Angler Use, Harvest and Economic Assessment on Wild Trout Streams in Pennsylvania

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Wild Trout Stream Angler Use, Trout Catch, & Economic Contribution in Pennsylvania

Executive Summary

The Pennsylvania Fish & Boat Commission manages a wide range of unstocked streams to provide angling opportunities for wild trout in Pennsylvania. Wild trout populations estimates from 76 stream reaches in 2005 indicated that there were about 220 legal size wild trout per mile of stream yielding an estimate of about 600,000 wild trout greater than 7 inches in the 2763 miles of streams managed solely for wild trout in Pennsylvania. Angler surveys were conducted from April 17 through September 3, 2004, to quantify use and catch statistics from a group of randomly selected unstocked stream sections that were representative of unstocked wild trout streams on a statewide basis. Information collected from these surveys was expanded to estimate angler effort and numbers of trout caught, harvested, and released on all unstocked wild trout streams statewide. Information was also collected to assess the economic contribution of wild trout stream angling in Pennsylvania. Fishery statistics were estimated for streams defined as large wild trout streams ($\geq$ 6 meters in width) and small wild trout streams (< 6 meters in width).

An estimated total of 80,098 angler trips were made on Pennsylvania's wild trout streams during the regular trout season in 2004. By stream size, 57.5% of the angler trips were made on large streams and 42.5% of the angler trips were made on small streams. Over the course of the survey period angler effort averaged 239 angler hours per mile on large streams and 44 hours per mile on small streams. Angler catch rates averaged 1.76/hr for brook trout on small streams, 0.51/hr for brook trout on large streams and 0.56/hr for brown trout on large streams. Anglers caught an estimated total of 343,240 trout on all wild trout streams and anglers released 92.7% of the trout caught resulting in about 25,000 trout harvested on all wild trout streams during the 2004 survey period; thus, about 4% of the 600,000 legal size wild trout were harvested. Anglers harvested a very small number (9/mile) of the legal size trout available on wild trout streams (221/mile).

Based on the results of this study, angling on wild trout streams contributed over 7.16 million dollars to Pennsylvania's economy during the regular trout season in 2004. Angling on wild trout streams also supported 105 jobs in Pennsylvania.

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Introduction

The Pennsylvania Fish and Boat Commission manages a diverse range of waters in order to provide a variety of trout angling opportunities in the Commonwealth. Included in that range of waters are unstocked streams managed to provide angling for wild trout. Wild trout populations in Pennsylvania can range from very low to substantial standing stocks of trout. Current management programs for wild trout waters include regulation options ranging from statewide regulations to special regulations where no harvest is permitted or harvest is restricted under reduced creel limits and elevated minimum length limits.

One of the primary goals of regulations is to prevent overexploitation of fish populations. Angler use and harvest surveys provide information that is essential to assessing the likelihood of overexploitation. Aside from a few use and harvest studies that have been conducted on special regulation and more accessible wild trout waters (Weber and Greene 1995; 2005 and Greene and Weber 1997; 1998), evaluations on wild trout waters have mostly been limited to trout population abundance assessments. Therefore, during the 2004 season, the Pennsylvania Fish and Boat Commission (PFBC) conducted a statewide survey of anglers on wild trout streams.

The purpose of this survey was to determine the amount of angler effort that occurs on stream sections managed for wild trout in Pennsylvania and to obtain information on catch and harvest of trout on these waters. In addition, information was also collected to assess the economic impact of wild trout stream angling in Pennsylvania. Overall, the survey was not designed to quantify use and harvest statistics from any one stream, but rather, from a group of streams that fit into the category of wild trout waters. Specifically, wild trout streams were defined as stream sections that were not stocked with hatchery trout and were accessible to public angling (though not necessarily in public ownership). The evaluation occurred throughout the regular trout season and extended from the opening day of regular trout season on April 17, 2004, through September 3, 2004.

The objectives of this sampling effort were to estimate the following fishery statistics: angler effort (angler hours), angler trips, catch by species, harvest by species and number released by species. Fishery statistics were estimated for 4,449 kilometers (km) or 2,763 miles (mi) of wild trout streams. These statistics were estimated for large streams, defined as stream sections greater than or equal to 6 meters in width (880 km – 547 mi), and small streams or stream sections less than 6 meters in width (3,569 km – 2,216 mi) and on a per-kilometer and per-day basis.

To carry out this project Fisheries Management Division staff worked with personnel from the Pennsylvania State University. For example, staff worked closely with Dr. Robert Carline and Dr. Duane Diefenbach from the Pennsylvania Cooperative Fish & Wildlife Research Unit on the overall study design. The Cooperative Unit also provided the statistical analysis of angler use, catch and harvest data. In addition, staff worked with Dr. Martin Shields from the Department of Agricultural Economics and Rural Sociology at the Pennsylvania State University to develop the questionnaire to assess the economic impact of wild trout stream angling. Dr. Shields also provided the data analysis for the economic portion of the survey.

Methods

Angler Use and Harvest

An extensive review of the PFBC database was required to determine waters to be included in this study. Waters considered for the study included streams that had been surveyed by PFBC staff. Ultimately, PFBC staff identified 1,925 stream sections ranging from 0.1 – 3.0 km long that represented 4,449 km of stream that were designated wild trout stream sections, were not stocked with hatchery fish (either by the PFBC, PFBC Cooperative Nurseries or private individuals), and were open to public access. Because angler use is known to be greater on larger streams ($\geq$6 m in average width) and on weekends and holidays, the sampling effort was stratified by stream width (<6 m versus $\geq$6 m wide) and type of day (weekends and holidays versus weekdays). For the purpose of this survey, subsections less than 1.5 km in length were not considered for use as survey subsections, as it was felt these units were too small to be representative sample units.

The sampling period between April 17, 2004 and September 3, 2004 included a total of 42 weekend and holiday days and 98 weekdays. Given budgetary limitations, it was estimated that 10 creel clerks could sample 200 stream subsections a total of four times each over the course of the survey period. The opinion of PFBC staff was used to allocate sampling effort in order to maximize the precision of estimates obtained from this stratified sampling design. Based on data from previous PFBC wild trout use and harvest studies (Weber and Greene 1995; 2005 and Greene and Weber 1997; 1998) creel clerks would be expected to encounter a range of 0 – 5 anglers on small streams and 0 – 25 anglers on large streams for any given count. If the standard deviation (SD) is crudely estimated by the Range/4 then we can assign an estimated SD = 2 on small streams and SD = 5 on large streams. In addition, it was assumed sampling costs would be the same on each size of stream. Therefore, according to Cochran (1977:98) an optimal allocation of 200 stream subsections would be:

$$\frac{n_{<6m}}{n} = \frac{N_{<6m} \times SD_{<6m}}{\sum_h N_h \times SD_h} = \frac{1{,}628 \times 2}{1{,}628 \times 2 + 612 \times 5} = \frac{3{,}256}{3{,}256 + 3060} = 0.52$$

Thus, 52% of the 200 sampled subsections should be from small streams and 48% of the sampled subsections should be from large streams. For the purpose of this survey it was decided to sample an equal number of streams from each of the large and small stream strata (i.e., $n_{<6m}$ = 100, $n_{\geq 6m}$ = 100).

For sampling purposes stream subsections were randomly selected from the PFBC database that consisted of 1,491 subsections greater than or equal to 1.5 km in length. A total of four visits were randomly assigned to each of the 200 subsections selected for sampling (2 weekend and 2 weekday visits). The two visits to a stream during a weekend or weekday consisted of a morning visit (before 1400 hr) and an afternoon visit (after 1400 hr). Morning and afternoon daily sample shifts consisted of a six-hour sample period and day length averaged 14.5 hrs during the sampling period. In cases where access limitations (posting) were noted during the clerks first visit to a subsection, a replacement water of the same stream size was inserted into the schedule prior to the next scheduled sample date. Ultimately, a total of 205 subsections were sampled on at least one sample date for the survey (Appendix 1).

The survey process required a creel clerk to travel the length of the stream subsection and record the number of anglers along the stream. Creel clerks were required to conduct a minimum of two angler use counts on each sample water per day. The first count was conducted on the entire subsection upon the arrival of the clerk at the stream and the last count was conducted at the end of the work shift. When considering the variability that existed in regards to access to the subsections, the length of time required to complete a use count varied considerably between the subsections. An extended period of time was needed to complete a use count in situations where the clerk needed to walk along the entire distance of the subsection or a major portion of the subsection. In these cases, two angler use counts were conducted per day. Other subsections were easily counted in a short period of time along a road. In these cases, up to four angler counts were completed per day.

For the time period between use counts, clerks interviewed anglers within the designated subsection. In situations that required a clerk to walk the stream to conduct use counts, angler interviews were conducted during the angler count process. Angler interview information included the length of time fished; complete or incomplete trip; number and species of trout caught (i.e. brook, brown and rainbow trout); number, species and size of trout harvested; number and species of trout released; and the type of tackle used by the angler. Additionally, anglers were also asked a series of questions to collect information on their opinions, attitudes and tendencies, as well as, demographic, and economic information (Appendix 2).

For simplicity, each count was treated as an instantaneous count, although it was recognized the length of time required to make a count varied considerably among streams. For each stream subsection in stratum *h* we calculated the average number of angler-hours/day/100 km. We calculated angler-hours/day on a 100 km basis because overall angler effort was low (< 2 angler-hours/day/km). This was calculated as:

$$y_{hi} = \frac{1}{n}\sum_{j=1}^{n}\frac{14.5\,hrs \times c_{ij} \times 100}{d_i},$$

where n is the number of visits to stream subsection i, c_{ij} is the count of anglers for day j (weekend or weekday) in stream i, and d_i is the length in km of stream subsection i.

To estimate angler effort we define the following:

h = stratum, where h = 1-4 (1 = small streams, weekend;
2 = small streams, weekday;
3 = large streams, weekend;
4= large streams, weekday),

i = unit within the stratum, where i = 1-100 small streams and 1-100 large streams,

N_h = total number of stream subsections in stratum h,

n_h = total number of sampled stream subsections in stratum h, and

y_{hi} = number of angler-hours/day/100 km in stream subsection i in stratum h.

Then calculate the following assuming that subsection lengths (l_i) are all the same ($\bar{l}$ = 2.31 km/subsection, Range 0.1 – 3.0):

$W_h = k\frac{N_h}{N}$ = stratum weight where k = 42/140 for weekend strata and 98/140 for weekday strata

$f_h = n_h / N_h$ = sampling fraction in stratum h

$\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h}$ = sample mean (angler-hours/day/100 km) for stratum h

$\bar{y} = \sum_{h=1}^{4} W_h \bar{y}_h$ = sample mean (angler-hours/day/100 km)

$s_h^2 = \frac{1}{n_h - 1}\sum_{i=1}^{n_h}(y_{hi} - \bar{y}_h)^2$ = sample variance for stratum h

$s^2 = \sum_{h=1}^{4} W_h^2 (1-f) \frac{s_h^2}{n_h}$ = sample variance

The estimated average length ($\bar{t}$ hours) of a fishing trip was based on all interviews with anglers who had completed their fishing trip. Estimated catch rates of anglers was accomplished by recording the length of time an angler had fished (t_i) and the number of trout caught up to the time of the interview; however, we excluded data from interviews in which an angler had been fishing for <0.5 hours (Pollock et al. 1994). We calculated the mean catch ($\overline{C}$), harvest ($\overline{H}$), and release ($\overline{R}$) per angler by stream size (s) and species f as, for example,

$$\overline{C}_{fs} = \frac{1}{n} \sum_{i=1}^{n} C_{fsi},$$

where n = the number of angler interviews, and the rates (i.e., catch/hr, harvest/hr, and release/hr) as the average, for example, catch per hour of angling,

$$C_{fs} = \frac{1}{n} \sum_{i=1}^{n} \frac{C_{fsi}}{t_i},$$

rather than the ratio of total catch divided by the total number of angler hours. This method of calculating a catch, harvest, and release rates is less biased, if data from incomplete fishing trips are used (Pollock et al. 1994).

Using estimates of angler hours, average length of a fishing trip, and catch, release, and harvest rates, the following parameters were estimated:

Total angler hours ($\hat{A}$)

$$= \frac{140\,days \times 4{,}452\,km}{100} \times \sum_{h=1}^{4} W_h \bar{y}_h \bar{l}$$

Total angler hours by stream size ($\hat{A}_s$)

$$= \frac{140\,days}{100} \times \sum_{h} k_h \bar{y}_h L_h$$

where s = stream size
h = 1-2 for small streams and
h = 3-4 for large streams, and L_h =3,571 km for small streams and 881 km for large streams

Angler hours per km

$$= \frac{140\,days}{100} \times \sum_{h=1}^{4} W_h \bar{y}_h \bar{l}$$

Angler hours per km by stream size	$= \frac{140\,days}{100} \times \sum_h k_h \bar{y}_h$	where h = 1-2 for small streams and h = 3-4 for large streams
Angler trips	$= \frac{\hat{A}}{\bar{t}}$ or $\frac{\hat{A}_s}{\bar{t}}$	where s = stream size

Total catch, harvest, and release were estimated by stream size as the product of angler hours and each corresponding rate, and summed these to obtain total catch. Similarly, catch, harvest, and release were estimated per km by stream size as the product of angler-hours per km and the corresponding rate. Because not all streams permitted harvest of fish, we excluded these streams when calculating harvest estimates. Variances of these parameters were calculated for the product of two independent variables (Seber 1982:9).

For calculation of 95% confidence intervals a lognormal distribution was assumed, rather than a normal distribution, because in the latter the lower confidence limit can be <0. Let

$$V = \exp\left[z_{\alpha/2}\sqrt{\ln\left(1 + cv(\theta)^2\right)}\right] \text{ and } \text{95\% CI} = \left[\theta/V, \theta \times V\right],$$

where (θ) represents the parameter of interest and cv(θ) = SE(θ)/2.

Trout Population Abundance

In addition to collecting use and harvest information, assessments of trout population abundance were also made on a sample of stream segments being evaluated for angler activity. The purpose of this effort was to derive estimates of the abundance of legal size trout ($\geq$ 175 mm/km) for comparison with harvest estimates from the use and harvest portion of the study. To accomplish this, a total of 20% of the 200 angler use and harvest subsections (20 subsections $\geq$ 6 meters in width and 20 subsections < 6 meters) were randomly selected for electrofishing work to monitor the trout population abundance during the 2004 field season.

Trout populations were examined by electrofishing surveys in accordance with the Procedures for Stream and River Inventory Information Input (Marcinko, et al. 1986). In cases where the mark and recapture method of sampling was conducted, the Chapman- Modified Petersen method was used to estimate trout population abundance (Ricker, 1975). On waters where single-pass electrofishing efforts were conducted, minimum estimates were derived based upon catch from single-pass electrofishing efforts.

