Impact of License Fees and Stocking Levels on Pennsylvania Trout Anglers’ Satisfaction and Participation in the Fishery

Report to the Pennsylvania Fish and Boat Commission

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Richard Ready, Donald Epp, and Willard Delavan
Department of Agricultural Economics and Rural Sociology
The Pennsylvania State University
College of Agricultural Sciences
University Park, PA 16802
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Summary

Two upcoming changes could have serious implications for angling participation in Pennsylvania. First, beginning in 2002, the Pennsylvania Fish and Boat Commission will reduce the number of catchable-sized trout stocked in the state by 28% relative to recent years. Second, the Commission has proposed a package of changes to the set of fishing license and permits sold in the state that includes increases in the costs of both a fishing license and a trout/salmon stamp, effective in 2003. This report reviews current knowledge about the potential impacts of these changes on angling participation in the state. Three sources of information are included. First, previous research done both in Pennsylvania and in other states is reviewed. Second, data on license sales in Pennsylvania over the last 30 years are analyzed using econometric models to estimate relationships between the size of the trout stocking program and license sales, and between license and stamp prices and license sales. Third, results from a survey of 611 resident trout anglers are presented.

Previous research on the impact of license price increases on angling participation (as measured by license sales) has given a consistent result. While an increase in license price does reduce license sales, the sales reduction is proportionately small, so that revenues increase as a result of the license price increase. In contrast, previous research on the impact of trout stocking on angling participation has given a consistent non-result. No statistical relationship has been found between the quantity of trout stocked in a state and the number of resident fishing licenses sold in that state.

Pennsylvania data on license sales, license prices, and trout stocking levels from 1970 to 2000 were analyzed using econometric regression techniques. That analysis gave results that are consistent with previous research in other states. The analysis found no statistical relationship between the number of trout stocked in Pennsylvania and license sales, either resident or non-resident. The statistical precision of that result is low, however, due to limited data. Further, the analysis showed that a 1% increase in fishing license price results in a 0.36% to 0.37% decrease in license sales. We project that a $10 increase in the price of a resident fishing license and trout stamp effective in 2003 would result in a decrease in the number of licenses sold in that year of 14%, but would result in an increase in license revenues of 26%.

A telephone survey of 611 resident trout anglers was conducted in September 2001. Anglers were asked their opinions about various management issues, the responses to which are summarized in the report. Anglers were also asked how they would respond if the number of trout stocked in the state was to decline. A decrease in the number of trout stocked would reduce angler satisfaction, and would cause some anglers to stop fishing for trout. The best estimate of the impact of a 28% decrease in trout stocking is that it will cause a 3.7% decrease in resident
license sales, and a 12.5% decrease in trout stamp sales. Anglers were then asked their attitudes toward an increase in the price of a fishing license and trout stamp. If the price increase was necessary to avoid further decreases in trout stocking, some anglers would support it. The level of support depended on the size of the price increase and on the size of the potential stocking decrease. Anglers who fish more often and anglers who use fly tackle were more likely to support a price increase. Finally, anglers were asked how they would respond to a price increase. A $10 increase in 2003 in the total price of a license and trout stamp would result in a 21.4% decrease in the number of resident trout anglers. How many of these dropouts would still buy a resident license would depend on how much of the price increase is imposed on the fishing license, and how much is imposed on the trout stamp.
Two upcoming changes could have serious implications for angling participation in Pennsylvania. First, beginning in 2002, the Pennsylvania Fish and Boat Commission will reduce the number of catchable-sized trout stocked in the state by 28% relative to recent years. Second, the Commission has proposed a package of changes to the set of fishing license and permits sold in the state that includes increases in the costs of both a fishing license and a trout/salmon stamp. This report reviews current knowledge about the potential impacts of these changes on angling participation in the state. Three sources of information are included. First, previous research done both in Pennsylvania and in other states is reviewed. Second, data on license sales in Pennsylvania over the last 30 years are analyzed using econometric models to estimate relationships between the size of the trout stocking program and license sales, and between license and stamp prices and license sales. Third, results from a survey of 611 resident trout anglers are presented.

I. Historical Background on Trout Management in Pennsylvania

The Pennsylvania Fish and Boat Commission (earlier the Pennsylvania Fish Commission) has propagated and stocked trout since 1873. Up until the late 1960’s and early 1970’s, the Commission managed the trout fishery primarily as a put-and-take fishery, with little attention paid to the wild trout resource (Snyder, 1995). Prior to the early 1970’s, trout stocking decisions (which waters received trout, and how many) were largely political, with less consideration given to differences among waters in angling pressure, access, or the ability of the waters to support the stocked fish. Beginning in 1973, a county quota system allocated hatchery production to each county, based on license sales in the county, amount of accessible water, and the population of the county. This occurred at the same time that total hatchery production was increasing dramatically (from 2.8 million catchable trout in 1970 to 4.3 million in 1975).

To make better use of this increased production, the Commission changed from a county-based allocation approach to a resource-based allocation approach. Beginning in the mid 1970’s, extensive inventories of the physical, chemical and biological characteristics of Pennsylvania waters were conducted. This information was used to form the basis of a classification system, based on the ability of each water body to support wild trout. In this classification, the best trout waters are classified as Class A wild trout waters. To capitalize on the natural productivity of these waters, and prevent competition between wild trout and hatchery-produced trout, stocking was discontinued on these waters. Waters with less wild trout productivity, but that meet minimum requirements for size, access and water quality, are eligible for trout stocking.

The objective of the stocking program has since been to “provide recreation in those waters where wild trout populations are inadequate to sustain the fishery at desired levels.” (PA FBC
Beginning in 1983, trout management has been conducted following consistent state-wide guidelines, so that similar waters are managed the same way, regardless of where they are located in the state. Trout are allocated to individual waters based on the size of the water, public access, angler use, and the ability of the water to sustain the trout until they are harvested. The goal of the stocking program is to generate one angler use day for each stocked trout.

II. Background On Angler Participation And Trout Stocking In Pennsylvania

A. Angling Activity

Two independent estimates of trout angling activity in Pennsylvania are available. According to the most recent National Survey of Fishing, Hunting and Wildlife-Related Recreation (USFWS 1998), Pennsylvania anglers participated in 18,635,000 angling days in 1996 (excluding Great Lakes angling). Of these, 8,861,000 angling days, or 48% of the total, were for trout. Resident anglers accounted for 93% of the trout angling days in the state.

The Coldwater Unit of the PA Fish and Boat Commission (PFBC) has assembled estimates of trout angling days for various classes of stocked waters, collected in various years from 1988 to 2000 (Snyder 2001). They estimate that 6,246,000 angling days occur on conventionally-regulated trout-stocked streams between mid April and mid June. No estimate is available of fall angling activity on conventionally-regulated streams. An additional 279,000 angler days occur on delayed harvest streams (spring and fall combined). Finally, 1,514,000 angler days are spent on trout-stocked lakes annually. The PFBC estimates do not include trout angling on waters that are not stocked.

B. License Sales

The total number of fishing licenses issued increased approximately 43% between 1970 and 1990, peaking at 1.164 million licenses in 1990. Since 1990, issuances have declined 19% (216,000 licenses). Trout stamp sales have declined in a parallel manner, though the proportional decrease has been smaller. Much of the decline occurred in 1991 and 1996, years when license fees were increased. Over 70% of the decrease in sales since 1990 occurred in those two years. Senior lifetime licenses may also account for a significant portion of the decline. Senior annual license sales in 2000 were 66,000 fewer than in 1978, the year before senior lifetime licenses became available. Other potential factors, such as changes in the demographic makeup of Pennsylvania, do not help explain the decline in license sales (Ford 1997). For example, between 1990 and 2000, the age distribution of Pennsylvania residents has actually skewed toward the 35-54 year old age category, a range of ages at which Pennsylvanians tend to fish proportionately more.
C. License Prices and Fees

During the period 1970-2000, license prices and fees have increased five times. Figure 2 shows the total cost to purchase the regular license and stamp necessary to fish for trout, including license price and issuing fees. While the nominal (face-value) cost has increased four-fold, the real price (adjusted for inflation, and measured in year 2000 dollars) is actually 8% lower in 2000 than it was in 1970. Comparison of Figures 1 and 2 shows that fishing license issuances declined in every year that fishing license costs were increased. The average drop in license issuances in years of a cost increase was 7.1 percent. A more-detailed analysis of the relationship between fishing license cost and license sales is provided in section V-B.
D. License Revenues

Fishing license revenues, including all license types, have increased steadily over the period 1970-2000 (Figure 3). Measured in real dollars, revenues have held fairly constant, with year-to-year fluctuations. Importantly, license revenues increased in every year that prices were increased.

E. Stocking Levels

Trout stocking levels in Pennsylvania (Figure 4), measured in number of adult trout, increased at a rate averaging 6% per year from 1970 to 1981. Stocking levels then leveled off, averaging slightly over 5 million trout annually from 1981 to 2001. While numbers of trout stocked have remained fairly constant from 1981 to 2000, the average size (weight) of the stocked trout increased during that period, so that total pounds stocked continued to increase until 2000. Trout
stocking levels are projected to decline by 28% in 2002, to 3.8 million trout, with a proportional decrease in the total weight (biomass) stocked.

![Fig 4. Trout Stocked](image)

F. Economic Impact From Angling In Pennsylvania

In 1996, anglers (trout and other species) spent over $650 million in direct expenditures (American Sport Fishing Association), including $296 million dollars for trip-related expenditures, $276 million for equipment, and $152 million for other expenditures including licenses. Non-resident anglers contributed $73 million of the direct expenditures. In addition to direct economic impacts, indirect effects of fishing in Pennsylvania contributed an estimated $690 million in additional economic activity, supported 16,677 jobs, and generated $49 million in state sales and income tax revenues. The total economic impact of sport fishing in Pennsylvania in 1996 was $1.34 billion.

III. Comparison of PA To Neighboring States

A. License Prices

Pennsylvania’s license cost (including trout stamp and issuing fees) is currently $22.50 for residents. Table 1 shows corresponding costs for neighboring states. New Jersey has the highest total cost to fish for trout, followed by Pennsylvania. These are also the two States that have changed their fees most recently.

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Table 1. License Costs in Selected States

<table>
<thead>
<tr>
<th>State</th>
<th>License Cost</th>
<th>Trout Stamp Cost</th>
<th>Total Cost</th>
<th>Year of Last Price Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania</td>
<td>$17.00</td>
<td>5.50</td>
<td>22.50</td>
<td>1996</td>
</tr>
<tr>
<td>New York</td>
<td>$14.00</td>
<td>NA</td>
<td>14.00</td>
<td>1991</td>
</tr>
<tr>
<td>New Jersey</td>
<td>$22.50</td>
<td>10.50</td>
<td>33.00</td>
<td>2000</td>
</tr>
<tr>
<td>Maryland</td>
<td>$10.00</td>
<td>4.20</td>
<td>14.20</td>
<td>1993</td>
</tr>
<tr>
<td>Delaware</td>
<td>$8.50</td>
<td>5.00</td>
<td>13.50</td>
<td>1985</td>
</tr>
<tr>
<td>Ohio</td>
<td>$15.00</td>
<td>NA</td>
<td>15.00</td>
<td>1994</td>
</tr>
</tbody>
</table>

B. Trout Stocking

Pennsylvania has stocked over 5 million adult trout per year for the past several years. A 1997 survey of trout stocking (Trout Unlimited 1998) shows that Pennsylvania’s stocking program is the nation’s second largest, behind California, in total number of catchable fish, and seventh in the nation in catchable trout per licensed angler. Table 2 shows the total number and weight of catchable trout stocked, along with the catchable stocking rate per licensed angler (all licenses, not just trout anglers) for several states. Of the seven mid-Atlantic states listed in Table 1, Pennsylvania has the highest stocking rate per licensed angler, measured either in numbers of fish or weight. With the 28% decrease in trout production projected for 2002, Pennsylvania will drop even with New York in terms of number of stocked catchable trout per licensed angler, though Pennsylvania will still have the highest stocked biomass per licensed angler.

