

Upper Delaware River Cold Water Fishing & Boating

Economic Impact Study



Prepared April, 2014 for:

**Delaware County Department of Economic Development
and Friends of the Upper Delaware River**



This project was made possible through funding from the Delaware County IDA, One Courthouse Square, Suite 4 , Delhi, NY 13753 and a grant from the Upper Delaware Council 211 Bridge Street, PO Box 192, Narrowsburg, NY 12764-0192

Table of Contents

<u>1.0</u>	<u>Background</u>	<u>1-1</u>
<u>2.0</u>	<u>Economic Base of Affected Area</u>	<u>2-1</u>
<u>2.1</u>	<u>Fishing Industry Contributions to Economy</u>	<u>2-1</u>
<u>2.2</u>	<u>Property Value Impacts of the Boating and Fishing Industry</u>	<u>2-13</u>
<u>3.0</u>	<u>Impact of Releases</u>	<u>3-1</u>
<u>4.0</u>	<u>Potential Gains from Consistent Releases</u>	<u>4-1</u>
<u>4.1</u>	<u>Potential Value of Consistent Cold Water Releases</u>	<u>4-1</u>
<u>4.2</u>	<u>Benefits of Consistent Releases to New York City</u>	<u>4-6</u>
<u>5.0</u>	<u>Conclusions</u>	<u>5-1</u>

Note: Cover photo courtesy of [West Branch Angler & Resort](#)

Report prepared with assistance of:

***The Town and Village of Hancock
The Town and Village of Deposit
The Town of Colchester***

***and a special thanks to all the businesses and organizations
who provided valuable data and other input to the study***

by Shepstone Management Company, Inc.



1.0 Background

Several parties joined efforts to sponsor this study of the economic impacts of the Upper Delaware River's boating and fishing industry on the region and, more specifically, to evaluate the potential impact of more consistent cold water releases from New York City's reservoirs. Those parties included the [Delaware County Industrial Development Agency](#), the [Delaware County Department of Economic Development](#), [Friends of the Upper Delaware River](#) and the [Upper Delaware Council](#).

The study includes a thorough literature search, examines the economy of the impacted area described more fully in Section 2.0, along with boating and fishing industry contributions to that economy and property value Impacts.

Section 3.0 is devoted to analyzing the impacts of the existing release patterns and the implication therefrom as well as the economic costs associated with inconsistent releases.

Section 4.0 looks at the potential gains from more consistent cold water releases and the benefits to New York City and environs.

The study uses research and data from a number of sources to accomplish these tasks, concluding the lack of consistent cold water releases has kept the local boating and fishing industry from capitalizing on approximately 40% of the recreational opportunities that could exist with more consistent releases. Data is projected 20 years forward to generate a net present value of the income stream which can then be added to impacts on real estate values to yield a total impact value that encompasses both. It concludes the following:

Altogether then, the final estimate of the current net present value of the cold water fishery, after considering both objective and subjective data sources, is an estimated \$414 million (\$305 million in economic activity plus another \$109 million in second home real estate values connected with that activity).

It is further estimated the value of the cold water fishery as both a boating and fishing resource, as well as a foundation for camping and second home visitation, would be enhanced by \$274 million with more consistent cold water releases (\$203 million in economic activity plus another \$71 million in second home real estate values connected with that activity).

It further notes every dollar spent at the fishing destination by anglers is accompanied by another 61 cents spent en route to the location. This means another \$186 million is now being spent on boating and fishing related activities *outside the immediately impacted area*, with the potential to add another \$124 million from more consistent releases. Assuming 75% of that money is spent in New York, that's another potential \$7.5 million in sales tax revenue for these areas.

Finally, the study illustrates it is residents of the New York City metro area who own many of the second homes in the immediately impacted region; as much as \$22.8 million of the \$109 million in second home value related to boating and fishing. Their properties could gain as much as \$15.2 million in value from a more consistent cold water releases protocol.

This data serves as the basis for the primary recommendation, which is as follows:

A more reliable, consistent pattern of water releases from the NYC Delaware River basin reservoirs as articulated in the Equitable Apportionment Plan (EAP), an approach strongly supported by the regional conservation and business communities, would address chronic thermal stress concerns, alleviate dramatic fluctuations in river flows, and provide more water at the right time to protect cold water habitat and enhance recreational opportunities in the Upper Delaware River. Adoption of the EAP in the next water management plan for the NYC Delaware River basin reservoirs would be a significant step in the right direction and would create more economic opportunities as a direct result of a better flow regime. While it would not totally remove the possibility of low-flow days during peak weekends, it will definitely reduce the number of those days dramatically to great economic benefit to the region as a whole.