Overall, trout population estimates were conducted on a total of 76 stream sections. This included examinations on the 40 randomly

selected subsections that encompassed a total of 38 stream sections (two of the waters had multiple subsections sampled within the larger stream section). An additional 38 stream sections sampled during the 2004 field season were also included as part of the trout population abundance assessment. Eight of these waters were part of the set of the 200 randomly selected creel survey waters and the remaining 30 sections were wild trout waters that had not been selected for creel survey sampling.

Overview of Economic Impact Analysis

The basic premise of any economic impact assessment is to determine the effects of an activity on the broader economy. The purpose of this evaluation was to examine how wild trout anglers contributed to Pennsylvania's economy. Generally, this effect is reported in terms of total sales (or output), employment (expressed as jobs or wages and salaries), and value-added (value-added is also known as income when looking at the Gross State Product accounts).[1]

In examining economic impacts, we discuss two separate effects. Direct effects are the economic effects created by expenditures generated in support of wild trout fishing itself. For the most part, these are purchases at affiliated businesses, such as lodging, food, transportation (e.g., fuel), gear, and bait. For this analysis, angler spending patterns were collected as part of the survey.

But the economic contribution extends far beyond its initial effect. Because the directly impacted businesses purchase supplies and services from other Pennsylvania businesses, they generate additional economic activity, and subsequently, jobs across the Commonwealth. Similarly, because employees in these businesses spend money in the state economy at places such as the grocery store and the movie theater, the impact is even more pronounced. These secondary effects are often called the ripple effects.

Overall, then, we see money initially spent by wild trout anglers at fishing-related businesses generates additional activity in the state's economy as it ripples through the other businesses and households buying goods and services. This is known as the economic multiplier effect, as the value of one dollar of initial sales may be multiplied throughout the economy. The multiplier process continues with each additional round of income/spending, but typically becomes smaller as money "leaks" out of the state economy to purchase goods and services produced outside the state.

[1] Value-added represents the portion of total sales directed to employee income, taxes, rent and profit. It excludes the cost of intermediate inputs, and as such, is the preferred measure of the net economic gain to the region.

Economic Assessment

In this analysis, we estimated the total contribution of wild trout fishing to the state economy using an economic impact software program known as IMPLAN (Impact Analysis for Planning). Originally developed by the United States Forest Service, IMPLAN is an input-output model that is widely used to quantify how businesses use technology, labor and materials (i.e., inputs) to produce a product (i.e., output). The IMPLAN software and database (www.implan.com) establishes the characteristics of economic activity in terms of 10 broad industrial groups, involving as many as 528 sectors. In practice, the IMPLAN model is used in every state and hundreds of communities across the nation to catalog economic activity and predict the effect of alternative policies and various economic changes. In this analysis we used IMPLAN to generate information on a number of important economic indicators.

In order to use models such as IMPLAN to examine the role of an industry in a local economy, analysts should have information on the final demand (i.e., expenditures) for any related goods and services. The angler expenditure data collected in the survey served as the basis for our analysis. In this study, final demand was expressed by the total expenditures by category. To determine the direct and secondary effects, we matched the total expenditure data with the IMPLAN sectoring scheme, and entered the appropriate amounts as a final demand "shock" to the model. This generated estimates of both the direct and indirect economic effects. As appropriate, expenditures were entered either on an industry or a commodity basis. For the retail sectors, we applied IMPLAN's default household margins. Secondary effects were based on the IMPLAN Type SAM (Social Accounting Matrix) multipliers, with households endogenous.

Because IMPLAN models are quite stable from year-to-year, we applied the 2001 multipliers (the most recent year available) to the 2004 survey data to determine the results. In the remainder of this section we define multipliers and other topics related to this analysis. The material is largely drawn from the IMPLAN User's Guide. A detailed description of the IMPLAN sectoring scheme is available on the IMPLAN website.

Estimating the economic contribution of wild trout fishing using the 2004 survey and the IMPLAN model

While fishing on the state's wild trout streams is a rather specialized activity, the methods for analyzing its economic contribution or impact are analogous to many other recreation-related sectors. As such, analysts have developed a comprehensive and commonly adopted framework appropriate for estimating impacts.

For analysts using IMPLAN, the most common approach for estimating the economic impact activities such as wild trout fishing is to examine how much economic activity is generated by angler

spending. This approach consists of a two-step process. The first step is to estimate the total unique local expenditures--by category--that are supported by wild trout fishing. The second step is applying these expenditures to the IMPLAN model in order to estimate the subsequent economic activity.

The starting point of our analysis is to estimate the annual number of angler days. Using information collected by the Fish & Boat Commission, there were an estimated 80,098 angler days spent on Pennsylvania's wild trout streams in 2004 (Table 1). After determining the appropriate number of angler days, the next step in estimating the economic impact of wild trout fishing in Pennsylvania with the IMPLAN model is approximating the total expenditures by category (lodging, food, transportation (e.g., fuel) and gear and bait). This information is generated from the survey.

The next step of the process is to use the IMPLAN model to examine the impacts of these total expenditures, by category, in the state economy. To determine the direct and secondary effects, we matched the expenditure data with the IMPLAN industry-sectoring scheme, and entered the appropriate expenditure amounts as a final demand "shock" to the model. This generates estimates of both the direct and indirect economic effects.

It is important to note that, due to the structure of input-output models, all recreation-related spending does not accrue to the region as final demand. The primary problem is with retail purchases of goods. For goods that are manufactured outside of the region, only the retail margin appears as final demand for the region. The cost (producer price) to the retailer or wholesaler of the good itself leaks immediately out of the region's economy, and cannot be considered a local impact. Recognizing this, we applied IMPLAN's default household margins for the affected retail sectors (transportation and sporting goods).

Determining Unique Local Expenditures

To adequately represent the impacts of fishing on wild trout streams, it is necessary to only examine the activity uniquely supported by the industry. Careful economic impact analyses of recreation-related activities distinguish between "new" economic activity and that which would have occurred anyway. For example, if people would have fished for something else in Pennsylvania that day regardless of whether or not a wild trout stream was available, then it is fishing, rather than wild trout fishing itself, that is the source of the impact. Similarly, if wild trout fishing was not available and anglers chose instead to spend their money on other local activities, such as movie tickets, then the economic impacts generated by wild trout fishing were simply substituting for other local economic activity. In both instances the net economic effects of the activity per se would be negligible. Conversely, should wild trout fishing itself be the sole reason that substantial new monies

enter (or remain in) the state then the impact can be attributed to wild trout fishing.

Accordingly, to measure the “true” impact of wild trout fishing on the state economy we must consider only economic activity in Pennsylvania related to wild trout fishing that would otherwise not occur. To calculate this, analysts that investigate recreation and other tourism type impacts often examine the expenditures of those who travel at least 50 miles one-way in state (i.e., D.K. Shifflet’s annual study of tourism in Pennsylvania) as well as visits from out-of-state.

Estimates of the number of trips greater than 50 miles were derived from the survey information. Therefore, we used the Geographic Information System (GIS) to calculate the linear distance between the point of the interview and the geographic centroid of the respondents reported home zip code.

Total expenditures by category by angler type were derived by multiplying the average expenditure by category by type per trip (obtained from the survey) by the estimated total number of trips.

Multipliers

Input-output models are driven by final consumption (or final demand). Industries respond to meet demands directly or indirectly (by supplying goods and services to industries responding directly). Each industry that produces goods and services generates demand for other goods and services and so on, round by round. Multipliers describe these so called ripple effects. A multiplier examines how much spin off economic activity is generated by a marginal change in an industry. For example, multipliers can describe how many total jobs in the economy are created when an industry adds one new job. In general, input-output modelers describe three types of multiplier effects when examining the role of an industry in the county economy.

1. The **direct effect** is the contribution of the industry itself. It may represent the total revenue (output), employment or employee compensation. The value of the direct effect multiplier is always 1.

2. The **indirect effects** are effects of the industry on its suppliers. This multiplier captures the additional activity in businesses that provide inputs to the industry of interest.

3. The **induced effects** capture the impacts of changes in spending from households as income changes due to the direct effect. This effect captures the impact of spending by a) employees of the industry being studied, and b) employees of the input supplying businesses. These effects usually show up in retail and service industries. In the study here, the secondary effects are the sum of the indirect and induced effects.

In this study we use the IMPLAN type SAM multipliers. The Type SAM multiplier is obtained according to the following formula:

Type SAM multiplier = (direct effect + indirect effect + induced effect) ÷ direct effect

Input-output analysis is a means of examining the relationships within an economy both between businesses and between businesses and final consumers. It captures all monetary transactions for consumption in a given time period. The resulting mathematical formulae allow one to examine the effects of change in one or several economic activities on an entire economy.

Industry output is a single number in dollar for each industry. The dollars represent the value of an industry's total production. In IMPLAN, the output data are derived from a number of sources including Bureau of Census economic censuses and the Bureau of Labor Statistics employment projections. Another way to think about industry output is as the total revenue generated by an industry.

Employment is total number of wage and salary employees and self-employed jobs in a region. It includes both full-time and part-time workers and is measured in total jobs. The data sets used to derive employment totals in the IMPLAN model are the ES-202 data, County Business Patterns, and the Regional Economic Information System (REIS) data.

While output captures the total dollar value of economic activity, its use as a measure of economic activity can be over counted in that it captures the value of all intermediate stages of the production process as well. For example, the price one pays for a car at the local auto dealership in large part represents economic activity that occurred in the production process. If one were to consider the price one paid for a car as the contribution to the local economy, then one would likely be overstating its impact. This is called double counting. To avoid double counting, economists usually examine economic contributions in terms of Value Added. At the local level, value added is equivalent to the concept of Gross Domestic Product in that it examines the unique contribution of an industry to the overall economy. In input-output analysis, value added consists of four components.

1. **Employee compensation** is wage and salary payments as well as benefits including health and life insurance, retirement payment, and any other non-cash compensation. It includes all income to workers paid by employers.

2. **Proprietary income** consists of payments received by self-employed individuals as income. This is income recorded on Federal Tax Form 1040C. This includes income received by private business owners, doctors, lawyers and so forth. Any income a person receives for payment of self-employed work is counted here. Note:

labor income is the sum of employee compensation and proprietary income.

3. **Other property type income** consists of payments for interest, rent, royalties, dividends and profits. This includes payments to individuals in the form of rents received on property, royalties from contracts, and dividends paid by corporations. This also includes corporate profits earned by corporations.

4. **Indirect business taxes** consist primarily of excise and sales taxes paid by the individual to businesses. These taxes occur during the normal operation of these businesses but do not include taxes on income or profit.

Results

Use and Harvest

Creel clerks surveyed 100 large stream subsections on weekdays and 101 subsections on weekends, and for small stream subsections they surveyed 101 subsections on weekdays and 103 subsections on weekends. A total of 405 anglers were counted on the survey waters over the course of the season. Creel clerks interviewed a total of 173 anglers (anglers that fished $\geq$ 0.5 hr) on large streams and 41 anglers on small streams to collect angler catch, harvest and release data. Twenty-three of the 173 interviewed anglers on large streams were fishing on streams closed to harvest; thus, these 23 anglers were excluded when calculating harvest rates. Among all anglers who were interviewed, 85 anglers had completed their fishing trip.

We found no differences in length of time spent fishing among size of stream or day of week strata; hence, an average length of time fishing per trip was calculated ($\bar{t}$). The average time spent fishing per trip was 2.84 hours (SE = 0.255, 95% CI = 2.4 – 3.4). Therefore, a mean trip length of 2.84 hrs and total fishing effort of 227,290 angler hours was used to compute the number of angling trips (Table 1). Overall, an estimated total of 80,098 trips occurred on wild trout waters over the course of the survey period. Large streams accounted for 57% of the total angler trips (46,028 angler trips) and small streams accounted for 43% of the trips (34,070 angler trips).

Average daily angler effort was greater on weekends than on weekdays, and it was greater on large streams ($\geq$ 6 meters in width) than on small streams (< 6 meters in width). Total fishing pressure during the entire season was low, ranging from 12-15 angler hours/kilometer (19-24 angler hours/mile) on small streams to 62-86 angler hours/kilometer (100-138 angler hours/mile) on large streams (Table 2).

This study was not designed to estimate angler effort by month. However, an estimate of angler hours by month is provided without any

measure of statistical precision (Table 3). These results provide a reasonable index of relative angling effort among months. Months were divided into April (April 17-30), May, June, July, and August (August 1– September 3). An estimated 37.2% of the angler effort occurred in April (84,552 angler hours), 26.3% occurred in May (59,777 angler hours), 16.5% occurred in June (37,503 angler hours), 16.1% occurred in July (36,594 angler hours), and 3.9% occurred in August (8,864 angler hours).

Anglers fishing on large streams had a mean catch rate of 1.16 trout/hour. By species, catch rates on large streams were 0.56/hour for brown trout, 0.51/hour for brook trout and 0.09/hour for rainbow trout. Anglers fishing small streams had a mean catch rate of 1.98 trout/hour, or about 70% higher than the catch rate on large streams. On small streams, catch rates by species were recorded at 1.76/hour for brook trout, 0.13/hour for brown trout and 0.09/hour for rainbow trout (Table 4).

By combining catch rate and fishing pressure estimates, the total numbers of trout caught, released and harvested were computed. An estimated total of 343,240 trout were caught from all streams. The total catch estimate included streams where harvest was allowed and where catch-and-release regulations applied. The estimated total catch was composed of 69% brook trout (236,461 trout), 25% brown trout (86,115 trout) and 6% rainbow trout (20,664 trout). An estimated total of 318,347 trout were released. By species, an estimated 217,165 brook trout, 82,958 brown trout and 18,224 rainbow trout were released. Approximately 93% of trout caught were subsequently released on large streams. The release rate was similar on small streams, 92%. An estimated total of 24,894 trout were harvested from all documented wild trout streams. The harvest estimate was composed of 19,297 brook trout, 3,157 brown trout and 2,440 rainbow trout (Table 5).

Harvest on a per length of stream basis was only 7/km. This value was calculated only for streams where harvest was legal (Table 6). Therefore, exploitation rates for all wild trout streams combined would be even lower.

Angler Success

A total of 252 angler interviews, including 85 completed angler trip interviews were recorded during the survey period. Angler success (based on all trips for both harvested and released trout) revealed that 44% of the anglers had not caught a trout at the time they were interviewed. Anglers had caught two trout or less at the time they were interviewed on 71.5% of the trips and anglers had caught five trout or more at the time they were interviewed on 16% of the trips (Table 7). Angler success (based on all trips for harvested trout) indicated that anglers had not harvested a trout at the time they were interviewed on 91% of the trips. Anglers harvested two trout or less at the time they were interviewed on 97% of the trips

and anglers harvested the creel limit of five (5) trout per day at the time they were interviewed on 1% of their trips (Table 8).

Angler success (based on completed trips for both harvested and released trout) indicated that anglers did not catch a trout on 41% of the angler trips. Anglers caught two trout or less on 62% of the trips and anglers caught five trout or more on 26% of the trips (Table 9). Upon examining completed trips based only on harvested trout, anglers did not harvest a trout on 88% of the angler trips, anglers harvested one trout or less on 96% of the trips and anglers harvested the creel limit of five (5) trout on 4% of the trips made to wild trout waters (Table 10).

