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Activity: **Freshwater Fishing Statistical Survey – Angler Mail Survey**

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Objective

To determine sport fishing catch and effort in the fresh waters of Delaware.

Summary

The statewide angling survey, conducted at five-year intervals, was revised to accommodate the change in licensing requirements. Since January 1, 2008, a fishing license has been required for fishing, clamming, or crabbing in any of Delaware's waters, not just non-tidal fishing as had been the case prior to that time. A sampling protocol was devised based on the Delaware FIN (Fisherman's Information Network) number database; a FIN number is required for all anglers age 16 and older in Delaware waters. Two mailings of the four-page questionnaire were sent out to query anglers about 2009 fishing activities. A postcard asking about fishing participation and license type was sent to an imbedded sample of non-respondents. To address non-response bias, those who did not return the postcard were contacted via telephone.

Data projections were tabulated individually for anglers within each of six different angler groups and then pooled. This survey cannot be directly compared to previous survey results due to the change in the survey population but some assessments can be made.

This survey serves to set the format for a new design based on the FIN database. The sampling format allows the calculation of fishing activity by angler groups formerly not available. The availability of email addresses in the FIN database will allow future surveys to be conducted online increasing efficiency and timeliness thus decreasing costs.

Activities

Since 1978, a statewide fishing survey had been conducted at five-year intervals to query licensed freshwater (non-tidal) anglers on their fishing activities (Martin and Whitmore 2005). The 2009 survey, originally scheduled for calendar year 2008, was postponed due to a change in the licensing requirements (effective January 1, 2008); a new recreational license is now required for both tidal and non-tidal anglers, as well as recreational clammers and crabbers. This change in the license requirement necessitated a new sampling design.

Additionally, a Fisherman's Information Network (F.I.N.) number was initiated in 2009 for all anglers over 16 years of age in Delaware waters to comply with federal angler data requirements. The FIN requirement includes resident anglers age 65 and older not required to obtain a fishing license, as well as those anglers covered by a boat license. The FIN number is obtained free of charge, either online or via telephone. Questions on the FIN application queried anglers about the

type of angling planned (tidal waters, fresh waters, recreational clamming, recreational crabbing, and ocean waters beyond Delaware's 3-mile territorial sea). This was the database used to select the sample population for the 2009 angler survey.

The sample population for the statewide angler survey obtained from the FIN database was limited to residents and non-residents who planned to participate in freshwater fishing.. All anglers who planned to fish freshwater only were selected in addition to a small portion (8%) of Delaware residents who planned both freshwater and tidal angling. A higher percentage of non-residents (12%) who indicated plans to fish both fresh and tidal waters were selected to compensate for those who purchased a 7-day (tourist) fishing license. The 7-day license holders had not been included in any previous mail surveys although they constitute about 30% of the non-resident licenses purchased. Resident anglers age 65 and older were selected in the same proportion as resident anglers (i.e.100% of those indicating they planned to fish freshwater only and eight percent of those planning to fish both fresh and tidal waters). This population of resident anglers age 65 and older had not been included in past surveys as they are exempt from license requirements. However, the FIN database gave access to this group of anglers so they were included in the sample population.

The first mailing (7,962) of the survey questionnaire (Figure 1) was sent out in early November, 2009. A second mailing (approximately 6,500) of the same questionnaire was sent to non-respondents in early January, 2010. Mailings returned due to incorrect addresses were removed from the survey population . Data entry from returned questionnaires was completed using Microsoft Access® database.

An imbedded sample of 215 individuals within the survey population was randomly selected to address the issue of non-response bias as described for the 2003 survey (Martin and Whitmore 2005). This group was selected in the same proportion of resident/non-resident anglers by angler type within the sample population. Following receipt of the majority of returns from both of the mailings of the survey questionnaire, non-respondents within this imbedded sample were mailed a stamped, pre-addressed postcard (Figure 2) asking 1) whether they fished at all in Delaware's waters during 2009 and if so, what type of fishing; and 2) whether they purchased a fishing license (either annual or 7-day). Non-respondents to the postcard survey were contacted via telephone to assure a response. Responses from the imbedded sample of anglers were used to determine the Probability of fishing (P) for Residents and non-residents that fished in freshwater only, or in both fresh and tidal waters(Table 1). Separate Probability values were calculated for 7-day license holders (typically non-residents) and for residents age 65 and older who were not required to purchase a license..

The sampling protocol of the new survey format was based on a combination of the FIN database and the old freshwater fishing license database used for Delaware's historical mail surveys.. Although the sample population of the historical license database did not include anglers who could legally fish in tidal freshwaters without a license, anglers could be defined numerically by the number of licenses sold. The use of the FIN database changed the determination of the freshwater (both non-tidal and tidal) fishing universe, as it also included saltwater anglers. Therefore, determination of the freshwater angling population was somewhat more complex than in prior surveys. As noted above, the sample population was selected depending on intended angling behavior when obtaining the FIN number (Table 2). Anglers were grouped into different categories by intended type of fishing (freshwater only or both freshwater and tidal), residency, and Delaware residents age 65 and older. The number of anglers within each of these "intention" groups could be obtained from the FIN database. However, the real number within each group had to be determined by actual fishing activity reported by respondents - as opposed to intended fishing activity. This was calculated using the percent of fishing activity from the three sets of respondents (survey form, postcard, telephone) within the imbedded sample. By multiplying the percent of fishing (i.e. active anglers among the respondents within each group type) by the original number of anglers by group from the FIN database, the universe of that angler type was determined (Table 1). It should be noted that there was confusion among anglers as to what tidal fishing includes. Although tidal freshwater rivers were listed in Question 13 (Figure 1), many anglers included fishing activity in brackish to marine areas. Generally, data from strongly brackish rivers were not entered during the data entry phase of the survey. However, this specific location information was not available for postcard respondents. For that small group, it was assumed that people who checked trout and non-tidal or tidal with no saltwater fishing were freshwater anglers. In the future, any postcard survey format should include a question to address this problem.

The proportion of non-resident anglers purchasing a 7-day fishing license was determined separately for the fresh only and the both fresh and tidal waters groups using data from all non-resident respondents. For fresh only, 54 of 160 respondents (34%) purchased a 7-day license. For those intending to fish both fresh and tidal waters, 88 of 441 respondents (20 %) bought 7-day licenses. The "universe" of 7-day license holders within the non-resident populations was obtained by subtracting anglers who had purchased annual fishing licenses from the total non-resident groups (Table 2).

Respondents were initially grouped into seven different categories for data expansion by: residency, planned type of fishing (i.e. fresh or both), age, and holders of 7-day license: Residents –

freshwater only under age 65 (FR), freshwater only age 65 and older (FR65), both freshwater and tidal under age 65 (BR), freshwater and tidal age 65 and older (BR65); Non-residents – freshwater only annual license (FNR), 7-day license (NR7), fresh and tidal annual license (BNR) (Table 2). However, the number of residents within the age 65 and older groups (freshwater only and both freshwater and tidal) were pooled (R65) for determination of probability due to a small sample size(freshwater only 4, both 5).

Imputations of missing values for catch were used when anglers marked a box to indicate catch in the category (see Appendix for full methodology). If three or more values were available for all angler types at that location, the mean value for the category replaced the missing value. However, if fewer than three values were available atthat location, responses from all bodies of water for all six angler groups for the species of concern were used to calculate a mean catch rate.

