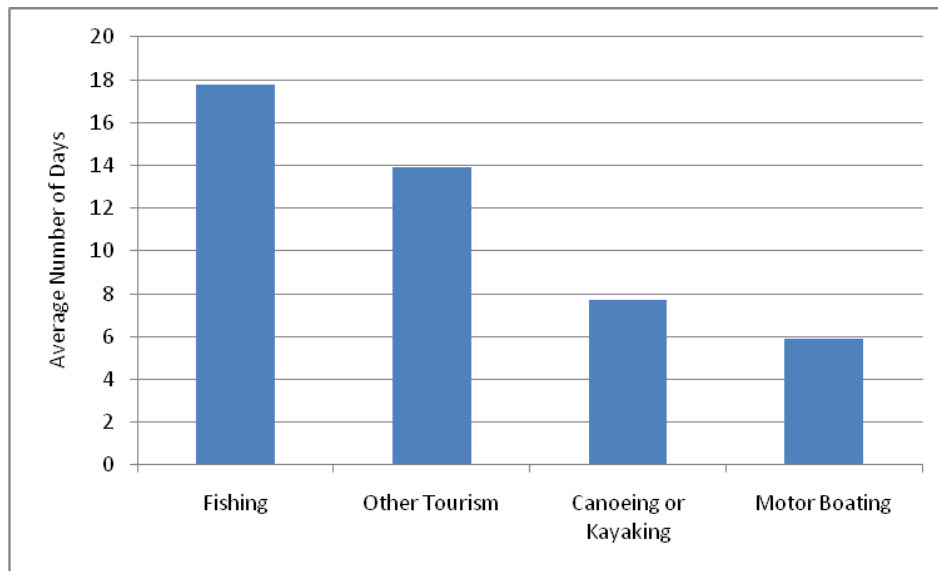
Over 70 percent of visitors cited the reason for visiting as fishing, canoeing, kayaking, or paddling, or motor boating. Nearly 30 percent cited other tourism activities as their reason for visiting the water trails. Among those reasons were picnicking, relaxing, enjoying the river scenery, photographing, and watching wildlife.

Exhibit 6. Reason for Visiting Water Trail



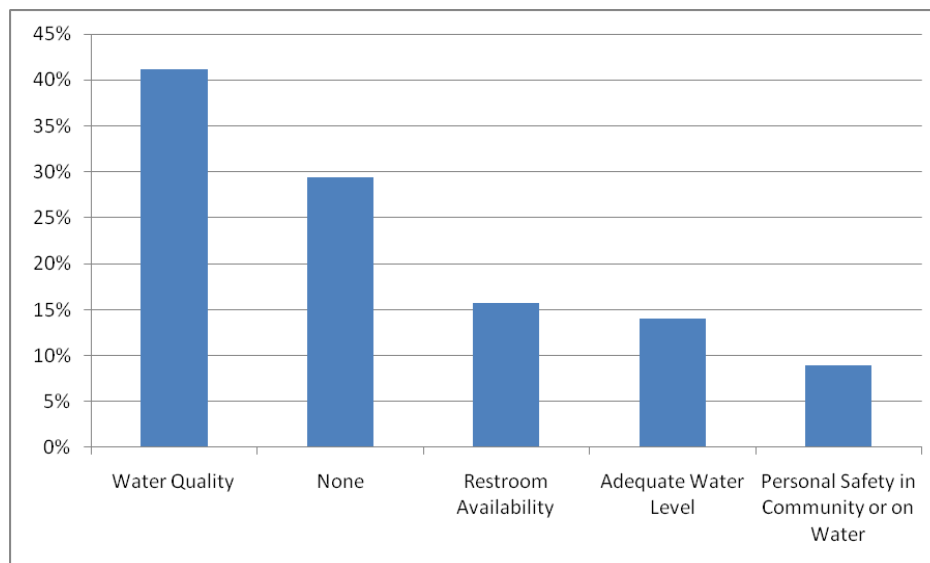
Visitors reported spending the most days per year (approximately 17.8 days on average), fishing on the water trail. Visitors spent approximately 13.9 days per year on other tourism activities including walking, picnicking, biking, and floating on or relaxing beside the water trail. The average number of days spent canoeing and kayaking, or motor boating, was approximately eight and six days, respectively.

Exhibit 7. Average Number of Days Spent on Activities per Year



When asked about concerns when visiting the water trails, over 40 percent of visitors cited water quality as their primary concern. Visitor interpretations of water quality included things like fish population health and garbage in the water. Nearly 30 percent of all visitors did not express any concerns, even when prompted with this question. Restroom availability, adequate water level, and personal safety in the community or on the water were also recurring issues of concern to many visitors, as is shown in the exhibit below.

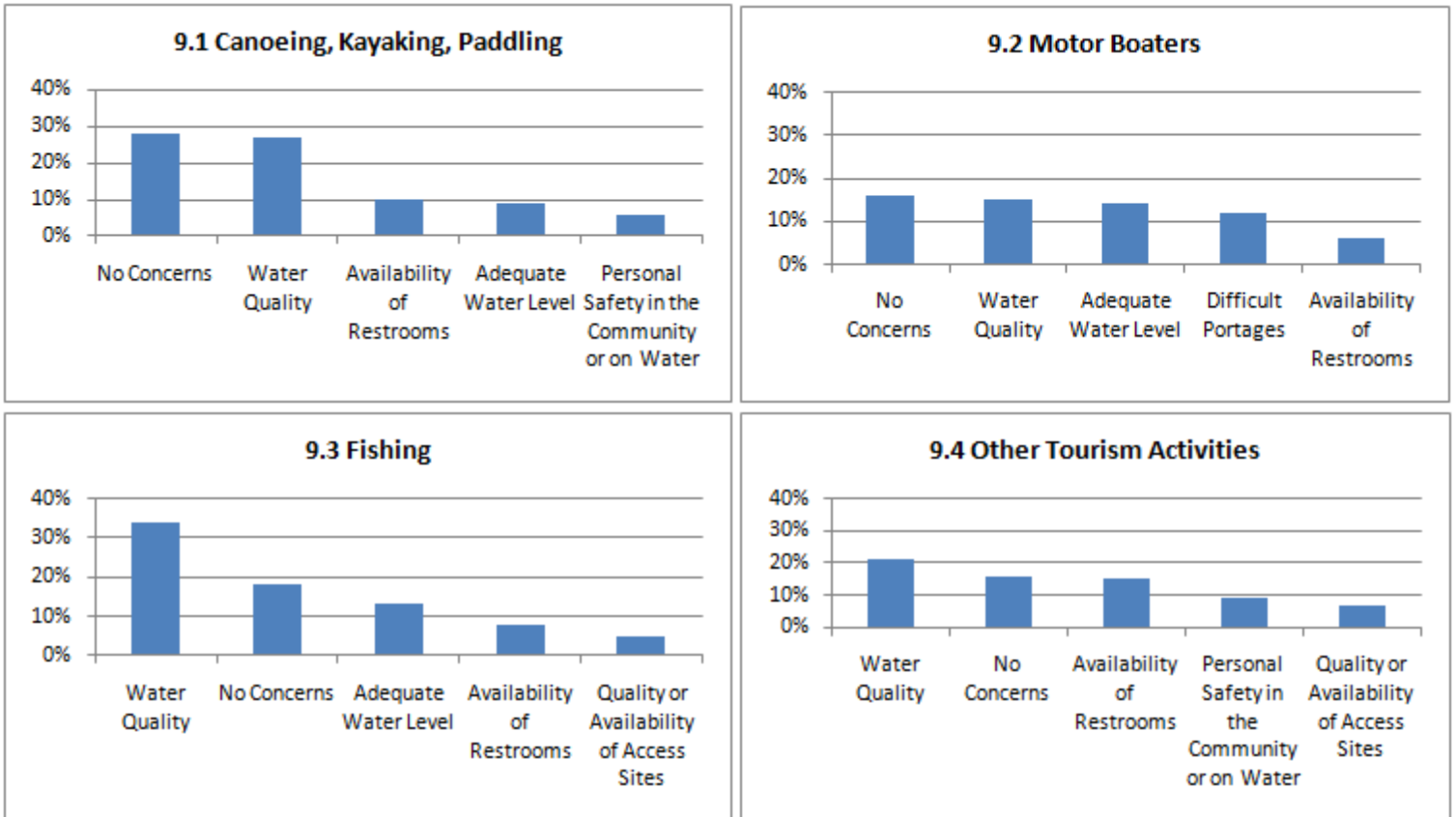
Exhibit 8. Concerns Expressed by Visitors to Pennsylvania Water Trails



Exhibits 9.1 through 9.4 highlight the top five concerns expressed by visitors by activity group. In each of the four groups, water quality and “no concerns” were expressed as the top two concerns, and

represented roughly 30 to 50 percent of all concerns for each group. Availability of restrooms and adequate water level were also top concerns mentioned by visitors.

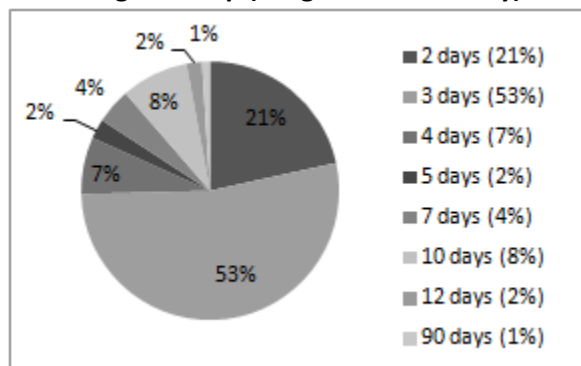
Exhibit 9.1 – 9.4. Concerns Expressed About Water Trails by Activity Group



Trip Length Characteristics by Activity Group

Of the visitors planning to stay longer than one day, over 50 percent planned a three-day trip. Another 21 percent planned a two-day trip. The remaining 26 percent planned to stay between 4 and 90 days. The visitors who cited a 90-day trip were traveling on a three-month long trip. Visitors were asked how long they would be away from their home, traveling in Pennsylvania. A trip was defined to the visitors as including the time they had spent **in Pennsylvania**, away from home, from the time they left home until the time they would return.