Table 2. 1997 Trout Stocking Rate in Selected States

<table>
<thead>
<tr>
<th>State</th>
<th>Catchable Trout Stocked</th>
<th>Catchable Biomass (lbs.)</th>
<th>Average Fish Weight (lbs.)</th>
<th>Catchable Trout per License (#)</th>
<th>Biomass Stocked per License (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania</td>
<td>5,215,000</td>
<td>2,838,065</td>
<td>0.53</td>
<td>4.77</td>
<td>2.54</td>
</tr>
<tr>
<td>New York</td>
<td>3,535,007</td>
<td>889,127</td>
<td>0.25</td>
<td>3.40</td>
<td>0.85</td>
</tr>
<tr>
<td>New Jersey</td>
<td>687,205</td>
<td>254,000</td>
<td>0.37</td>
<td>3.02</td>
<td>1.12</td>
</tr>
<tr>
<td>Maryland</td>
<td>500,000</td>
<td>200,000</td>
<td>0.40</td>
<td>0.96</td>
<td>0.39</td>
</tr>
<tr>
<td>Delaware</td>
<td>30,900</td>
<td>16,200</td>
<td>0.52</td>
<td>1.17</td>
<td>0.62</td>
</tr>
<tr>
<td>Ohio</td>
<td>32,991</td>
<td>18,668</td>
<td>0.57</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>West Virginia</td>
<td>1,186,311</td>
<td>743,045</td>
<td>0.63</td>
<td>1.46</td>
<td>0.92</td>
</tr>
</tbody>
</table>
C. License Sales

Figure 5 shows how the number of federally-certified license holders in Pennsylvania and surrounding states has changed during the last 5 years. The federally-certified figure includes an allowance for lifetime license holders. The relative decline in the number of Pennsylvania license holders during the period (8.4 percent) is slightly greater than the declines experienced by New York and Ohio, but much less than the declines experienced by New Jersey and Maryland.

![Fig 5. Trends in Fishing License Holders in Selected States](image)

IV. What Factors Influence Angler Satisfaction?

A 1996 survey of Pennsylvania Anglers and Boaters (Responsive Management, 1996b) shows that anglers have high levels of satisfaction with the general performance of the fish and boat commission, fishing access, efforts to inform and educate anglers, monitoring, management and opportunities to fish for wild fish. Of the anglers who reported that they fished during the current season (active anglers), 76% responded that they were either “somewhat satisfied” or “very satisfied” with their fishing experience during the preceding two years. When asked about factors that took away from their satisfaction, 21% responded that “pollution or litter” detracted from their enjoyment, 18% responded “not enough game fish,” 18% said “interference from others,” and 16% reported “work obligations” kept them from enjoying fishing as much as they would have liked. Several other reasons were reported, but were attributed to smaller segments of the angler population.
Other studies indicate that angler satisfaction is due to several factors in addition to catch rate. Holland and Ditton (1992) examined fishing trip satisfaction in Texas. They narrowed their inventory of all dimensions of fishing trip satisfaction to six: 1) sense of freedom, 2) excitement, 3) competency, 4) relaxation, 5) enjoying the natural setting, and 6) reflection on past experience. They found that enjoyment of nature and sense of freedom were the two most important factors of satisfaction, followed by excitement and competency.

Hummon and Greene (1993) examined trout fishing in Pennsylvania. Analyzing survey data from a random sample of 1600 anglers, they found that anglers ranked the following characteristics in order of their importance to a satisfying fishing experience: 1) close to home, 2) nice environment, 3) special waters--clean water or good fishing holes, 4) uncrowded, 5) catch trout, and 6) stocked trout. Furthermore, angler’s who fish for “anything that bites” fish mainly to get out in the environment or to spend time with their children.

In 1997 survey (Heberling 1997), Pennsylvania anglers provide three factors important to their choice of a fishing site. Nearly 60% of the respondents feel peace and quiet is a prominent factor. Over half (55%) think being in an uncongested environment is an important characteristic. The third most chosen factor is type of fish with more than 45% choosing it. Number of fish caught (39%) and nice scenery (35%) are the next important factors.

A common finding, then, is that number of fish caught does contribute to fishing satisfaction, but is a less important determinant than other factors such as the physical setting of the fishing experience and social factors.

V. What Factors Influence License Sales?

A. Prior Studies

Previous studies on factors affecting fishing participation and license sales are scant. Hence there is a great deal of speculation on the cause of the drops in fishing numbers seen since 1995. Four recent studies have direct implications for Pennsylvania. Two of these studies focused on the impact of license price on participation, the other two focused on the impact of stocking levels.

Teisl et al. (1999), in a study of anglers in New England, found that a one percent increase in the resident fishing license price will lead to a 0.05 percent decrease in resident license sales, while a one percent increase in nonresident fees will lead to a 2.83 percent decrease in sales. Sutton et al. (2001) found that an 18% increase in license price to a unique fishing spot in Texas will lead to a 10% drop in sales, implying a 0.55% drop per 1% increase in license price. This latter result must be interpreted with caution, since it involved purchase of a special permit to fish in one specific area, not a statewide license.
Loomis (1999) found no statistical relationship between stocking levels and statewide license sales in California. Likewise, Loomis and Fix (1998) found no statistical relationship between statewide license sales and stocking levels in Colorado. Loomis and Fix did find, however, that intra-state regional differences in stocking levels were related to regional differences in fishing activity, as measured by angler days. Whether this relationship is the result of an inducement effect, where anglers in a region with higher stocking levels are induced to fish more frequently, by an attraction effect, where anglers travel to regions with highest stocking levels, or to a program delivery effect, where the state conservation agency stocks more heavily in areas where more fishing occurs, is unclear. Several studies have shown that fishing sites with higher catch levels attract more angling use. What has not been demonstrated is that higher catch rates at all sites results in more license sales statewide.

Two other studies have focused on the individual decisions made by active anglers whether to continue to fish. Fedler and Ditton (2001), based on a survey of Texas anglers, found that while some half of the anglers surveyed fish consistently, year after year, the rest “drop in” and “drop out” over time. Most significantly, 25% of anglers who purchased a license in any given year were likely to not purchase a license within the next one or two subsequent years, citing time as the reason for not participating.

In a 1996 survey, inactive anglers in Pennsylvania (anglers who had fished in 1995, but who did not buy a 1996 license) were asked their reasons for not buying a license (Responsive Management 1996a). Respondents were not prompted, and could list multiple reasons. The most common reason given was a lack of free time, due to work, family or other commitments. Only 8% of inactive anglers cited license cost as a reason for not buying a license. This even though the survey was conducted in the year following an increase in fishing license fees. Even fewer inactive anglers mentioned the quantity of fish (4%) or quality of fish (2%) as reasons for not buying a license.

A national survey conducted between 1993 and 1996 (Responsive Management 1996b) also asked inactive anglers their reasons for not buying a license. Here, anglers were read a list of potential reasons, and asked how strongly each reason influenced their decision to not buy a license. Among inactive Pennsylvania anglers, the most commonly-cited factor was a loss of interest (62% said that loss of interest influenced their decision to no longer fish). Others in the top five reasons that respondents said influenced their decision included lack of free time, no one to fish with, and work and family obligations. Of particular interest to us is that 21% of the inactive anglers stated that the cost of licenses influenced their decision to no longer fish, while only 10% stated that the quantity of game fish available influenced their decision.

These two surveys taken together suggest that the typical angler who leaves the sport does so because he has lost interest, and chooses to devote his time to other activities. They both show that, of Pennsylvania anglers who have left the sport, a minority did so because of disappointment over the quality of the fish, or the cost of the license.
B. Econometric Analysis of PA data

An analysis of license sales data from Pennsylvania over the last thirty years (1970-2000) was conducted. Details are provided in an appendix to this report.

Only two categories of licenses were modeled, resident, non-senior licenses and non-resident licenses. The non-resident licenses are modeled using only data prior to 1996, when the 3- and 7-day tourist licenses were instituted.

Regression analysis gave the following results for resident license sales:

1. Price is a statistically significant determinant of license sales. A 1% increase in the real price of a license (annual resident angler license plus trout stamp price plus issuing fees) leads to a fall in license sales of approximately 0.36%.
2. The unemployment rate positively affects license sales, most likely because potential anglers have more time available to fish.
3. Number of adult trout stocked was not a significant determinant of resident license sales.
4. The background rate at which resident license sales change from year to year has become negative over time.

The following results were obtained for non-resident license sales:

1. Price is a significant determinant of non-resident license sales as well. A 1% increase in the real price of a license (annual non-resident angler license plus trout stamp price plus issuing fees) leads to a fall in license sales of approximately 0.37%.
2. Number of adult trout stocked was not a significant determinant of non-resident license sales.
3. The background rate at which non-resident license sales changes from year to year is positive, and has not changed over time.

C. Projections Of License Sales

Using the results of the econometric analysis, it is possible to project changes in license sales and revenues that would occur if license prices were increased. Projections are made for three different levels of license price increase, a $5 increase, a $10 increase, and a $15 increase, effective in the year 2003. For the analysis, it is assumed that unemployment remains at its year 2000 level, population in Pennsylvania between the ages of 16 and 64 grows at 0.25% per year (the average rate of growth from 1990 to 2000), and that inflation between 2000 and 2003 is 4%.
per year. The analysis only considers sales of resident, non-senior annual licenses and non-resident annual licenses. Resident and non-resident license sales in 2001 are assumed to be 0.25% and 4.22% higher than in 2000, respectively, based on preliminary license sales figures ending August 31, 2000.

Table 3 shows the projected changes in resident and nonresident licenses sales that can be expected absent any license price change, as well as the impact on revenues (in millions of dollars) from these two license types. The projections in Table 3 assume that license sales do not change in response to changes in trout stocking that may occur.

### Table 3. Projections of resident and non-resident license sales. (Assuming no change in license fees, and no impact of stocking decreases)

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Licenses</th>
<th>Non-resident Licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Nominal Revenues</td>
</tr>
<tr>
<td>2000</td>
<td>832,038</td>
<td>17.68</td>
</tr>
<tr>
<td>2001</td>
<td>834,118</td>
<td>17.73</td>
</tr>
<tr>
<td>2002</td>
<td>830,218</td>
<td>17.64</td>
</tr>
<tr>
<td>2003</td>
<td>824,746</td>
<td>17.53</td>
</tr>
</tbody>
</table>

The number of resident licenses is projected to decrease in 2002 and again in 2003, due mostly to the negative background rate of change.