A slightly different method was used to impute effort. In some instances there was no response to questions requiring a numeric response (e.g. when an angler reported catching fish at a pond but left the number of days fished blank). The preferred option used the average number of trips taken by the angler group of concern for the same water body and for the species of concern. A second option used the pooled number of trips taken for all six angler groups for the same body of water for the species of concern. If neither of those options were available, a missing value for effort was replaced with the value of 1, reasoning that if an angler reported catching fish, he/she must have been to the area to fish at least once.

The question regarding “species sought” provided three answer choices in descending order. To calculate the rank of each species, the top species listed by each angler was assigned three points, second choice was assigned two points, and the third choice was assigned one point. Species were then ranked by total score from all anglers of that type, i.e. pond or river/stream.

Trout angler data was based on trout fishing activity reported on the survey form. The 2003 survey modified trout effort and catch projections by the proportion of anglers that purchased a trout stamp (Martin and Whitmore 2005). However, it was decided that because anglers needed a trout stamp for only part of the year (April – June 30 in trout streams; first Saturday in March – March 30 in trout ponds), trout stamp possession was not valid for the calculation of trout effort and catch. Therefore the proportion that purchased a trout stamp (26.9% in 2003) was eliminated from data projections for trout catch and effort for 2009.

Data Expansions

Previous expansion methodologies (Martin and Whitmore 2005) of fishing effort based on the sample population responses were modified for this survey. As noted above, the determination of the

angling universe within five of the angler types (FR, BR, R65, FNR, and BNR) was obtained by multiplying P (probability of fishing from the imbedded sample population) by the original universe of that angler type from the FIN database. The universe of 7-day license holders was determined by calculating the proportion of FNR and BNR anglers who had purchased a 7-day license. These proportions were used to calculate the number of 7-day license holders within the FNR and BNR groups. The P value for those respondents who reported a 7-day license was then used to determine the proportion of active anglers within that select group (Table 1).

Historically the P value was included in the expansion calculation to modify the angling population and account for inactive anglers. However, since P was used in the calculation of the active angler universe for each angler type, the calculations of projected participants, effort and catch were made as follows:

F = Y * mean value * angler universe

Where F was the expansion of the value of interest (trips, catch by species, etc) for that angler group ;

Y wasthe number of anglers who reported fishing the location (pond, river, trout stream) divided by the number of active anglers within that group ("total went" from Table 2);

Mean value wasthe average value of the characteristic of interest for those who fished within that angler group (i.e. days fished at that site, catch by species, etc.);

Angler universe wasthe calculated universe within that angler group obtained by multiplying P by the number within that group from the FIN database (Table 1). The number of participants within each group was obtained using the formula above without the mean value, for example the number of participants of Hearns FR anglers was:

FR Participants = Y * angler universe or 12/412 * 1458 = 42

The following calculation of the number of largemouth bass caught in Hearns Pond during 2009 by resident anglers (FR and BR):

FR:

FR Hearns bass = 12/412 * 19.0833 * 1458 = 810.4

BR

BR Hearns bass = 23/344 * 20.2038 * 21,911 = 29,598.2

Resident angler bass catch from Hearns Pond

FR bass + BR bass = 810.4 + 29,598.2 = 30,409

Results and Discussion

The first mailing of the 2009 mail survey questionnaire was sent to 7,962 anglers who had obtained Delaware FIN numbers (Table 2B). All forms returned for incorrect addresses (423) were removed from the database; this constituted 5.3% of the sample population although the addresses had been prescreened to remove ”inaudible addresses” from the FIN database. This was the lowest proportion of address error documented during the survey’s history (Martin and Whitmore 2005). A number of duplicate names and addresses (20) were noted as the returns arrived and were removed from the survey population database. A check of the total FIN database (99,351 records) indicated that there were 1,728 duplicates (1.74 %) within that database (up to four from the same person). After removing incorrect addresses and duplicates from the sample population, the corrected population was 7,519.

A total of 2,168 survey responses were received following the two mailings that resulted in an overall response rate of 28.8%. This response rate for the new survey format was comparable to the 2003 survey which had a 26.1% response rate. The response rate was consistent among all groups (Table 1), varying from 23 to 26 percent, except the Delaware residents age 65 and older. This group, which had never been included in previous surveys as they are not required to get a license, exhibited a 62 percent response rate. However, the Probability of fishing by this small group was less than that for residents who purchased a license. Differences between angler groups validate separate calculations of fishing effort projections for the six angler sets.

Non-response bias has been addressed in past Delaware angler surveys by using an imbedded sample of 150 anglers to determine the proportion of inactive anglers, i.e. those who purchased a license but did not fish (Martin and Whitmore 2005). This methodology was originally designed by statistician Ed Ratledge (University of Delaware Center for Applied Demography and Survey Research) in 1986. The 2009 imbedded sample was expanded to 215 to compensate for the difference in original sample population between the 2003 survey (5,270) and the 2009 survey (7,518). As noted in the Activities section, the 215 anglers were selected based on the proportion of angler types selected for the original sample population (resident age 16-64, resident over 64 years, and non-residents, with additional non-residents to compensate for 7-day license holders). A postcard was mailed to survey questionnaire non-respondents within the 215 imbedded sample (Figure 2). An additional question asked whether the angler had purchased either an annual or a seven-day license or was legally exempt (e.g. residents age 65 years or older). The postcard mailing was conducted in mid-March 2010. Anglers within the imbedded sample who did not respond to either the survey mailings or the postcard were contacted by telephone. They were asked what

type(s) of fishing they had participated in and what type of license they had purchased. These data were used to calculate the Probability of fishing (P) by angler group.

One of the problems revealed during the projections of effort by different angler groups was the address inaccuracies within the FIN database. A number of city/state/zipcode mismatches were found, e.g. Philadelphia, DE with either a Delaware or Pennsylvania zipcode or Smyrna, PA with a DE zipcode. All 7,518 records within the sample population database were reviewed and edited to correct for this problem so anglers could be placed in the correct angler type. However, it is not known how many of the original FIN database records also had inaccurate addresses. This should be corrected prior to the next statewide angler survey.

Preliminary projections of angling effort by pond resulted in much higher than expected number of trips for several locations. A review of the raw data showed that occasional respondents fished at some sites much more often than the "typical" angler. Although all effort data were used in the calculations, the sites impacted by extremely active anglers were marked with an asterisk to indicate that the number of trips (and catches which are based on trips) have been biased by these anglers. The protocol to address this issue was to flag any site with one or more anglers reporting 100 or more trips to that location. These include: Bellevue State Park Pond, Chipmans, Hearns, Lums, Millsboro, Records, and Trap Ponds.

Resident and non-resident active anglers (i.e. those who participated in angling during the survey year) were more likely to have fished in the public ponds than any other location (84.9% overall). River/stream angling was participated in by 46.4 percent of active anglers (resident and non-resident annual license holders) and trout fishing by nearly 19 percent. Delaware residents age 65 and older, by comparison, were slightly less likely to fish in the public ponds or rivers/streams. However, the incidence of these older anglers who participated in trout fishing was slightly higher than any other angler type. Those non-resident anglers who purchased a 7-day license had similar patterns although they were more likely to fish the public ponds but much less likely to fish the rivers/streams or trout waters.

	Resident/non-resident annual	Residents age 65 & older	7-day license holder	Total
No. stating they fished DE waters 2009	951	133	51	1135
No. fished	807	108	45	960

public ponds	(84.9%)	81.2%	88.2%	
No. fished private ponds	281 29.5%	42 31.6%	12 23.5%	335
No. fished rivers/streams	441 46.4%	61 45.9%	9 17.6%	511
No. fished trout streams	180 18.9%	26 19.5%	4 7.8%	210

All effort (trips) and catch (number of fish) projections were tabulated by angler group and then pooled. The pooled results for all angler groups are included in Tables 3 and 7, while the individual angler group data are provided in the Appendix.