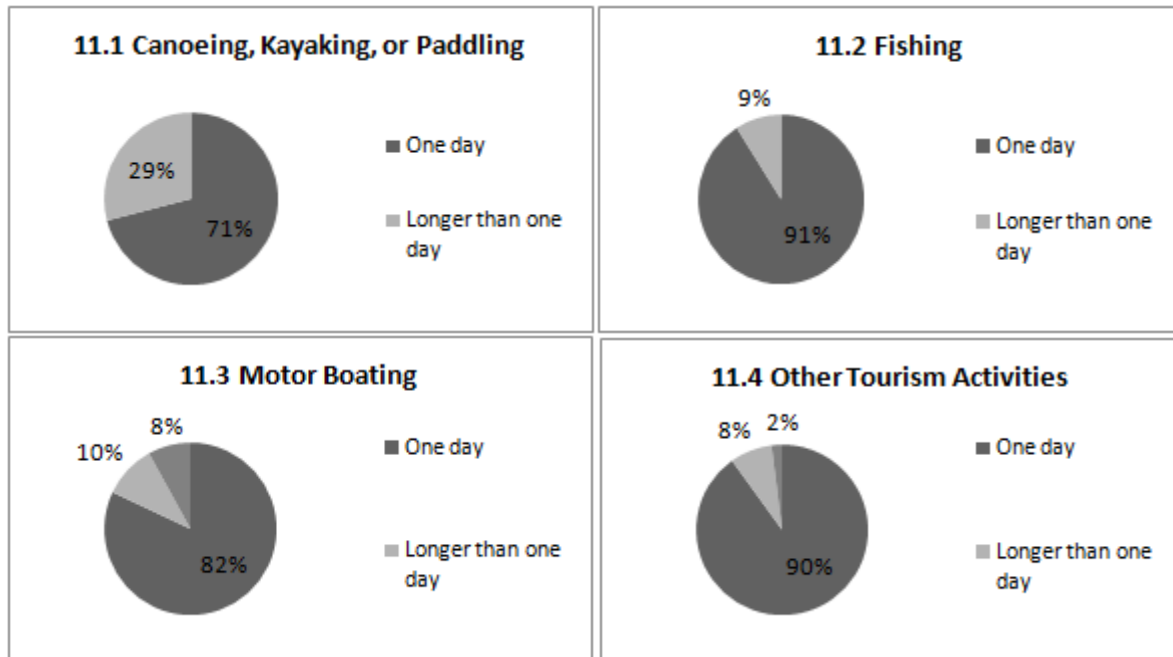
Exhibit 10. Length of Trip (Longer than One Day) of Visitors



Trip length for 85 percent of all visitors was one day (i.e., non-overnight day trip); 13 percent of visitors planned trips longer than one day. As shown in the exhibit below, the percent of trips lasting one day or longer than one day varies by activity group.

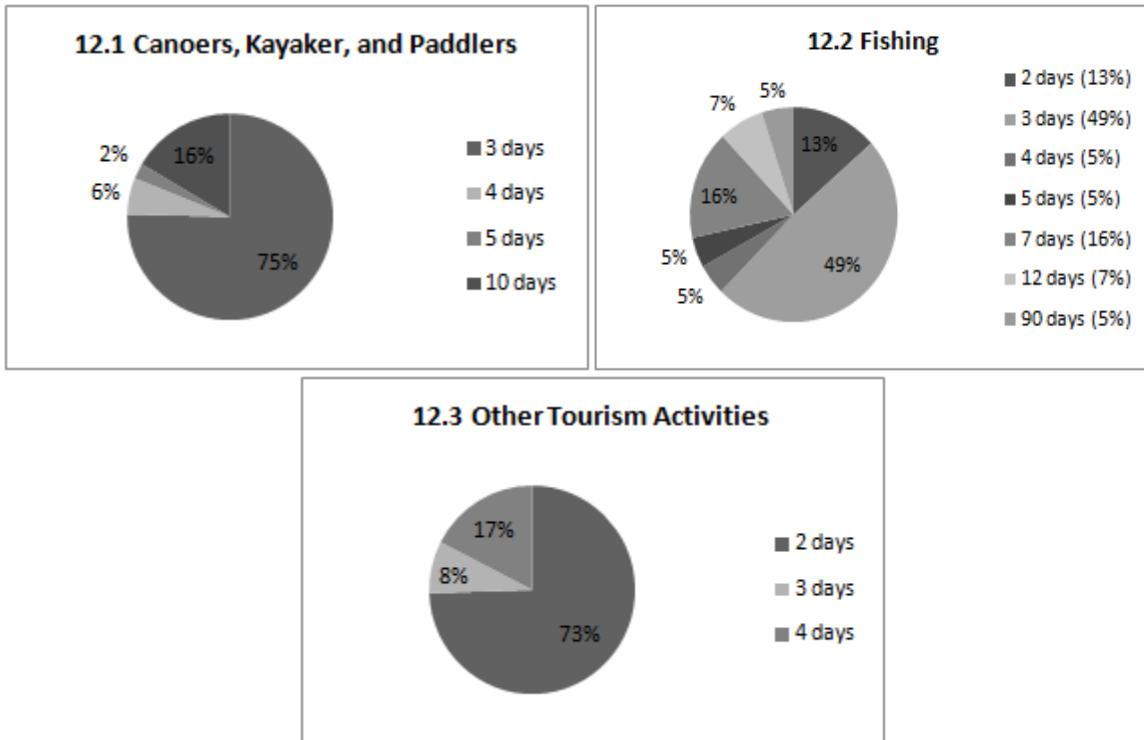
Of the visitors who were canoeing, kayaking, or paddling, 71 percent stayed one day, and the remaining 29 percent stayed longer than one day. For motor boating, fishing, and other tourism activities, a greater percent of visitors planned day trips only; hence, fewer stayed longer than one day. Nine percent of anglers, 10 percent of motor boaters, and eight percent of those participating in other tourism activities stayed longer than one day. These figures are presented in Exhibits 11.1 through 11.4.

Exhibit 11.1 – 11.4. Length of Trip by Activity Group



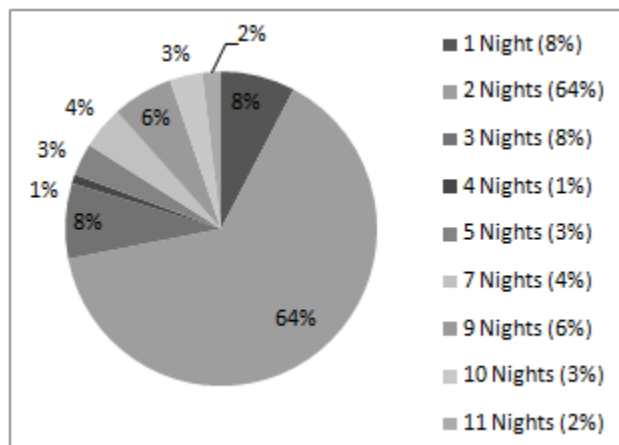
Twenty-nine percent of visitors who canoed, kayaked, or paddled said their trip would last longer than one day (see Exhibit 11.1, above). Of this population, approximately 75 percent planned a three-day trip (Exhibit 12.1). The longest trip among this group was planned for 10 days. All of the motor boaters who stayed longer than one day intended a two-day stay. The nine percent of anglers that stayed longer than one day had planned 2–10 day trips; of them, over half planned a three-day trip (Exhibit 12.2). For all other tourism activities, approximately 73 percent of those staying longer than one day stayed two days (Exhibit 12.3).

Exhibit 12.1 – 12.3. Length of Trip (Longer than One Day) by Activity Group



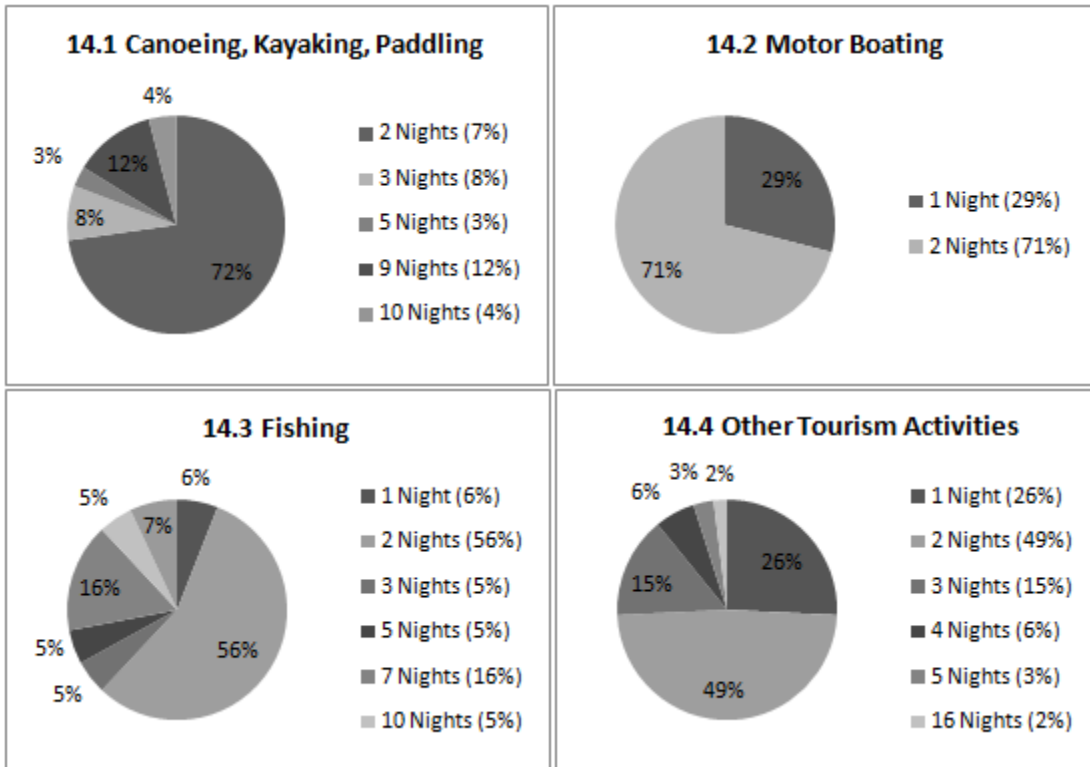
The overwhelming majority, approximately 65 percent of visitors to the four surveyed water trails, spent two nights at their lodging. Of the population that reported spending at least one night away from home, the average number of nights spent during a trip was 3.3 nights.

Exhibit 13. Number of Nights Away from Home during Water Trail Trip



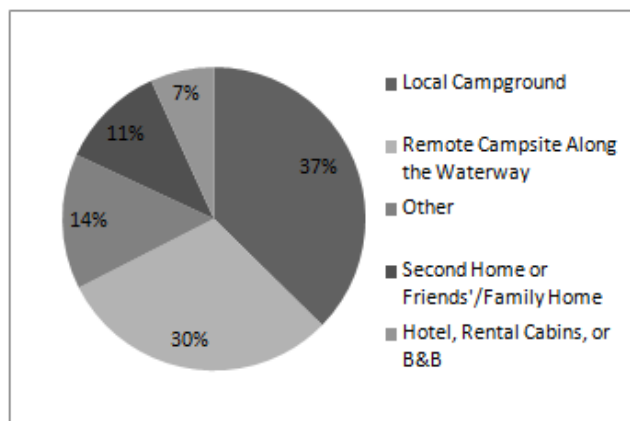
Exhibits 14.1–14.4 show the number of nights away from home by activity group. In each of the groups, two nights was most common, ranging from 49 to 72 percent of visitors. The number of nights away among anglers and those participating in other tourism activities varied the most. Motor boaters reported staying one or two nights.