Non-resident license sales are projected to increase each year, due to the combination of inflation (which decreases the real price of a license and stamp), and a positive background rate of change. Projections of non-resident license sales are more speculative, as the projection model is estimated based on data from years prior to 1996. It is too early to tell how non-resident license sales will change over time, now that shorter-term tourist licenses are available.

Table 4 shows projected license sales and revenues (in millions of dollars) in year 2003, with four different license price increases effective in that year. It is assumed that the price increase falls completely on the license, and that the price of a trout stamp is not affected. If a portion of the price increase falls on the trout stamp, some trout anglers may respond by quitting trout angling, but still buy a general license. To the extent that that happens, the impact of the price increase on license sales will be less than that shown in Table 4.
While increasing price does decrease participation, the proportional drop in sales is less than the proportional increase in price, and revenues are increased. Care must be taken in interpreting the projections for price increases of $10 and $15, as these price changes are larger than those included in the data set on which the analysis is based. Those projections are less reliable, with larger potential projection errors. Again, particular care must be taken when considering the projections for non-resident licenses. The relationship between non-resident license sales and price no doubt depends on whether 3- and 7-day tourist license prices change simultaneously.

Table 4. Projections of resident and non-resident license sales in 2003, for various fee increases. (Assuming no impact of stocking decreases)

<table>
<thead>
<tr>
<th>License Price Increase</th>
<th>Resident Licenses</th>
<th></th>
<th></th>
<th>Non-resident Licenses</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Nominal Revenues</td>
<td>Real Revenues</td>
<td>Number</td>
<td>Nominal Revenues</td>
<td>Real Revenues</td>
</tr>
<tr>
<td>$0</td>
<td>824,746</td>
<td>17.53</td>
<td>15.58</td>
<td>54,931</td>
<td>2.16</td>
<td>1.92</td>
</tr>
<tr>
<td>$5</td>
<td>765,401</td>
<td>20.09</td>
<td>17.86</td>
<td>51,738</td>
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<td>23.44</td>
<td>20.84</td>
<td>45,351</td>
<td>2.46</td>
<td>2.19</td>
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</table>

Our projections are consistent with the historical data. Each of the last five price increases resulted in an immediate decrease in license sales, but an increase in revenues. We project that a price increase in 2003 of the magnitude considered here would have the same effect.

VI. Results of a Survey of Pennsylvania Trout Anglers

A survey of Pennsylvania trout anglers was conducted during the first half of September, 2001. Sampling was done by pulling license application forms from the Pennsylvania Fish and Boat Commission’s storage facility. Interviewing was performed by Responsive Management, Inc. A total of 611 anglers were interviewed over the telephone. Of these, 600 held regular, annual resident licenses. The remaining 11 held senior annual resident licenses. All had purchased trout stamps for the 2001 season.

A. Characteristics of Pennsylvania Resident Trout Anglers

Frequencies of responses to several questions in the survey are shown graphically in the attached figures (Appendix 3). Below we highlight several results.

The average age of the survey respondents was 42.6 years; the median age was 42 years. Note that anglers who hold senior lifetime licenses were not included in the sample, so survey
respondents will tend to be younger than the overall population of trout anglers. The average respondent had 27.1 years of experience in trout fishing, and 93% were male.

The average respondent expects to have fished for trout on 17.1 days in 2001, though the distribution of days fished across respondents was skewed. The median angler will have fished for trout 10 days in 2001. Of all of the trout fishing effort, 10% occurred during the opening week of trout season (Saturday, April 14 to Sunday, April 22). Eight percent of anglers fished only during opening week, while 20% did not fish at all during opening week.

Most anglers (61%) fish primarily with bait, while only 16% fish primarily with flies. Most anglers (75%) fish primarily on streams and rivers. One third of all anglers (33%) stated that they fish on delayed harvest waters. Fly-fishers are much more likely to fish delayed harvest waters than anglers who typically use bait or other artificial lures. A sizeable proportion of respondents (9%) did not know whether they fish on delayed harvest waters, suggesting that at least some anglers are not always aware of the regulations in force on the waters they are fishing.

Most anglers (61%) fish primarily with bait, while only 16% fish primarily with flies. Most anglers (75%) fish primarily on streams and rivers. One third of all anglers (33%) stated that they fish on delayed harvest waters. Fly-fishers are much more likely to fish delayed harvest waters than anglers who typically use bait or other artificial lures. A sizeable proportion of respondents (9%) did not know whether they fish on delayed harvest waters, suggesting that at least some anglers are not always aware of the regulations in force on the waters they are fishing.

The median angler typically catches 3 trout over 7” in length during a day of fishing. Eight percent of anglers state that they typically do not catch any trout during a day of fishing. Most anglers believe that most (37%) or all (40%) of the trout they catch are stocked trout. Most anglers keep few (27%) or none (40%) of the trout that they catch that they can legally keep. While 36% of trout anglers prefer to catch wild trout, most anglers (56%) do not care whether they catch wild trout or stocked trout.

The majority of anglers are somewhat satisfied (40%) or very satisfied (37%) with trout fishing in Pennsylvania. The distribution of satisfaction ratings by resident anglers is very similar to that measured in a survey taken in 1996 (Responsive Management, 1996). Anglers who use flies tend to have slightly higher satisfaction ratings than anglers who use other artificial lures or bait.

B. Rate of Entry and Exit

Of anglers who purchased a resident license and trout stamp in 2001, 1.3% stated that they did not intend to purchase a license in 2002. An additional 2.6% stated that they intended to purchase a license, but not a stamp. Focusing on license sales only, this gives a year-to-year exit rate of 1.3%.

Of anglers who purchased a license and stamp in 2001, 0.8% did not purchase a license in 2000. An additional 0.3% had purchased a license in 2000, but not a trout stamp. If this rate of entry continues, the net change in license sales to trout anglers from 2001 to 2002 would be a decrease of 0.5%. This is very similar to the results of the econometric model estimated from actual license sales, which predicts a decrease in total license sales of 0.5% from 2001 to 2002.

It should be noted that these predicted rates of entry and exit are measured with low precision. The 25 respondents who stated that they planned to stop fishing for trout in 2002 were asked their reasons why. The most common reason given was poor quality of fishing. The second
most common reason was poor water quality or contaminants in the fish. Four of the 25 mentioned license cost as a factor. While the question was asked before respondents were told about planned changes in the stocking program, one angler did mention the planned decrease in stocking levels as a reason for quitting trout angling.

The remaining analyses include only those anglers who plan to fish for trout in 2002.

C. Attitudes towards management issues

Respondents were asked their preferences over several current management issues. Under the current trout stocking program, half of all available trout are stocked prior to opening day of trout season. The other half are stocked after opening day. The largest group of survey respondents preferred a change in this policy, with more trout stocked after opening day, and fewer before opening day. Even among respondents who did all of their fishing during opening week, the preference was, on balance, toward a shift toward later stocking.

Current practice also is to stock more fish in waters with good access, and fewer fish in waters with poorer access. Respondents were also asked whether they would favor changing this allocation. Most respondents thought that the current practices were about right. Of those respondents that favored a change, about the same number favored stocking more fish in waters with good access as favored stocking more fish in waters with poorer access.

A slight majority of respondents (54%) would like to see the use of artificial lures allowed on delayed harvest waters that are currently fly-fishing only. However, of the 37% that are opposed, the strength of preference tends to be strong. Not surprisingly, fly-fishers tend to be more opposed to the proposal than anglers using bait or other artificial lures. Anglers who currently use delayed harvest waters also tend to be more opposed to the proposal. This result is not surprising, given that current users of delayed harvest waters tend to be fly fishers.

D. Impact of Reductions in Trout Stocking

Respondents were told that fewer trout will be stocked in 2002 than in 2001. Forty-three percent of respondents stated that they were already aware of this change. Fly-fishers were more likely to be aware of the planned reduction than anglers who use other artificial lures or bait. Still, recall that only one respondent claimed that he planned to stop fishing for trout as a consequence of the planned reduction in stocking levels.

Respondents were asked to imagine that the reduction in number of trout stocked would be one of three levels: 10%, 30%, and 50%. Each respondent was randomly assigned one reduction level. (Later in the interview, respondents were told that the actual planned reduction is 28%.)
D.1. Impact on Enjoyment and Satisfaction

Respondents were asked whether the specified reduction in the number of trout stocked would make trout fishing more enjoyable or less enjoyable for them. At all three stocking reduction levels, the most common response was that the decrease would have no impact on enjoyment from trout fishing. Of those who stated that their enjoyment would be impacted, far more said that the reduction would decrease their enjoyment than increase it. On balance, then, a reduction in stocking levels would reduce enjoyment from trout fishing for the average trout angler. Still, a few (28) respondents stated that a reduction in trout stocking would make trout fishing more enjoyable. The most common reason given was that the reduction would make trout fishing more challenging.

Similarly, a reduction in trout stocking would decrease the overall level of satisfaction with trout fishing in Pennsylvania. Of respondents who rated their satisfaction level both at current stocking levels and at a reduced stocking level, the reduction in stocking would decrease satisfaction for 51% of respondents, would have no impact for 43% of respondents, and would increase satisfaction for 6% of respondents.

A reduction in trout stocking would also impact the number of days anglers would fish for trout. Absent any change in stocking, anglers as a group expected to fish more often in 2002 than they have in 2001. Such expectations may tend to be overly optimistic, as they do not include the influence of unforeseen events. However, anglers are clearly less optimistic about the frequency of angling if stocking levels are lower in 2002 than in 2001. While we cannot project how many fewer angler days will occur if trout stocking levels decline, we can expect a decline in angling activity related to reduced stocking.

D.2. Impact on license sales

Respondents were asked whether they still would buy a license and stamp in 2002, if stocking levels were reduced by the specified amount. Of respondents who were told that stocking would decrease by 10%, 5% said that they would no longer buy a trout stamp, and an additional 1% said that they would no longer buy a fishing license at all. Larger decreases in stocking levels (30% and 50%) resulted in larger rates of drop-outs, though there were not important differences between the 30% group and the 50% group. Our best prediction of the impact of a 28% reduction in the number of trout stocked is then the combined responses of the 30% group and the 50% group, giving a predicted 3.7% decrease in license sales and a 12.5% decrease in trout stamp sales (3.7% who no longer buy any license plus 8.8% who buy only a license but no stamp).

These dropout rates can be used to predict the impact on license sales from the expected decrease in stocking. There were 689,494 trout anglers who bought stamps in the year 2000. The August, 2001 sales report shows that trout stamps sales are 1.16% higher in 2001 than in 2000. If that trend continues, then a total of 697,492 trout stamps will be sold in 2001. If we further assume that other categories of anglers react to changes in the trout stocking program in the same way as
resident anglers, then a 28% decrease in the number of trout stocked will result in 25,807 fewer licenses (all types) sold in 2002 than in 2001, and 87,188 fewer trout stamps.