Warmwater Ponds

Fishing in the public ponds remains the most popular type of fishing exhibited by anglers from all angler groups surveyed as has been the case since the surveys began (Martin and Whitmore 2005). Projected estimates of catch and effort by pond were tabulated separately by angler group and then pooled to get the overall projections (Table 3). It wasdifficult to compare these projections to historical values due to changes in the survey population and license requirements. However, the total 2009 pond angling effort by annual license holders of 263,535 trips was similar to those estimates of 208,042 and 279,209 in 2003 and 1998, respectively (Martin and Whitmore 2005). An additional 20,875 trips were made in 2009 by resident anglers age 65 and older and 7-day license holders. Angling trips per acre were also calculated and resulted in different rankings of the ponds (Table 3B).

Changes in effort varied by pond between surveys (using only the resident anglers age 16-64 and non-resident annual license holders) with 2009 increases nearly 20 times that from 2003at Hearns Pond and declines by nearly 74 percent (Table 4). As noted, Hearns Pond effort (trips) increased substantially but ten other ponds also showed increases over 50 percent. Conversely, Becks Pond which had the highest reported effort in 2003 declined by over 70 percent. Five ponds showed decreases by half or more of trips between 2003 and 2009. These ponds included: Wagamons, Becks, Waples, Raccoon, and McColley. Although Waples and Raccoon experienced low water levels in recent years which undoubtedly discouraged angling, there were no obvious reasons for declines at the other three ponds.

Estimated effort was tabulated by pond separately for resident and non-resident anglers, and combined. Some ponds, such as Lums and Trap, supported a much higher proportion of non-resident effort than others (Table 5). These ponds are both located within State Parks with campgrounds and extra amenities which would attract non-resident anglers. Others such as Chipmans and Records Ponds have historically attracted a higher proportion of non-resident anglers. Fleetwood Pond, a relatively recent acquisition, has no boat ramp but more than half of the effort reported from there was expended by non-residents. The 7-day non-resident license holders tended to mirror annual non-resident anglers in their pond use; Trap Pond also had the highest number of trips by 7-day licensees.

Trips by residents age 65 and older constituted only 6.7 percent of total pond angling effort. The ponds fished most often by this group of anglers were: Lums Pond, Chipmans Pond, and Horseys Pond (Appendix).

The actual number of participants (unique anglers) was highest at Lums Pond with Trap Pond and Garrisons Lake following (Appendix). The number of 7-day participants was highest at Trap Pond which was fished by over 35 percent of the 7-day licensed participants. This pond is extremely popular with non-resident campers and the effort by 7-day licensees undoubtedly reflected this.

Catch by species varied between ponds but largemouth bass was the dominant species reported by anglers (Table 3). Sunfish, including bluegill and other *Lepomis* species, and crappie were the next most common. Highest pond catch rates for largemouth bass (with 500 or more angling participants) ranged from 4.76 to 2.01 bass/trip (Appendix) and included in decreasing order: McColleys Pond, Chipmans Pond, Wagamons Pond, Concord Pond, Trussum Pond, Derby Pond, Hearns Pond, Haven Lake, Silver Lake (Dover), and Noxontown Pond. A total of 448,205 largemouth bass was caught by anglers, over one-third of all fish reported from the ponds. One change between the 2003 and 2009 surveys was the difference in catch of white and yellow perch. In 2003, white perch reported by pond anglers exceeded yellow perch by nearly 40 percent. However, the 2009 data showed yellow perch catches more than double those of white perch. The heaviest 2009 catches of yellow perch were reported from: Millsboro Pond, Andrews Lake, and Derby Pond. Lums Pond had the highest number of white perch reported.

Angling activity from boats was higher than that reported by shore anglers (Table 6), 56.6 percent compared to 43.4 percent shore angling. Although fishing activity in the ponds was reported for all months, it peaked between May and August (Table 6).

A total of 125,800 projected trips were made to private ponds by all angler groups with the majority by resident anglers. Private ponds included any not listed in Question 8 of the survey form

(Figure 1) ranging from small farm ponds of a quarter acre or less to large privately owned ponds such as Red Mill (Lewes) and Collins (Bridgeville).

Private ponds	Resident Anglers	Non-resi-dents	Combined	Resident over 64	7-day non-resident	Total trips
Trips	110,565	6,580	117,145	7,989	666	125,800
Percent	87.9%	5.2%	93.1%	6.4%	0.5%	
Participants	7,183	665	7,848	605	285	8,738

Streams and Rivers

Twelve tidal streams in the coastal plain and four Piedmont streams were listed on the survey form for anglers to document fishing activities. A total of 154,209 trips of fishing effort were expended in these streams in 2009 by all angler groups (Tables 7A-7C). The Nanticoke River system was the most heavily fished river with just over one-third of the total river/stream effort (Table 7C). Non-resident effort was also heaviest at this River, likely due to the high proportion of largemouth bass tournaments that use this waterway and serve to familiarize avid bass anglers with the area. The Brandywine and Broadkill Rivers were the next most heavily fished rivers over all. Projected trips for river/stream anglers were nearly twice those from 2003. Part of the increase was expected as the effort now includes anglers who prior to 2008 were not legally required to purchase a fishing license to fish these areas and may not have been included in historical angler surveys. However, some of this may be due to an increase in river angling overall. The Brandywine which has very little tidal water (so most anglers would have been required to have a license) also exhibited a substantial increase in effort, from 11,683 trips in 2003 to 16,814 in 2009 (Table 7A) – a 44 percent increase by annual license holders. An additional 643 trips were taken by resident anglers age 65 and holder and 7-day license holders in 2009. Rivers with larger expanses of tidal waters such as the Christina and Nanticoke had effort increase from two to nearly four times between the two surveys.

Fish catches differed markedly between Piedmont streams and coastal plain rivers as might be expected (Tables 7A-7C). White perch, sunfish, catfish, and largemouth bass were the top four most abundant fishes reported by coastal plain river anglers. Leipsic River was the top white perch river (Table 7B). The Nanticoke River which supported over 35 percent of river fishing effort had the highest catch of largemouth bass – nearly 53 percent off all river bass caught (Table 7C).

The top catches by species in the Piedmont streams were: sunfish, rockbass, largemouth bass, and striped bass with very similar total catches (Table 7A). This was in marked contrast to the results of the 2003 survey when sunfish and smallmouth bass were the dominant species reported.

However, the 2003 survey data were driven by the angling effort on the Brandywine which constituted nearly 54 percent of the Piedmont stream effort. In 2009, the Brandywine angling had declined to just over 46 percent of Piedmont effort.

Shore angling in the rivers and streams was more popular than boat fishing in contrast to pond angling effort (Table 6). This was in contrast to pond angling where boat use exceeded shore angling and the 2003 survey where river angling was nearly equal from shore and boat. River angling peaked between May and August although some activity took place during every month (Table 6).

Fishing Behaviors

High release rates were typical for all groups of anglers whether pond or river/stream fishing (Table 8). Release rates over 95 percent were reported by most pond anglers and over all species. The highest harvest rate, although only 5.5 percent, was for yellow perch. The only anomaly was for 7-day license holders who reported harvesting 23 percent of crappie they caught. Release rates were also high for anglers fishing rivers and streams. The highest harvest rates were reported by residents for “herring” which may have been used for bait, and for catfish by non-resident anglers. Largemouth bass release rates by both pond and river/stream anglers approached 98 percent as has been documented in previous surveys (Martin and Whitmore 2000).