Exhibit 14.1 – 14.4. Number of Nights Away from Home by Activity Group



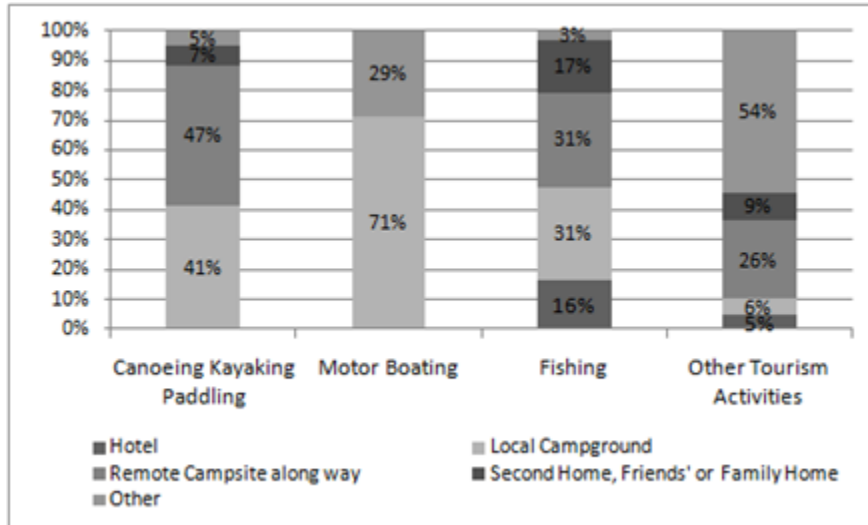
Approximately 13.4 percent of visitors reported staying in the area overnight. Of that population, approximately 37 percent said they were staying at a local campground, and another 30 percent said they were staying at a remote campsite along the waterway. The remaining 32 percent reported staying at a second home, a friend’s or family home; at a hotel, rental cabin, or B&B; or, other location.

Exhibit 15. Overnight Lodging Choice of Visitors to Water Trails



The following exhibit shows the breakdown of lodging choice by activity group. As shown, most visitors stayed at local campgrounds, which accounts for over 70 percent of lodging choices by motor boaters. Remote campsites and local campgrounds account for 88, 71, and 62 percent of lodging choices for canoeists, kayakers, and paddlers, motor boaters, and anglers, respectively. Anglers and those participating in other tourism activities were more likely to stay in hotels.

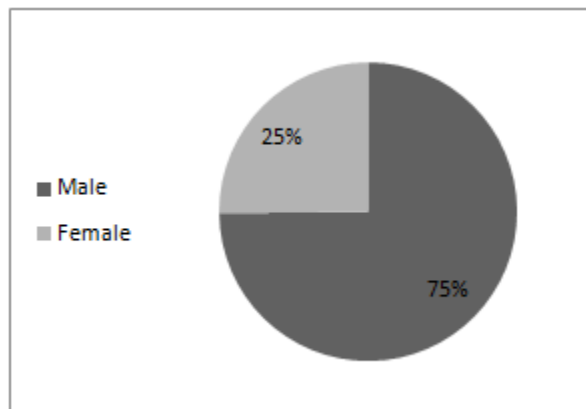
Exhibit 16. Overnight Lodging Choice by Activity Group



RESPONDENT PROFILE

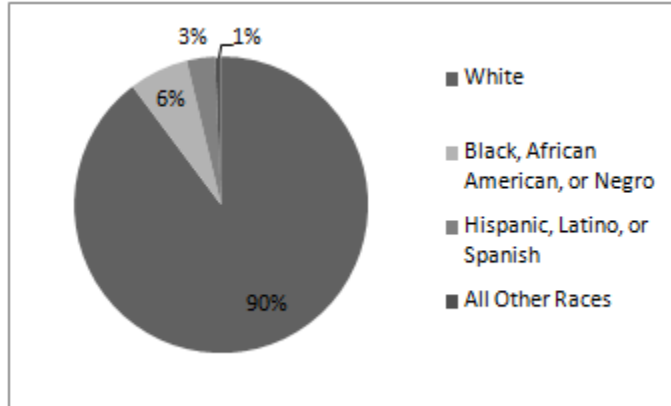
As shown in the following exhibit, the overwhelming majority – approximately 75 percent – of all survey visitors self-identified as male.

Exhibit 17. Visitor’s Self-Identified Gender



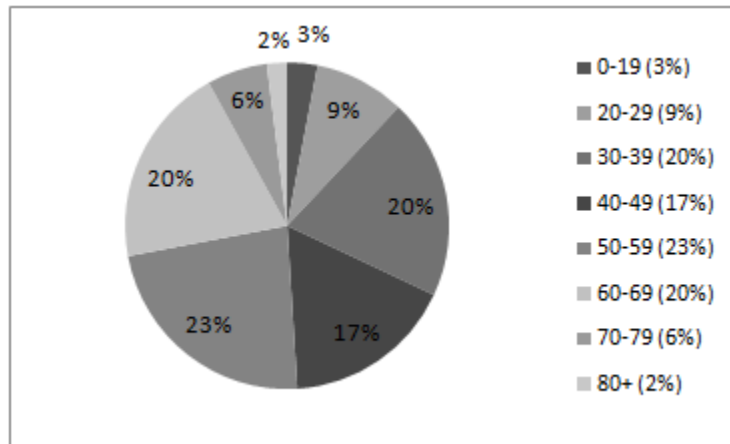
Interviewers also asked respondents to identify their race. Nearly 90 percent self-identified as white, 6 percent identified as African American, and 3 percent as Hispanic, Latino/a, or Spanish. Less than one percent of respondents self-identified as American Indian/Alaskan Native, Asian, Native Hawaiian or Pacific Islander, or as other (i.e., none of the above).

Exhibit 18. Self-Identified Race of Visitors to Water Trails



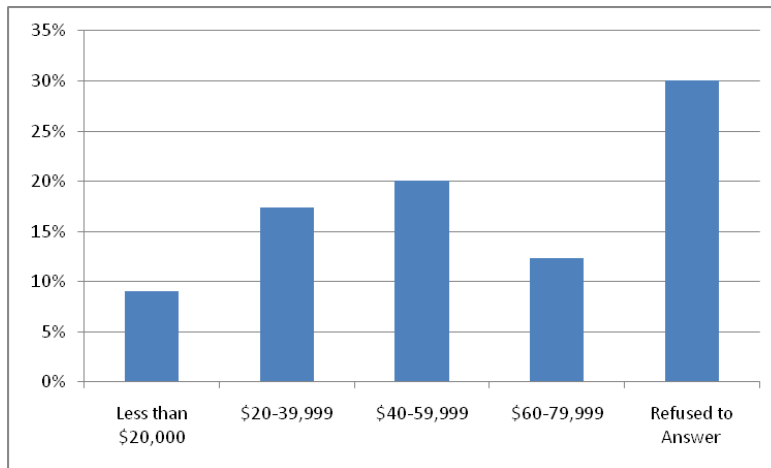
Approximately 80 percent of visitors were between the ages of 30 and 69. The youngest person surveyed was 15 years old, and the oldest was 92. The following exhibit provides a breakdown of visitor ages by decade.

Exhibit 19. Visitors' Age to Water Trails



Visitors also were asked to answer a question regarding their annual income, and they were presented options separated into eight ranges; they also could indicate that they did not know or that they did not want to answer. Of all interviewed visitors, 30 percent chose not to answer the question. Of the 70 percent that did answer, approximately 70 percent reported an annual income of \$20,000–\$79,999. The five most common responses are presented in the exhibit below.

Exhibit 20. Visitors' Annual Income



IN-STATE VS. OUT-OF-STATE

Ninety-one percent of all surveyed visitors to Pennsylvania's water trails were state residents. Motor boaters were the highest percentage of in-state visitors, by group; of them, all were Pennsylvania residents. Conversely, canoeists, kayakers, and paddlers comprised the highest out-of-state population; 11 percent of this user group was from out-of-state. Of those who visited for fishing and other tourism activities, 93 and 90 percent, respectively, were from Pennsylvania.

ECONOMIC IMPACTS & IMPLICATIONS

To complete the economic impact analysis, we used the IMPLAN economic model to estimate the total—direct, indirect, and induced—economic impact of visitor activities on the four selected water trails during the six- week sampling period.

The IMPLAN model is a well-known static input-output framework used to analyze the effects of an economic stimulus on a pre-specified economic region; in this case, the economic region was the State of Pennsylvania. IMPLAN is considered a static model because the impacts calculated for any scenario estimate the indirect and induced impacts for one period in time (typically a year).

MODELING APPROACH

IMPLAN, a proprietary model maintained by the Minnesota IMPLAN Group (www.implan.com), is a widely used and effective economic analysis model that uses average industry expenditure data. Expenditures in these industries “reverberate” up to the supplier industries. IMPLAN traces and calculates the multiple rounds of secondary indirect and induced economic impacts throughout the supply chain. Whenever new industry activity or income is injected into an economy, it initiates a “ripple” or multiplier effect that creates an economic impact that is often larger than the initial input.

The multiplier effect is generated when the recipients of the new income spend a percentage of that new income in the state; the subsequent recipients of that share, in turn, spend a share of it, and so on. The total spending impact of the new activity is the sum of these progressively smaller rounds of spending within the statewide economy. The total impact of this additional economic activity creates impacts on the gross state product (GSP), jobs (i.e., the total employment impact), and tax revenues for federal and state/local governments (i.e., the total fiscal impact).

MODELING METHODOLOGY

For this analysis, ICF used the most recent version of IMPLAN (Version 3.0) with the state-level data set for Pennsylvania. IMPLAN Version 3.0 uses 2010 data and improves on previous versions of the model by implementing a new methodology for estimating regional imports and exports.

The IMPLAN model is based on the input-output data from the U.S. National Income and Product Accounts (NIPA) from the Bureau of Economic Analysis. The model includes 440 sectors based on the North American Industry Classification System (NAICS). The model uses region-specific multipliers to trace and calculate the flow of dollars from the originating industries to supplier industries. These multipliers thus are coefficients that “describe the response of the economy to a stimulus (a change in demand or production).” Three types of multipliers are used in IMPLAN:

- **Direct** – represents the impacts (e.g., employment or output changes) due to direct investments, including payments for goods and services such as food, gasoline, and recreational equipment.
- **Indirect** – represents the impacts due to the industry inter-linkages caused by the iteration of industries purchasing from industries, brought about by the changes in final demands (e.g., purchases to wholesalers or manufactures by the vendors of recreational equipment).

-
- **Induced** – represents the impacts on all local industries due to consumers’ consumption expenditures arising from the new household incomes that are generated by the direct and indirect effects of the final demand changes (e.g., a worker purchases new clothing).

The total impact is simply the sum of the multiple rounds of secondary indirect and induced impacts that remain in the state. IMPLAN then uses this total impact to calculate subsequent impacts, such as total jobs created and tax impacts. This methodology, and the use of IMPLAN, is well established and consistent with numerous other statewide evaluations of industry impacts.

IDENTIFY MODEL INPUTS

The first step in the modeling was to define the inputs. The survey captured visitor expenditures by various types of goods and services. ICF assigned an IMPLAN industry code to each expenditure category and then totaled the value for each expenditure category by visitor type. We created five modeling scenarios: one that included the total spending across all visitor types, and another for each visitor activity type: fishing; canoeing, kayaking or paddling; motor boating; and other (such as picnicking, swimming, or tubing).

ECONOMIC IMPACTS

Once the data were prepared for input into IMPLAN, ICF ran the model for each scenario and generated results (discussed below). Results are reported for the direct, indirect, and induced impacts under each scenario in terms of employment, labor income, gross state product (GSP), economic output, and state/local and federal tax revenue. The four trails surveyed in the study represented both urban and rural water trails. While the data was statistically significant when aggregated from all the trails, there was not sufficient data from each of the individual water trails to conduct an urban versus rural analysis.