D.3. **Comparison of Econometric Analysis and Survey Results**

How do we reconcile this projection with the results of the econometric analysis, which showed no relationship between resident license sales and the level of trout stocking? In the year 2000, 87.8% of all licenses sold were regular resident annual licenses. It is reasonable to expect, then, that 87.8% of the 25,807 fewer licenses predicted by the survey results, or 22,658 licenses would be resident annual licenses. In contrast, an econometric analysis that includes trout stocking levels as an explanatory variable predicts essentially no change in license sales as a result of a 28% decrease in stocking levels. However, both estimates have uncertainty associated with them. Figure 6 shows the 95% confidence interval associated with each estimate. The upper limit of a two-tailed 95% confidence interval on the projection based on the econometric analysis is 22,547 licenses, very close to the projection based on the survey responses. While the projections based on the survey responses has less uncertainty associated with it than the projection based on the econometric analysis, it still has some, due to random sampling variability. A 95% confidence interval on the survey-based projections has a lower limit of 11,011 and an upper limit of 34,304. The difference between the two projections (22,658 from the survey responses, essentially 0 from the econometric analysis) is therefore not statistically significant, due mostly to the high level of uncertainty associated with the projections of the econometric analysis. Thirty years of data does not include enough variation in stocking levels and license sales to reliably measure the relationship between the two.

![Figure 6. Projected decline in license sales due to stocking decrease](image)
One must still ask the question whether the survey results accurately predict behavior. Previous research on the predictive reliability of surveys of intended behavior shows that, to the extent that survey responses are biased, they tend to be biased toward overprediction of changes in behavior. In the current situation, this means that if the survey projections are biased, they are biased toward predicting a larger decrease in license sales than will actually occur. The survey-based projection of 25,807 fewer total licenses and 87,188 fewer trout stamps should therefore be viewed as upper-bound estimates.

E. Attitudes towards a license price increase to maintain stocking levels

After considering how they would react to a hypothetical decrease in stocking levels in 2002, respondents were told that stocking levels would actually decrease by 28% between 2001 and 2002, to 3.8 million trout per year. Respondents were then told that stocking levels could decrease even further in following years, unless significant expenditures were made to upgrade fish production facilities, to be funded by an increase in the price of a fishing license and trout stamp. Respondents were told that trout production would fall a further 10%, 20%, or 30% after 2002, unless license prices were increased by either $5, $10, or $15. Each respondent was told one potential stocking reduction level and one price increase, which were each randomly assigned.

Respondents were thus faced with a choice between two possible futures. In one scenario, the total price of a license and trout stamp would be higher than it currently is, and the number of trout stocked would be maintained at 3.8 million per year. In the other scenario, the price would stay at current levels, but the number of trout stocked would decline. Respondents were asked whether they would support or oppose the price increase, if it would prevent the potential stocking reduction. Fifty one respondents (8.7%) did not state a preference. Twenty respondents stated a preference, but indicated in a follow-up question that they did not understand the question being asked, or did not accept some of the assumptions underlying the question. These statements are evidence of “scenario rejection,” where the respondent does not accept some aspect of the question. As is standard practice in stated preference research, these 20 responses were omitted from the analysis.

For the remaining 515 respondents, the symbols in Figure 7 shows the proportion that favored the price increase for each combination of price increase size and potential stocking decrease. Between 18% and 55% of respondents supported the price increase, depending on the size of the price increase and the size of the potential stocking reduction. The most common reasons for opposing the price increase (preferring the stocking decrease) were 1) a perception that the price increase was unfair, 2) indifference to the number of trout stocked, 3) the opinion that avoiding the potential stocking decrease was not worth the money being asked, and 4) inability to pay the price increase.
Factors influencing preference toward the price increase were investigated using logistic regression (see appendix 2). The regression showed that support for the price increase was significantly more likely if 1) the price increase was low, 2) the potential stocking reduction (e.g. the decrease in stocking that will occur if price is not increased) was high, 3) the respondent fished more often, and 4) the respondent used flies as the terminal tackle. Other factors that were found to be statistically unrelated to support for the price increase included the respondent's age, experience in trout fishing, gender, or where the respondent typically fished.

A second regression allows prediction of the proportion of respondents who would support a price increase other than $5, $10, or $15. That regression generates the solid lines shown in Figure 7 for the three stocking decrease levels, though similar lines could be generated for other stocking decrease levels. From these lines, it is possible to calculate the price increase that a specified proportion of anglers would support, depending on the size of the potential decrease in stocking. In Table 5, the price increase that 50% of anglers would support to maintain stocking at 2002 levels is calculated for the three stocking-decrease scenarios. A 95% confidence interval is provided for each value to reflect uncertainty due to sampling error.
The results displayed in Table 5 should be interpreted as follows: 50% of anglers would support a price increase of $4.77 to avoid a potential stocking decrease of 20% (relative to projected 2002 stocking levels). The results shown in Figure 7 and Table 5 clearly demonstrate that most anglers (over 90%) are willing to pay something to avoid further stocking decreases after 2002, and that they are willing to pay more to avoid larger decreases.

In addition to reporting whether he supported or opposed the price increase, the respondent reported how strong his preference was. There, respondents who were opposed to the price increase tended to have stronger preferences than those who supported the price increase.

F. Impact of a Price Increase on Angler Participation

Finally, regardless of whether the respondent was in favor of or opposed to the proposed price increase, he was asked whether he would still buy both a license and a trout stamp, if the price was increased by the specified amount, and the trout stocking level was maintained at 3.8 million trout per year.

The second column of Table 6 shows the proportion of respondents who stated that they would stop fishing for trout. This includes both anglers who would stop fishing altogether, and anglers who would still buy a license, but would no longer buy a trout stamp. The survey did not specify how much of the total price increase would fall on the license and how much on the trout stamp, so it is not possible to predict which action these anglers would take.

<table>
<thead>
<tr>
<th>Table 5. Price increases that 25%, 50% and 75% of anglers would support to avoid potential stocking decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Stocking Decrease</td>
</tr>
<tr>
<td>10%</td>
</tr>
<tr>
<td>20%</td>
</tr>
<tr>
<td>30%</td>
</tr>
</tbody>
</table>

(95% confidence intervals in parentheses)

Table 6. Projected decline in number of trout anglers in 2003.

<table>
<thead>
<tr>
<th>Price Increase</th>
<th>% who would not fish for trout in 2003</th>
<th>% who will not fish for trout in 2002</th>
<th>% additional decline due to price increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>19.7%</td>
<td>12.5%</td>
<td>8.2%</td>
</tr>
<tr>
<td>$10</td>
<td>31.2%</td>
<td>12.5%</td>
<td>21.4%</td>
</tr>
<tr>
<td>$15</td>
<td>35.5%</td>
<td>12.5%</td>
<td>26.3%</td>
</tr>
</tbody>
</table>
Depending on the size of the price increase, 19.7 - 35.5% of the respondents stated that they would cease trout fishing in 2003. However, these dropouts include anglers who plan to drop out already due to the reductions in stocking that will occur beginning in 2002. The net projected declines due to the price increase alone range from 8.2% to 26.3%, depending on the size of the price increase. These dropout rates are similar to, but slightly larger than, those predicted by the econometric analysis, though that analysis projected total licenses sales, while the projections in Table 6 are for total trout anglers.

The combined effect of the trout-stocking decrease that will occur in 2002 and a possible price increase in 2003 can also be calculated. Table 7 shows the projected number of trout stamps that will be sold in the years 2001 to 2003. It is assumed that 3.8 million trout are stocked in 2002 and 2003, and that fishing license and trout stamp prices increase in 2003. The decrease shown between 2001 and 2002 is due to the decrease in trout stocking. The decrease between 2002 and 2003 is due to the price increase.

<table>
<thead>
<tr>
<th>Year</th>
<th>Price Increase</th>
<th>Trout Stamps</th>
<th>% Decrease from 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>--</td>
<td>697,492</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>--</td>
<td>610,304</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>$5</td>
<td>560,086</td>
<td>8%</td>
</tr>
<tr>
<td>2003</td>
<td>$10</td>
<td>479,699</td>
<td>21%</td>
</tr>
<tr>
<td>2003</td>
<td>$15</td>
<td>449,794</td>
<td>26%</td>
</tr>
</tbody>
</table>

The projections in Table 7 are for trout stamp sales. Recall that of the 12.5% of trout anglers who stop fishing for trout between 2001 and 2002 because of the stocking decrease, most (8.7% of the 12.5%) will continue to fish for other species. It is not possible to project a similar breakout for trout anglers who stop fishing for trout in 2003 due to the price increase.

Finally, how many trout anglers would stop fishing for trout in 2003 if prices were held constant, but trout stocking decreased even more than the 28% decrease expected in 2002? The survey did not ask this question directly. However, there was very little difference in the responses of respondents who were told that trout stocking would decrease by 50% versus respondents who were told that the reduction would be 30%. The stated dropout rates were very similar for the two groups. From this we might infer that additional decreases in stocking over and above the initial 28% would have a smaller marginal effect on license and stamp sales.
References


Ford, Tom. “Where Have All the Anglers Gone?” 1997 Pennsylvania Angler and Boater. 54-57.


Appendix 1: An Econometric Analysis of License Sales in Pennsylvania

An analysis of license sales data from Pennsylvania over the last thirty years (1970-2000) was conducted. Only two categories of licenses were modeled, resident, non-senior licenses and non-resident licenses. The non-resident licenses were modeled using only data prior to 1996, when the 3- and 7- day tourist licenses were instituted. Senior annual licenses are too difficult to model, because of the attrition process as anglers buy lifetime licenses. Three- and 7- day tourist licenses are too new to model using historical data.

For resident licenses, to control for changes in population over the period, the number of licenses sold in each year was divided by the number of Pennsylvania residents between the ages of 16 and 64, generating a measure of licenses sold per capita. In 1970, this measure was 9.7%. It peaked in 1990 at 13.4%, and has since declined to 10.7%. For non-resident licenses, no adjustment for population changes was made, because of difficulty in determining the appropriate population base.

Several factors were investigated to determine whether they influenced license sales, including license price, the unemployment rate (measured as percent*100), per-capita personal income, and the number of adult trout stocked in Pennsylvania. License price includes issuing fees, as well as the cost of a trout stamp. While not all license holders purchase a trout stamp, the majority do. The unemployment rate was included because anglers have reported that the amount of free time they have is an important determinant of participation in angling.

Tests showed that the license sales time series was non-stationary, meaning that an ordinary regression of license sales on the explanatory variables could lead to spurious results. Instead, regressions were conducted using first-differenced data. That means that the dependent variable in the regressions was the absolute change in licenses sales (positive or negative) that occurred each year, relative to the year before. The explanatory variables were first-differenced as well (change in real price, change in unemployment, change in income, and change in stocking rate).

A second set of tests showed that the differenced data exhibited serial autocorrelation. An autocorrelation coefficient was therefore estimated for each regression.