Trout Population Abundance

Electrofishing surveys to assess trout population abundance on a total of 76 stream sections were conducted between June 9 and October 13, 2004. Most of the stream sections (71 of the 76 sections) were sampled within the time frame between June 15 and August 31, 2004 (Table 11).

The results of these examinations revealed that the sample waters supported an average of 137 legal size wild trout ($\geq$ 175 mm) per kilometer of stream. This translated into a total of 221 legal size wild trout per mile of stream. By species, there was an average of 47 legal size wild brook trout per kilometer (76/mile) of stream, 88 legal size wild brown trout per kilometer (142/mile) and two legal size wild rainbow trout per kilometer (3/mile) of stream (Table 12).

Angler Demographic Information

Based on the information from the 252 angler interviews, 90.1% of the anglers were licensed anglers over 16 years of age, and 9.9% of the anglers were less than 16 years of age (Table 13). In regards to angler interviews by gender, 93.7% of the anglers interviewed were males and 6.3% were female anglers (Table 14).

Tackle Preference

With respect to terminal tackle preference, 42.5% of the interviewed anglers used bait, 36.1% used flies, 15.1% used artificial lures and 6.3% used some combination of tackle types (Figure 1). Of 107 anglers that used some form of bait, 45.8% used red worms or night crawlers, 16.8% used minnows 13.1% used wax worms or mealworms and the remaining 24.3% used a variety of different types of bait (Table 15).

Angler Trip and Fishing Tendency Responses

Initially, anglers were asked how often they harvested legal size trout when fishing on the stream where they were being interviewed. Nearly 51% of the 252 respondents reported that they never harvest trout on this stream, 31.7% reported that they rarely harvest trout on this stream, 10.7% responded that they harvest legal size trout about half of the time when fishing this water and 6.8% reported that they always or almost always harvest legal size trout when fishing on this water (Table 16).

Anglers were reminded that the stream where they were fishing was not stocked with trout and were asked if they also fished on waters that were stocked with trout in Pennsylvania. Overall, 82.9% of the 252 interviewed anglers reported that they also fished on stocked trout waters in Pennsylvania. A total of 15.9% of the anglers indicated that they did not fish waters that were stocked with trout in Pennsylvania (Table 17).

Anglers were asked how many days that they would be fishing during this trip. Responses ranged from one to nine days. A total of 66.7% of the 252 interviewed anglers reported that they were making a day trip and 20.6% of the respondents were fishing for two days on their trip. Responses ranged from three to nine day fishing trips for the remaining 12.7% of the anglers (Table 18).

Anglers were asked what they would have done on this day if they could not fish for trout. Overall, 27.4% of the 186 respondents said that they would have fished for some other species of fish and 72.6% of the respondents claimed that they would have done something else aside from fishing (Table 19).

Finally, anglers were asked how many times a year they go trout fishing in Pennsylvania. Responses ranged from zero to over 100 trips per year. Overall, 16% of the 237 respondents claimed to make between one and ten trout fishing trips per year, 23.2% reported that they make between 11 and 25 trout fishing trips per year, 24.9% claimed to make between 26 and 50 trout angling trips per year and 28.7% of the respondents reported that they make over 50 trout angling trips in Pennsylvania per year. A total of 7.2% of the respondents claimed that they don’t make any trout angling trips in Pennsylvania per year even though they were being interviewed while fishing on a trout stream (Table 20).

Average Length of Trout Harvested

The creel clerks observed a total of 50 trout that had been harvested prior to an interview during the survey period. These included 28 brook trout, 15 brown trout and seven rainbow trout. Harvested brook trout ranged from 6.5 to 10.25 inches in length and averaged 8.4 inches. The brown trout harvested ranged from 8.0 to 18.0 inches in length and averaged 11.8 inches. Rainbow trout

harvested ranged from 8.0 to 13.0 inches in length and averaged 10.4 inches (Figure 2).

Economic Benefit Analysis

In 2004, anglers spent more than 80,000 angler days fishing on wild trout streams in Pennsylvania. While providing important recreational benefits, wild trout fishing also provides important economic benefits to the Commonwealth. Results from this survey show that anglers spend millions of dollars annually on a variety of goods and services, including gear and bait, lodging, food, and associated travel expenses. This spending creates jobs and income in the economy, both directly through fishing party expenditures and indirectly through ripple effects.

In this section, we quantify the economic contribution and impacts of wild trout fishing in Pennsylvania. We discuss the direct economic effect of wild trout fishing on the state economy, focusing on how angler expenditures translate into output (or sales), employment, payroll and value-added. Recognizing that wild trout fishing has impacts beyond those of the anglers, we then report the results from an economic impact model used to examine wild trout fishing's secondary contributions to the state's economy, quantifying the ripple (or multiplier) effects of business and employee spending.

In this section we use information from a stream intercept survey to describe the contribution and impact of Pennsylvania's wild trout streams on the state economy. Given that there are several ways of describing the economic effects, we conduct our analysis at two separate levels. In our first scenario we provide an estimate of the total contribution of wild trout stream fishing to the Pennsylvania economy. This accounts for all spending related to Pennsylvania wild trout stream angling.

However, as we noted above, proper economic impact analysis requires considering only the economic activity that would otherwise not have occurred. Limiting ourselves to the number of anglers according to the above criteria, we estimate that about 28 percent of all angler days were attributed to those who traveled more than 50 miles who would otherwise not fish. This accounts for 22,797 angler days, a figure that serves as the basis of our second scenario.

Scenario 1. The estimated economic contribution of wild trout stream angling in Pennsylvania

In the first scenario we describe the activity's economic contribution. This captures the effects of all spending related to wild trout fishing in Pennsylvania. This is the broadest measure possible, as it does not take into account the notion that money spent on fishing is, in many cases, money that could have been spent on other activities in Pennsylvania. Because of this, the contribution

estimate should not be considered the economic impact. As we describe below, economic impacts account for the unique economic effects that likely would not have otherwise occurred.

In our study we surveyed more than 250 anglers on Pennsylvania's wild trout streams. In Table 21 we present the average daily Pennsylvania expenditures related to wild trout stream fishing for the study period. On average, these anglers spent about $45 per day on trip-related expenses. These averages include $6.50 on lodging, $18.61 on travel, $14.55 on food and $5.33 on bait and gear. Based on these per trip expenditures and an estimate of 80,098 angler days, we estimate 2004 wild trout fishing expenditures in Pennsylvania totaled about $3.604 million. Accounting for retail margins, the related expenditures in Pennsylvania are estimated at $2.839 million.

We report the results of our economic contribution analysis in Table 22. Here, wild trout stream angling generates a direct output effect (accounting for retail margins) of $2.839 million. Based on the IMPLAN model, this translates into 59 jobs, with an annual total compensation for these workers of $1.176 million per year ($19,797 per worker). In addition, our analysis suggests wild trout fishing directly generates about $1.548 million of value-added activity.

Secondary effects are the spin-off or ripple effects. For example, anglers purchase a variety of inputs and services; and the businesses that produce these goods and services also need labor. Accordingly, the secondary effects also capture the impact of spending by employees of the angler-related business as well as supporting industries. Using IMPLAN, we estimate that these effects result in nearly $4.322 million in additional output, of which about $2.612 million is value-added. This translates into 46 additional jobs in the state economy, and more than $1.698 million in employee compensation.

In terms of multipliers, the employment multiplier is 1.78, suggesting that for every job in a wild trout-related business; an additional 0.78 jobs are supported in the state economy. The labor income multiplier is $2.44, suggesting an additional dollar in employee compensation in wild trout-based recreation wages supports $1.44 of wages and benefits in other state businesses. Similar interpretations can be given to the output multiplier ($2.52) and value-added multiplier ($2.69). [2]

Overall, the direct and secondary contributions of wild trout fishing are estimated at nearly $7.2 million in output, of which nearly $4.2 million is value added. Of the value added, slightly more

[2] Economic multipliers are used to translate the direct impact into the total impact; multiplying the direct impact by the multiplier gives an estimate of the additional economic activity generated by a change in output. To derive the multiplier, simply divide the total impact (direct plus secondary) by the direct impact.

than $2.8 million is employee compensation. From an employment standpoint this translates into 105 jobs.

Scenario 2. The estimated Pennsylvania economic impact of wild trout stream angling

In this scenario we describe the economic impact of wild trout stream fishing in Pennsylvania. An impact differs from a contribution in that it attempts to quantify economic activity that would otherwise have not occurred; while contribution analysis considers all spending related to the activity, impact analysis accounts for the fact that some spending on trout angling might simply substitute for other activities. For example, when people fish locally, the money that they spend on bait and gear might just as well be spent on movie tickets. Here we simply see a substitution of fishing for movie going, with more jobs at the bait shop resulting in fewer jobs at the movie theatre. Accordingly, impact analysis accounts for the unique economic contribution of the activity.

To account for this, analysts that investigate recreation and other tourism-type impacts often examine the expenditures of those who travel at least 50 miles one-way in state (e.g., D.K. Shifflet's annual study of tourism in Pennsylvania), or visit from out-of-state. In this study we use GIS to determine the linear distance between the "longitude-latitude" of the spot on the stream where the survey was conducted and the centroid of the angler's reported zip code of residence.

After limiting the analysis to anglers traveling more than 100 miles round-trip, an accurate portrait still requires that we consider trips that are uniquely devoted to wild trout fishing. Here, we want to remove from our analysis expenditures by anyone who would have "fished for something else" that day, had they not been wild trout fishing.

In Table 23 we present the average daily expenditures for the subset of anglers that are the source of the economic impact. Here, this includes Pennsylvania residents who traveled more than 50 miles one way, and all out-of-state residents capturing about 28 percent of all wild trout stream fishing days. To estimate total expenditures, the per trip expenditure profiles are multiplied by the total number of trips (22,797). This yields a total unique expenditure of about $1.298 million. After applying retail margins, the output impact is about $1.039 million.

We report the results of our economic impact analysis in Table 24. Here, wild trout angling generates a direct effect (accounting for retail margins) of $1,039,667. Based on the IMPLAN model, this translates into 22 jobs, with an annual total compensation for these workers of $433,049 per year ($20,049 per worker). In addition, our analysis suggests wild trout fishing directly generates $575,137 of value-added activity.

Using IMPLAN, we estimate that the secondary effects result in more than $1.57 million in additional output, of which about $951,000 is value-added. This translates into 17 additional jobs in the state economy, and nearly $618,000 in employee compensation.

In terms of multipliers, the employment multiplier is 1.78, suggesting that for every job in a wild trout-related business; an additional 0.78 jobs are supported in the state economy. The labor income multiplier is $2.43, suggesting an additional dollar in employee compensation in wild trout-based recreation wages supports $1.43 of wages and benefits in other state businesses. Similar interpretations can be given to the output multiplier ($2.52) and value-added multiplier ($2.65).

Overall, the direct and secondary impact of wild trout fishing are estimated at more than $2.615 million in output, of which more than $1.526 million is value-added. Of the value-added, nearly $1.051 million is employee compensation. From an employment standpoint, this translates into 38 jobs.

Discussion

Angler Use

Over the course of the survey period angler use on large streams (239 hrs/mile) was much greater than that on small streams (44 hrs/mile). Total angler effort averaged 82 hours/mile for all wild trout streams combined in 2004 (Figure 3). Overall, the differences in use between the larger and smaller wild trout streams was not surprising, as the larger streams tend to represent many of the more popular wild trout streams in Pennsylvania. Interestingly, the approximate five to one difference in use between the large and small streams was very similar to the figures staff provided based on data collected from previous wild trout stream use and harvest surveys.

Overall, angler use observed on wild trout waters was light in comparison with the use levels previously observed on stocked trout streams. Based on information collected from 1988 through 1991, angler use on stocked trout waters averaged 1,480 angler hours/mile over relatively short 18 day sample periods in the spring (Figure 3). Had the surveys on stocked trout streams been carried out over a longer duration as on the wild trout stream surveys, the discrepancy in angler use between stocked and wild trout streams would have been even more pronounced.

By month, estimated angler use on wild trout streams was greatest during April and steadily declined through May and June. Estimated angler use in July was very similar to the use observed during June. However, angler use sharply declined during August. Based on angler count information, a total of 405 anglers were counted on the study waters over the course of the survey period. When this information was partitioned into two-week intervals, the highest number of anglers

recorded during a two-week period occurred during the last two weeks of April. Counts did not steadily decline between two-week intervals for each month, as there was some variability in the counts by two-week intervals in May and June. During both months the total number of anglers counted in the later two-week intervals exceeded the number counted in the two-week interval early in the month (Table 25). This may have been influenced more by weather patterns and stream conditions during these periods, as precipitation was above average and stream flows were higher than normal for most waters in the Commonwealth during the 2004 season. Nonetheless, the general pattern of angler use on wild trout waters for the 2004 season could be characterized as peaking in the spring (April and May) leveling off during mid summer (June and July) and sharply declining by late summer (August and early September).

Angler Catch, Harvest, and Release Rates

Catch rates for all trout species combined on wild trout streams were exceptional and exceeded 1.0 trout/hour on both large streams (1.16/hr) and small streams (1.98/hr). Based on these catch rates, an angler would catch one trout for every half hour spent fishing on a small stream and one trout for every 52 minutes fished on a large stream. Release rates were high and also exceeded 1.0 trout/hour on both large (1.09/hr) and small streams (1.82/hr). Conversely, harvest rates were very low on both large streams (0.07/hr) and small streams (0.16/hr). As evidenced by the high release rates and low harvest rates recorded on wild trout streams, anglers were inclined to harvest only a very small portion of their catch from wild trout streams. Based on these harvest rates, one trout was harvested on a small stream for every 6.25 hours fished and one trout was harvested on a large stream for every 14.5 hours spent fishing.

By species, catch rates for brook trout ranged from 0.51/hr on large streams to 1.76/hr on small streams (Figure 4). The goal for high quality streams that are managed for wild trout or a combination of wild and hatchery trout in New York is to provide a catch rate of at least 0.50/hr (Engstrom-Heg, 1990). Therefore, in comparison with these guidelines, catch rates for brook trout were good on large streams and were very good on small streams. The high catch rates for brook trout on small streams coincides with the fact that brook trout tend to be the primary trout species that reside in small coldwater streams in Pennsylvania. Based on the results from this survey, anglers released the majority of the brook trout caught on both large and small streams. Harvest rates for brook trout were low and ranged from 0.03/hr on large streams to 0.16/hr on small streams. Based on these harvest rates, one brook trout was harvested for every 33.3 hours fished on a large stream and one brook trout was harvested for every 6.25 hours fished on a small stream.

Brown trout catch rates ranged from 0.13/hr on small streams to 0.56/hr on large streams (Figure 4). The fact that catch rates for brown trout were much better on larger streams was not surprising, as

brown trout tend to be more common on larger coldwater streams in Pennsylvania. Interviewed anglers released the majority of the brown trout caught on large streams and all of the brown trout they caught on small streams. The harvest rate for brown trout on large streams was very low 0.02/hr. Based on this harvest rate, one brown trout was harvested for every 50 hours fished on a large stream.