TOTAL IMPACTS

The summary table below presents the effect of spending by visitors on economic output, GSP, employment, and labor income. The results are presented in terms of direct, indirect, induced, and total impact.

- The total weighted expenditures associated with the surveyed trip activities is \$537,000.
- Total economic output measures the total value of all industry sales generated by water trail visitor activity and includes direct effects (i.e., spending at establishments where water trail users purchased trip-related products), indirect effects (i.e., economic activity generated by the direct expenditure establishments), and induced effects (i.e., activity generated by wages associated with increased water trail-related economic activity). The water trail activity generated approximately \$318,000 in direct output, \$123,000 in indirect output, and \$290,000 in induced output, for a total output impact of approximately \$731,000. Total output is the standard measure for assessing economic impact in this type of study.
- Gross State Product (GSP) is the value added (or net value of all visitor sales) to the economy through visitor activity. The water trail activity generated nearly \$335,000 in direct GSP, more than \$78,000 in indirect GSP and more than \$180,000 in induced GSP, for a total GSP impact of approximately \$593,000.
- Labor income is the sum of the employee wages that are supported by the water trails, and it coincides with the employment figures for direct, indirect, and induced jobs. The total effect of

spending by all water trail users on labor income was slightly more than \$389,000. Moreover, spending along Pennsylvania’s water trails supports nearly 11 full-time, year-round jobs. This is estimated for the six-week sampling period.

Table 2. Summary of Total Economic Impacts

Impact/Effect	Output	GSP	Labor Income	Employment
Direct Effect	\$318,000	\$335,000	\$242,000	8
Indirect Effect	\$123,000	\$78,000	\$46,000	1
Induced Effect	\$290,000	\$180,000	\$102,000	2
Total Effect	\$731,000	\$593,000	\$389,000	11

Tax Impacts

Total tax impacts include the following five types of taxes: employee compensation (social security tax), proprietor income, indirect business taxes (sales, property, motor vehicle licenses, severance, and other), household taxes (income, property, fines, motor vehicle license, and other), and corporation profit taxes. The total tax impact for all tax types as a result of spending along the four Pennsylvania water trails was approximately \$82,200 at the state and local government levels, and nearly \$88,800 at the Federal government level.

Table 3. Summary of Tax Impacts

Tax Level/ Description	Employee Compensation	Proprietor Income	Indirect Business Tax	Households	Corporations	Total Tax Impact
Total State and Local Tax	\$600	\$0	\$68,600	\$11,400	\$1,600	\$82,200
Total Federal Tax	\$41,400	\$2,200	\$10,800	\$25,700	\$8,800	\$88,800

BY VISITOR TYPE

The following section presents the impacts associated with spending by each visitor type – that is, those whose primary purpose for visiting the water trails include canoeing, kayaking, and paddling; motor boating; fishing; and other tourism activities such as swimming, tubing, picnicking, or walking/jogging. It should be noted that anglers had a more significant impact compared to other visitor types across all of the metrics. One of the key reasons for this finding is that respondents who indicated that fishing was their primary purpose for the visit also indicated that they had purchased expensive equipment for the activity, including motor boats. By contrast, motor boating as a primary activity resulted in the lowest impacts across all metrics; this might indicate that many motor boaters may consider their primary reason for a visit to be fishing. Therefore, because so few visitors identified motor boating as the primary reason for their visit, the economic impact of motor boaters in this study was the lowest among

the different types of visitors. While it is likely that some visitors' primary purpose in visiting a water trail is to motor boat, the interviews we completed were with respondents who selected fishing as the primary purpose for their visit. This indicates some overlap potential between the two activities; however, additional interviews or an extended fielding period may have yielded respondents whose primary purpose was to motor boat on the water trail. *Table 4* shows the median expenditure of a single group within each visitor type. The median expenditure is the amount which the remaining 50 percent of expenditures were either above or below.

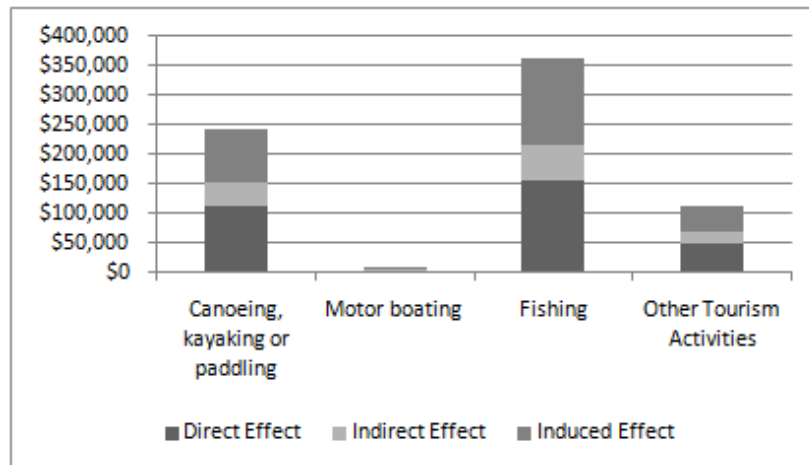
Table 4. Median Expenditure by Visitor Type

Visitor Type by Primary Purpose of Visit	Number of Observations	Median Expenditure (\$)
Canoeing, kayaking, paddling	66	40
Motor boating	25	35
Fishing	116	35
Other tourism (tubing, swimming, picnic, photography, etc.)	143	10
Not specified	2	129

Economic Output

The following exhibit compares economic output associated with spending by each visitor type. As shown in Exhibit 21, results indicate that the economic output was greatest for anglers, accounting for nearly half, or over \$350,000 of the economic output across all groups. The anglers' impacts also had the greatest output multiplier effect; that is, every direct dollar spent generated a total impact of \$2.36. Though the amount was minimal, the multiplier effect was greatest for motor boaters, who generated a total impact of \$2.81 per dollar of direct spending. Anglers, with the greatest overall impact, had the second largest multiplier effect – generating \$2.36 per dollar spent. Canoeing, kayaking, and paddling generated \$2.20 per dollar of spending, and all other tourism activities generated \$2.29 per dollar.

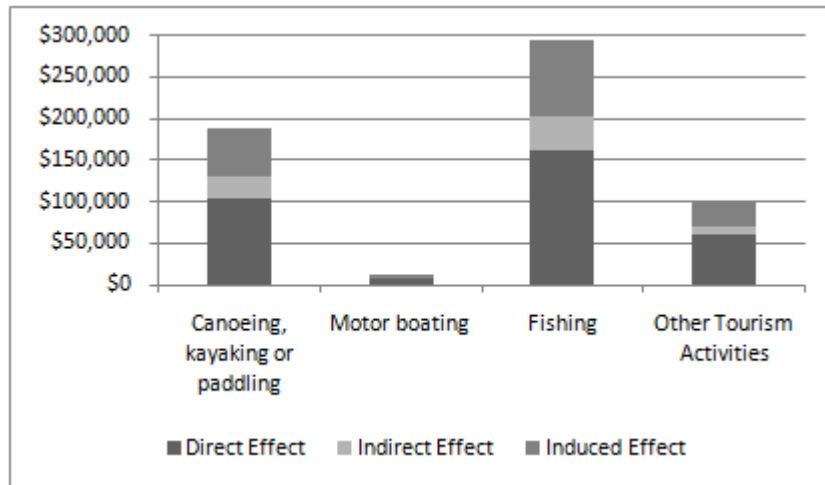
Exhibit 21. Economic Output by Visitor Type



Gross State Product (GSP)

The GSP measures the value-added economic output associated with water trail visitor spending. As with economic output, the impact associated with anglers was the most significant, and accounted for nearly \$300,000 of GSP impact. The canoeing, kayaking, and paddling group created a GSP impact of nearly \$200,000, whereas tourists participating in other tourism activities contributed \$100,000 to GSP. Motor boaters contributed only minimally to the GSP.

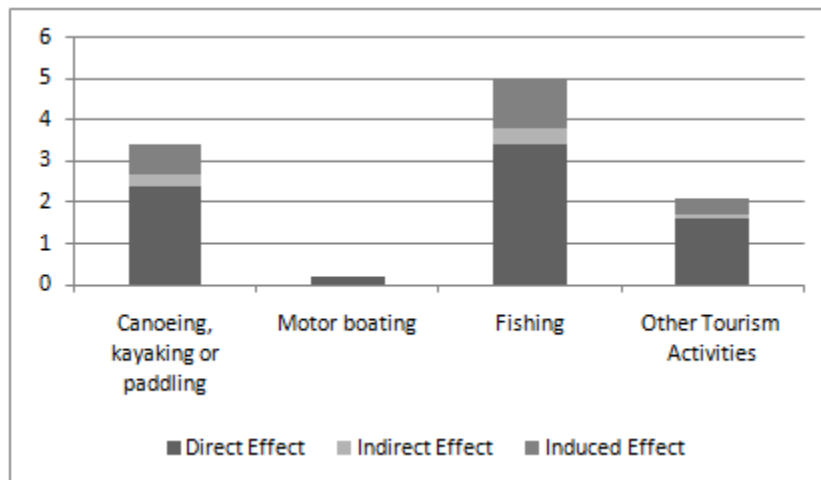
Exhibit 22. Gross State Product by Visitor Type



Employment Impacts

The following exhibit details, by visitor type, the number of direct, indirect, and induced jobs created by visitor expenditures. As with the previous two metrics, spending associated with fishing activities contributed the greatest economic impact compared to the other three visitor groups. Anglers support over three direct jobs along the water trails, and nearly two additional indirect or induced jobs in areas surrounding the trails. As shown, motor boating has a negligible effect on job creation.

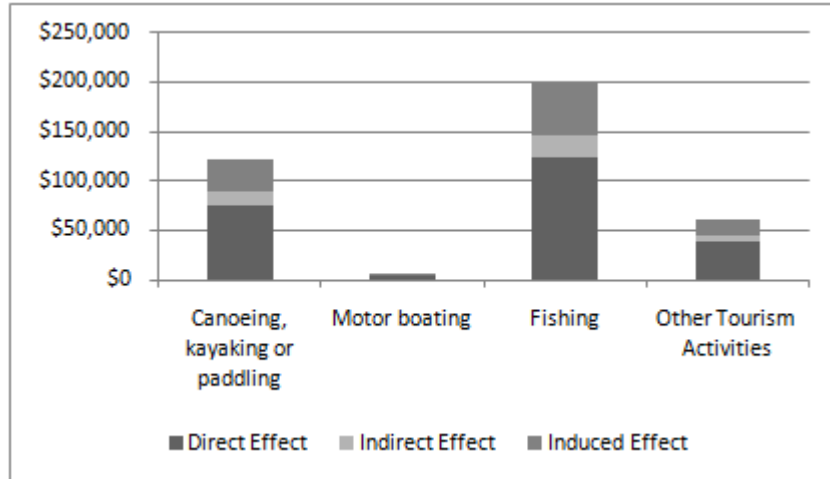
Exhibit 23. Employment Impacts (Jobs Created) by Visitor Type



Labor Income

Exhibit 24 presents labor income that can be attributed to expenditures by tourist groups to Pennsylvania’s water trails. Continuing the trend, fishing provided the greatest impact, and added approximately \$200,000 to labor incomes. Approximately 38 percent of this income was the result of the indirect and induced (i.e., multiplier) effect of expenses on labor income. Canoeing, kayaking, and paddling activities added nearly \$125,000 to state incomes. Motor boating had a negligible effect on incomes.