Anglers were queried about the top three species of fish targeted while fishing ponds and rivers/streams. Largemouth bass was by far the most frequently sought species by pond anglers (44-54 %) depending on angler type (Table 9). This was an increase over the preference in the 2003 survey when total angler preference for largemouth bass was 43 percent. Crappie was the second-most sought species in ponds for most groups followed by sunfish. Largemouth bass also increased in demand by river/stream anglers and was the top species sought (29-60%) depending on angler type. This was in contrast to the 2003 survey where “no preference” was the top ranked species. Striped bass and white perch varied as second and third species of preference depending on angler type for all groups except the 7-day licensees. That group listed smallmouth bass (generally confined to the Brandywine River) as the second most popular species.

Fishing activity by month was obtained from pond and river anglers (Table 6). Pond and river angling pressure by month was quite similar with the months of highest participation being May through August for both types. However, some fishing effort occurred in both ponds and streams during all months of the year.

The number of resident anglers over age 64 per household and the number of legally unlicensed anglers under age 16 per household was variable by angler group (Table 10). The

highest number of legally unlicensed youth anglers per household was 0.36 for residents age 64 and younger . Residents age 65 and older had the greatest number of legally unlicensed anglers age 65 and older per household (0.80) as might be expected.

A new question for the 2009 survey queried anglers about personal computers (Table 10). Over all angler groups, 43.1 percent owned a personal computer. However, this varied among groups from 52.2 for resident anglers age 64 and younger to 31.8 percent for residents age 65 and older. Of those anglers that owned a personal computer, 65.5 percent had visited the Division of Fish and Wildlife's website. Surprisingly, the group least likely to have checked out the Division's website was 7-day license holders (43.1 %). Residents age 64 and younger had the greatest likelihood of checking out the website (70.1%).

Trout Angling

Freshwater trout fishing in Delaware is limited to a put-and-take fishery. In northern Delaware, six designated trout streams are stocked prior to and weekly during the trout season (Table 11). Two small ponds are also stocked in southern Delaware to provide an opportunity for this type of angling. Tidbury Park Pond in Kent County and Newton Pond in Sussex County are designated trout ponds during the month of March. A trout stamp is required by anglers, in addition to a license where required, to fish during trout season. In designated trout streams, the season runs from the first Saturday in April through June 30 and the first Saturday in October until November 30. Trout stamps are also required to fish in the trout ponds between the first Saturday in March and March 31. The proportion of all anglers that purchased a trout stamp was 8.85 percent but varied among angler groups from 1.4 percent of 7-day licensees to 11.1 percent of resident annual license holders. Although the trout stamp proportion was included in the projection calculations of trout effort just for 2003, it was decided to eliminate this factor for the 2009 effort projects due to the narrow time period that trout stamps are required.

White Clay Creek has been the most popular trout fishing area since the first survey in 1976 (Martin and Whitmore 2000). In 2009, trips to White Clay Creek constituted nearly 60 percent of all trout fishing continuing this trend (Table 11). Pond trout fishing supported nearly 13 percent of all trout angling effort in Delaware with Newton Pond, new to the program in 2009, supporting slightly more angling trips than Tidbury Park Pond.

The mean trip length for trout anglers varied by angler group ranging from 3.2 (non-residents) to 4.0 hours. Residents age 64 and younger reported the longest mean trip length.

Trout fishing activity by month was also reported by anglers. As might be expected, activity peaked in April and May with lesser activity reported in June and October (Table 6). A fall stocking of

fish usually occurs in October in the designated trout streams undoubtedly resulting in the fall peak in activity. Some trout fishing, however, took place during all months of the year.

Angler Demographics

Angler demographic information included gender, residence (city and state), and birthyear. Mean age by angler group was tabulated by all respondents, pond anglers, river/stream anglers, and trout anglers (Table 6). Residents age 64 and younger and residents age 65 and older were similar across all type of angling. Non-residents, however, varied among angling types especially those with 7-day licenses. Trout anglers represented the youngest group of 7-day licensees (39.7 years) and river anglers (mean age 61.8 years) the oldest.

Female anglers made up a small portion of anglers overall (Table 12). The highest proportion was in the warmwater pond angler group. Residents age 65 and older had the lowest percentage of female angler participation.

County of residency of respondents was tabulated for Delaware residents while non-residents were tabulated by state (Table 13). New Castle County had the greatest number of anglers as might be expected due to its high proportion of the State's population. Kent and Sussex Counties were fairly balanced with the remaining Delaware resident anglers. Respondents to the survey from outside Delaware included the greatest number from Pennsylvania, followed by Maryland, New Jersey, Virginia, and New York. Pennsylvania and Maryland residents accounted for 83.4 percent of all non-resident anglers.

Angler Concerns

It is often difficult to determine the concerns of the angling public. Since 1997, respondents to the angler survey have been asked to list issues of concern. This is an open-ended question with no pre-selected list for consideration. However, results are grouped by category to prioritize the most important issues of concern to anglers and ranked by the total number of responses in each category (Table 14). Water quality issues overall have been the number one concern with many mentioning fish consumption advisories, pollution, and having clean water and fish safe to eat for future generations. This pattern continued in 2009 with all four angler groups having water quality as their top concern (Table 14). Increased boat and shore access, increased enforcement, weed control, and improved and better maintenance of boat ramps were the remaining top five concerns although their placement varied by angler group. All of these issues were noted during the 1997, 1998, and 2003 surveys. Historically, promotion of catch and release fishing was listed as one of the top five concerns. However, this issue appeared to be less important during 2009. One explanation is that,

as a result of its high ranking in previous surveys, information about catch and release fishing has been included in the annual fishing guides since 2005. It may also be a factor of the changed survey population with a higher proportion of river/stream anglers.

Recommendation

1. Reword the question about tidal fishing to separate anglers fishing in freshwater tidal areas from those fishing in saltwater tidal areas on both the survey questionnaire and the postcard. This was a major point of confusion for anglers and consequently for data projections.
2. Make sure the FIN database is "clean". During data projections, many addresses within sample population pulled from the FIN database were found to be inaccurate, e.g. Philadelphia, DE 19901. Before proceeding with projections of effort (by angler type), the sample population database (7,518) records were individually checked for accuracy. However, the more than 99,000 records of the full FIN database were not edited due to the time requirement. These corrections should be made in the entire FIN database before the sample population is pulled for the next angler survey.
3. Maintain the methodology developed for this survey and conduct another statewide survey in 2013. Evaluate the possibility of conducting the survey in an online format, at least for a portion of the sample population where email addresses are available.

Literature Cited

Martin, C. C. and W.H. Whitmore 2000. Delaware's freshwater fisheries management program. Annual Report Federal Aid in Fisheries Restoration Project F-41-R-11, DE. Division of Fish & Wildlife, Dover.

Martin, C.C. and W.H. Whitmore. 2005. Delaware's freshwater fisheries management program. Annual Report Federal Aid in Fisheries Restoration Project F-41-R-16. DE Division of Fish & Wildlife, Dover.

Table 1. Angler groups used for selection of sample population and data projections. Residents over age 64 were pooled to include those intending to fish freshwater only and those selecting both freshwater and tidal angling. Seven-day (non-resident) license holders could not be separated from the non-resident groups until a response was received describing the license type obtained and total number* were calculated from those data.