Rainbow trout catch rates were low at 0.09/hr on both large and small streams (Figure 4). The fact that catch rates for this species were low was not surprising as reproducing rainbow trout populations are not widely distributed across the Commonwealth. Again, interviewed anglers released the majority of the rainbow trout caught on large streams and all of the rainbow trout they caught on small streams. The harvest rate for rainbow trout on large streams was very low 0.02/hr. Based on this harvest rate, one rainbow trout was harvested for every 50 hours fished on a large stream.

Although catch rates were considered very good for brook trout on small streams and good for both brook and brown trout on large streams, anglers released a significant portion of their catch on wild trout streams. Based on the low harvest rates observed during this study, anglers did not place a great deal of emphasis on harvesting trout when fishing on wild trout streams in Pennsylvania during the 2004 season.

Over the course of the survey period, anglers caught an estimated average of 124 trout/mile from all streams. Anglers harvested an average of nine trout per mile or only about 7.3% of their catch (Figure 5). By species, anglers harvested an average of seven brook trout/mile, one brown trout/mile and one rainbow trout/mile (Figure 6).

By stream size, angler catch/mile was greater on large streams (278 trout /mile) than on small streams (86 trout/mile). Anglers harvested an average of 18 trout per mile on large streams (Figure 5). This translated into an average of eight brook trout/mile, six brown trout/mile and four rainbow trout/mile. On small streams anglers harvested an average of seven trout/mile all of which were brook trout (Figure 6). These results coincide with the fact that brook trout are the primary trout species present in small streams while brown trout are more common on larger waters. Interestingly, the percentage of the catch harvested was similar on both groups of waters, as anglers harvested 6.5% of their catch on large streams and 8.1% of their catch on small streams. Again, the results of this survey indicate that exploitation rates on Pennsylvania wild trout streams were low.

Upon further review of the harvest records, it was apparent that some of the trout harvested within the study segments were of hatchery origin. From the 28 harvested brook trout examined by creel clerks, a total of 17 were harvested from stream sections where brook trout stocking occurred within adjacent sections. At least seven of these 28 brook trout (25%) appeared to be of hatchery origin. For example,

five of the brook trout harvested from Mehoopany Creek, Section 02 (subsection F), and Beaverdam Run, Section 01, ranged between 9 and 10.25 inches in length. These fish exceeded the size range of any wild brook trout captured within these stream sections during previous stream examination inventories. In addition, two brook trout were harvested from stream sections where brook trout reproduction had not been observed during previous stream inventory examinations. The seven harvested rainbow trout observed during the survey all appeared to be of hatchery origin. These trout were harvested from stream sections where either rainbow trout stocking occurred in adjacent stream sections or where a trout hatchery was located along the section of stream. Furthermore, rainbow trout reproduction had not been documented during previous inventories on any of these stream sections. From the 15 harvested brown trout observed during the survey, a total of 10 were harvested from stream sections where either brown trout stocking occurred in an adjacent stream section or where a trout hatchery was located along the section of stream. No further determination could be made on the origin (wild or stocked) of the brown trout. As based on previous inventory information, these fish were harvested from stream sections that supported wild brown trout within the size range captured during stream examinations on these waters.

Based on this information, hatchery trout contributed to the harvest, catch, and release estimates recorded for this survey. For example, the harvest estimate for rainbow trout was entirely based on the presence of hatchery trout, and at least 25% of the brook trout harvest appeared to be composed of hatchery trout. Furthermore, it appeared that at least a small portion of the brown trout harvest could have been composed of hatchery trout.

Trout Population Abundance

Based on the results recorded from stream examinations to assess trout population abundance within 76 stream sections in 2004, the sample waters supported an average of 221 legal size ($\geq$ 7 inches) wild trout per mile of stream. By species, this translated into 76 legal size wild brook trout, 142 legal size wild brown trout and 3 legal size wild rainbow trout available per mile of stream. In comparison with the associated harvest rates of 7 brook trout/mile, 1 brown trout /mile and 1 rainbow trout/mile, angler harvest was very low. Overall, anglers harvested less than 10% of the legal size brook trout, and less than 1% of the legal size brown trout (Figure 7). However, as pointed out in the previous paragraph, the harvest estimates were influenced by the presence of hatchery trout. Therefore, it should be noted that if the harvest estimates were based solely on wild trout, these estimates would have been lower than reported above.

From this information, exploitation rates can be calculated by dividing the total season harvest by the pre-season trout population. The pre-season trout population would be assumed to be the estimated harvest of brook and brown trout observed during the season plus the

late summer population estimate for legal size (≥ 7 inches) trout (Vermont Department of Fish & Wildlife, 2000). Based on this calculation the exploitation rate for legal size brook trout would be 8.4% and the exploitation rate for legal size brown trout would be 0.7%. Thorn (1990) concluded that the rate of exploitation of the preseason population should exceed 50% before a special regulation is imposed. Therefore, based on the low exploitation rates observed during this study, special regulations would not be expected to have an impact on most Pennsylvania wild trout populations.

Tackle Use

The primary tackle type used by the 252 anglers interviewed during the survey was bait, followed by flies and artificial lures. By stream size a total of 44 anglers were interviewed on small streams. On these streams the majority of the anglers used bait (70.4%), followed by artificial lures (11.4%), flies (9.1%) and anglers that used a combination of tackle types (9.1%). A total of 208 anglers were interviewed on large streams. Overall, there was more of a balance in tackle use by anglers on large streams, as 41.8% of these anglers used flies, 36.5% used bait, 15.9% fished with artificial lures and 5.8% used a combination of tackle (Table 26). The disparity in tackle use by stream size may be due in part to differences in the habitat and cover along the riparian corridor of these streams. Typically, the stream corridor along small coldwater streams in Pennsylvania is often lined with trees and shrubs. These conditions can provide excellent cover for trout but can also present rather tight spots for casting. Therefore, small streams may present conditions that are generally more conducive to the use of bait. Conversely, larger streams tend to provide more open space for angling. Consequently, these streams may be more conducive to the use of a wider variety of tackle. Tackle choice could also be influenced by tackle restrictions that were in place on 11 of the larger stream sections managed under special regulations.

In addition to the 50 trout that were harvested by interviewed anglers, anglers also reported to have released 748 trout over the survey period. Based on this catch information, fly anglers caught a total of 222 trout (27.8%), anglers fishing with artificial lures caught 142 trout (17.8%), bait anglers caught 375 trout (47%) and anglers using a combination of lures and bait caught 59 trout (7.4%). These results are similar to the recorded percentage of tackle use by anglers. In terms of angler harvest by tackle type, fly anglers harvested one trout or 0.5% of their catch, artificial lures anglers harvested a total of six trout or 4.2% of their catch, bait anglers harvested 43 trout or 11.5% of their catch and anglers using a combination of lures and bait did not harvest a trout. Based on these results, regardless of tackle type, anglers released the majority of their catch from wild trout streams in 2004 (Table 27).

Angler Tendencies

A number of interesting tendencies were noted from the angler interview information collected during the survey. For example, the majority of the anglers interviewed during this survey were male anglers (93.7%). This was similar to the results from previous surveys conducted on wild trout waters in Pennsylvania (Weber and Greene 1995; 2005 and Greene and Weber 1997; 1998). Most of the interviewed anglers (82.5%) reported that they never or rarely harvest a trout from the wild trout stream where they were fishing. This was very similar to the angler success information based on completed trips, where 88% of the anglers did not harvest a trout. The majority of the angler trips on wild trout streams (87.3%) were short in duration (one day or two day trips). However, most of the interviewed anglers (76.8%) claimed they made eleven or more trout angling trips on Pennsylvania waters per year. Finally, most of the anglers fishing for trout on wild trout streams (82.9%) reported that they also fish for trout on stocked waters in Pennsylvania.

Economic Contribution and Economic Impact

As part of this study, information was collected to assess the economic contribution of angling on wild trout streams in Pennsylvania. Overall, the direct and secondary contributions of wild trout angling in Pennsylvania were estimated at more than $7.16 million in output, of which nearly $4.16 million was value-added. Of the value-added, over $2.87 million was employee compensation. From an employment standpoint, this translated into a total of 105 jobs in the Commonwealth. The economic impact of wild trout angler use, i.e., the contribution that was uniquely due to wild trout fishing but that would not have otherwise contributed to the state’s economy, was $2.615 million, of which $1.526 million was value added. Of the value added, $1.051 million was employee contribution. This translated to 38 jobs.

Conclusions

1. Over the course of the season angler use was low on wild trout streams (82 hrs/mile), especially in comparison with angler use observed on trout stocked stream sections (1,480 hrs/mile) for a much shorter duration in the spring.

2. Angler catch rates for brook trout were very good (1.76/hr) on small streams and good for brook (0.51/hr) and brown trout (0.56/hr) on large streams.

3. Approximately 88% of the anglers did not harvest a trout during their trip to a wild trout stream. Anglers released over 92.7% of the trout caught and harvested less than 7.3% of the trout caught on wild trout streams.

4. Anglers harvested a very small number (9/mile) of the legal size trout available on wild trout streams (217/mile).

5. Hatchery trout that moved into wild trout waters from adjacent stocked sections contributed to the harvest, catch, and release estimates on wild trout waters.

6. Data collected from this survey suggest that angler exploitation rates on wild trout streams were low.

7. In terms of tackle preference, bait anglers composed the largest group of anglers on wild trout streams, followed by fly and lure anglers.

8. In 2004, wild trout stream angling contributed approximately 7.161 million dollars to the Pennsylvania economy. The economic impact of wild trout angling i.e., the contribution that was uniquely the result of wild trout angling, and that would not have otherwise contributed to the state's economy by way of other recreational alternatives, was $2.615 million.

9. Peak use of Pennsylvania wild trout waters occurred during April.

10. Most wild trout anglers (59%) caught at least one trout during their trip. However, only 12% of the wild trout anglers actually harvested a trout during their trip.

11. The vast majority of wild trout stream anglers (82.9%) reported that they also fish for trout on stocked waters.

12. Most wild trout anglers were adult males.

13. Based on the low amount of harvest observed during this survey there does not appear to be a need for the more widespread use of special regulations or more conservative statewide regulations to adequately protect wild trout populations from overexploitation.

Management Recommendations

1. The PFBC should continue to identify and designate appropriate stream sections for wild trout management.

2. The PFBC should continue to protect this resource by seeking the highest Chapter 93 water quality protection standards applicable.

3. Some marketing should occur to make the public more aware of the angling opportunities that are available on Pennsylvania wild trout streams.

4. On a broad basis, the study suggests that special regulations will have little or no impact on most wild trout populations in Pennsylvania. However, it may be appropriate to use special regulations on an individual water basis where much higher rates than the average statewide rates of angler use and exploitation could exist.

5. This study evaluated wild trout streams selected randomly from all wild trout streams in Pennsylvania. It would be prudent to conduct a future study on the known most popular wild trout fisheries, (e.g. Spring Creek and Penns Creek, Centre County; Fishing Creek in Clinton County) to see if these fisheries may experience higher use rates and higher contributions to the state’s economy than determined from a random survey.

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Table 1. Angler effort by stream size on wild trout streams in Pennsylvania, 2004.

				Daily Total		Seasonal Totals			
				Angler-hrs/day/100 km		Angler-hrs/km		Angler hours	
Streams	n[a]	Trips	Trips/km	$\bar{x}$	95% CI	$\bar{x}$	95% CI	$\hat{A}$	95% CI
≥6 m	200	46,028	52	106	79 – 142	148	110 – 199	130,610	97,257 – 175,399
<6 m	204	34,070	10	19	10 - 37	27	14 – 52	96,680	50,827 – 183,900
All	404	80,098	18	37	26 - 51	51	37 – 71	227,290	164,215 – 314,592

[a] No. stream subsections surveyed

Table 2. Angler effort by stream size and day of week on wild trout streams in Pennsylvania, 2004.

			Daily Total		Seasonal Totals			
			Angler-hrs/day/100 km		Angler-hrs/km		Angler hours	
Streams	Day of week	n[a]	$\bar{x}$	95% CI	$\bar{x}$	95% CI	$\hat{A}$	95% CI
≥6 m	Weekday	100	88	60 – 129	86	59 – 127	76,092	51,935 – 111,485
≥6 m	Weekend	101	147	93 – 233	62	39 – 98	54,518	34,506 – 86,135
<6 m	Weekday	101	16	6 – 39	15	6 – 39	55,158	21,936 – 138,699
<6 m	Weekend	103	28	12 – 61	12	5 - 26	41,522	18,750 – 91,949

[a] No. stream subsections surveyed

Table 3. Estimated total angler hours by month on Pennsylvania wild trout streams from April 17 through September 3, 2004.

Month	Angler Hours	Percent
April 17-30	84,552	37.2
May	59,777	26.3
June	37,503	16.5
July	36,594	16.1
August 1 – September 3	8,864	3.9
	227,290	100

Table 4. Number of fish caught, harvested, and released per hour (*n* = 173) for large (≥6 m wide) and small (<6 m wide) streams classified as wild trout streams, Pennsylvania, 2004.

	Streams >6 m wide			Streams <6 m wide		
Species	No./hr	SE	95% CI	No./hr	SE	95% CI
Brook trout						
Catch	0.507	0.1110	0.332 – 0.775	1.761	0.3097	1.251 – 2.479
Release	0.475	0.1091	0.305 – 0.741	1.605	0.3189	1.091 – 2.361
Harvest	0.032	0.0164	0.012 – 0.082	0.156	0.0723	0.065 – 0.372
Brown trout						
Catch	0.562	0.0992	0.009 – 0.063	0.131	0.0702	0.049 – 0.351
Release	0.539	0.0989	0.377 – 0.770	0.131	0.0702	0.049 – 0.351
Harvest	0.023	0.0127	0.399 – 0.792	0.000		
Rainbow trout						
Catch	0.094	0.0317	0.049 – 0.179	0.087	0.0515	0.030 – 0.255
Release	0.076	0.0282	0.038 – 0.154	0.087	0.0515	0.030 – 0.255
Harvest	0.018	0.0112	0.006 – 0.055	0.000		

Table 5. Number of fish caught, released and harvested, for brook, brown, and rainbow trout on large and small wild trout streams in Pennsylvania, 2004.