**Resident Licenses**

Regression results for resident licenses are shown in Table A1. The dependent variable is the annual absolute change in resident licenses sold per capita. The regression R-square was 0.827. The regression standard error was 0.002078.
Table A1. Regression results for Resident Licenses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.002534</td>
<td>0.001254</td>
<td>2.021</td>
</tr>
<tr>
<td>Trend</td>
<td>-0.000143</td>
<td>6.69E-05</td>
<td>-2.141</td>
</tr>
<tr>
<td>Price</td>
<td>-0.001705</td>
<td>0.000134</td>
<td>-12.727</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.000992</td>
<td>0.000362</td>
<td>2.744</td>
</tr>
<tr>
<td>MA(1) Autocorr. coeff.</td>
<td>0.534152</td>
<td>0.170180</td>
<td>3.139</td>
</tr>
</tbody>
</table>

The constant term and the trend term work together to determine the background level of change in license sales. The trend term is set so that it equals 1 in 1970. Thus, in the early part of the period 1970-2000, the background trend was positive--absent any change in price or unemployment, license sales tended to increase. In later years, the background trend turns negative. In 1970, the background trend was an annual increase in licenses per capita of 0.00239, which would translate into 17,000 resident licenses. By 2000, the background trend was -0.00189, or 14,700 licenses. The switch point, where the background trend went from positive to negative, occurred in 1988.

Price is an important determinant of license sales. For each $1 increase in the real price of a fishing license, resident license sales per capita dropped by 0.001705. In 2000, when the population of Pennsylvania between the ages of 16 and 64 was 7,770,000, this would translate into a decrease of 13,250 licenses. Alternatively, a 1% increase in the real price of a fishing license would result in a 0.36% decrease in resident licenses sales.

Unemployment was also a significant determinant of license sales, with higher unemployment leading to higher license sales. The magnitude of the effect was much less than for price changes. A change in the unemployment rate from 5% to 6% would result in an increase in resident license sales of 7,700.

Neither the number of adult trout stocked nor the biomass stocked was a significant determinant of resident license sales. This non-result held regardless of whether a trend variable was included in the regression, so it cannot be attributed to colinearity with the trend variable. Nor did the result change when the regression was run with longer lags, up to a four-year lag. From the 30 years of data used for the analysis, we have no statistical evidence that stocking rate influences license sales. This is quite different from concluding that there is no relationship. Our result simply states that a relationship could not be found.

Similarly, per capita income was not a significant determinant of license sales.

Non-resident Licenses

A similar analysis was conducted for non-resident, annual licenses. The results of the regression are presented in Table A2. The dependent variable was the annual change in the total number of non-resident licenses sold. The regression R-square was 0.805. The regression standard error was 1833.05.
Table A2. Regression results for Resident Licenses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimated Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1184.8</td>
<td>368.932</td>
<td>3.211</td>
</tr>
<tr>
<td>Price</td>
<td>-718.418</td>
<td>110.429</td>
<td>-6.506</td>
</tr>
</tbody>
</table>

In this case, the trend variable was not significant, indicating that the background rate of license change has been constant, at +1184.8 licenses per year, over the period of the analysis.

In contrast to the resident license analysis, the serial correlation coefficient was not found to be significantly different from zero. Further, the unemployment rate was also a statistically insignificant factor.

As with the resident license analysis, the rate of trout stocking was not a statistically significant determinant of non-resident license sales.

Price is an important determinant of non-resident license sales. A $1 increase in the real price of a non-resident license results in a sales loss of 718.4 licenses. Using year 1995 (the last year before 3- and 7- day tourist licenses became available) as the baseline, a 1% increase in real price results in a 0.37% decrease in license sales. If we assume that the model continues to hold after 1995, and use year 2000 as the baseline, then a 1% increase in real price would result in a 0.52% decrease in license sales. The difference between 1995 and 2000 is due solely to the lower level of sales in year 2000. It is too soon to tell how the relationships between non-resident license sales and price will change now that short-term tourist licenses are available. However, it might be reasonable to guess that total sales of annual and tourist licenses will behave similarly to how annual license sales behaved prior to 1996. Thus, it is reasonable to project that a 1% increase in all non-resident license prices will result in a 0.37% decrease in total non-resident license sales, annual plus tourist.

Use of Results

Projections of the impact of a change in license prices are fairly straightforward. For non-resident licenses, the projected decrease in license sales from a projected increase in price (adjusted to year 2000 dollars) is simply 718.4 times the change in price. For resident licenses, the Pennsylvania population between the ages of 16 and 64 (which was 7,770,000 in year 2000) must be multiplied by 0.001705, and then multiplied in turn by the price change.

Care must be taken when projecting the impacts of a price change larger than any included in the data set. For both resident and non-resident licenses, the largest real price change occurred in 1974, and was $6.60 (measured in year 2000 dollars). Non-resident real prices increased by $9.42 in 1996, but that year was not included in the analysis, due to the confounding effect of the newly-introduced 3- and 7- day tourist licenses.
Appendix 2. Logistic Regression of Stated Preference Data

This appendix details the statistical analysis of responses to the question, “Which would you prefer, an increase in the price of a fishing license and trout stamp coupled with no decline in trout stocking after 2002, or no increase in price coupled with a decline in trout stocking after 2002?”

Responses, Y, were coded as “prefers price increase and maintained stocking” = 1 and “prefers no price increase and decreased stocking” = 0. The probability of a response=1 was then modeled using a log-logistic regression. The form of the log-logistic probability is given by

$$\text{Prob}(Y=1) = 1 - \frac{1}{1 + \exp[X\beta + \gamma \cdot \ln(P)]}$$

where P is the price increase, X is a vector of explanatory variables, and $\beta$ and $\gamma$ are estimated parameters, with $\beta$ a vector including an intercept term. A linear-in-price form was also estimated, but did a poorer job fitting the data, as measured by the log-likelihood statistic.

Explanatory variables in the vector X included the price increase, the potential decrease in stocking after 2002 (in percent terms), an intercept, and factors describing the respondent, including age, gender, gear used, type of water fished, number of days fished, catch, and proportion of catch kept. Of the angler descriptors investigated, only number of days fished and gear used were significantly related to the preference response. Results of the log-logistic regression are presented in Table A3.

<table>
<thead>
<tr>
<th>Table A3. Log-logistic regression results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>ln(Price Inc)</td>
</tr>
<tr>
<td>stock decrease</td>
</tr>
<tr>
<td>Fly Fisher</td>
</tr>
<tr>
<td>Days Fished</td>
</tr>
</tbody>
</table>

All parameter estimates are significantly different from zero, except the intercept. As price increases, the probability of preferring the price increase decreases. As the potential decrease in stocking increases, the probability of preferring the price increase increases. Fly fishers are more likely to prefer the price increase, and anglers who fish more often are more likely to prefer a price increase.

In addition to exploring factors that influence preferences, logistic regression can be used to predict the proportion of anglers who would support a price increase other than $5, $10, or
$15 to avoid a stocking decline other than 10%, 20%, or 30%. A second regression was estimated using only intercept, ln(Price Inc), and the potential stocking decrease as explanatory variables. Here, the 4.6% of respondents who stated that they would actually prefer fewer fish were treated separately in the analysis, and assumed to always be opposed to the price increase. The result is a spike model, with a discrete portion accounting for 4.6% of the distribution, and a continuous portion covering the rest. The combined model generates an estimate of the proportion of anglers who would support the price increase given by

$$\text{Proportion Support} = (1 - 0.046) \times \left(1 - \frac{1}{1 + \exp[\alpha + \beta + \gamma \cdot \ln(P)]}\right)$$

where $\alpha$, $\beta$, and $\gamma$ are the estimated coefficients on the intercept, the decrease in stocking, and the natural log of the price increase, respectively. The results of this regression are presented in Table A4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.1211</td>
<td>0.5270</td>
</tr>
<tr>
<td>ln(Price Inc)</td>
<td>-1.0464</td>
<td>0.2145</td>
</tr>
<tr>
<td>stock decrease</td>
<td>3.0430</td>
<td>1.2070</td>
</tr>
</tbody>
</table>

These parameter estimates are used to generate both the solid lines shown in Figure 7, and the price increases shown in Table 5.
Appendix 3. Graphs based survey responses of 611 trout anglers

A1. May I ask your age? (Q58)

Median = 42
Mean = 42.6
A2. How many years experience do you have fishing for trout? (Q52)

Median = 27  
Mean = 27.1
A3. What is the Respondent's Gender? (Q60)

- Male: 93%
- Female: 7%

Percent of All Respondents (n=611)
A4. How many total days will you fish this year (2001)? (Q8, Q10)

Median = 10 days
Mean = 17.1 days
A5. What percent of each angler's effort occurred during opening week? (Q8, Q9, Q10)

10.0% of all effort occurred during opening week
A6. When you fish for trout, which terminal tackle do you usually use? (Q12)

- Flies: 16%
- Other Artificial Lures: 22%
- Bait: 61%
- Don't Know: 3%

Percent of All Respondents (n=611)
A7. When you fish for trout, do you usually fish at a lake or at a stream or river? (Q11)

- Lake: 15%
- Stream or River: 75%
- Both about equally: 9%
- Don't Know: 1%

Percent of All Respondents (n=611)
A8. Do you fish delayed harvest waters? (Q17)

- Yes: 33%
- No: 59%
- Don't Know: 9%

Percent of All Respondents (n=611)
A9. Do you fish delayed harvest waters? (By Terminal Tackle) (Q17, Q12)

- **Yes**: 74% (36% Flies, 20% Other Artificial Lures, 10% Bait)
- **No**: 70% (56% Flies, 21% Other Artificial Lures, 8% Bait)
- **Dont Know**: 4% (10% Flies, 8% Other Artificial Lures, 10% Bait)

Percent of All Respondents (Total n=594)
A10. How many trout over 7” long do you typically catch, per day? (Q13)

Median # trout caught per day=3
A11. Of the trout you catch, how many are stocked? (Q15)

- All of them: 40%
- Most of them: 37%
- About half of them: 10%
- A few of them: 4%
- None of them: 3%
- Don't Know: 5%
A12. Of the trout you catch that you can legally keep, how many do you keep? (Q14)

- All of them: 16%
- Most of them: 7%
- About half of them: 9%
- A few of them: 27%
- None of them: 40%
- Don't Know: 2%

Percent of All Respondents (n=564)
A13. Do you prefer to catch wild trout, stocked trout, or do you not care? (Q16)

- Prefer Wild Trout: 36%
- Prefer Stocked Trout: 6%
- Do Not Care: 56%
- Don't Know: 2%
A14. How satisfied or dissatisfied are you with trout fishing in Pennsylvania? (Q18)
A15. How satisfied or dissatisfied are you with trout fishing in Pennsylvania? (Q18, Q12) (By Terminal Tackle)

- Very Satisfied: 45%
- Somewhat Satisfied: 42%
- Neither Satisfied nor Dissatisfied: 41%
- Somewhat Dissatisfied: 10%
- Very Dissatisfied: 6%
- Don't Know: 7%

Percent of All Respondents (Total n=594)
A16. Do you think you will buy a fishing license and trout stamp next year (2002)? (Q19, Q20)

- License and Stamp: 95.9%
- License Only: 2.6%
- Neither: 1.3%
- Don't Know: 0.2%

Percent of All Respondents (n=611)
A17. Why will you not buy a license and stamp next year? (Q22)

- Don’t have time to go fishing: 3 respondents
- Other hobbies/interests I’d rather do: 1 respondent
- Lost interest in fishing: 0 respondents
- Moving: 0 respondents
- Cant afford/not worth cost of fishing: 4 respondents
- Cant afford/not worth cost of license/stamp: 4 respondents
- Quality of fishing not good enough: 8 respondents
- Contaminants in fish/water quality: 6 respondents
- Fishing areas too crowded: 1 respondent
- Lack of access to fishing areas: 0 respondents
- Fishing regulations too complicated: 1 respondent
- Fewer stocked trout next year: 1 respondent
- No answer/Don’t know: 1 respondent
- Other reasons: 7 respondents