Resident	Freshwater Only < age 65	Both fresh & tidal < age 65	Pooled Resident > age 65
Universe	1,944	33,597	4,547
% sampled	100%	8%	11%
Sample size	1,944	2,534	494
Respondents	492	625	308
Response rate	25%	25%	62%
Non-respondents	1,452	1,909	186
Imbedded sample			
Mail respondents	20	16	10
Postcard respondents	19	30	9
Telephone survey	17	23	0
Total	56	69	19
No. active anglers	42	45	8
P (probability of fishing)	0.75	0.65	0.42
Estimated universe	1,458	21,911	1,915

Non-resident	Freshwater Only	Both fresh & tidal	7-day License*
Universe	707	15,702	
% sampled	100%	11%	
Sample size	707	1,716	
Respondents	160	441	142
Response rate	23%	26%	
Non-respondents	707	1716	
Non 7-day lic holders	106	353	
% Non 7-day	66%	80%	
Corrected universe	468	12,569	3,372
Imbedded sample*			
Mail respondents	7	10	
Postcard respondents	8	23	
Telephone survey	0	0	
Total	15	33	142
No. active anglers*	7	6	51
P (probability of fishing)	0.47	0.18	0.36
Estimated universe	219	2,285	1213

Total Freshwater Universe = 29,001

Table 2. Summary of angler universe by angler group and number who went angling by location.

Angler Group	Indicated Fishing Activity Grouping	Corrected Angler Universe	Sample Size	Number of Responses	Total went	Total Number Actively Fishing in Ponds	Tidal Rivers	Trout Waters
Resident < 65	Freshwater Only	1,458	1,944	492	412	365	130	97
Resident < 65	Freshwater & Tidal	21,911	2,534	625	344	286	236	59
Non-Resident < 65	Freshwater Only	219	707	160	108	91	32	16
Non-Resident < 65	Freshwater & Tidal	2,285	1,716	441	87	65	43	8
7-Day Non-Resident	Pooled Both Groups	1,213	2,423	142	51	45	9	4
Resident >= 65	Pooled Both Groups	1,915	494	308	133	108	61	26

Table 3. Estimated catch and effort from public ponds by all freshwater angler groups in Delaware, 2009. An asterisk indicates inclusion of extremely active angler in data projections.

Public pond	Angler trips	Largemouth bass	Crappie	Sunfish	Chain pickerel	White perch	Yellow perch	Catfish	Hybrid st bass	Other fishes	Total catch	Catch per trip
Abbotts Pond	1,504	2,122	737	244	1,815						4,917	3.27
Andrews Lake	4,320	7,256	1,564	11,231	2,522	382	6,196	573			29,725	6.88
Becks Pond	7,510	8,970	5,483	9,380	4,238	1,975	3,309	74			33,428	4.45
Bellevue Pond*	3,657	1,485	664	4,320				131			6,600	1.80
Blairs Pond	5,623	9,073	3,381	7,137	3,604		2,360				25,556	4.55
Canal Pond	3,772	1,349	878	517		7		1,274	1,274		5,298	1.40
Chipmans Pond*	5,422	18,210	4,440	16,279	7,021		1,302	11		318	47,583	8.78
Concord Pond	4,594	14,942	1,998	2,590	5,330		1,454				26,314	5.73
Courseys Pond	7,837	14,484	9,974	4,190	641	73	53	14		672	30,128	3.84
Craigs Pond	1,365	1,544	707	1,322	792		191	29			4,585	3.36
Derby Pond	2,501	7,008	5,682	5,026	4,922	127	5,187	577			28,529	11.41
Fleetwood Pond	697	891	184	675			4				2,051	2.94
Garrisons Lake	19,211	21,419	19,066	29,853	3,182	1,675	37	559			75,792	3.95
Griffith Lake	5,623	10,624	1,565	3,827	2,219	336	354			955	19,882	3.54
Haven Lake	9,216	21,918	4,515	3,916	6,909	1,663	1,641	318		1,837	42,716	4.64
Hearns Pond*	26,756	32,436	5,840	8,314	6,393		2	836			53,820	2.01
Horseys Pond	3,802	10,697	5,878	9,040	3,948	4	568	8			30,143	7.93
Ingrams Pond	10,055	20,066	3,098	24,167	7,255	21	2,820				57,428	5.71
Killens Pond	8,511	16,760	11,577	12,561	1,583	1,369	218				44,857	5.27
Lake Como	2,452	3,201	4,915	4,396	146	386		406		7	13,457	5.49
Lums Pond*	17,651	16,321	16,674	25,184	288	9,964	1,453	772	532	131	71,320	4.04
Masseys Pond	9,434	9,405	8,727	12,164	55	11		662			31,024	3.29
McColleys Pond	2,008	9,572	4,163	2,523	1,208	189	177	29		2	17,864	8.90
McGinnis Pond	3,602	7,004	6,098	12,286	1,802	127	4,888	138			32,344	8.98
Millsboro Pond*	19,289	13,947	21,809	8,735	35,917		9,365	64			89,837	4.66
Moores Lake	6,488	7,865	8,311	12,435	1,911	127	382	3,259		39	34,331	5.29
MudMill Pond	11,811	17,433	20,059	11,941	1,796			446		191	51,866	4.39
Newton Pond	1,434	1,337		1,122							2,459	1.71
Noxontown Pond	9,341	18,774	12,125	4,912	6,058	171	744	105			42,890	4.59
Portsville Pond	1,541	7,203	64	64	1,905		127				9,363	6.08
Raccoon Pond	530	736	373	594	706			4			2,413	4.56
Records Pond*	20,129	15,638	3,894	3,824	7,312		870	366		318	32,223	1.60
Silver Lake (Dover)	19,045	45,139	18,072	14,360	892	1,975	810	2,105		510	83,862	4.40
Silver Lake (Milford)	3,430	6,478	1,769	6,327	74	1,592	354	637			17,231	5.02
Trap Pond*	12,937	21,755	10,407	32,768	5,300		2,694	515			73,439	5.68
Trussum Pond	1,982	6,034	2,174	1,513	4,305		62	53			14,142	7.14
Tubmill Pond	4,830	7,240	432	7,139	1,034		79				15,924	3.30
Tussock Pond	1,290	2,638		828	401						3,867	3.00
Wagamons Pond	2,275	7,406	2,570	2,518	3,679		1,796				17,969	7.90
Waples Pond	1,179	1,825	309	1,596	420	64					4,213	3.57
Totals	284,654	448,205	230,176	321,818	137,583	22,238	49,497	13,965	1,806	4,980	1,231,390	4.88

Table 3B. Total trips and trips per acre for Delaware ponds, 2009.

Pond	Total trips	acres	trips/acre	Rank trips/acre
Hearns	26756	53.4	501	2
Records	20129	91.9	219	
Millsboro	19289	101	191	
Garrison	19211	85.9	224	8
Silver L (Dover)	19045	157.2	121	
Lums	17651	189.3	93	
Trap	12937	88	147	
Mudmill	11811	60	197	
Ingrams	10055	24.4	412	3
Masseys	9434	30.4	310	4
Noxontown	9341	158.6	59	
Haven	9216	82.5	112	
Killens	8511	75.1	113	
Courseys	7837	58.1	135	
Becks	7510	25.9	290	5
Moores	6488	27.1	239	7
Griffith	5623	32.2	175	
Blairs	5623	28.5	197	
Chipmans	5422	52.4	103	
Tubmill	4830	4.8	1006	1
Concord	4594	76.8	60	
Andrews	4320	17.5	247	6
Horseys	3802	46.3	82	
McGinnis	3602	31.3	115	
Silver L (Milford)	3430	28.5	120	
Derby	2501	23.1	108	
Como	2452	42	58	
Wagamons	2275	41.1	55	
McColleys	2008	49	41	
Trussum	1982	58.7	34	
Portsville	1541	14.5	106	
Abbotts	1504	16.9	89	
Newton	1434	11	130	
Craigs	1365	11.9	115	
Tussock	1290	8.6	150	
Waples	1179	50.6	23	
Fleetwood	697	31	22	
Raccoon	530	13.5	39	

Table 4. Changes in number of trips by resident and non-resident anglers in Delaware ponds over time. Bold indicates use of one or more extremely active anglers (number of trips to site is > 99) at the pond. Ponds ranked in decreasing order by percent of change between 2003 and 2009 effort projections. Shading indicates increased effort between two adjacent years.