	Catch		Release		Harvest	
Streams	No./fish	95% CI	No./fish	95% CI	No./fish	95% CI
Brook trout						
≥6 m	66,236	39,528 – 110,991	61,898	36,291 – 105,573	4,339	1,475 – 12,760
<6 m	170,225	82,180 – 352,598	155,267	73,373 – 328,566	14,958	5,043 – 44,367
All	236,461	136,243 –410,400	217,165	123,380 – 382,238	19,297	7,850 – 47,434
Brown trout						
≥6 m	73,415	46,712 – 115,385	70,258	44,221 – 111,626	3,157	1,015 – 9,823
<6 m	12,700	3,926 – 41,090	12,700	3,926 – 41,090	0	
All	86,115	56,066 – 132,272	82,958	53,520 – 128,590	3,157	1,015 – 9,823
Rainbow trout						
≥6 m	12,271	6,046 - 24,905	9,831	4,554 - 21,223	2,440	692 – 8207
<6 m	8,393	2,397 - 29,386	8,393	2,397 - 29,386	0	
All	20,664	6,042 - 70,673	18,224	8,648 - 38,402	2,440	692 – 8207

Table 6. Number of fish caught per kilometer, released per kilometer and harvested per kilometer, for brook, brown, and rainbow trout on large and small wild trout streams in Pennsylvania, 2004.

Streams	Catch		Release		Harvest	
	No. fish/km	95% CI	No. fish/km	95% CI	No. fish/km	95% CI
Brook trout						
≥6 m	75	45 – 126	71	41 – 120	5	2 – 13
<6 m	48	23 – 99	43	21 – 92	4	1 – 12
All	53	21 – 137	49	18 – 130	5	1 – 18
Brown trout						
≥6 m	83	53 – 131	80	50 – 127	3	2 – 10
<6 m	4	1 – 12	4	1 – 12	0	
All	19	4 - 101	19	3 – 99	1	0 – 13
Rainbow trout						
≥6 m	14	7 – 28	11	5 – 24	3	1 – 9
<6 m	2	1 – 8	2	1 – 8	0	
All	5	1 – 16	4	1 – 26	1	1 – 9

Table 7. Angler Success – All Trips (Number of trout caught).

# Caught	# Anglers	%
0	111	44
1	39	15.5
2	30	12
3	21	8.5
4	10	4
>5	41	16
Total	252	100

Table 8. Angler Success – All Trips (Number of trout harvested).

# Harvested	# Anglers	%
0	229	91
1	11	4
2	5	2
3	2	1
4	2	1
5	3	1
Total	252	100

Table 9. Angler Success – Completed Trips (Number of trout caught).

# Caught	# Anglers	%
0	35	41
1	11	13
2	7	8
3	6	7
4	4	5
>5	22	26
Total	85	100

Table 10. Angler Success – Completed Trips (Number of trout harvested).

# Harvested	# Anglers	%
0	75	88
1	7	8
2	0	0
3	0	0
4	0	0
5	3	4
Total	85	100

Table 11. Number of Legal Size Wild Trout (≥ 175 mm) per Kilometer and per Mile of Stream Based on 2004 Electrofishing Surveys

Water Name	Lat/Lon	Section	Kilometers	Miles	SSB	All Wild Trout ≥ 175mm/Km	All Wild Trout ≥ 175 mm/Mi	Brook Trt ≥ 175 mm/Km	Brook Trt ≥ 175 mm/Mi	Brown Trt ≥ 175 mm/Km	Brown Trt ≥ 175 mm/Mi	Rainbow Trt ≥ 175 mm/Km	Rainbow Trt ≥ 175 mm/Mi	Survey Date
						-	-	-	-	-	-	-	-	
Allegheny Portage	414820781651	2	3.06	1.9	16C	146	236	32	52	114	184			8/9/2004
Barney Rn	411828774917	1	7.5	4.66	9B	77	124	77	124					7/21/2004
Beaverdam Rn	400710784749	1	6.2	3.85	18E	28	45	24	39	4	6			7/13/2004
Benner Rn	405723780224	1	3.2	1.99	8D	16	26	14	23	2	3			10/1/2004
Birch Rn	413327775659	1	8.5	5.28	8A	189	304	189	304					8/20/2004
Camp Rn	400552791944	1	6.6	4.1	19E	40	64	40	64					7/15/2004
Cherry Rn	405037772110	2	4.3	2.67	6A	153	246	43	69	110	177			6/28/2004
Chilson Rn	413753763227	1	2.5	1.55	4C	0	0	0	0					7/1/2004
Cooks Rn	413208781804	1	6.4	3.98	8A	43	70	37	60	6	10			8/5/2004
Crooked Ck	411718761609	1	2.9	1.8	5C	3	5	3	5					7/19/2004
Deep Hw	413857763119	1	4.67	2.9	4C	50	81	50	81					7/1/2004
Doubling Gap Ck	401124772506	1	5.2	3.23	7B	0	0	0	0					7/20/2004
Elk Ck	405140772740	5	6	3.73	6A	506	815	3	5	503	810			8/11/2004
Elk Rn	414428773441	1	1.8	1.12	9A	171	275	168	270	3	5			8/9/2004
Fork Rn	413222791553	1	4.8	2.98	16F	28	45	28	45					7/19/2004
Green Rn	411947753925	1	7.3	4.54	5A	160	258	160	258					7/26/2004
Hammersley Fk	412650775212	2	2.9	1.8	9B	13	21	7	11	6	10			8/6/2004
Heberly Rn	411934762045	1	7.8	4.85	5C	0	0	0	0					7/20/2004
Hickory Ck E	413451792423	1	11.5	7.15	16F	15	24	6	10	9	14			7/19/2004
Hickory Ck W	413338792513	1	4	2.49	16F	9	14	9	14					7/13/2004
Higgins Rn	400837785754	2	2.91	1.81	18E	64	103			64	103			6/29/2004
Honey Ck	403943773544	4	6.12	3.8	12A	887	1428			887	1428			8/16/2004
Indian Rn	413446773858	1	4	2.49	9B	17	27	17	27					8/3/2004
Jacks Ck	403500773333	3	8.2	5.1	12A	272	438			272	438			8/18/2004
Jeans Rn	405221754624	1	4.1	2.55	2B	27	43	27	43					8/5/2004
Kettle Ck	411802775020	2	12.8	7.95	9B	100	161	92	148	8	13			8/26/2004
Kistler Rn	410805752857	2	2.61	1.62	2A	68	109	68	109					6/30/2004
Laurel Rn	402025771940	1	10.8	6.71	7A	70	113	70	113	0	0			7/1/2004
Laurel Rn	411644782730	4	6.8	4.23	8A	18	29	18	29					8/9/2004

Laurel Rn	403640772028	1	8.2	5.1	12A	71	114	30	48	41	66			7/15/2004
Laurel Rn	412123784909	1	11.8	7.33	17A	13	21	13	21					7/15/2004
Laurel Rn N Br	401549772925	1	10.4	6.46	7A	37	60	37	60					7/1/2004
Laurel Run S Br	401548772925	1	6	3.73	7A	29	47	26	42	3	5			7/1/2004
Lehigh Ck Ltl	403550752657	3	2.85	1.77	2C	235	378			235	378			8/27/2004
Lewis Rn	415225783925	1	8.1	5.03	16C	97	156	0	0	97	156			7/22/2004
Lye Rn	413519764450	1	7.55	4.69	4C	10	16	10	16					8/18/2004
Lyman Rn	414209774410	2	6.2	3.85	9A	95	153	92	148	3	5			8/17/2004
Mcelhattan Ck	410851772239	1	12.4	7.7	9B	57	92	50	81	7	11			7/13/2004
Middle Ck	405346753000	2	7.9	4.91	2B	464	747	6	10	458	737			7/26/2004
Mill Bk	412313751427	1	4	2.49	1C	116	187	103	166	13	21			7/20/2004
Mill Ck	411538755214	1	8.3	5.16	5B	78	125	66	106	12	19			7/26/2004
Millstone Ck	414059763042	2	4.2	2.61	4C	50	81	50	81					6/24/2004
Minister Ck	413703790901	1	8	4.97	16F	35	56	22	35	13	21			8/17/2004
Nates Rn	413815763606	1	2.81	1.75	4C	0	0	0	0					8/12/2004
Ninemile Rn	414726774542	2	6.3	3.91	9A	64	104	14	23	50	81			8/9/2004
Oley Ck	410317755550	1	3.7	2.3	5D	179	288	163	262	16	26			7/6/2004
Ontelaunee Ck	403735755120	1	4.5	2.8	3B	85	137	49	79	36	58			6/15/2004
Painter Rn	414443772928	1	4.4	2.73	9A	23	37	23	37					7/30/2004
Penns Ck	404500765128	3	11.3	7.02	6A	420	676	3	5	417	671			7/7/2004
Pine Swamp Rn	413535764453	1	3.85	2.39	4C	27	43	27	43					8/18/2004
Porcupine Ck	412624793242	1	6.39	3.97	16E	18	29	18	29	0	0	0	0	7/13/2004
Rattlesnake Ck	411850753818	2	3.6	2.24	5A	79	127	56	90	23	37			7/6/2004
Rattling Rn	403452760135	1	6.2	3.85	3A	84	135	84	135					8/10/2004
Rauchtown Ck	410809771337	1	1.8	1.12	10A	138	222	33	53	105	169			10/7/2004
Roaring Ck S Br	405427763039	5	5.06	3.14	5E	106	171			106	171			6/9/2004
Rollinson Rn	413539764300	1	4.93	3.06	4C	3	5	3	5					8/16/2004
Satterlee Rn	413947762718	1	7.09	4.4	4C	10	16	10	16					7/13/2004
Saucon Ck	403712752010	5	3.4	2.11	2C	1311	2111			1311	2111			8/10/2004
Schrader Ck	414230763020	4	9.76	6.06	4C	9	15	6	10	3	5			6/23/2004
Schuylkill R W Br	403803761052	3	9.1	5.65	3A	224	360	104	167	120	193			8/11/2004
Shaeffer Rn	401802773035	2	7.7	4.78	7A	64	103	64	103					7/16/2004
Shingle Rn	411711761055	1	2.8	1.74	5C	43	69	43	69					7/19/2004
Shoemaker Br	411350773839	1	6	3.73	9B	58	94	50	81	8	13			8/23/2004

Sinn Ck E Fk	413146780118	1	4.1	2.55	8A	48	77	48	77	0	0			8/18/2004
Slate Rn	412820773016	1	11.5	7.15	9A	263	423	122	196	141	227			8/9/2004
Spring Ck	405633774716	2	17.1	10.63	9C	1215	1956			1215	1956			7/8/2004
Spring Ck Bg	401119772331	1	1	0.62	7B	590	950	376	605	47	76	167	269	9/10/2004
Spring Ck E Br	413112790002	2	7.9	4.91	17A	12	19	0	0	12	19			8/11/2004
Sugar Rn	413739763727	1	5.33	3.31	4C	47	76	47	76					6/24/2004
Trim Root Rn	404701781908	1	4.1	2.55	8D	117	188	117	188					7/8/2004
Tunungwant Ck E Br	415728783832	4	5.7	3.54	16C	70	113			70	113			7/22/2004
Two Lick Ck	402855791138	2	12.6	7.83	18D	63	101			63	101			8/18/2004
Wallace Rn	405551774901	2	3.3	2.05	9C	259	417	164	264	95	153			6/28/2004
Willow Ck	402537755627	4	1.5	0.93	3B	180	290	180	290					10/13/2004
Wistar Rn	411605775701	1	3.7	2.3	8A	44	71	44	71	0	0			7/19/2004
Wolf Swamp Rn	410335752206	1	3.4	2.11	1E	36	58	30	48	6	10			8/2/2004
Total						10,446	16,818	3,565	5,739	6,714	10,810	167	269	

Table 12. Number of legal size wild trout (≥ 175 mm) per kilometer and per mile by species based on electrofishing surveys conducted on 76 wild trout stream sections in 2004.

Species	Total # trout ≥ 175 mm/km	Mean # trout ≥ 175 mm/km	Total # trout ≥ 175 mm/mi	Mean # trout ≥ 175 mm/mi
Brook Trout	3,565	46.9	5,739	75.5
Brown Trout	6,714	88.3	10,810	142.2
Rainbow Trout	167	2.2	269	3.5
Total	10,446	137.4	16,818	221.2

Table 13. Age group of interviewed anglers.

Age

	# Anglers	%
Adult	227	90.1
Youth	25	9.9
Total	252	100

Table 14. Gender of interviewed anglers.

Gender

	# Anglers	%
Male	236	93.7
Female	16	6.3
Total	252	100

Table 15. Bait type used by interviewed bait anglers.

Bait Type

	# Anglers	%
Red worms	23	21.5
Night crawlers	26	24.3
Minnows	18	16.8
Multiple baits	15	14.0
Wax worms	9	8.4
Meal worms	5	4.7
Power bait	2	1.9
Maggots	4	3.7
Corn	2	1.9
Bread	2	1.9
Other	1	0.9
	107	100

Table 16. Summary of response from question: How often do you harvest legal size trout when fishing this water?

	# Anglers	%
Always	14	5.6
Almost Always	3	1.2
Half	27	10.7
Rarely	80	31.7
Never	128	50.8
Total	252	100

Table 17. Summary of response from question: Do you also fish waters that are stocked with trout in Pennsylvania?

	# Anglers	%
Yes	209	82.9
No	40	15.9
NR	3	1.2
Total	252	100

Table 18. Summary of response from question: How many days will you be fishing during this trip?

	# Anglers	%
One	168	66.7
Two	52	20.6
Three	12	4.75
Four	12	4.75
Five	2	0.8
Six	0	0
Seven	4	1.6
Eight	0	0
Nine	2	0.8
Total	252	100

Table 19. Summary of response from question: What would you have done if you could not fish for trout today?

	# Anglers	%
Fish for something else	51	27.4
Other	135	72.6
Total	186	100

Table 20. Summary of response from question: How many times a year do you go trout fishing in Pennsylvania?

# Trips	Frequency	%
0	17	7.2
1-10	38	16.0
11-25	55	23.2
26-50	59	24.9
>50	68	28.7
	237	100

Table 21. Expenditures by category for wild trout anglers in Pennsylvania

Category	Expenditures per day	Total Expenditures	Margined Expenditures
Lodging	$6.50	$520,637	$520,637
Travel	$18.61	$1,490,624	$1,162,687
Food	$14.55	$1,165,426	$874,069
Gear	$5.33	$426,922	$281,769
Total	$44.99	$3,603,609	$2,839,162

Table 22. Wild Trout Fishing's Estimated Contribution to the Pennsylvania Economy.

	Direct Effect	Multiplier Effect	Total Effect (Direct + Indirect)	Multiplier
Industry Output	$2,839,162	$4,321,948	$7,161,110	$2.52
Value Added	$1,547,899	$2,612,094	$4,159,993	$2.69
Employment	59	46	105	1.78
Labor Income	$1,175,926	$1,698,371	$2,874,297	$2.44
Per Worker Compensation	$19,797	$36,761	$27,219	

Table 23. Expenditures by category for wild trout anglers traveling at least 50 miles.

Category	Expenditures per day	Total Expenditures	Margined Expenditures
Lodging	$10.49	$239,062	$239,062
Travel	$22.57	$514,476	$401,291
Food	$19.41	$442,593	$331,945
Gear	$4.48	$102,074	$67,369
Total	$56.95	$1,298,204	$1,039,667

Table 24. Wild Trout Fishing's Estimated Impact on the Pennsylvania Economy.