Number of Respondents Who Will Stop Buying License and Stamp Who Mentioned Reason (n=25)
A18. Did you buy a fishing license and trout stamp last year (2000)? (Q54, Q54)

- License and Stamp: 97.5%
- License Only: 0.3%
- Neither: 0.8%
- Don't Know: 1.3%
A19. Would you prefer that more than half of the trout to be stocked be stocked before opening day, and fewer than half after, half before opening day and half after, or fewer than half after opening day and more than half after? (Q38)
A20. Would you prefer that more than half of the trout be stocked before opening day, and fewer than half after, half before and half after, or fewer than half before and more than half after? (By First Week Effort) (Q38, Q8, Q9, Q10)
A21. Current FBC practice is to stock more trout in waters with good access, and fewer in waters with poor access. Should the FBC stock even more in waters with good access and even fewer in waters with poor access, or vice versa? (Q39)

- More in Waters with Good Access: 20%
- Same as Now: 53%
- More in Waters with Poor Access: 24%
- None of These: 1%
- Don't Know: 2%

Percent of All Respondents Who Will Fish in 2002 (n=586)
A22. Do you support or oppose allowing the use of artificial lures on delayed harvest waters that are currently fly-fishing only? (Q40)

- Strongly Support: 24%
- Moderately Support: 30%
- Neither Support or Oppose: 5%
- Moderately Oppose: 14%
- Strongly Oppose: 23%
- Don't Know: 4%

Percent of All Respondents Who Will Fish in 2002 (n=586)
A23. Do you support or oppose allowing the use of artificial lures on delayed harvest waters that are currently fly-fishing only? (By Terminal Tackle) (Q40, Q12)

Percent of All Respondents Who Will Fish in 2002 (n=569)

- Strongly Support: 10% Flies, 25% Other Artificial Lures, 32% Bait
- Moderately Support: 17% Flies, 31% Other Artificial Lures, 34% Bait
- Neither Support or Oppose: 2% Flies, 8% Other Artificial Lures, 6% Bait
- Moderately Oppose: 11% Flies, 14% Other Artificial Lures, 15% Bait
- Strongly Oppose: 1% Flies, 14% Other Artificial Lures, 15% Bait
- Don't Know: 2% Flies, 6% Other Artificial Lures, 6% Bait
A24. Do you support or oppose allowing the use of artificial lures on delayed harvest waters that are currently fly-fishing only? (By Delayed Harvest Use) (Q40, Q17)

- **Strongly Support**: 28% use, 22% do not use, 2% neither support or oppose, 11% moderately support, 4% moderately oppose, 16% strongly oppose, 1% don't know.
- **Moderately Support**: 35% use, 28% do not use, 7% neither support or oppose, 8% moderately oppose, 16% strongly oppose, 3% don't know.
- **Neither Support or Oppose**: 22% use, 22% do not use, 8% neither support or oppose, 3% moderately oppose, 11% strongly oppose, 3% don't know.
- **Moderately Oppose**: 16% use, 18% do not use, 4% neither support or oppose, 8% moderately support, 11% strongly support, 7% don't know.
- **Strongly Oppose**: 36% use, 18% do not use, 4% neither support or oppose, 16% moderately support, 11% moderately oppose, 3% don't know.
- **Don't Know**: 18% use, 18% do not use, 4% neither support or oppose, 11% strongly support, 22% moderately support, 7% moderately oppose.
A25. Are you aware that fewer trout will be stocked next year than this year? (Q25)

- Yes: 43%
- No: 57%
- Don't Know: 1%

Percent of All Respondents (n=586)
A26. Are you aware that fewer trout will be stocked next year than this year?
(By Terminal Tackle) (Q25, Q12)

Yes

No

Dont Know

Percent of All Respondents (Total n=569)

Yes: 60%
No: 40%
Dont Know: 1%

Flies
Other Artificial Lures
Bait
A27. Would a reduction in the number of trout stocked make trout fishing more enjoyable, less enjoyable, or have no impact on the enjoyment that you get from trout fishing?  (Q28)
A28. Why would a decrease in the number of trout stocked increase the enjoyment you get from trout fishing? (Q30)

- Allow larger wild trout population: 4
- Fewer fishermen/less crowding: 8
- Fishing would be more challenging: 13
- Less environmental impact from hatcheries: 3
A29. If the number of trout stocked in 2002 was reduced by X%, how satisfied would you be with trout fishing in Pennsylvania? (Q37, Q18)

<table>
<thead>
<tr>
<th>Satisfaction Level</th>
<th>Current Year</th>
<th>10% Reduction</th>
<th>30% Reduction</th>
<th>50% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Satisfied</td>
<td>37%</td>
<td>19%</td>
<td>20%</td>
<td>23%</td>
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<td>40%</td>
<td>17%</td>
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<td>36%</td>
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<td>7%</td>
<td>12%</td>
<td>9%</td>
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<tr>
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<td>21%</td>
<td>9%</td>
<td>25%</td>
<td>17%</td>
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<tr>
<td>Very Dissatisfied</td>
<td>17%</td>
<td>8%</td>
<td>13%</td>
<td>17%</td>
</tr>
<tr>
<td>Don't Know</td>
<td>9%</td>
<td>8%</td>
<td>7%</td>
<td>4%</td>
</tr>
</tbody>
</table>
A30. If the number of trout stocked in 2002 was reduced by X%, would you go fishing more often or less often than in 2001? (Q34, Q24)

More Often
- No Reduction: 17%
- 10% Reduction: 14%
- 30% Reduction: 15%
- 50% Reduction: 37%

About the Same Number of Times
- No Reduction: 58%
- 10% Reduction: 79%
- 30% Reduction: 78%
- 50% Reduction: 71%

Less Often
- No Reduction: 2%
- 10% Reduction: 3%
- 30% Reduction: 7%
- 50% Reduction: 11%

Dont Know
- No Reduction: 4%
- 10% Reduction: 1%
- 30% Reduction: 1%
- 50% Reduction: 3%
A31. Would you still buy a license and trout stamp if the number of trout stocked was reduced by X%? (Q32, Q33)

Percent of All Respondents Who Will Fish in 2002 (n=586)

- License and Stamp: 93%
- License only: 5% (9%)
- Neither: 1% (4%)
- Don't Know: 0% (1%)

Options for percentage reduction of trout stocked:
- 10% Fewer Trout Stocked
- 30% Fewer Trout
- 50% Fewer Trout
A32. Why do you oppose a license price increase to maintain stocking? (check all that apply) (Q48)

- I don't care how many trout are stocked
- I personally would prefer to see fewer trout stocked
- Maintaining stocking at its current level isn't worth the $$
- Cant afford to pay price increase
- Concern for other anglers
- Price increase is unfair
- Price is already too high
- Raising price will reduce revenues due to dropouts*
- Commission should get money somewhere else/already collects enough money*
- Didnt Understand Choice*

* scenario rejection response - omitted from analysis

Number of Respondents Mentioning Reason (n=349)
A33. How strong is your preference in favor of or against a program that would raise the price of a license and stamp in order to maintain stocking at 2002 levels? (Q45, Q46)

Very Strong Preference (5) - 35% Support, 51% Oppose

(4) - 28% Support, 20% Oppose

(3) - 24% Support, 21% Oppose

(2) - 7% Support, 4% Oppose

Not Very Strong (1) - 4% Support, 2% Oppose

Dont Know - 2% Support, 2% Oppose

All Respondents Who Will Fish in 2002 (n=535)
1. PRESS RETURN WHEN INTERVIEW BEGINS

START

TIMER STARTS AFTER THIS SCREEN

2. Time when interview began

|_|_|_|_|_|

TIME1 1:1-5

3. Hello, may I please speak with (NAME FROM CALLSHEET).
My name is ____________, and I'm calling on behalf of The Pennsylvania Fish and Boat Commission to ask you some questions about trout fishing. We are not selling anything and the survey will just take a few minutes. Your answers will help The Commission make important decisions regarding the management of the state's trout waters and your responses will be kept strictly confidential. Will you help us out by doing the survey?

CONPER 1:6-7

(CHECK ONLY ONE ANSWER)

| | 1. Correct person, good time to do survey (GO TO QUESTION 5)
| | 2. Bad time/schedule recall (CB - do not save) (GO TO QUESTION 4)
| | 3. AM, NA, BZ (do not save)
| | 4. TM
| | 5. RF
| | 6. NE
| | 7. DS
| | 8. BG
| | 9. DL
| | 10. Bad Number (missing digit, begins with zero, etc.)

SKIP TO QUESTION 65

=================================

4. When would be the best time for me to call back?
Thank you for your time.

WHENCALL

ENTER DAY AND TIME ON CALLSHEET (CB)

SKIP TO QUESTION 65

=================================
5. First, have you purchased a Pennsylvania fishing license for this year?  

(CHECK ONLY ONE ANSWER)  

|   | 1. Invalid answer. Select another. (GO TO QUESTION 5)  
|   | 2. Yes (GO TO QUESTION 6)  
|   | 3. No  
|   | 4. Don't know  

SKIP TO QUESTION 7  

===========================================================  

6. And have you purchased a Pennsylvania trout stamp for this year?  

(CHECK ONLY ONE ANSWER)  

|   | 1. Invalid answer. Select another. (GO TO QUESTION 6)  
|   | 2. Yes (GO TO QUESTION 8)  
|   | 3. No  
|   | 4. Don't know  

7. Sorry, but right now we are only interviewing those individuals that have purchased a Pennsylvania license and trout stamp for this year. However, we do appreciate your time and cooperation.  

PRESS ENTER TO CONTINUE  

SKIP TO QUESTION 65  

===========================================================  

8. So far this year, from January 1st until now, on about how many separate days have you gone fishing for trout in Pennsylvania?  

(ENTER 999 FOR DON'T KNOW)  

|   |   |   | days  

IF (#8 = 0) GO TO #10  

9. And how many of those days were during the first week of trout season (that is Saturday, April 14th through Sunday, April 22nd)?  