Decreased effort from 2003 to 2009

	1998	Percent change	2003	Percent change	2009
Portsville	2107	-28.9	1498	-1.9	1469
Moores	9637	-31.6	6596	-5.6	6229
Chipmans	4519	-39.9	2718	-5.9	**2557**
Griffith	6429	-11.6	5684	-7.4	5263
Courseys	11353	-25.8	8429	-9.7	7612
Blairs	9181	-42.1	5312	-9.9	4788
Killen	12704	-31.9	8650	-11.3	7672
Haven	7962	24.5	9914	-14.6	8471
Como	2599	18.6	3083	-27.5	2236
Craigs	1612	8.1	1743	-27.5	1264
Lums	43888	-53.9	20212	-31.3	**14109**
Derby	4201	-22.8	3243	-31.5	2223
Horsey	4173	-8.7	3809	-38.7	2335
McGinnis	4227	39.7	5903	-46.8	3142
Abbotts	4161	-38.9	2543	-49.3	1289
McColley	7352	-44.9	4053	-56.1	1778
Raccoon	1059	-31.7	723	-58.6	299
Waples	3488	-5.3	3304	-67.2	1083
Becks	16442	50.0	24656	-69.5	7510
Wagamons	6926	7.8	7467	-73.6	1973

Increased effort from 2003 to 2009

	1998	Percent change	2003	Percent change	2009
Hearns	5266	-75.4	1298	1917.8	**26178**
Tubmill	3697	-77.8	822	478.8	4758
Silver L (M)	2345	-68.0	751	344.6	3339
Tussock	400	-18.5	326	295.7	1290
Records	9160	-36.0	5864	227.0	**19174**
Millsboro	11532	-46.6	6156	205.0	**18776**
Garrison	8831	-24.2	6691	174.6	18376
Massey	2530	41.7	3586	160.7	9348
Silver L (D)	11385	-18.8	9248	101.8	18667
Mudmill	6081	-3.7	5857	100.9	11768
Ingram	11094	-50.4	5505	72.1	9423
Trap	8773	-7.8	8088	43.5	**11605**
Trussum	2990	-58.4	1243	42.9	1776
Concord	4766	-39.3	2893	41.0	4080
Andrews	4023	-20.7	3190	26.8	4046
Noxontown	14775	-43.8	8308	8.1	8982
Canal	7541	-50.9	3704	1.8	3772

Table 5. Resident and non-resident (annual license holders) angling effort in ponds and rivers and streams, 2009.

Location	Resident trips	Non-resident trips	Percent Non-resident
Ponds			
Abbotts	1226	63	4.9
Andrews	3935	111	2.7
Becks	6936	85	1.2
Bellevue	3316	0	0.0
Blairs	4687	101	2.1
Canal	3772	0	0.0
Chipmans	2183	374	14.6
Concord	3638	443	10.9
Courseys	7535	77	1.0
Craigs	1171	93	7.4
Derby	2069	154	6.9
Fleetwood	297	400	57.4
Garrisons	16054	2322	12.6
Griffith	5231	32	0.6
Haven	8387	85	1.0
Hearns	26023	155	0.6
Horseys	2153	182	7.8
Ingrams	8504	919	9.8
Killens	7060	612	8.0
Como	1723	513	22.9
Lums	11730	2378	16.9
Masseys	9172	176	1.9
McColleys	1689	89	5.0
McGinnis	2863	279	8.9
Millsboro	17616	1160	6.2
Moores	5909	319	5.1
Mudmill	11711	57	0.5
Newton	1097	236	17.7
Noxontown	8068	914	10.2
Portsville	1469	0	0.0

Table 5. continued

Location	Resident trips	Non-resident trips	Percent Non-resident
Ponds			
Raccoon	205	94	31.4
Records	18528	646	3.4
Silver L (Dover)	18418	249	1.3
Silver L (Milford)	3319	20	0.6
Trap	9760	1844	15.9
Trussum	1515	261	14.7
Tubmilll	4728	30	0.6
Tussock	1288	2	0.2
Wagamons	1957	16	0.8
Waples	1055	28	2.6
Rivers			
Appoquinimink	1868	79	4.1
Blackbird	1529	0	0.0
Brandywine	15462	1352	8.0
Broadkill	13677	325	2.3
C&D Canal	13115	946	6.7
Christina	11864	709	5.6
Leipsic	4459	0	0.0
Marshyhope	1720	293	14.6
Mispillion	7631	552	6.7
Murderkill	1798	0	0.0
Nanticoke/Broad	47198	3019	6.0
Primehook	3212	34	1.0
Red Clay	979	0	0.0
Smyrna	4278	0	0.0
St. Jones	4271	0	0.0
White Clay	4885	659	11.9

Table 6. Average age of Delaware anglers by angler type, fishing mode, and fishing activity by month and location.

Mean Age

Angler group	All Respondents	Pond anglers	River anglers	Trout anglers
Residents	47.2	46.5	46.2	46.2
> 65	71.8	71.4	71.3	70.7
Non-residents	47.6	54.5	55.3	53.5
7-day	48.5	55.8	61.8	39.7

Percent of anglers

Mode	Pond	River
Boat	56.6	42.5
Shore	43.4	57.5

Percentage of Activity

Months fished

	Pond	River	Trout
Jan	1.5	1.5	1.4
Feb	1.8	1.9	2.0
Mar	5.5	5.5	2.7
Apr	10.4	9.6	27.5
May	14.2	12.8	23.5
June	16.6	16.4	14.4
July	13.5	15.3	5.1
Aug	13.1	14.3	4.0
Sept	10.8	9.7	4.2
Oct	7.4	7.2	8.3
Nov	4.0	4.0	5.6
Dec.	1.2	1.8	1.3

Table 7A. Estimated catch and effort from Piedmont rivers and streams by all freshwater angler groups in Delaware, 2009.

River/stream	Angler trips	American shad	Catfish	Hickory shad	Largemouth bass	Rockbass	Smallmouth bass
Brandywine River	17,457	322	578	3,202	8,381	26,300	11,040
Christina River	12,933	4	11,126	955	12,684		64
Red Clay Creek	1,037			318	192		
White Clay Creek	5,659	127	11	3,185	5,329	382	1,543
Totals	37,086	453	11,715	7,660	26,586	26,682	12,647

	Striped bass	Sunfish	White perch	Other fishes	Total catch	Catch per trip
Brandywine River	7,619	18,986	2,337	1,326	80,109	4.59
Christina River	14,607	6,194	14,280	290	60,651	4.69
Red Clay Creek	127	1,434	64	255	2,391	2.31
White Clay Creek	3,263	3,108	1,418		18,367	3.25
Totals	25,616	29,722	18,099	1,871	161,518	3.71 mean

Table 7B. Estimated catch and effort from Coastal Plain rivers and streams by all freshwater angler groups in Delaware, 2009.