	Direct Effect	Multiplier Effect	Total Effect (Direct + Indirect)	Multiplier
Industry Output	$1,039,667	$1,575,439	$2,615,106	$2.52
Value Added	$575,137	$950,971	$1,526,108	$2.65
Employment	22	17	38	1.78
Labor Income	$433,049	$617,899	$1,050,948	$2.43
Per Worker Compensation	$20,049	$36,780	$27,368	

Table 25. Angler use counts by two-week intervals on wild trout study waters.

Dates	Total Count	%
4/17-4/30	137	33.85
5/1-5/14	36	8.9
5/15-5/28	75	18.5
5/29-6/11	20	4.95
6/12-6/25	49	12.1
6/26-7/9	17	4.2
7/10-7/23	26	6.4
7/24-8/6	28	6.9
8/7-8/20	8	2
8/21-9/3	9	2.2
	405	100

Table 26. Tackle use by stream size.

Stream Size	# of Anglers	Flies	Lures	Bait	Multiple Tackle
Small Streams	44	4	5	31	4
Large Streams	208	87	33	76	12
Total	252	91	38	107	16

Table 27. Trout released, harvested, and caught by tackle type.

	Flies	Lures	Bait	Lures & Bait	Total
# Released	221	136	332	59	748
# Harvested	1	6	43	0	50
# Caught	222	142	375	59	798
% Harvested	0.5	4.2	11.5	0	6.3

Figure 1. Tackle Use by interviewed anglers on wild trout waters in 2004

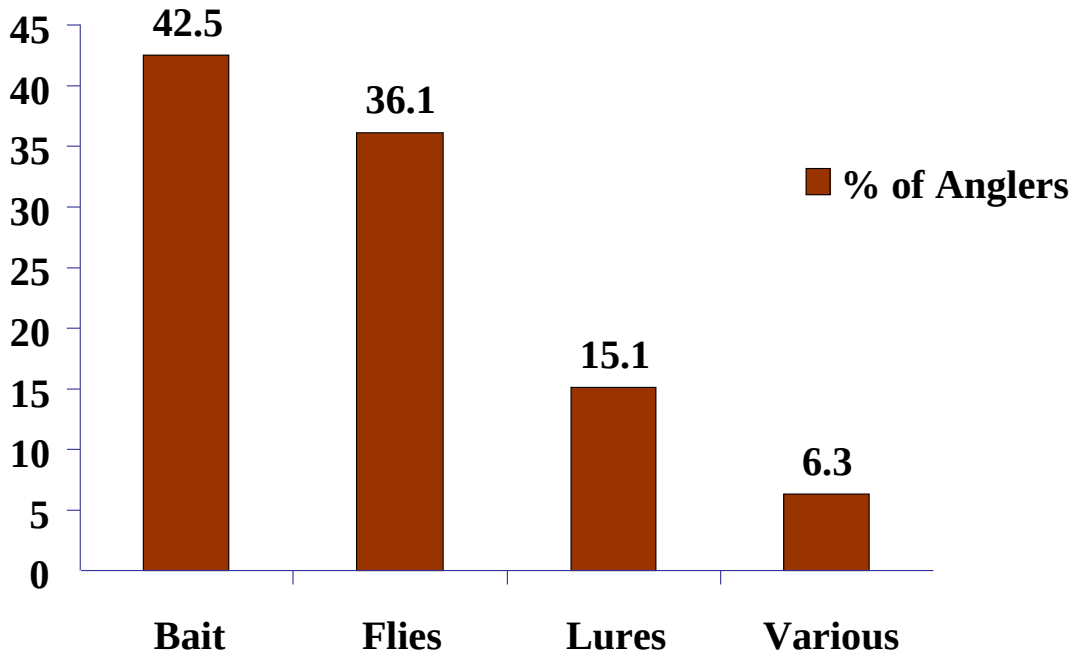


Figure 2. Average length of trout harvested by species.

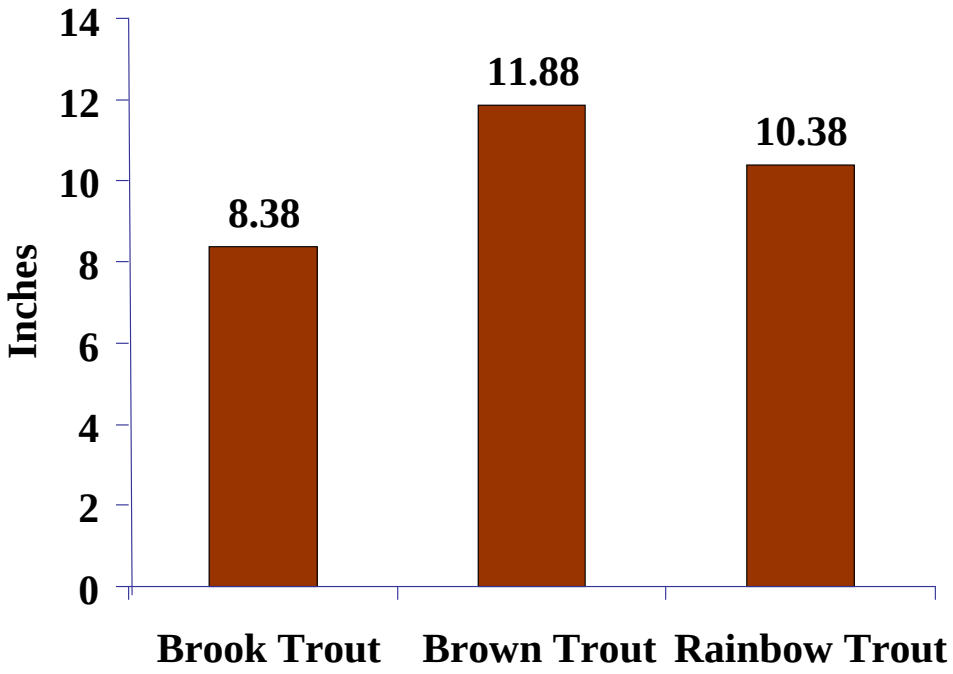


Figure 3. Angler effort by stream size.

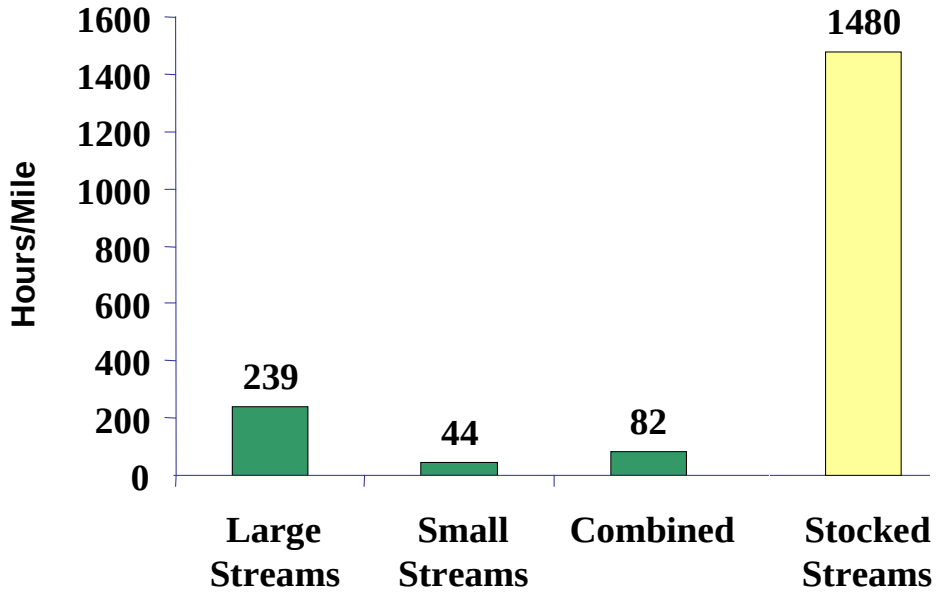


Figure 4. Angler catch rates per hour by species and by stream size.

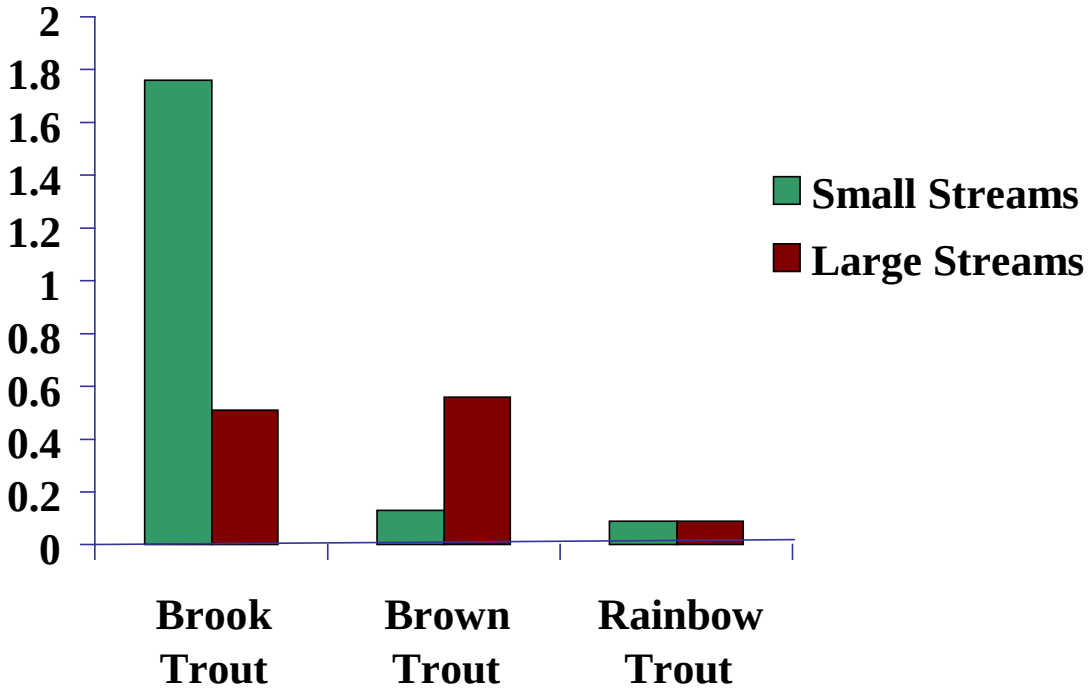


Figure 5. Angler Catch/Mile and Angler Harvest/Mile by stream size.

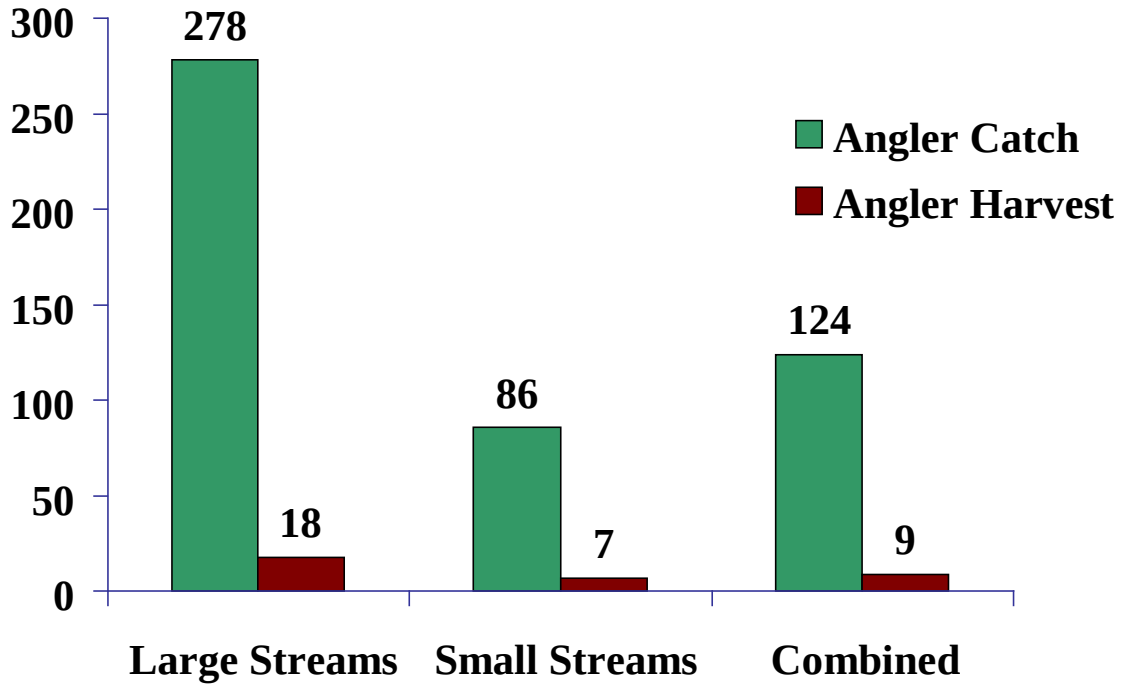


Figure 6. Angler harvest per mile by species and by stream size.