(ENTER 999 FOR DON'T KNOW)  

|   |   |   | days  


10. From now until the end of 2001, how many days do you expect to go fishing for trout in Pennsylvania? (ENTER 999 FOR DON'T KNOW) MOREDAYS 1:16-18

|__|__|__| days

11. When you fish for trout, do you usually fish at a lake or at a stream or river? (READ LIST; CHECK ONLY ONE ANSWER) WHEREFSH 1:19

(CHECK ONLY ONE ANSWER)

|__| 1. Invalid answer. Select another. (GO TO QUESTION 11)
|__| 2. Lake
|__| 3. Stream or river
|__| 4. DNR: Both about equally
|__| 5. Don't know

12. When you fish for trout, which of the following terminal tackle do you most often use? (READ LIST; CHECK ONLY ONE ANSWER) GEAR 1:20

(CHECK ONLY ONE ANSWER)

|__| 1. Invalid answer. Select another. (GO TO QUESTION 12)
|__| 2. Flies
|__| 3. Other artificial lures
|__| 4. Bait
|__| 5. DNR: Don't know

13. When you fish for trout, how many trout over seven inches long do you typically catch, per day? (ENTER 999 FOR DON'T KNOW) NUMCATCH 1:21-23

|__|__|__| trout

IF (#13 = 0) GO TO #16
14. Of the trout you catch that you could legally keep, how many do you keep? Would you say you keep...? (READ SCALE AS NECESSARY; PROMPT FOR DEGREE)

(CHECK ONLY ONE ANSWER)

___ 1. Invalid answer. Select another. (GO TO QUESTION 14)
___ 2. All of the trout you catch
___ 3. Most of them
___ 4. About half of them
___ 5. A few of them
___ 6. None of the trout you catch
___ 7. Don't know

15. Of the trout you catch, how many are stocked trout? Would you say...? (READ SCALE AS NECESSARY; PROMPT FOR DEGREE)

(NUMSTCKD 1:25)

(CHECK ONLY ONE ANSWER)

___ 1. Invalid answer. Select another. (GO TO QUESTION 15)
___ 2. All of the trout you catch are stocked
___ 3. Most of them are stocked
___ 4. About half of them are stocked
___ 5. A few of them are stocked
___ 6. None of the trout you catch are stocked
___ 7. Don't know

16. Do you prefer catching wild trout, catching stocked trout, or do you not care whether the fish you catch are wild or stocked trout? (READ LIST AS NECESSARY)

(PREFER 1:26)

(CHECK ONLY ONE ANSWER)

___ 1. Invalid answer. Select another. (GO TO QUESTION 16)
___ 2. Prefer wild trout
___ 3. Prefer stocked trout
___ 4. Do not care
___ 5. Don't know
17. Do you fish delayed harvest waters?  
(CHECK ONLY ONE ANSWER)  
___  1. Invalid answer. Select another. (GO TO QUESTION 17)  
___  2. Yes  
___  3. No  
___  4. Don't know  

18. How satisfied or dissatisfied are you with trout fishing in Pennsylvania? (READ SCALE AS NECESSARY; PROMPT FOR DEGREE)  
(TROUTSAT 1:28)  
(CHECK ONLY ONE ANSWER)  
___  1. Invalid answer. Select another. (GO TO QUESTION 18)  
___  2. Very satisfied  
___  3. Somewhat satisfied  
___  4. Neither satisfied nor dissatisfied  
___  5. Somewhat dissatisfied  
___  6. Very dissatisfied  
___  7. Don't know  

19. Do you think that you will buy a fishing license and trout stamp next year? If you are not sure, please give me your best guess.  
(NEXTYEAR 1:29)  
(CHECK ONLY ONE ANSWER)  
___  1. Invalid answer. Select another. (GO TO QUESTION 19)  
___  2. Yes (GO TO QUESTION 24)  
___  3. No  

20. Do you think that you will buy a fishing license without a trout stamp?  
(NOSTAMP 1:30)  
(CHECK ONLY ONE ANSWER)  
___  1. Invalid answer. Select another. (GO TO QUESTION 20)  
___  2. Yes  
___  3. No  
___  4. Don't know  
SKIP TO QUESTION 22  
===========================================================
21. YOU DID NOT USE
YOUR SPACE BAR
NOSPAC1
PRESS ENTER TO TRY AGAIN

22. What is the most important reason why you will not
buy both a license and a trout stamp next year?
(DNR LIST; CHECK ALL THAT APPLY)
Nobby 1:31-44
(CHECK ALL THAT APPLY)

| 1. Don't have time to go fishing (work, school, etc.)
| 2. Have other hobbies/interests that I'd rather do
| 3. Just not interested in it anymore
| 4. Moving
| 5. Can't afford it/not worth the cost of fishing
| 6. Can't afford it/not worth the cost of license and stamp
| 7. Quality of fishing is not good enough
| 8. Contaminants in the fish/water quality is poor
| 9. Fishing areas are too crowded
| 10. Lack of access to fishing areas
| 11. Fishing regulations too complicated
| 12. Fewer stocked trout next year
| 13. Don't know
| 14. Other

IF (#22 = 0) GO TO #21
IF (#22 @ 14) GO TO #23

SKIP TO QUESTION 51
=====================================================================

23. ENTER OTHER REASON FOR NOT PURCHASING A LICENSE AND TROUT STAMP.
(IN FIRST PERSON; 120 CHAR.)
Nobuy 2:1-120

___________________________________________________________
___________________________________________________________
___________________________________________________________

SKIP TO QUESTION 51
=====================================================================
24. Do you expect that next year you will fish for trout more often, less often or about the same number of times as this year?  

\[\text{WILLFISH 3:1}\]  

(CHECK ONLY ONE ANSWER)  

__ 1. Invalid answer. Select another. (GO TO QUESTION 24)  
__ 2. More often  
__ 3. About the same number of times  
__ 4. Less often  
__ 5. Don't know  

25. You may have heard that the Fish and Boat Commission must close one of its trout hatcheries, and reduce production at others, in order to meet water quality regulations imposed by the Pennsylvania Department of Environmental Protection. This means that the Fish and Boat Commission will not be able to produce as many trout for stocking as it has in the past. 

Were you aware that fewer trout will be stocked next year than this year?  

\[\text{AWARE 3:2}\]  

(CHECK ONLY ONE ANSWER)  

__ 1. Invalid answer. Select another. (GO TO QUESTION 25)  
__ 2. Yes  
__ 3. No  
__ 4. Don't know  

26. RANDOMIZATION FOR % REDUCTION IN HATCHERY PRODUCTION  

\[\text{REDUCTN 3:3}\]  

(CHECK ONLY ONE ANSWER)  

__ 1. 10%  
__ 2. 30%  
__ 3. 50%
27. For the next few questions, I want you to imagine that the Fish and Boat Commission stocks 26 fewer trout in 2002 than in 2001. The actual decrease may end up being larger or smaller, but for the purpose of this survey, I want you to assume that 26 fewer trout will be stocked next year.

The reductions in stocking will be spread out over the entire state. Some streams and lakes will have a stocking program similar to past years, but most stocked waters will receive fewer trout overall. Some waters that are currently stocked will be removed from the stocking program. These will tend to be waters that have poorer water quality, or are posted, or receive little fishing use. Also, some stream sections that support substantial wild trout populations will be stocked less than in the past. As in past years, about half of the trout will be stocked prior to opening day, and the other half will be stocked after opening day.

ASSUME

PRESS ENTER TO CONTINUE

28. For you personally, would a 26 decrease in the number of trout stocked make trout fishing in Pennsylvania more enjoyable, less enjoyable, or have no impact on the enjoyment you get out of trout fishing in Pennsylvania?

(CHECK ONLY ONE ANSWER)

__ 1. Invalid answer. Select another. (GO TO QUESTION 28)
__ 2. More enjoyable (GO TO QUESTION 30)
__ 3. Less enjoyable
__ 4. No impact
__ 5. Don't know

SKIP TO QUESTION 32

==================================================================

29. YOU DID NOT USE YOUR SPACE BAR

NOSPAC2

PRESS ENTER TO TRY AGAIN
30. Why do you feel that a decrease in the number of trout stocked would make trout fishing more enjoyable for you? (DNR LIST; CHECK ALL THAT APPLY)  
WHYENJ 3:5-10  
(CHECK ALL THAT APPLY)  
|___| 1. Would allow larger wild trout population  
|___| 2. Fewer fishermen/less crowding  
|___| 3. Fishing would be more challenging  
|___| 4. Less environmental impact from hatcheries  
|___| 5. Don't know  
|___| 6. Other  
IF (#30 = 0) GO TO #29  
IF (#30 @ 6) GO TO #31  
SKIP TO QUESTION 32  
===========================================================  
31. ENTER OTHER REASON FOR INCREASED ENJOYMENT.  
(IN FIRST PERSON; 120 CHAR.)  
WHYENJST 4:1-120  
_________________________  
_________________________  
_________________________  
32. Suppose that #26 fewer trout are going to be stocked next year than this year. Would you still buy both a fishing license and a trout stamp for 2002?  
BUY2002 5:1  
(CHECK ONLY ONE ANSWER)  
|___| 1. Invalid answer. Select another. (GO TO QUESTION 32)  
|___| 2. Yes (GO TO QUESTION 34)  
|___| 3. No  
|___| 4. Don't know
33. Would you buy a fishing license without a trout stamp?

(CHECK ONLY ONE ANSWER)

|__| 1. Invalid answer. Select another. (GO TO QUESTION 33)
|__| 2. Yes
|__| 3. No
|__| 4. Don't know

SKIP TO QUESTION 38

34. If you do buy a fishing license and stamp for 2002, and 26 fewer trout are stocked, will you go fishing more often than in 2001, less often, or about the same number of times?

(READ LIST AS NECESSARY)

(CHECK ONLY ONE ANSWER)

|__| 1. Invalid answer. Select another. (GO TO QUESTION 34)
|__| 2. More often (GO TO QUESTION 36)
|__| 3. About the same number of times
|__| 4. Less often (GO TO QUESTION 35)
|__| 5. Don't know

SKIP TO QUESTION 37

35. Assuming that 26 fewer trout are stocked in 2002, please tell me about how much less you would go fishing in 2002 compared to 2001? Please express this as a percent of how much you expect to fish in 2001 (e.g. 25% less, 50% less, 75% less).

(ENTER 999 FOR DON'T KNOW)

|__|__|__|%

SKIP TO QUESTION 37

36. Assuming that 26 fewer trout are stocked in 2002, please tell me about how much more you would go fishing in 2002 compared to 2001? Please express this as a percent of how much you expect to fish in 2001 (e.g. 25% more, 50% more, 75% more).

(ENTER 999 FOR DON'T KNOW)

|__|__|__|%
37. If #26 fewer trout were stocked in 2002 than are currently being stocked, how satisfied or dissatisfied would you be with trout fishing in Pennsylvania?  
(READ SCALE AS NECESSARY; PROMPT FOR DEGREE)  
SAT2002 5:10  
(CHECK ONLY ONE ANSWER)  

<table>
<thead>
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<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 37)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2. Very satisfied</td>
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<tr>
<td></td>
<td>3. Somewhat satisfied</td>
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<td></td>
<td>4. Neither satisfied nor dissatisfied</td>
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<td>5. Somewhat dissatisfied</td>
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<tr>
<td></td>
<td>6. Very dissatisfied</td>
</tr>
<tr>
<td></td>
<td>7. Don't know</td>
</tr>
</tbody>
</table>

38. Next I want to ask your opinion about when and where trout are stocked in waters throughout the state. Currently, about half of the available trout are stocked before opening day. The other half are stocked at various times after opening day. Which of the following best describes your opinion about this practice?  

Do you think The Commission should stock more trout before opening day and fewer after opening day? OR do you think The Commission should stock half of the trout before opening day and half after opening day, as it has been done in the past? OR do you think The Commission should stock more trout after opening day and fewer before opening day?  
(READ LIST AS NECESSARY; CHECK ONLY ONE ANSWER)  
STCKPLAN 5:11  
(CHECK ONLY ONE ANSWER)  

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</thead>
<tbody>
<tr>
<td></td>
<td>2. The Commission should stock more before and fewer after</td>
</tr>
<tr>
<td></td>
<td>3. The Commission should stock half before and half after</td>
</tr>
<tr>
<td></td>
<td>4. The Commission should stock more after and fewer before</td>
</tr>
<tr>
<td></td>
<td>5. DNR: None of these</td>
</tr>
<tr>
<td></td>
<td>6. Don't know</td>
</tr>
</tbody>
</table>
39. Currently, waters with better public access are stocked more heavily than waters with restricted or difficult access. Which of the following statements best describes your opinion about this practice?