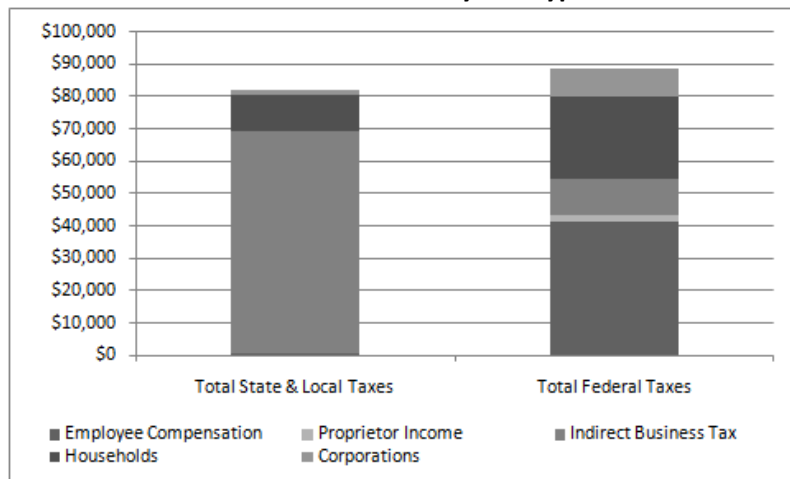
Exhibit 24. Labor Income Effects by Visitor Type



Tax Impacts

The exhibit below details the tax impacts that result from visitor expenditures on activities associated with Pennsylvania’s water trails. As shown, the added revenues result in over \$82,000 to the state and local business tax base and nearly \$89,000 in federal taxes.

Exhibit 25. Tax Effects by Tax Type



The summary in Table 5 below presents the modeled effects of spending by in- and out-of-state water trail users. The results are presented in terms of total impact. The total weighted expenditures associated with state residents equal \$462,000; and the total weighted expenditures associated with out-of-state visitors is \$75,000. These are the weighted expenditures directly from survey, which were used in the modeling analysis.

As it can be seen in Table 5, direct, indirect, and induced impacts are largely attributable to expenditures by in-state residents. This is mainly because more in-state residents visit the water trails, and is not meant to imply that in-state residents spend more, on average. A full discussion of the result, by impact type, is included in the subsequent sections below.

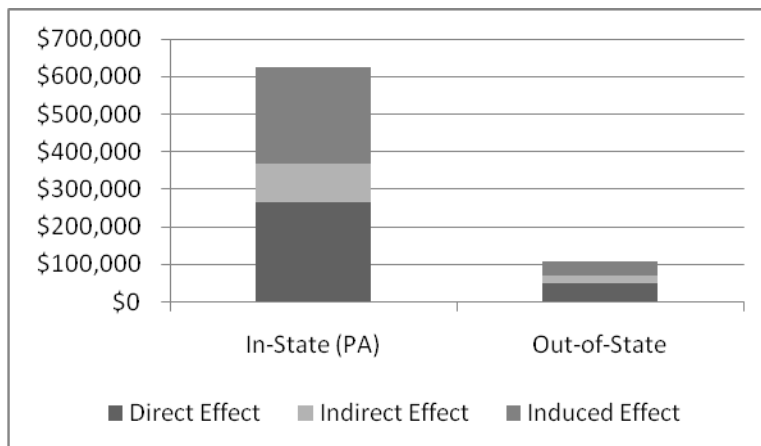
Table 5. Summary of Total Economic Impacts

	Output	GSP	Labor Income	Employment
In-State Residents	\$624,000	\$512,000	\$340,000	9
Out-of-State Visitors	\$108,000	\$81,000	\$49,000	2

Economic Output

Expenditures along the water trails by in-state residents accounted for 85 percent of the total output impact, or \$624,000 of the \$731,000 created by visitors to the trails. For every dollar of output directly attributable to expenditures by in-state residents, \$1.30 were indirectly created or induced by expenditures created as a result of increased economic activity in the region. This “multiplier” effect was much smaller for out-of-state residents; for every dollar of output created by direct expenditures, \$1.10 were indirectly created or induced.

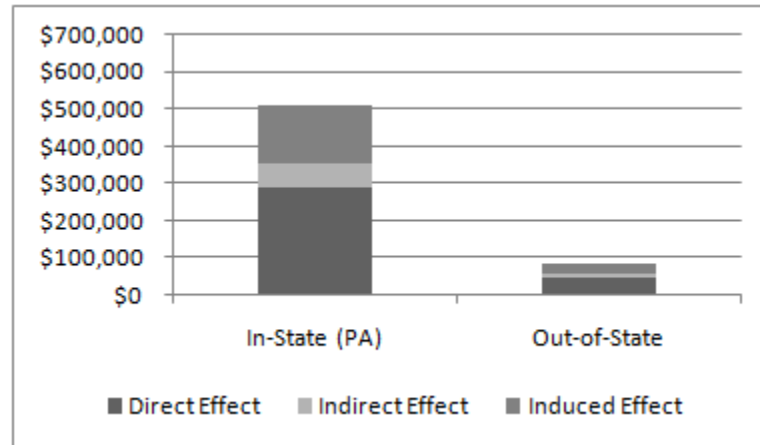
Exhibit 26. Effect on Total Output of Expenditures by In-State (PA) and Out-of-State Visitors



GSP

Similar to economic output, roughly 86 percent of the total GSP created was a result of expenditures by in-state residents. The Total GSP impact by in-state residents is \$512,000 and \$81,500 for out-of-state visitors.

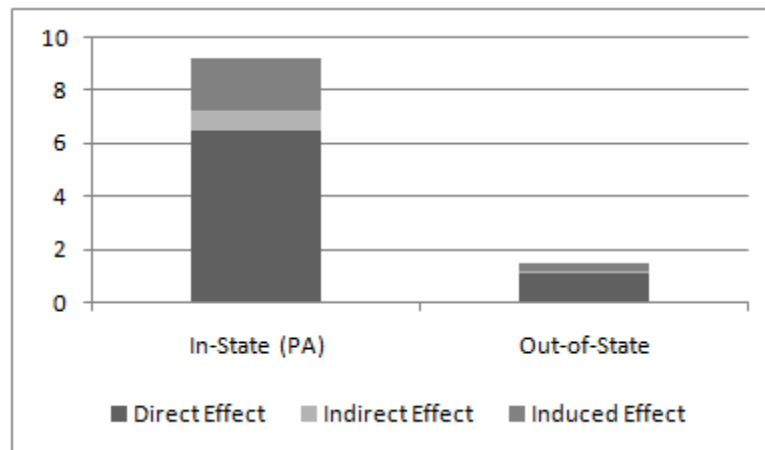
Exhibit 27. Effect on GSP (Value Added) of Expenditures by In-State (PA) and Out-of-State Visitors



Employment Impacts

Total direct, indirect, and induced jobs are also largely attributable to expenditures by in-state visitors. However, out-of-state visitors create slightly more jobs, per visitor, than do in-state visitors. For both in-state and out-of-state visitors, approximately 70 to 75 percent of the jobs they create are a direct result of trail expenditures.

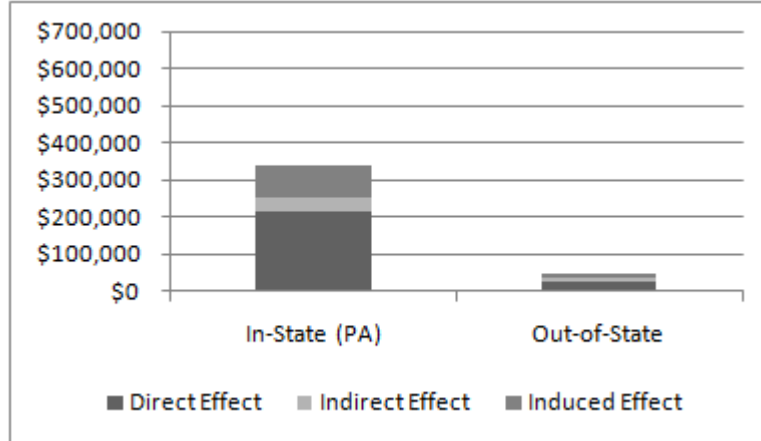
Exhibit 28. Effect on Employment of Expenditures by In-State (PA) and Out-of-State Visitors



Labor Income

For labor income, the effect from expenditures by in-state and out-of-state visitors was nearly identical to the effect on employment. In-state visitor expenditures added approximately \$340,000 to local incomes (approximately 87 percent of the total), whereas out-of-state visitor expenditures added approximately \$49,000 (approximately 13 percent of the total). For each group, the majority of the regional added income was a direct effect of expenditures on the water trails.

Exhibit 29. Effect on Labor Incomes of Expenditures by In-State (PA) and Out-of-State Visitors



Tax Impacts

Table 6 below details the total tax impacts (including state, local, and federal) that result from expenditures on visitor activities associated with Pennsylvania’s water trails. As shown, the added business revenue from in-state visitors results in tax revenues of nearly \$150,000. Out-of-state visitors add nearly another \$24,000 to the state, local, and federal tax base. Of the in-state visitor tax revenues, 46 percent come from indirect business taxes on expenditures. Similarly, 49 percent of tax revenues from out-of-state visitors are also from indirect business taxes on expenditures.

Table 6. Summary of Tax Impacts for In-State (PA) and Out-of-State Visitors

	Description	Employee Compensation	Proprietor Income	Indirect Business Tax	Households	Corporations	Total Tax Impact
In state Residents	Total State and Local Tax	\$700	\$0	\$59,000	\$10,000	\$1,300	\$71,000
	Total Federal Tax	\$36,000	\$1,900	\$9,200	\$22,500	\$7,300	\$76,900
Out of state visitors	Total State and Local Tax	\$100	\$0	\$10,000	\$1,400	\$300	\$11,800
	Total Federal Tax	\$5,157	\$278	\$1,600	\$3,200	\$1,500	\$11,735

INDUSTRY ACTIVITY

Looking at the impact as it affects each industry can provide additional information about how the impact may be felt in the local and state economy. Table 7 presents labor income, GSP, and total economic output by industry.

As shown, the largest industry of impact is the “other accommodations” sector, which includes predominantly campgrounds and to a lesser extent bed and breakfasts, etc. This finding follows the trend seen in survey results that over one-third of all those surveyed whose trip lasted at least one night stayed at campgrounds.

The total economic output in the other accommodation sector was nearly double the second highest sector – the food services and drinking places sector. This sector, which includes restaurants, food and drinks stands, and alcohol establishments, had a total economic output of roughly \$52,000 from all visitor groups. Unlike the other accommodations industry, the food services and drinking places industry caters to both day and overnight visitors.

The “general and consumer goods rental except video tapes and discs” sector was the third largest industry of impact in terms of output at \$43,000. The prominence of this industry is due to the boat, kayak, and other water sport rental spending by water trail visitors. The fourth largest industry to benefit is the hotels and motels industry, which accounts for the roughly 7 percent of overnight visitors surveyed that stayed in hotels. The total economic output for this industry was \$39,000.