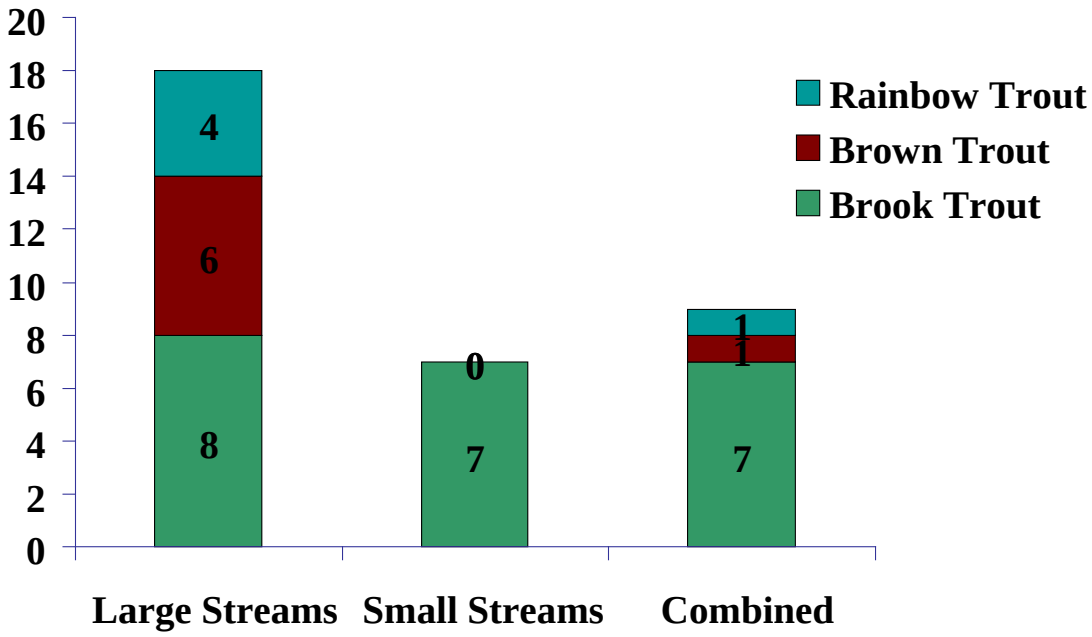
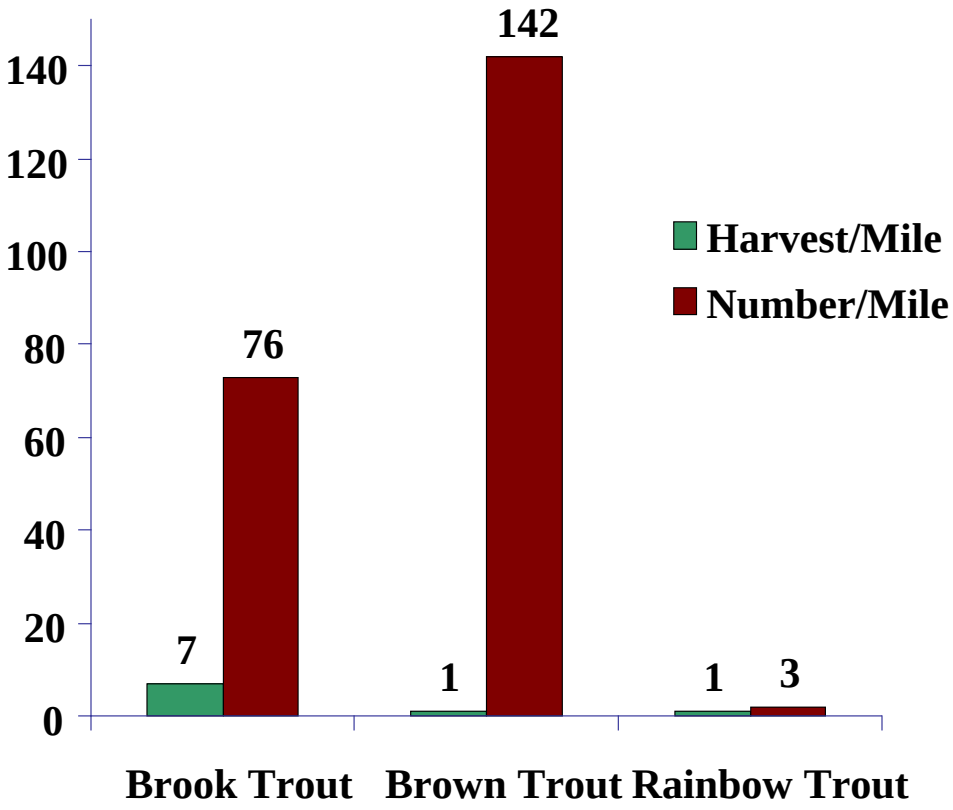


Figure 7. Angler harvest per mile and number of legal size trout per mile by species.



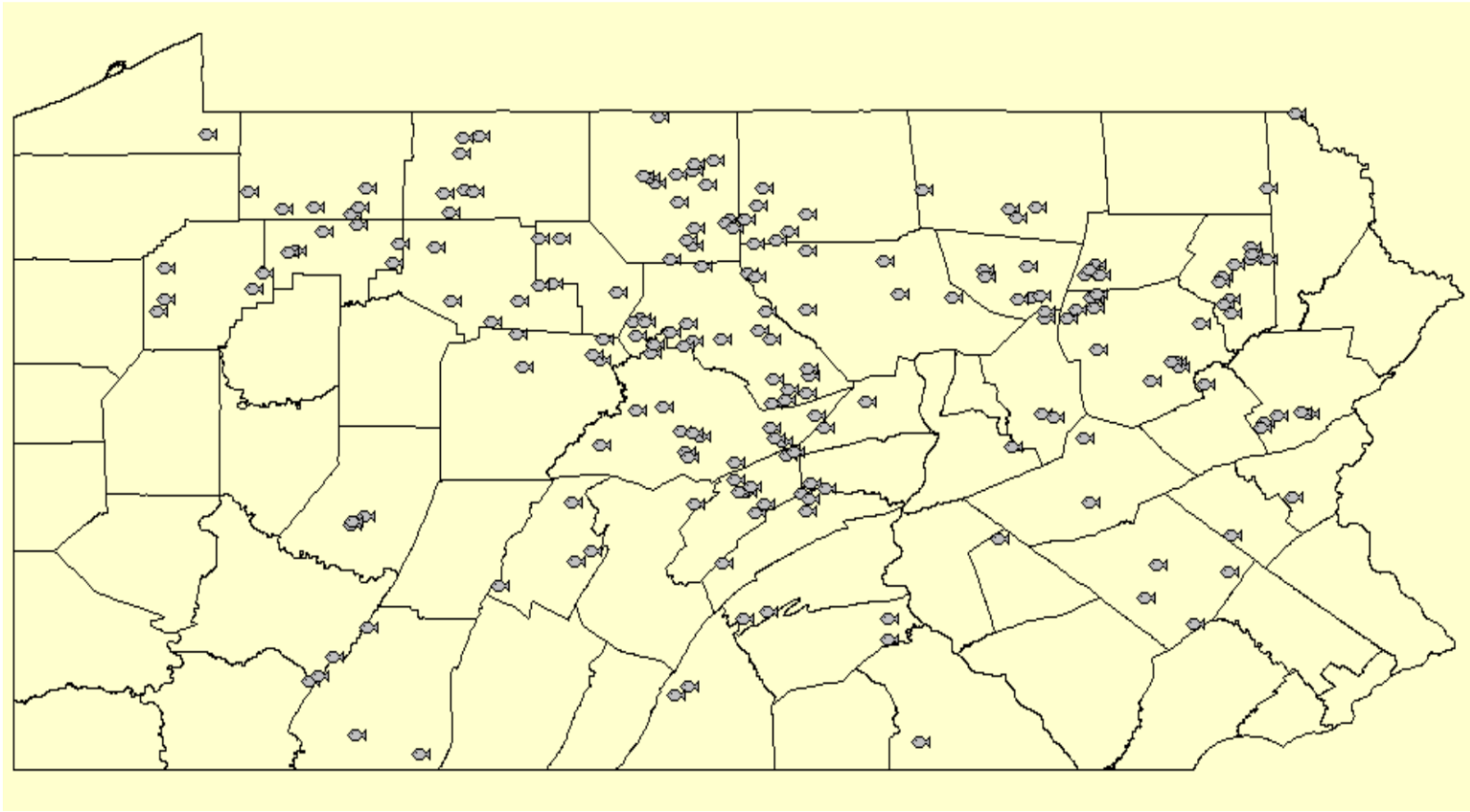


Figure 8. Map location of the study subsections from the 2004 Wild Trout Use and Harvest Study

Appendix 1. List of subsections surveyed for 2004 Angler Use & Harvest assessment on Wild Trout Streams in Pennsylvania.

WtrName	WtrLatLon	Sec Number	Sub Section	Sec Length	Subsec Length	Width (m)	Subbasin	Sub Subbasin	% Public Owned	% Access 300 m	Wilderness Stream	Regulations	Contiguous with Stocked Water
Appenzell Ck	405723751705	2	C	6.5	3	7.42	1	E	0	100		CR	Yes
Appenzell Ck	405723751705	2	B	6.5	3	7.42	1	E	0	100		CR	No
Arnot Rn Ltl	414436790452	1	B	4.5	3	4.65	16	F	59	6	Yes	WS	No
Barney Rn	411828774917	1	B	7.5	3	4.10	9	B	93	16	Yes	WS	No
Bear Ck	412255785000	1	C	6.4	3	4.17	17	A	100	48		CR	Yes
Bear Valley Run	400243774740	1	A	6	3	3.60	7	B	82	100		CR	No
Beaver Rn	415328794416	1	C	7.5	3	4.80	16	A	0	89		CR	Yes
Beaverdam Rn	400710784749	1	C	6.2	3	4.41	18	E	17	96		CR	Yes
Bell Draft	412146781907	1	B	8.95	3	2.90	8	A	100	65		CR	No
Beth Rn	412139760950	1	A	3	3	5.60	4	G	100	5		CR	No
Big Rn	403624772149	1	A	4.8	1.6	4.20	12	A	0	32		CR	No
Big Rn Md Br	410904774607	1	B	4.3	3	2.95	9	C	100	49	Yes	WS	No
Big Rn W Br	410759774525	1	B	9.8	3	5.22	9	C	63	0	Yes	WS	No
Black Ck	410155754441	2	B	4.8	3	7.51	2	A	85	39		CR	Yes
Blacklog Ck	401514775439	1	C	10.9	3	4.00	12	C	26	53		CR	No
Blood Rn	413625791011	1	B	3.8	3	2.20	16	F	98	65		CR	Yes
Bobs Ck	400837783327	1	B	5.44	3	5.10	11	C	10	65		CR	No
Bohen Rn	413426772307	1	A	2.1	2.1	2.69	9	A	100	0		CR	No
Bougher Rn	410942775919	1	B	4.9	3	3.50	8	D	100	9		CR	No
Bowman Ck	413050755642	1	C	10.4	3	6.99	4	G	100	100		CR	No
Bowman Ck	413050755642	1	D	10.4	3	6.99	4	G	100	100		CR	Yes
Buffalo Rn	405500774711	2	C	10.8	3	4.41	9	C	0	71		CR	No
Caldwell Ck W Br	414138793415	3	B	4.6	3	9.65	16	E	0	28		SR	Yes
Cedar Rn	413141772650	3	C	7.4	3	7.95	9	A	93	100		SR	Yes
Cherry Rn	405926772939	1	C	12.8	3	4.77	9	C	100	6	Yes	WS	No
Clarion R W Br	412930784047	1	B	5	3	4.93	17	A	0	60		CR	Yes
Codorus Ck	400330763842	3	A	5	2	9.33	7	H	0	90		SR	Yes
Conety Rn	410602755034	1	B	4.3	3	3.00	5	D	54	43		CR	No
Conodoguinet Ck	401617765448	1	B	13.8	3	6.87	7	B	44	48		CR	No
Cooks Rn	413208781804	1	C	6.4	3	3.70	8	A	100	11	Yes	WS	Yes
Crooked Ck	411718761609	1	A	2.9	2.9	2.40	5	C	51	58		CR	Yes
Cross Fk	412859774913	2	A	4.9	1.9	7.30	9	B	85	100		CR	No
Cross Fk	412859774913	3	B	7.8	3	10.12	9	B	55	100		SR	No
Dark Rn	405255761223	1	C	6.6	3	3.30	5	E	0	66		CR	No
Dents Rn Ltl	412230782256	1	B	3.3	3	2.20	8	A	100	10		CR	No

Doubling Gap Ck	401124772506	1	A	5.20	2.20	3.90	7	B	100	70		CR	No
Dunbar Ck	400016793552	1	B	4.7	3	4.83	19	D	29	0		CR	No
Elk Ck	405140772740	5	A	6	3	8.95	6	A	5	100		CR	No
Elk Rn	411815762417	1	B	7.9	3	6.13	5	C	60	29	Yes	WS	No
Elk Rn	414428773441	1	A	1.8	1.8	2.70	9	A	100	100		CR	No
Faulkner Bk	415853752023	2	A	2.9	2.9	1.80	1	A	100	21		CR	No
Fields Rn	411242775653	1	C	7.9	3	2.93	8	D	100	8		CR	No
Fisher Rn	405724762120	1	B	4.6	3	3.10	5	E	75	43		CR	No
Fishing Ck	405839762804	1	A	1.7	1.7	13.83	5	C	0	100		CR	No
Fishing Ck	410720772859	4	A	8	2	9.70	9	C	7	47		CR	No
Fishing Ck	410720772859	7	A	1.9	1.9	11.61	9	C	10	100		SR	No
Fishing Ck	410720772859	6	A	5.2	2.2	13.77	9	C	6	100		CR	No
Fishing Ck	410720772859	12	B	4.15	3	17.33	9	C	0	100		CR	Yes
Fishing Ck Evening Br	403241763021	1	A	5.8	2.8	6.30	7	D	100	15	Yes	WS	No
Fishing Ck W Br	411633762223	3	C	6.3	3	10.07	5	C	0	93		CR	No
Fork Rn	413222791553	1	A	4.8	1.8	3.70	16	F	86	64		CR	No
Genesee Fks	414633774251	1	D	12.6	3	6.10	9	A	0	100		CR	No
Germania Br	413536773738	3	B	3.8	3	6.55	9	B	97	100		SR	No
Grays Rn	412514770132	2	B	3.6	3	7.29	10	A	100	100		SR	No
Green Rn	411947753925	1	C	7.3	3	4.03	5	A	74	24		CR	No
Grove Rn	411900780552	1	C	9.4	3	4.30	8	A	24	7		CR	No
Hall Rn	405801780228	1	B	4	3	2.60	8	D	100	0		CR	Yes
Hammersley Fk	412650775212	2	A	2.9	2.9	9.40	9	B	100	10	Yes	WS	Yes
Heberly Rn	411934762045	1	B	7.8	3	5.38	5	C	100	4		CR	No
Hemlock Ck	412704793330	1	D	10.1	3	6.90	16	E	0	8		CR	Yes
Hessler Br	412214764428	1	B	3.7	3	2.50	10	B	61	84		CR	No
Hickory Ck E	413451792423	1	D	11.5	3	6.43	16	F	100	5	Yes	WS	Yes
Hickory Ck W	413338792513	1	B	4	3	5.50	16	F	0	24		CR	Yes
Honey Ck	403943773544	4	C	6.1	3	15.13	12	A	7	100		CR	No
Honey Ck	403943773544	4	B	6.1	2.7	15.13	12	A	7	100		CR	No
Indian Rn	413446773858	1	B	4	3	2.30	9	B	100	2		SR	No
Irish Settlement B	415900775234	1	A	4.5	1.5	3.30	14	A	0	100		CR	No
Isers Rn	395130791307	2	B	9.1	2.33	5.27	19	F	0	31	Yes	WS	No
Jacks Ck	403500773333	3	C	8.2	3	12.60	12	A	0	100		CR	No
Jacks Ck	403500773333	3	A	8.2	2.2	12.60	12	A	0	100		CR	No
Juniata R Ltl	403340780406	3	D	9.84	3	14.93	11	A	0	94		CR	No
Junta R Frkstn Br	403339780407	5	B	6	3	39.55	11	A	0	100		CR	No
Kent Rn	414036762732	1	A	5.1	2.1	3.90	4	C	35	35		CR	No