Do you think The Commission should stock even more trout in waters with good access and fewer trout in waters with difficult access, than they do now? OR do you think The Commission's current practice is about right? OR do you think The Commission should stock fewer trout in waters with good access and more trout in waters with difficult access than they do now?

(READ LIST AS NECESSARY; CHECK ONLY ONE ANSWER)

STCKACC 5:12

(CHECK ONLY ONE ANSWER)

<table>
<thead>
<tr>
<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 39)</th>
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<tbody>
<tr>
<td></td>
<td>2. The Commission should stock more in waters with good access</td>
</tr>
<tr>
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<td>3. The Commission's current practice is about right</td>
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<tr>
<td></td>
<td>4. The Commission should stock fewer in waters with good access</td>
</tr>
<tr>
<td></td>
<td>5. DNR: None of these</td>
</tr>
<tr>
<td></td>
<td>6. Don't know</td>
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</table>

40. Currently, there is a proposal to allow the use of artificial lures on delayed harvest waters that are currently fly-fishing only. Would you support or oppose this proposal?

(READ SCALE AS NECESSARY; PROMPT FOR DEGREE)

USELURES 5:13

(CHECK ONLY ONE ANSWER)

<table>
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<th>1. Invalid answer. Select another. (GO TO QUESTION 40)</th>
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<tbody>
<tr>
<td></td>
<td>2. Strongly support</td>
</tr>
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<td>3. Moderately support</td>
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<td>4. Neither support nor oppose</td>
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<tr>
<td></td>
<td>5. Moderately oppose</td>
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<td></td>
<td>6. Strongly oppose</td>
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<td>7. Don't know</td>
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</table>
41. Up to this point, I have asked you to assume that #26 fewer trout will be stocked next year than this year. In fact, this year, the Fish and Boat Commission will stock 5.2 million trout statewide. Next year, the Commission projects that it will stock 3.8 million trout, 27% fewer than this year. After 2002, the number of trout stocked could decrease even further, unless the Fish and Boat Commission spends money to upgrade its fish culture stations.

In order to maintain fishing opportunities, including trout stocking, at 2002 levels, the Commission would need to raise more money. All of the Commission's operating revenues come from fishing license and trout stamp sales.

I am going to describe two different situations that might occur in the future, after year 2002. I want you to compare the two situations, and tell me which one you would personally prefer. Your answer will help the Fish and Boat Commission make decisions that are in the best interest of the state's anglers.

PRESS ENTER TO CONTINUE

42. RANDOMIZATION FOR FUTURE LICENSE COST

(CHECK ONLY ONE ANSWER)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>1. $27.50</td>
</tr>
<tr>
<td></td>
<td>2. $32.50</td>
</tr>
<tr>
<td></td>
<td>3. $37.50</td>
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</table>

43. RANDOMIZATION FOR 2003 % REDUCTION IN HATCHERY PRODUCTION

(CHECK ONLY ONE ANSWER)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>1. 3.4 million, 10%</td>
</tr>
<tr>
<td></td>
<td>2. 3.0 million, 20%</td>
</tr>
<tr>
<td></td>
<td>3. 2.7 million, 30%</td>
</tr>
</tbody>
</table>
44. Situation A is as follows. Trout stocking would be maintained at 2002 levels, that is 3.8 million trout each year. The total price of a resident fishing license and trout stamp would increase from its current level of $22.50 to $42. Prices for senior licenses and non-resident licenses would increase a similar amount.

Situation B is as follows. The price of a fishing license and trout stamp would stay at $22.50, but the number of trout stocked would be 43 fewer than in 2002.

If you had to choose between these two situations, which would you prefer? (READ LIST; CHECK ONLY ONE ANSWER)

LICCOST 5:16

(CHECK ONLY ONE ANSWER)

|   | 1. Invalid answer. Select another. (GO TO QUESTION 44) |
|   | 2. Situation A (GO TO QUESTION 45) |
|   | 3. Situation B (GO TO QUESTION 46) |
|   | 4. DNR: Don't know |

SKIP TO QUESTION 51
===================================================================================================

45. OK. You said you would prefer Situation A over Situation B. How strongly do you prefer Situation A, on a scale of 1 to 5, where 5 means your preference is very strong and 1 means your preference is not very strong? (CHECK ONLY ONE ANSWER)

DEGREEA 5:17

|   | 1. Invalid answer. Select another. (GO TO QUESTION 45) |
|   | 2. 5 |
|   | 3. 4 |
|   | 4. 3 |
|   | 5. 2 |
|   | 6. 1 |
|   | 7. DNR: Don't know |

SKIP TO QUESTION 50
====================================================================================================
46. OK. You said you would prefer Situation B over Situation A. How strongly do you prefer Situation B, on a scale of 1 to 5, where 5 means your preference is very strong and 1 means your preference is not very strong? 

(CHECK ONLY ONE ANSWER)

___ 1. Invalid answer. Select another. (GO TO QUESTION 46)  
___ 2. 5  
___ 3. 4  
___ 4. 3  
___ 5. 2  
___ 6. 1  
___ 7. DNR: Don't know

SKIP TO QUESTION 48
=====================================================================

47. YOU DID NOT USE YOUR SPACE BAR

NOSPAC3

PRESS ENTER TO TRY AGAIN

48. Why would you prefer Situation B?
(Situation B - cost stays at $22.50 but #43 fewer trout would be stocked.)
(DNR LIST; CHECK ALL THAT APPLY)

(CHECK ALL THAT APPLY)

___ 1. I don't care how many trout are stocked  
___ 2. I personally would prefer to see fewer trout stocked  
___ 3. Maintaining stocking at its current level isn't worth more 

___ 4. I can't afford to pay the price increase  
___ 5. The price increase is unfair  
___ 6. The Commission should get the money from somewhere else  
___ 7. Don't know  
___ 8. Other

IF (#48 = 0) GO TO #47
IF (#48 @ 8) GO TO #49

SKIP TO QUESTION 50
=====================================================================
49. ENTER OTHER REASON FOR PREFERING SITUATION B
(IN FIRST PERSON; 120 CHAR.)

WHYBST 6:1-120

SKIP TO QUESTION 50
==========================================================================

50. If, in the future, the combined price of a fishing license and trout stamp was increased to $42, and trout stocking was maintained at the 2002 level, that is 3.8 million trout per year, would you continue to buy a license and trout stamp?

(INCREASE 7:1)

(CHECK ONLY ONE ANSWER)

___ 1. Invalid answer. Select another. (GO TO QUESTION 50)
___ 2. Yes
___ 3. No
___ 4. DNR: Don't know

51. Great! We are just about through. I just have a few more questions so that we can make sure we have talked to a representative group of anglers.

DEMO

PLEASE PRESS ENTER TO CONTINUE...

52. How many years experience do you have fishing for trout?
(ENTER 999 FOR DON'T KNOW; 888 FOR REFUSED)
(PORTIONS OF A YEAR COUNT AS A WHOLE YEAR)

TROUTEXP 7:2-4

|__|__|__| years
53. Did you purchase a Pennsylvania fishing license last year, that is for the year 2000?  

(CHECK ONLY ONE ANSWER)

<table>
<thead>
<tr>
<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 53)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Yes (GO TO QUESTION 54)</td>
</tr>
<tr>
<td></td>
<td>3. No (GO TO QUESTION 55)</td>
</tr>
<tr>
<td></td>
<td>4. Don't know</td>
</tr>
</tbody>
</table>

54. Did you purchase a Pennsylvania trout stamp last year (2000)?  

(CHECK ONLY ONE ANSWER)

<table>
<thead>
<tr>
<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 54)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Yes</td>
</tr>
<tr>
<td></td>
<td>3. No</td>
</tr>
<tr>
<td></td>
<td>4. Don't know</td>
</tr>
</tbody>
</table>

55. If you can remember, did you purchase a Pennsylvania fishing license for the year before last, that is for the year 1999?  

(CHECK ONLY ONE ANSWER)

<table>
<thead>
<tr>
<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 55)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2. Yes (GO TO QUESTION 56)</td>
</tr>
<tr>
<td></td>
<td>3. No</td>
</tr>
<tr>
<td></td>
<td>4. Don't know</td>
</tr>
</tbody>
</table>

56. Did you purchase a Pennsylvania trout stamp for 1999?  

(CHECK ONLY ONE ANSWER)

<table>
<thead>
<tr>
<th></th>
<th>1. Invalid answer. Select another. (GO TO QUESTION 56)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2. Yes</td>
</tr>
<tr>
<td></td>
<td>3. No</td>
</tr>
<tr>
<td></td>
<td>4. Don't know</td>
</tr>
</tbody>
</table>
57. In what county do you live?
(ENTER 99 FOR DON'T KNOW; 88 FOR REFUSED)

COUNTY 7:9-10

|   |   |

58. And, finally, may I ask your age?
(ENTER 999 FOR DON'T KNOW; 888 FOR REFUSED)

AGE 7:11-13

|   |   |   |

LOWEST VALUE = 1

59. That is the end of the questionnaire. Thank you very much for your time and input!
(IF ADDITIONAL COMMENTS, RECORD HERE IN FIRST PERSON; 120 CHAR)

END 8:1-120

60. OBSERVE AND RECORD GENDER

GENDER 9:1

(CHECK ONLY ONE ANSWER)

|   |   |   |   |   |

1. Invalid answer. Select another. (GO TO QUESTION 60)
2. Male
3. Female
4. Don't know

61. ENTER LICENSE TYPE FROM CALLSHEET

LICTYPE 9:2

(CHECK ONLY ONE ANSWER)

|   |   |   |   |   |

1. Invalid answer. Select another. (GO TO QUESTION 61)
2. MISSING (See manager)
3. R (Resident)
4. SR (Senior resident)

62. TIME INTERVIEW WAS COMPLETED

ENDTIME 9:3-7

|   |   |   |   |   |
63. Please enter your initials.  

|__|__|__|

64. Enter the area code and telephone number of number dialed.  

|__|__|__|__|__|__|__|__|__|__|

LOWEST VALUE = 1

65. SAVE OR ERASE INTERVIEW.  
DO NOT ERASE A COMPLETED INTERVIEW!  

FINISH 9:21  
(CHECK ONLY ONE ANSWER)

|__| 1. Save answers  (GO TO QUESTION 67)  
|__| 2. Erase answers  
|__| 3. Review answers  (GO TO QUESTION 3)

66. ARE YOU SURE YOU WANT TO ERASE THIS INTERVIEW?  
ONLY ERASE IF: Terminated (record on back),  
RF, BZ, NA, DS, BG, DL, AM  

MAKESURE 9:22  
(CHECK ONLY ONE ANSWER)

|__| 1. No, do not erase the answers  (GO TO QUESTION 65)  
|__| 2. Yes, erase this interview

67. Date call was made  

|__|__|__|__|__|__|__|__|__|__|

Year  Month  Day

SAVE IF (#65 = 1)