Table 7. Top Ten Industries by Output

Sector	Description	Total Labor Income	Total GSP	Total Output
412	Other accommodations	\$47,000	\$53,000	\$95,000
413	Food services and drinking places	\$18,000	\$28,000	\$52,000
363	General and consumer goods rental except video tapes and discs	\$20,000	\$25,000	\$43,000
411	Hotels and motels, including casino hotels	\$11,000	\$22,000	\$39,000
361	Imputed rental activity for owner-occupied dwellings	\$0	\$28,000	\$32,000
328	Retail Stores –Sporting goods, hobby, book and music	\$35,000	\$52,000	\$31,000

Sector	Description	Total Labor Income	Total GSP	Total Output
324	Retail Stores - Food and beverage	\$41,000	\$59,000	\$26,000
360	Real estate establishments	\$3,000	\$22,000	\$25,000
406	Museums, historical sites, zoos, and parks	\$6,000	\$12,000	\$21,000
397	Private hospitals	\$9,000	\$10,000	\$18,000

CONCLUSIONS

The results from this study have provided the LB & FC and the PA Water Trail Partnership with important information regarding water trail usage by tourists, both paddlers and non-paddlers. This information will allow the PA Water Trail Partnership to enhance water trail experiences, further promote water trail visits, and provide maintenance and expansion of the PA Water Trails network. This section highlights the key findings and makes recommendations for further research.

Characteristics of Water Trail Visitors

The study gathered additional information and demographics of water trail visitors. It is important to understand visitor characteristics to aid in planning, marketing and outreach, and decision-making.

- Males constituted 75 percent of the visitors interviewed during the sampling period.
- Visitor ages ranged from 15–92. Nearly 60 percent of visitors were aged 33–62.
- Over 70 percent of visitors cited their reason for visiting as fishing, canoeing, kayaking, or paddling, or motor boating.

Knowledge of Water Trails

Interview results indicate that nearly 50 percent of visitors learned about the water trails because they live near an access site.

- Anglers were more apt to learn about the water trails through word of mouth or living nearby.
- The majority of motorboaters learned about the water trails through a guidebook.

Recommendation: The PA Water Trails Partnership should use data captured as part of this study to develop a marketing and communications plan that appropriately utilizes print and electronic media strategies. Based on the results of this study, increased knowledge and use of water trails may have a positive effect on tourism and economic impact on local communities.

Economic Impact

- The PA Water Trails Economic Impact Study estimated that weighted water trail visitors during the six-week sampling period contributed approximately \$593,000 toward state GSP due to expenditures associated with their trip.

Recommendation: The economic impact analysis for the PA Water Trails Four-Trail Case Study was limited primarily by the time frame of the study. The estimates of the economic impacts are for a six-week fielding period. A future analysis could build from this case-study to include more of the state's water trails and cover a longer fielding period. This would provide even better estimates of visitor usage across the state's water trails, as well as even better expenditure data for an impact analysis.

Visitor Interests for Water Trail Maintenance and Infrastructure

- Roughly 40 percent of visitors were concerned about water quality when they visit a water trail; however, that was balanced by the 30 percent of visitors who said that had no concerns at all.
- Availability of restroom facilities, adequate water levels and personal safety in the community or on the water, were among the top five concerns or interests visitors provided.

Recommendation: It will be useful for the PA Water Trails Partnership to gain a better understanding of water trail users' concerns regarding water quality, and personal safety in communities and on the water. This will aid the Partnership and specific water trail managers with implementing appropriate strategies to minimize the impact of these issues on use of the water trails.

The PA Water Trails Partnership could consider expanding access to water quality information in Pennsylvania through coordination with other Pennsylvania agencies.

Recommendations for further research

The 6-week fielding period for the PA Recreational Water Trails Economic Impact Study was a short timeframe in which to conduct the economic impact analysis of the water trails. It started in late July and ended after Labor Day weekend. While this was the height of summer and the water trails were active, the most active period of the spring, summer and fall seasons were not assessed as part of this study. If further economic impact analysis is considered, we offer the following suggestions:

- Expand the fielding period to span April through the end of September, to cover spring and early summer, which are typically the busiest times on waterways because water levels are more than adequate for boaters. In addition, by including this busy time in fielding, population demographics may similarly expand. Avid boaters and those traveling by boat to specific waterways are more likely to do so during the spring and early summer when water levels are high. Additionally, if LB & FC would like to include a larger number of hunters or anglers in the study, then extending the fielding period into late September or October might also increase the number of respondents within the visitor group.
- We also would recommend that the PA Water Trails Program conduct an assessment of annual visitation for all water trails, either as part of a larger fielding period or as a separate study. Annual visitation numbers provide usage information necessary to estimate economic impact at a more detailed level for both a state and community level analysis.
- In addition to expanding the fielding period, we also would suggest that any additional studies be conducted at the state level. The more data that can be collected across the eligible sites statewide, the more refined the economic impact analysis will be at the state and local levels.

While the PA Recreational Water Trails Economic Impact Study provides a snapshot of the aggregated impact of four water trails in four distinct regions of the state, a larger study with a longer fielding period would certainly provide an even better estimate of the economic impact of Pennsylvania's extensive water trails network.

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Pollack, Noah; Chase, Lisa C.; Ginger, Claire; Kolodinsky, Jane. Northern Forest Canoe Trail: Economic Impacts and Implications for Sustainable Community Development. 2007. www.uvm.edu/~snrvtdc/NFCT/. June 2012

Water Trail Informational Links

Schuylkill River National Heritage Area. www.schuylkillriver.org/default.aspx. October 2012.

Endless Mountains Heritage Region. www.endlessmountainsheritage.org/index.php. October 2012

American Trails. www.americantrails.org/nationalrecreationtrails/trailNRT/Juniata-River-Water-Trail-PA.html. October 2012

Friends of the Riverfront. http://fishandboat.com/watertrails/three_rivers/three-guide-map.pdf. October 2012

PA Fish and Boat Commission. <http://www.fishandboat.com/watertrails/trailindex.htm> October 2012

The Pennsylvania Water Trails Partnership. www.pawatertrails.org

APPENDICES

A. SURVEY INSTRUMENT

Section A. Current Activities on the Water Trails

Introduction [Interviewer to present to respondent]:

Hello, my name is _____. The State of Pennsylvania is conducting a study to learn about the economic impact of Pennsylvania’s Water Trails on the state’s economy. By Water Trails, we mean rivers designated as recreation Water Trails by the Pennsylvania Fish & Boat Commission. This section of the [INSERT RIVER at SITE of INTERVIEW] has been designated as a Water Trail.

Today, I am interviewing visitors about their activities and expenses related to the state’s Water Trails. We are studying four specific Water Trails: the Susquehanna-North Branch, the Juniata, the Three Rivers, and the Schuylkill **[Interviewer: show map]. [CONSENT]** Could I ask you a few brief questions about your trip? The survey should take about 10 minutes.

1a. [Interviewer Code]

- o1 Consent
- o2 Refusal

1. Is this your first trip to this section of [INSERT RIVER]? Yes/No
2. How did you learn about the [INSERT RIVER] Water Trail? [Interviewer:

Do Not Read Options]

- a. Travel brochure
 - b. Pennsylvania Fish & Boat Commission or other State Tourism website
 - c. Water Trail Organization website
 - d. Other internet site
 - e. Water Trail Map & Guide
 - f. Guide Book
 - g. Word of mouth/Friends or Family
 - h. I live nearby.
 - i. Other, specify: _____
3. Which of the following activities is your **primary** reason for visiting this Water Trail? Select ONE.

Canoeing, kayaking or paddling
Motor boating
Fishing

Other tourism activities - Explain (e.g. tubing, swimming, picnic)
[Interviewer to record specific activity]

4. Will your visit to this Water Trail be a one day trip, or will you stay at least one night away from home?
[Interviewer note if needed: A trip includes the time you've spent **in Pennsylvania**, away from your home, from the time you left home until you return.]

- a. One day (Go to Q5)
- b. Longer than one day (go to Q4a)

4a. How many days will your trip last? |_|_|_|

4b. How many nights away from your permanent residence will you spend on this trip? |_|_|_|

4c. What type of accommodation will you use for this trip?

- a. Hotel, rental cabins or B&B
- b. local campground
- c. remote campsite along the waterway
- d. second home or friends'/family home
- e. Other (specify): _____

Section B. Expenditures Associated with Current and Past Activities

Questions in this section ask about your activities for this trip, and similar trips in the past 12 months.

[A trip includes the time you've spent **in Pennsylvania**, away from your home, from the time you left home until you return.]

First, we'd like to know about your expenses for transportation, accommodations, food, equipment, and fees associated with this trip. Please include money you spent to cover the expenses of other people traveling with you, such as family members or friends. If your current trip is not yet complete, include what you expect to pay before returning home. When reporting your expenditures, keep in mind that we're interested in what you spent directly related to your current trip on [Insert River Name; **show map**]. [Interviewer to expand on the fact that the visitor could be making a trip to the Water Trail to pass leisure time beside or enjoying the water trail by fishing from the bank, swimming, picnicking, etc.]

Then, we'd like to know about your expenses for all activities on these four Water Trails in the past 12 months, including today's trip. [**Interviewer note: Please show map of four Water Trails.**] For those questions, we'll ask you to think about your visits in the last 12 months to any of these four Water Trails, and your total expenses for all the trips you've taken. Again, we'll ask you to include your costs for the people who visited with you and only include money you personally spent in the State of Pennsylvania.

Let's start with this trip.

5. What were your expenses related to your current trip and trips you've taken over the past 12 months?

Expense Category	Expense Type	Current Trip Group Expense (\$)	Current Number People in Group	Total Group Expense for all trips in the last 12 months (\$)	Average Number of People in Group (last 12 months)
ACCOMODATION	Hotels, motels, B&B				
	Other accommodation types including cabins, campgrounds, lodges (do not include park fees)				
FOOD OR DRINK	From a grocery, convenience store or liquor store				
	From a restaurant or bar				
TRANSPORTATION	Gas or oil to operate private vehicles, including autos, RVs and motorized boats				
	Motorized boat purchases				
	Vehicle rental, including autos, campers, trailers but NOT boats				
	Motorized boat operation costs excluding gas (repair or other operation expenditures)				
	Local scenic transportation (fishing tours or charters)				
EQUIPMENT, SERVICES AND FEES	Sporting goods such as camping, fishing or hunting gear, cameras, or				

	non-motorized boats, including canoes or kayaks				
	Equipment rental and repairs <u>including motorized and non-motorized boats</u>				
	Tour/fishing guides, outfitters				
	Private park or site fees				
	Public park or site fees, or fishing or hunting license				
OTHER	Souvenirs				
	Other major expenses (explain in detail)				

Section C. Past Activities on Water Trails

The next two questions ask about your annual visits to, and activities on, the four Water Trails we've mentioned throughout the questionnaire: **Susquehanna—North Branch, Juniata, Three Rivers and Schuylkill Water Trails** [Interviewer: show map again if necessary].

6. How many days did you spend on or at each of the following Water Trails in the past 12 months.
///Range 0-365///

Site	Days in the past 12 months
Susquehanna River Water Trail-North Branch	_ _ _
Juniata River Water Trail	_ _ _
Three Rivers Water Trail	_ _ _
Schuylkill River Water Trail	_ _ _

7. Thinking about your trips to these four Water Trails, how many days in the last 12 months did you spend doing the following activities?