River/stream	Angler trips	Carp	Catfish	Largemouth bass	Striped bass	Sunfish	White perch
Delaware Estuary							
Appoquinimink River	1,947	158	4,378	1,189	1,720	6,914	17,524
Blackbird Creek	1,601		382	142		142	5,987
Broadkill River	15,061	1,338	3,278	11,249	6,570	5,823	6,203
C&D Canal	14,377		13,894	2,828	6,546	1,112	15,419
Leipsic River	4,531		10,334		842	2,166	34,919
Mispillion River	8,787	637	2,374	6,126	536	17,356	9,587
Murderkill River	2,186		4,370	193	198	644	8,609
Primehook Creek	3,351			4,705	1,083	534	2,142
Smyrna River	4,360		141	191	1,210	7,442	13,185
St. Jones River	4,300	764	2,431	566	318	5,057	7,374
Subtotals	60,501	2,897	41,582	27,189	19,023	47,190	120,949

River/stream	Yellow perch	Other fishes	Total catch	Catch per trip
Appoquinimink River	127		32,138	16.50
Blackbird Creek			6,653	4.16
Broadkill River	1,099	144	35,705	2.37
C&D Canal	955		40,754	2.83
Leipsic River				
Mispillion River		321	43,942	5.00
Murderkill River	7,006	531	14,545	6.65
Primehook Creek		178	8,777	2.62
Smyrna River	134		22,169	5.09
St. Jones River			16,511	3.84
Subtotals	9,321	1,174	221,194	5.45

Table 7C. Estimated catch and effort from Coastal Plain rivers and streams by all freshwater angler groups in Delaware, 2009.

River/stream	Angler trips	Catfish	Largemouth bass	Striped bass	Sunfish	White perch	Yellow perch
Chesapeake Watershed							
Marshyhope River	2,675	4	12,804	43	599	373	318
Nanticoke River/ Broad Creek	53,947	10,513	75,030	7,993	23,599	26,824	11,469
Subtotals	56,622	10,517	87,834	8,036	24,198	27,197	11,787

River/stream	River herring	Shad species	Other fishes	Total catch	Catch per trip
Marshyhope River			537	14,679	5.49
Nanticoke River/ Broad Creek	17,297	3,185	1,125	180,779	3.35
Subtotals	17,297	3,185	1,662	195,458	4.42 mean

Table 8. Average release rate of the most popular species of fish in freshwater ponds and rivers for resident, non-resident, over 65 and seven day anglers for 2009.

Ponds	Resident Anglers Percent Released	Non-Resident Anglers Percent Released	Over 65 Residents Percent Released	Seven Day Anglers Percent Released
Largemouth Bass	99	98	97	95
Crappie	97	100	98	77
Sunfish	97	94	98	80
Pickerel	100	100	95	100
White Perch	97	99	100	100
Yellow Perch	95	93	92	100
Catfish	96	95	100	100
Carp	100	100		
Striped Bass Hybrid	100			

Rivers/streams	Resident Anglers Percent Released	Non-Resident Anglers Percent Released	Over 65 Residents Percent Released	Seven Day Anglers Percent Released
Largemouth Bass	97	99	93	100
Smallmouth Bass	97	100	100	100
Crappie	93	90	100	
Sunfish	98	98	100	100
Pickerel	100	100	100	
White Perch	90	91	94	100
Yellow Perch	90	100	99	
Catfish	92	79	100	
Carp	100	100		
Rock Bass	100		100	
Striped Bass	98	100	100	
Herring	65		25	
Shad	100			

Table 9. Species sought by by resident, non-resident, over 65 and seven day anglers fishing in freshwater ponds and rivers/streams during 2009.

Ponds

Resident Anglers Species Sought	Non-Resident Anglers Species Sought	Over 65 Residents Species Sought	Seven Day Anglers Species Sought
Largemouth Bass (54 %)	Largemouth Bass (52 %)	Largemouth Bass (52 %)	Largemouth Bass (44 %)
Crappie (17 %)	Crappie (22 %)	Crappie (19 %)	Sunfish (22 %)
Sunfish (9 %)	Pickerel (9 %)	Sunfish (10 %)	Crappie (21 %)
No Preference (4 %)	Sunfish (9 %)	Pickerel (9 %)	Pickerel (4 %)
Catfish (3 %)	No Preference (2 %)	No Preference (4 %)	Yellow Perch (4 %)
Other (13 %)	Other (6 %)	Other (6 %)	Other (5 %)

Rivers/streams

Resident Anglers Species Sought	Non-Resident Anglers Species Sought	Over 65 Residents Species Sought	Seven Day Anglers Species Sought
Largemouth Bass (29 %)	Largemouth Bass (45 %)	Largemouth Bass (40 %)	Largemouth Bass (60 %)
White Perch (13 %)	Striped Bass (13 %)	Striped Bass (16 %)	Smallmouth Bass (20 %)
Striped Bass (12 %)	White Perch (9 %)	White Perch (15 %)	Sunfish (7 %)
Catfish (12 %)	Catfish (7 %)	Crappie (7 %)	White Perch (13 %)
Smallmouth Bass (11 %)	Crappie (7 %)	No Preference (5 %)	
Other (23 %)	Other (19 %)	Other (17 %)	

Table 10. Computer access and use and legally unlicensed anglers per licensed household of Delaware anglers, 2009.

Group	No. > 65/house	No. < 16/house	Percent of respondents	
			Own computer	DFW website*
Residents				
Age 64 & younger	0.05	0.36	52.2	70.1
≥ Age 65	0.80	0.10	31.8	64.3
Non-residents	0.07	0.26	33.9	58.3
7-Day licensees	0.08	0.20	35.7	43.1
		Mean	43.1	65.5

* Respondents with personal computer who accessed DFW website.

Table 11. Estimated trout catch and effort from designated trout streams and ponds by all freshwater angler groups in Delaware, 2009.

Trout Waters	Participants	Angler trips	Trout caught
Streams			
White Clay Creek	3,258	17,954	56,971
Christina River	670	4,222	18,598
Wilsons Run	377	1,716	2,266
Beaver Run	227	1,056	2,016
Pike Creek	216	917	859
Mill Creek	84	247	47
Ponds			
Newton Pond	493	2,006	5,208
Tidbury Pond	523	1,839	4,418
Totals		29,957	90,383

Table 12. Gender distribution by angler group in the Delaware 2009 angler survey.

Gender	Resident	Non-resident	Combined	Resident Over age 64	Non-resident 7-day	Total
Warmwater Pond Anglers						
Male	406	115	521	77	24	622
Female	78	14	92	5	7	104
Total	484	129	613	82	31	726
% female	16.1	10.9	15.0	6.1	22.6	14.3
Private Pond Anglers						
Male	201	49	250	39	12	301
Female	27	4	31	3	0	34
Total	228	53	281	42	12	335
% female	11.8	7.5	11.0	7.1	0	10.1
Rivers and Stream Anglers						
Male	220	47	267	44	4	315
Female	31	4	35	3	1	39
Total	251	51	302	47	5	354
% female	12.4	7.8	11.6	6.4	20.0	11.0
Trout Anglers						
Male	120	21	141	23	2	166
Female	19	0	19	1	1	21
Total	139	21	160	24	3	187
% female	13.7	0	11.9	4.2	33.3	11.2

Table 13. Demographic data on respondents from the Delaware 2009 fishing survey.

State	County (DE)	Respondents	Percent
Delaware	New Castle	601	27.7
	Kent	386	17.8
	Sussex	437	20.2
Pennsylvania		429	19.8
Maryland		191	8.8
New Jersey		38	1.8
Virginia		28	1.3
New York		15	0.7
			Less than 0.5 percent
Arizona		3	
California		1	
Colorado		1	
Connecticut		1	
Washington DC		1	
Florida		3	
Georgia		2	
Illinois		1	
Indiana		1	
Kentucky		3	
Massachusetts		2	
Missouri		1	
North Carolina		7	
Ohio		2	
Oklahoma		1	
Oregon		1	
Texas		1	
Out of country		2	

Table 14. Issues of concern to anglers in Delaware waters, 2009, by angler group. Bold indicates top five issues listed overall.