Ketchum Rn	412746763845	1	B	4.6	3	3.70	10	B	80	38	Yes	WS	Yes
Kettle Ck	411802775020	2	D	12.8	3	8.23	9	B	74	60		SR	No
Kettle Ck	411802775020	2	B	12.8	3	8.23	9	B	74	60		SR	No
Kettle Ck	412430764219	1	B	11.7	3	4.80	10	B	57	10	Yes	WS	No
Kinzua Ck S Br	414611785239	1	A	5.5	2.5	5.40	16	B	87	45	Yes	WS	No
Kinzua Ck S Br	414611785239	2	B	5.9	3	9.00	16	B	85	21	Yes	WS	Yes
Lackawanna R	412028754737	2	D	10.8	3	12.19	5	A	0	100		CR	No
Lackawanna R	412028754737	3	B	5	3	18.78	5	A	0	89		SR	No
Lackawanna R	412028754737	3	A	5	2	18.78	5	A	0	89		SR	No
Lackawanna R	412028754737	6	D	25.3	3	19.02	5	A	0	94		CR	No
Lackawanna R	412028754737	6	B	25.3	3	19.02	5	A	0	94		CR	Yes
Lackawanna R	412028754737	6	E	25.3	3	19.02	5	A	0	94		CR	No
Lackawanna R E Br	414210752857	3	B	4.5	3	6.90	5	A	37	100		CR	No
Larrys Ck	411301771312	2	D	9.8	3	6.50	10	A	91	16		CR	Yes
Laurel Ck	404209773304	2	B	3.9	2.4	6.40	12	A	44	100		CR	No
Laurel Rn	412923753231	1	A	5.6	2.6	2.45	5	A	15	54		CR	No
Laurel Rn	405213771120	2	A	5.78	2.78	5.63	6	A	42	82		CR	No
Laurel Rn	402025771940	1	B	10.8	3	6.27	7	A	27	83		CR	No
Laurel Rn	411644782730	4	B	6.8	3	10.40	8	A	90	54		CR	No
Laurel Rn	403640772028	1	A	8.2	2.2	3.70	12	A	0	74		CR	No
Laurel Rn	403640772028	1	B	8.2	3	3.70	12	A	0	74		CR	No
Laurel Rn	394832785136	2	C	9.2	3	4.96	13	A	47	58		CR	No
Laurel Rn	412123784909	1	C	11.8	3	4.11	17	A	43	42		CR	No
Lehigh Ck Ltl	403550752657	3	A	2.5	2.5	7.03	2	C	0	100		CR	Yes
Lewis Rn	415225783925	1	A	8.1	2.1	5.36	16	C	74	100		CR	No
Lick Rn	410252782258	1	D	13.4	3	6.14	8	C	100	6		CR	No
Lick Rn	410252782258	1	C	13.4	3	6.14	8	C	100	6		CR	No
Lick Rn	411010773057	2	B	15.5	3	9.25	9	B	100	4	Yes	WS	No
Lick Rn	411010773057	2	E	15.5	3	9.25	9	B	100	4	Yes	WS	No
Logan Br	405435774704	2	A	2.6	2.6	7.58	9	C	1	100		CR	No
Long Hw	405628761828	1	B	3.9	3	3.20	5	E	85	14		CR	No
Loyalsock Ck	411408765633	2	D	20.1	3	19.78	10	B	27	39		CR	No
Lushbaugh Rn	412538780148	1	B	6.9	3	3.50	8	A	100	0	Yes	WS	No
Maple Rn	411557761537	2	B	4.5	3	4.00	5	C	0	93		CR	No
Mcelhattan Ck	410851772239	1	B	12.4	3	6.15	9	B	68	25		CR	No
Mcelhattan Ck	410851772239	1	C	12.4	3	6.15	9	B	68	25		CR	No
Mehoopany Ck	413422760331	2	F	15.2	3	12.17	4	G	84	76		CR	Yes
Mehoopany Ck	413422760331	2	D	15.2	3	12.17	4	G	84	76		CR	No

Mehoopany Ck	413422760331	2	B	15.2	3	12.17	4	G	84	76		CR	No
Middle Ck	405346753000	2	C	7.9	3	5.93	2	B	0	100		CR	Yes
Middle Ck S Br	404503771406	1	C	6.3	3	4.20	6	A	0	100		CR	Yes
Mill Ck	410952751431	1	A	3	3	2.80	1	E	100	29	Yes	WS	No
Mill Ck	411538755214	1	A	8.3	2.3	4.90	5	B	0	67		CR	No
Mill Ck	414623780106	1	C	9.5	3	7.40	16	C	6	100		CR	No
Mill Ck	414623780106	1	D	9.5	2.6	7.40	16	C	6	100		CR	No
Mill Ck	414623780106	1	B	9.5	3	7.40	16	C	6	100		CR	No
Millstone Ck	414059763042	2	B	4.2	3	6.81	4	C	0	100		CR	No
Minister Ck	413703790901	1	C	8	3	5.90	16	F	97	16		CR	Yes
Monocacy Ck	403657752153	7	A	2.5	2.5	11.59	2	C	0	100		SR	Yes
Mosquito Ck	410703780635	3	D	11.6	3	15.53	8	D	18	5		CR	No
Mosquito Ck	410703780635	3	B	11.6	3	15.53	8	D	18	5		CR	No
Neals Rn	400210792100	1	B	4.7	3	3.60	19	E	0	76		CR	Yes
Nescopeck Ck Ltl	410521755100	2	B	5.6	3	4.80	5	D	4	35		CR	No
Ninemile Rn	414726774542	1	B	3.5	3	3.80	9	A	88	100		CR	No
Ninemile Rn	414726774542	2	B	6.3	3	5.43	9	A	44	100		CR	No
Paint Rn	413558772115	1	A	2.6	2.6	2.30	9	A	35	61		CR	No
Painter Rn	411817762608	1	B	7	3	8.25	5	C	100	57		CR	No
Painter Rn	414443772928	1	B	4.4	3	3.70	9	A	93	88		CR	Yes
Penns Ck	404500765128	3	C	11.3	3	30.77	6	A	32	63		SR	No
Penns Ck	404500765128	3	A	11.3	2.3	30.77	6	A	32	63		SR	Yes
Pine Ck	405208772720	1	B	5.9	3	3.10	6	A	100	91		CR	Yes
Pine Ck	411016771611	2	A	7.8	1.8	7.37	9	A	19	100		CR	No
Pine Ck W Br	414359773839	1	C	17.8	3	6.73	9	A	63	33		CR	No
Piney Ck	402828781341	2	C	10	2.63	7.01	11	A	17	88		CR	No
Piney Ck	402828781341	2	B	10	3	7.01	11	A	17	88		CR	No
Pohopoco Ck	404856754022	3	B	3.3	3	16.90	2	B	0	68		CR	No
Pohopoco Ck	404856754022	2	C	16.6	3	6.38	2	B	0	100		CR	No
Porcupine Ck	412624793242	1	A	6.3	3	6.33	16	E	0	7		CR	No
Potter Rn	404911773737	1	C	8.4	2.8	4.50	6	A	68	86		CR	No
Queens Rn Md Br	411101772832	1	C	6.6	3	3.93	9	B	25	91		CR	No
Ramsey Rn	411702771917	1	B	4.3	3	3.50	9	A	49	13		CR	No
Rapid Rn	405727770043	3	C	7.3	3	6.63	10	C	30	100		CR	Yes
Rathbone Ck	414315765350	1	B	4.7	3	4.20	4	A	59	63		CR	Yes
Roaring Ck S Br	405427763039	5	A	4.9	1.9	6.23	5	E	0	100		CR	Yes
Roaring Rn	400941790020	1	A	1.5	1.5	3.15	18	E	100	20	Yes	WS	No
Round Island Rn	411754775938	1	C	7.2	3	4.05	8	A	95	1		CR	No

Round Island Rn	411754775938	1	B	7.2	3	4.05	8	A	95	1	CR	No
Sandy Ck S	412132795417	2	D	9.6	3	9.33	16	G	93	6	CR	No
Sandy Ck S	412132795417	2	B	9.6	3	9.33	16	G	93	6	CR	No
Satterlee Rn	413947762718	1	B	7	3	4.10	4	C	37	13	CR	No
Schuylkill R W Br	403803761052	3	D	9.1	3	15.35	3	A	3	60	CR	No
Shaeffer Rn	401802773035	2	B	6.3	3	4.48	7	A	94	77	CR	No
Sheriff Rn Lw	413704790654	1	B	7.4	3	5.20	16	F	84	7	CR	No
Shickshinny Ck	410905760850	2	C	8.2	3	6.97	5	B	0	85	CR	No
Shingle Br	412401774222	1	A	5.4	2.4	5.60	9	B	100	7	CR	No
Shingle Rn	411712761055	1	A	2.8	2.8	3.15	5	C	92	13	CR	No
Shoemaker Br	411350773839	1	B	6	3	4.65	9	B	100	0	CR	No
Shoemaker Br	411350773839	1	A	6	3	4.65	9	B	100	0	CR	No
Sinn Ck Driftwd Br	412012780801	1	D	11	3	4.91	8	A	18	100	CR	No
Slate Rn	412820773016	1	B	11.5	3	7.99	9	A	92	84	SR	No
Slip Rn	411913763058	1	A	1.8	1.8	2.20	5	C	100	0	CR	No
Somer Bk	412731761019	1	A	5.1	2.1	5.40	4	G	100	59	CR	No
Spring Bk	412126754414	3	A	5.4	2.4	6.77	5	A	88	77	CR	No
Spring Bk	412126754414	2	B	3.9	3	7.10	5	A	93	72	SR	No
Spring Ck	405633774716	2	B	17.1	3	13.58	9	C	47	64	SR	No
Spring Ck	405633774716	2	A	17.1	2.1	13.58	9	C	47	64	SR	No
Spring Ck	405633774716	4	A	5.8	2.8	18.50	9	C	53	100	SR	No
Spring Ck E Br	413112790002	2	C	7.9	3	7.53	17	A	53	8	CR	Yes
Spring Rn	412016782425	2	B	3.8	3	3.90	8	A	6	35	CR	No
Stdng Stne Ck E Br	403449775135	2	B	14.8	3	6.00	11	B	22	94	CR	No
Sugar Camp Rn	412044765819	1	A	1.8	1.8	2.00	10	B	67	57	CR	Yes
Swamp Ck	401604752758	1	B	4.2	3	3.80	3	E	0	100	CR	No
Tea Ck	403945773548	2	A	1.8	1.8	6.92	12	A	13	100	CR	No
Tomtit Rn	405204781227	1	B	6.4	3	3.20	8	D	100	34	CR	No
Trim Root Rn	404701781908	1	B	4.1	3	3.70	8	D	48	0	CR	No
Trindle Spring Rn	401512770029	2	A	1.5	1.5	11.45	7	B	0	100	CR	No
Trout Rn	400917765937	1	B	3.2	3	5.00	7	E	0	100	CR	No
Trout Rn	412401772743	1	B	4.4	3	3.10	9	A	100	100	CR	No
Trout Rn	412401772743	2	A	7.9	1.9	4.68	9	A	99	100	CR	No
Trout Rn	400211792101	1	B	5.4	3	3.83	19	E	0	50	CR	Yes
Trout Rn -Cedar Rn	413135772528	1	B	11.1	3	4.50	9	A	59	0	CR	No
Tubbs Rn	413033792700	2	B	5.1	3	6.05	16	F	100	30	CR	No
Tubbs Rn	413033792700	2	A	5.1	2.1	6.05	16	F	100	30	CR	No
Tunungwant Ck E Br	415728783832	4	A	5.7	2.7	13.27	16	C	0	100	CR	No

Tunungwant Ck W Br	415728783833	1	B	6.3	3	6.85	16	C	0	100	CR	No
Two Lick Ck	402855791138	2	E	12.6	3	20.80	18	D	6	83	CR	No
Two Lick Ck	402855791138	2	B	12.6	1.56	20.78	18	D	6	83	CR	No
Unnamed Tributary	401437754640	1	A	2.7	2.7	3.30	3	D	85	77	CR	No
Unnamed Tributary (11)	410257755626	1	A	1.9	1.9	2.60	5	D	0	54	CR	Yes
Unnamed Tributary (19)	410526755203	1	A	4.6	1.6	2.80	5	D	76	98	CR	No
Upper Three Runs	410901780232	1	B	4.6	3	2.75	8	D	100	92	CR	No
Wallace Rn	405551774901	1	C	7	3	5.00	9	C	88	0	CR	Yes
Warden Rn	412613795351	1	D	9.2	3	5.10	16	D	0	55	CR	Yes
Weikert Rn	405111771748	1	B	8.4	3	7.80	6	A	100	100	CR	No
Weikert Rn	405111771748	1	C	8.4	3	7.80	6	A	100	100	CR	No
Wetmore Rn	414243774136	1	B	8.72	3	4.00	9	A	67	30	CR	No
Willow Ck	402537755627	4	A	1.5	1.5	6.67	3	B	0	100	CR	No
Wilson Rn	413433784132	1	B	4.9	3	3.63	17	A	0	100	CR	Yes
Wilson Rn E Br	411313783516	1	A	5	2	3.75	8	A	93	22	CR	No
Windfall Rn	413135774735	1	D	9.8	3	4.05	9	B	93	100	CR	No
Wistar Rn	411605775701	1	B	3.7	3	1.10	8	A	56	16	CR	No
Wyomissing Ck	401946755622	3	B	3.8	3	7.75	3	C	100	100	CR	No
					568.6							

Regulation/Program

WS - Wilderness Trout Stream

SR - Special Regulations

CR - Conventional (Statewide) Regulations

Appendix 2. Angler Interview Form for 2004 Angler Use and Harvest Assessment on Wild Trout Streams.

2004 WILD TROUT ANGLER USE AND HARVEST SURVEY

Clerk: _____

Water Name _____ SSB _____ SubSection _____

Date: _____ (mo., day, yr.) Age Group _____ (1 = Adult, 2 = Youth) Angler Gender _____ (1 = Male, 2 = Female)

Start Fishing Time: (2400 Time)_____

Time of Interview: (2400 Time)_____ Zip Code:_____

Trip Complete _____ 1 = Yes; 2 = No

Terminal tackle used: Flies_____ Lures_____ Bait Type_____

Species Caught	Total # Harvested		Total # Released	
	/	/	/	/
	/	/	/	/
	/	/	/	/

Size of Fish Harvested (species/inches):

_____ _____ _____ _____

Questions: (1 for "Yes"; 2 for "No")

1. How often do you harvest (keep) legal size trout when fishing this water?
   _____Always _____Almost Always _____Half _____Rarely _____Never
2. The stream you are fishing is not stocked with trout, do you also fish waters that are stocked with trout in PA? Yes_____ No _____
3. How many days will you be fishing during this trip? _____
4. Will you be staying away from home overnight? Yes_____ No_____
   4a. If yes, how many nights will you be staying? _____
   4b. Where will you be staying?
   Motel/Hotel/B&B_____ Friends_____ Camping_____
   Cottage/Camp/RV_____ Other_____
   4c. What is the total cost of the lodging? _____
5. How much will you spend on travel this trip? _____
6. How much will you spend on food and drink this trip?_____
7. How much will you spend on gear and bait this trip? _____
8. What would you have done if you could not fish for trout today?
   Fish for something else _____ Other _____
9. How many times a year do you go trout fishing in Pennsylvania? _____
10. Do you have any additional thoughts you would like to share with the PA Fish and Boat Commission? ___

_____

_____