///Range: 0-365///

Activity	Days in the past 12 months on the PA Waterways
Canoeing or kayaking or paddling	_ _ _
Motor boating	_ _ _
Fishing	_ _ _
Other tourism	_ _ _

8. Which Water Trails have you visited in the last 12 months? [Interviewer: Show Map. Do Not Read Options. Respondent will specify.]

- a. Clarion River Lower
- b. Clarion River Middle
- c. Clarion River Upper
- d. Conestoga River
- e. Conewango Creek
- f. Conodoguinet Creek
- g. Delaware River
- h. Juniata River
- i. Kiski-Conemaugh River
- j. Lehigh River
- k. Lower Susquehanna

-
- l. Middle Allegheny River
 - m. Middle Susquehanna River
 - n. North Branch Susquehanna River
 - o. Pine Creek
 - p. Raystown Branch Juniata River
 - q. Schuylkill River
 - r. Swatara Creek
 - s. Three Rivers Water Trail: Allegheny, Monongahela, and Ohio Rivers
 - t. Tidal Delaware River
 - u. Upper Monongahela River
 - v. West Branch Susquehanna River
 - w. Yellow Breeches Creek
 - x. Youghiogheny River Northern
 - y. Youghiogheny River Southern
9. What concerns, if any, do you have when visiting Pennsylvania's Water Trails? [Interviewer: Do Not Read. Select all that apply]
- a. Water quality
 - b. Availability of parking
 - c. Adequate water level
 - d. Quality or availability of access sites
 - e. Difficult portages
 - f. Availability of restrooms
 - g. Personal safety in the community or on the water
 - h. Access to medical care
 - i. Quality and availability of rental equipment
 - j. Access to instructors or guides
 - k. Finding safe, clean, and comfortable lodging
 - l. Security of my personal vehicle
 - m. Getting lost
 - n. Other: Specify: _____

Section D. About you and your household

The following questions will help us understand more about the visitors who use these Water Trails. The answers you give will not be connected to your contact information.

10. What is your Zip code?
11. What is your race (check all that may apply)?
 - American Indian or Alaskan Native
 - Asian
 - Black, African American, or Negro
 - Native Hawaiian or Pacific Islander
 - Hispanic, Latino, or Spanish

-
- White
 - Other: _____
 - Don't know
 - Refused

12. In what year were you born?

13. Please select which of the following categories best describes your household's **total annual income before taxes** in 2011? (*Respondent selects*)

- Less than \$20,000
- \$20,000-\$39,999
- \$40,000-\$59,999
- \$60,000-\$79,999
- \$80,000-\$99,999
- \$100,000-\$149,999
- \$150,000-\$199,999
- \$200,000 or more
- Don't know
- Refused

14. For protocol purposes, I have to ask if you prefer to report your gender as male or female?

- a. Female
- b. Male

15. In order to confirm that this interview was conducted with you, we may make a follow-up phone call to verify the interview. Would you be willing to provide your name and phone number to us for a follow-up call? We will not share your information with anyone.

01. Yes

Name:

Phone:

02. REFUSED

16. Any further comments about your experience on Pennsylvania's Water Trails? [Open End: Max 350 characters]

CODED BY INTERVIEWER After Interview

- 17. County code: ____
- 18. Site code: _____
- 19. GPS location: ____
- 20. Weather condition:
 - a. Sunny
 - b. Partly cloudy
 - c. Rain/thunderstorms
- 21. Temperature: _____

-
22. Water Condition [Interviewer: Code as best as possible.]
- a. Low water level
 - b. Average water level
 - c. High water level

B. OTHER RELEVANT ECONOMIC IMPACT CASE STUDIES FOR WATER TRAILS

Completed in other states, several studies that were part of an evaluation of a statewide water trail program or a specific water trail may be relevant to the Pennsylvania water trails program and any additional economic impact analyses. The following is a brief description of each study, an overview of information that they included, and a synopsis of their findings.

Northern Forest Canoe Trail: Economic Impacts and Implications for Sustainable Community Development: 2007

Website: www.uvm.edu/~snrvtdc/NFCT/

Lead Author(s): Noah Pollock, Rubenstein School of Environment & Natural Resources, University of Vermont

Lisa C. Chase, University of Vermont Extension, and the Vermont Tourism Data Center

Clare Ginger, Rubenstein School of Environment & Natural Resources, University of Vermont

Jane Kolodinsky, Department of Community Development and Applied Economics, University of Vermont

The Northern Forest Canoe Trail (NFCT) is a 740-mile route traversing New York, Vermont, Quebec, New Hampshire, and Maine. The objectives of this research were to:

- Assess group and trip characteristics of paddlers recreating on Northern Forest Canoe Trail waterways;
- Quantify the current economic impact of paddlers in regional communities;
- Identify potential social and environmental impacts of increased waterway recreation; and,
- Report on opportunities and challenges for businesses and communities along the NFCT.

The researchers used the data to attempt to answer the question, “Can the Northern Forest Canoe Trail stimulate sustainable community development?”

Target population: paddlers and visitors

Timeline: 2 years

Major Findings: Results indicate that approximately 90,000 visitors paddled the waterways in the six study regions. Their spending in local communities created \$12 million in total economic impacts, supporting about 280 jobs. The median paddler group spent about \$215 per trip, primarily at lodging establishments, restaurants, grocery stores, and service stations. Non-locals spent an average of \$414–498 per trip, or \$46 per person per day. However, use levels, types of users, average expenditures, and resulting economic impacts vary significantly between regions. In addition to information about economic impact, the report gathered information about the social and environmental impacts of water trails.

2008 Paddle Tourism Study: North Carolina State Trails Program

Website: www.ncparks.gov/About/docs/paddle_report.pdf

Lead Author(s): Jennifer Beedle, North Carolina State University, Parks Recreation & Tourism Management Internship Project

This study is mainly a market analysis of paddling in North Carolina. Many of the questions asked how users paddle, where they paddle, and what resources they access when they paddle. The questionnaire includes questions about expenditures, so the researchers draw conclusions about the overall economic impact of paddling. At the time of the study, North Carolina was beginning to implement a water trails program as part of their statewide trails program. The intent of this survey was to gain general information about paddling in North Carolina to assist in establishing this program. Goals of the study included:

- Gather information from paddlers who recreate in North Carolina: specifically: demographics, level of paddling, desired amenities, trip patterns, planning sources, other activities, and expenditures
- Gather information from paddling/outfitting businesses/guides who operate in North Carolina, as well as organized outdoor clubs and organizations that promote paddle trips within North Carolina.

Target: paddlers (NC, GA, SC, TN, VA)

Timeline: online survey conducted over four months

Major Findings:

- North Carolina is a destination for paddlers from surrounding states. The greatest numbers of responses from outside North Carolina were from Georgia, South Carolina, Tennessee, and Virginia
- The majority of participants in this survey (70%) believe that paddling is a viable form of economic development for North Carolina.
- Respondents spent almost one million dollars (\$947,800) last year on paddle trips outside their local area.
- Respondents spent nearly \$300,000 last year on trips within their local area.

Evaluating the Economic Benefits and Future Opportunities of the Maine Island Trail Association: March 22, 2011

Website: www.hks.harvard.edu/m-rcbg/heep/papers/HEEP%20Discussion%2028_final.pdf

Lead Author(s): Jonathan Glassman & Vilas Rao, Master in Public Policy Candidates, Harvard Kennedy School

Targets: boaters and campers (users), supporters of Maine Island Trail Association (MITA), local communities, and state government

Timeline: Island logbook entries, 2002–2010; a 2006 census of user characteristics and attitudes toward the trail; and, a detailed usage and spending pattern survey that was fielded December 2010–January 2011.

Major Findings:

-
- The Maine Island Trail generates at least \$674,000 up to potentially \$2.1 million annually in visitor spending in Maine, as well as 27 jobs and \$54,000 in annual state and local tax revenue.

Report on the Survey of Iowa Canoe, Kayak & Innertube Liveries: January 27, 2009

Website: www.iowadnr.gov/portals/idnr/uploads/riverprograms/liveries_report.pdf

Lead Author(s): Iowa Department of Natural Resources (DNR) with assistance from Iowa State University Department of Landscape Architecture

Target: liveries through phone surveys

Major Findings:

- Liveries contribute \$5.14 million to Iowa's economy.
- Innertubing is a major part of the river recreation industry, and most livery revenues are concentrated on four rivers.

Case Study of Water Trail Impacts on Rural Communities: September 2002

Website: www.nps.gov/ncrc/programs/rtca/helpfultools/wtimpacts.pdf

Lead Author(s): Lindsay Johnson, MCRP, University of Oregon

Target: Paddlers in 1.) Lake County, Minnesota; 2.) Vernon County, Wisconsin; 3.) Martin County, North Carolina

Timeline: 2 years

Major Findings:

- Paddlers will spend \$27–\$63 per day. “Destination” paddlers on an overnight trip will spend approximately \$88 in local communities.

C. ACCESS SITES INCLUDED IN THE 2012 PA WATER TRAILS ECONOMIC IMPACT STUDY

The access sites included in this list were included in the study as requested by the LB&FC, and as suggested by the individual water trail program managers. Access sites were drawn from water trail maps and from lists provided by the PA Fish & Boat Commission. Sampling at some access sites was stopped if water levels dropped too low during the study period, or if it was discovered that sites were closed.

TrailName	SiteName
Three Rivers	Heinz Quay Launch (0.1R)
Three Rivers	Westhall Street Launch (2.8R)
Three Rivers	Kilbuck Access (7.9R)
Three Rivers	Chestnut Street Launch (11.6R)
Three Rivers	Walnut Street Launch (11.8R)
Three Rivers	Clemente (6th Street) Bridge Launch (0.6R)
Three Rivers	Three Rivers Rowing Launch (2.8R)
Three Rivers	Lawrenceville Launch (3.1L)
Three Rivers	Millvale Riverfront Park Launch (3.2R)
Three Rivers	Sharpsburg Riverfront Park Launch (5.5R)
Three Rivers	O'Hara Chapel Harbor Launch (8.5R)
Three Rivers	Verona Launch (10.5L)
Three Rivers	Oakmont Launch (12.0L)
Three Rivers	Deer Creek Access (13.1R)
Three Rivers	Springdale Access (16.5R)
Three Rivers	Station Square Marina (0.7L)
Three Rivers	Mon Wharf Launch (0.7R)
Three Rivers	4th Street Launch (1.3L)
Three Rivers	South Side Riverfront Park (2.3L)
Three Rivers	South Side Riverfront Park (2.5L)
Three Rivers	Nine Mile Run Launch (7.5R)
Three Rivers	Braddock Launch at 11th Street (10.7R)
Three Rivers	Port Vue Launch (0.1L)
Susquehanna River North Branch	Starrucca Viaduct (Mile 353L)
Susquehanna River North Branch	D&H Rail Trail (Mile 353L)
Susquehanna River North Branch	PA Rt. 92 Scenic Drive (Mile 351)
Susquehanna River North Branch	Starrucca House (Mile 351L)
Susquehanna River North Branch	Susquehanna Dam (Mile 350)
Susquehanna River North Branch	Mormon Monument (Mile 349R)
Susquehanna River North Branch	Finger Islands (Mile 346)