Issue	Residents	Over age 65	Non-residents	7-day licensees	Overall
Water Quality					
Water quality/fish advisories	**221**	**40**	**48**	**12**	**321**
Weed control	**50**	**6**	**18**	**1**	**75**
Silt & turbidity	5	1	0	0	6
Remove geese	0	1	0	0	1
Access					
Increase boat & shore access	**75**	**13**	**28**	**4**	**120**
Improve & maintain boat ramps	**39**	**14**	**13**	**0**	**66**
Enforcement					
Improve/increase	**64**	**10**	**19**	**2**	**95**
Boating safety problems	5	2	2	1	10
Facilities					
Litter/trash clean-up	44	4	7	4	59
Dredge ponds	13	3	0	0	16
Parking & security	9	1	7	0	17
Fishery Issues					
Management	53	3	14	4	74
Stock fish	40	6	7	3	56
Size & creel	35	11	0	1	47
Promote catch & release	34	7	3	1	45
Increase conservation	24	1	6	2	33
Invasive species	8	2	2	1	13
Stock trout	16	5	1	1	23
Limit tournaments	10	0	3	0	13
Other					
Fees & licenses	21	4	5	5	35
Information & education	11	1	5	0	17
Promote youth angling	5	0	0	0	5
Misc	39	1	18	1	59

Figure 1. Sample survey questionnaire for 2009 mailing.

PLEASE FILL OUT AND RETURN THIS SURVEY FORM
EVEN IF YOU DID NOT FISH IN 2009

Dear Angler,

Please help us manage Delaware's waters to provide better fishing and access. Answer the questions below using only YOUR fishing experiences this year, fold the questionnaire, and return it to us. Please fill out the form whether you fished in 2009 or not. All answers will be kept in strict confidence.

This survey is sent to only one in every five licensed anglers, so your response is especially important. The information is used to determine needs for access areas as well as to determine fish management activities. Your cooperation is greatly appreciated. If you would like to receive a notice about a summary of the survey results, check the box on the last page.

---

1. Which activities did you participate in 2009 in **Delaware** waters? Please check all that apply:
Non-tidal fishing (ponds & non-tidal streams) □ Tidal river/stream fishing □ Freshwater trout □
Saltwater fishing □ Clamming □ Crabbing □

2. Did you purchase an annual fishing license? Yes □ No□ A 7-day fishing license? Yes □ No□
In your household, how many legally unlicensed persons fished in Delaware's waters in 2009? _____ over 65 years (residents only) _____ under 16 years

If you did not fish in Delaware's freshwaters this year, please fold and return.

Freshwater Trout Fishing

3. Did you purchase a 2009 trout stamp? _____. If you fished for freshwater trout, please fill in the section below using the streams listed and go to the next page. If not, check here □ & turn page.

	Stream Name*	No. trips	No. Trout Caught

*__Streams__: Christina, White Clay, Mill Creek, Pike Creek, Beaver Run, Wilsons Run, Tidbury Pond, Newton Pond.

4. How many hours did you spend trout fishing on an average trip? _____ hours.

5. Did you fish in the Fly Fishing Only section on White Clay? Yes □ No □

6. Did you keep your trout catch? Yes □ No □ Some □

7. Circle the months that you fish for freshwater trout in De streams, beginning in April:

A M J J A S O N D J F M

Warmwater Pond Fishing

8. Did you fish in any of Delaware's **public** (listed below) ponds in 2009? Yes ☐ No ☐

If yes, please fill in the table below as much as possible - the names of the public ponds are listed below. If you did not fish in a Delaware pond, go to question 13 :

			Number caught						
	Pond Name	No. days fished	bass	crappie	sunfish	Others: *pickerel*	Fill in	as	needed
	Example Abbotts	*5*	*12*	*2*	*21*	*3*			

If you fished more ponds, just list the information on a plain sheet of paper & enclose with survey form.

Public Ponds*

Abbotts	Concord	Haven	McColleys	Raccoon	Trussum
Andrews	Courseys	Hearns	McGinnis	Records	Tubmill
Becks	Craigs	Horseys	Millsboro	Silver L	Tussock
Blairs	Derby	Ingrams	Moores	(Dover)	Wagamons
Canal	Fleetwood	Killens	MudMill	Silver L	Waples
Chipmans	Garrisons	Lums	Newton	(Milford)	
Lake Como	Griffith	Masseys	Noxontown	Trap	

9. Circle the month(s) that you fished in public ponds in 2009:

J F M A M J J A S O N D

10. What fish species are you trying to catch while pond fishing?
1st choice _____ 2nd choice _____ 3rd choice _____

11. Did you mostly fish the public ponds from a boat ☐ or from shore ☐? Check one

12. How many days did you spend fishing in **private** ponds (those not listed above) in Delaware this year? _____ days.

River/Stream Fishing

13. Did you fish in Delaware's freshwater tidal or non-tidal rivers this year? Yes ☐ No ☐

If yes, please fill out the following table, using the names of the rivers and streams listed below.

Number caught

	River or stream*	No. days fished	Lm bass	sunfish	white perch	Others: *Striped bass*	Fill in	as	needed
	Example: Nanticoke	*5*	*17*	*6*		*2*			

Streams/Rivers*

Nanticoke R/ Broad Creek
Broadkill
Brandywine
Christina
C&D Canal
Appoquinimink
Blackbird
Smyrna
Leipsic
St. Jones
Marshyhope
Mispillion
Murderkill
White Clay
Red Clay
Primehook

14. Circle the month(s) that you fished in tidal or non-tidal freshwater rivers in 2009:

J F M A M J J A S O N D

15. What fish species were you trying to catch while stream or river fishing?

1st choice _____ 2nd choice _____ 3rd choice _____

16. Did you river fish mostly from a boat ☐ or from shore/pier ☐ check one

17. What was your average release rate of the following species?

Species	**Percent released - ponds**	**Percent released - rivers**
Largemouth bass		
Crappie		
Sunfish/bluegill		
Pickerel		
White perch		
Yellow perch		
Catfish		
Other? list		

Questions or Comments:

_____

_____

_____

_____

_____

First fold back here

FRESHWATER FISH SURVEY

BUSINESS REPLY SECTION

X

X

Fold back here second^, then tape at Xs ^

18. What fishing issues do you think are most important in Delaware?

a. _____

b. _____

c. _____

19. Check here if you have a personal computer ____

20. Have you checked out the Division's website? _____ [www.fw.delaware.gov]

Check here to receive a notice when the report summary is available online □; **Print** email address:

_____

Figure 2. Postcard for embedded sample, top is front, lower is back section

Freshwater Angler Survey

Final Notice

Dear Angler,

Our 2009 fishing survey is nearing completion and we have not received your response. Your response is important in helping us compile accurate estimates. Therefore, we need you to please return your completed survey and fill out this postcard immediately.

What activities did you participate in 2009 in Delaware waters?

☐ Non-tidal (ponds & non-tidal streams) ☐ Tidal river/streams ☐ Freshwater trout

☐ Saltwater fishing ☐ Clamming ☐ Crabbing

☐ Did Not Fish

Did you purchase a Delaware fishing license?

☐ Annual ☐ 7-Day ☐ Legally exempt ☐ No

Thank you for your cooperation and timely response. Cathy Martin, Fisheries Biologist

NAME

Fisheries Section
PO Box 330
Little Creek, DE 19961

Division of Fish & Wildlife
Freshwater Angler Survey
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