Susquehanna River North Branch	Red Rock (Mile 345L)
Susquehanna River North Branch	Two Rivers State Park in Waverly
Susquehanna River North Branch	Chemung River/Spanish Hill
Susquehanna River North Branch	LVRP Passenger Station (Mile 289R)
Susquehanna River North Branch	Carantouan Greenway (Mile 288R)
Susquehanna River North Branch	Tioga Point Museum (Mile 286R)
Susquehanna River North Branch	Fort Sullivan (Mile 286R)
Susquehanna River North Branch	Tioga Point (Mile 284R)
Susquehanna River North Branch	Tioga Point Overlook (Mile 284L)
Susquehanna River North Branch	Sheshequin Universalist Church (Mile 281L)
Susquehanna River North Branch	Canal remnants/aqueduct (Mile 274R)
Susquehanna River North Branch	Towanda (Mile 271R)
Susquehanna River North Branch	Standing Stone Community Vespers Church (Mile 263L)
Susquehanna River North Branch	Standing Stone (Mile 262R)
Susquehanna River North Branch	French Azilum Historic Site (Mile 261R)
Susquehanna River North Branch	Marie Antoinette Overlook (Mile 260L)
Susquehanna River North Branch	French Asylum Methodist Church (Mile 259R)
Susquehanna River North Branch	Homet's Ferry and Mill (Mile 257R)
Susquehanna River North Branch	Wyalusing Rocks Overlook (Mile 254L)
Susquehanna River North Branch	Eastern Delaware Nations (Mile 253.8L)
Susquehanna River North Branch	Wyalusing Historic District (Mile 251.5L)
Susquehanna River North Branch	The Wyalusing Valley Museum and Natural Area (Mile 251L)
Susquehanna River North Branch	Friedenshutten Monument (Mile 249L)
Susquehanna River North Branch	Indian Hill (Mile 246L)
Susquehanna River North Branch	Laceyville's Oldest House (Mile 241L)
Susquehanna River North Branch	Sullivan's March (also called Sullivan's Expedition)
Susquehanna River North Branch	Friedenshutten Monument (Mile 249L)
Susquehanna River North Branch	Indian Hill (Mile 246L)
Susquehanna River North Branch	Scenic Rock Outcrop (Mile 242R)
Susquehanna River North Branch	Laceyville Bridge (Mile 241)
Susquehanna River North Branch	Laceyville (Mile 241L)
Susquehanna River North Branch	Table Rock (Mile 240L)
Susquehanna River North Branch	Black Walnut (Mile 238L)
Susquehanna River North Branch	Kiwanis Wyoming Co. Fairgrounds (Mile 235.5L)
Susquehanna River North Branch	Meshoppen (Mile 233L)
Susquehanna River North Branch	Mehoopany (Mile 230R)
Susquehanna River North Branch	Procer & Gamble (Mile 230L)
Susquehanna River North Branch	Mile 229-228
Susquehanna River North Branch	The Vosburg Neck

Susquehanna River North Branch	Camp Lackawanna (Mile 226L)
Susquehanna River North Branch	Howland Preserve (Mile 224L)
Susquehanna River North Branch	Tunkhannock (Mile 218L)
Susquehanna River North Branch	Rock Garden in the River (Mile 215)
Susquehanna River North Branch	LaGrange Island (Mile 214)
Susquehanna River North Branch	Buttermilk Falls (Mile 207L)
Susquehanna River North Branch	Sullivan's March (also called Sullivan's Expedition)
Susquehanna River North Branch	Campbell's Ledge ("Dial Rock") (Mile 199L)
Susquehanna River North Branch	Twin Shaft Disaster (Mile 197L)
Susquehanna River North Branch	Pittston River Front Park (Mile 196L)
Susquehanna River North Branch	Coal Miners Memorial (Mile 196L)
Susquehanna River North Branch	West Side Trail (Mile 195R)
Susquehanna River North Branch	Knox Mine Disaster (Mile 94.5L)
Susquehanna River North Branch	Queen Esther's Bloody Rock Marker (Mile 193R)
Susquehanna River North Branch	Wyoming Monument (Mile 192.7R)
Susquehanna River North Branch	Swetland Homestead (Mile 192.5R)
Susquehanna River North Branch	Monocanock Island (Mile 192.5)
Susquehanna River North Branch	Luzerne County Recreation Complex (Mile 192R)
Susquehanna River North Branch	Nathan Denison House (Mile 192R)
Susquehanna River North Branch	Luzerne County Rail with Trail (Mile 191.5L)
Susquehanna River North Branch	Music Box Theater (Mile 191.5R)
Susquehanna River North Branch	Forty Fort Meeting House (Mile 191R)
Susquehanna River North Branch	Back Mountain Rail Trail (Mile 190.5R)
Susquehanna River North Branch	Wyoming Valley Levee Trail System (Mile 190R)
Susquehanna River North Branch	Kingston Recreation Center (Mile 189.5R)
Susquehanna River North Branch	Lion Brewery (Mile 189.5L)
Susquehanna River North Branch	Luzerne County Courthouse (Mile 188.5L)
Susquehanna River North Branch	Nesbitt Park (Mile 188.5R)
Susquehanna River North Branch	Luzerne County Historical Society (Mile 188L)
Susquehanna River North Branch	F.M. Kirby Center for the Performing Arts (Mile 188L)
Susquehanna River North Branch	King's College (Mile 188L)
Susquehanna River North Branch	D&L National Heritage Corridor, Black Diamond Trail (Mile 188L)
Susquehanna River North Branch	Dorothy Dickson Darte Center for the Performing Arts (Mile 187.5L)
Susquehanna River North Branch	Sordoni Art Gallery, Wilkes University (Mile 187.5L)
Susquehanna River North Branch	Kirby Park (Mile 187.5R)
Susquehanna River North Branch	Avondale Mine Disaster (Mile 182R)
Susquehanna River North Branch	Tilbury Knob (Mile 181R)
Susquehanna River North Branch	Canal Park (Mile 180R)
Susquehanna River North Branch	Susquehanna Warrior Trail (Mile 175R)

Susquehanna River North Branch	Mocanaqua Trail (Mile 172L)
Susquehanna River North Branch	Susquehanna Riverlands Environmental Preserve (Mile 167R)
Susquehanna River North Branch	Wetlands Nature Area (Mile 166R)
Susquehanna River North Branch	Council Cup Overlook (Mile 166L)
Susquehanna River North Branch	Sullivan's March (also called Sullivan's Expedition)
Susquehanna River North Branch	Berwick Test Track Park (Mile 158R)
Susquehanna River North Branch	Fort McClure House (Mile 147R)
Susquehanna River North Branch	Boone's Dam (Mile 146.6R)
Susquehanna River North Branch	Rupert Covered Bridge (Mile 146.1R)
Susquehanna River North Branch	Abandoned Reading Railroad Bridge (Mile 146)
Susquehanna River North Branch	River Bluffs & Profile (Indian Head) Rock (Mile 145.2R)
Susquehanna River North Branch	Catawissa Opera House (Mile 145L)
Susquehanna River North Branch	Danvielle Historic District (Mile 136.5R)
Susquehanna River North Branch	Lake Augusta (Mile 130)
Susquehanna River North Branch	Joseph Priestley House (Mile 125.5R)
Schuylkill	Pottstown Riverfront Park (river left)
Schuylkill	Hanover Street Boat Ramp (river right)
Schuylkill	Towpath Park Boat Ramp (river right)
Schuylkill	Linfield Fireman's Park (river left)
Schuylkill	Spring City (river right)
Schuylkill	Phoenixville PFBC Access (river right)
Schuylkill	Upper Schuylkill Valley Park (river left)
Schuylkill	Mont Clare (river left, canoes only)
Schuylkill	Betzwood Power & Non-Power Boat Ramp (river left)
Schuylkill	Boat Ramp at Norristown Riverfront Park (river left, power and unpowered)
Schuylkill	Upper Merion Township Boathouse (river right)
Schuylkill	Flat Rock Park (river right)
Schuylkill	Kelly Drive-Fairmount Park (river left)
Schuylkill	Tamaqua Senior Center (river right)
Schuylkill	Tamaqua Dam (river left)
Schuylkill	New Ringgold (river left)
Schuylkill	Terry Reilly Memorial Picnic Area and Canoe Landing--Pottsville (river left)
Schuylkill	Schuylkill Haven Island Park (river right)
Schuylkill	Auburn Dam Access, PA Fish & Boat Commission (river right)
Schuylkill	Auburn Rte 895 Trailhead (river left)
Schuylkill	Port Clinton Park (river left)
Schuylkill	Kernsville Landing (river right)
Schuylkill	Kernsville Landing (river right)
Schuylkill	Hamburg Park (river left)

Schuylkill	Five Locks PA Fish & Boat Commission (river left)
Schuylkill	Peter Yarnell Landing at Berne (river left)
Schuylkill	Leesport Canoe Launch (river left)
Schuylkill	Stoudt's Ferry Landing (river right)
Schuylkill	Epler's Landing--PFBC (river right)
Schuylkill	Felix Dam Park-Muhlenberg Township (river left)
Schuylkill	Reading (Kerper's) Landing at Riverfront Park (river left)
Juniata	Duncannon
Juniata	Newport
Juniata	Pittman's Riverside Campground
Juniata	Cocolamus Creek
Juniata	Millerstown Community Park Access (river left)
Juniata	Donnally's Mill
Juniata	Thompsons town
Juniata	PF&BC Van Dyke Research Center
Juniata	Zook and Lyter Cottages
Juniata	Mexico
Juniata	Juniata River Adventures
Juniata	Tuscarora Creek
Juniata	Port Royal
Juniata	Tuscarora Valley
Juniata	Mifflintown
Juniata	Lost Creek
Juniata	Lewistown Narrows Canal Park
Juniata	Kishacoquillas Creek
Juniata	Lewistown
Juniata	Restored Canal
Juniata	Green Valley Campground and Grocery
Juniata	Howe Township Park Access (river left)
Juniata	Neff Bridge
Juniata	Hatfield Iron Works
Juniata	Mid-State Trail (river left)
Juniata	Alexandria
Juniata	Little Juniata Natural Area
Juniata	Birmingham Window (river right)
Juniata	Mt. Etna Furnace (river left as you approach the tip of the oxbow)
Juniata	Tyrone History Museum (river right)
Juniata	Williamsburg
Juniata	Indian Chief Rock (river left)

Juniata	Former Three-Mile Dam
Juniata	Point View Gap
Juniata	Canoe Creek State Park
Juniata	Newton Hamilton
Juniata	Aqueduct Campground (river left)
Juniata	Mount Union
Juniata	Thousand Steps
Juniata	Jacks Narrows
Juniata	Mapleton
Juniata	Mill Creek
Juniata	Canal Remains (river left)
Juniata	Raystown Branch
Juniata	Riverside Nature Trail on Raystown Branch
Juniata	Smithfield Riverside Park Access
Juniata	Portstown Park Access (river left)
Juniata	Old Crow Wetland Area
Juniata	Huntingdon Historic District
Juniata	Warrior Ridge Dam
Juniata	Petersburg
Juniata	Lower Trail