That such a reliable, consistent pattern of water releases is possible is evidenced by a review of the USGS flow data for the West Branch of the Delaware River at Hale Eddy which, for the period of April through October for 2011-2013 showed an average flow of 1,078 cfs against the desirable level of 725 cfs. Unfortunately this excess occurs during periods of flooding, the early Spring, late Fall and on weekday periods when it does nothing to cure the deficit in flows now negatively impacting prime fishing and boating weekends. The average deficit compared to this standard was 87 cfs per day for the weekends (Thursday through Sunday) during this period, meaning there is plenty of room to cure the low releases problem with better flow management.

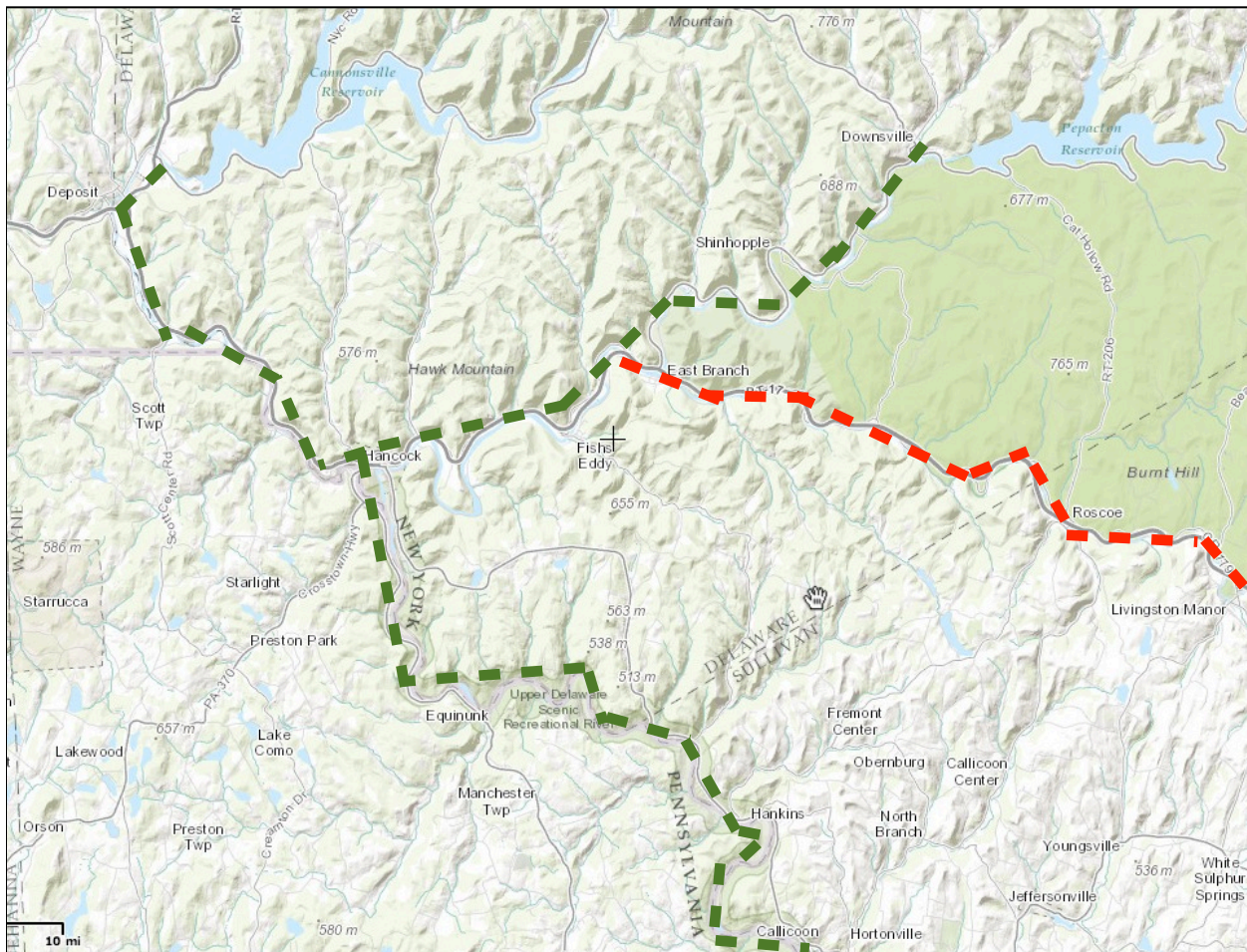
2.0 Economic Base of Affected Area

2.1 Fishing Industry Contributions to Economy

Delaware County's fishing industry cannot be segregated from that of adjoining Broome, Sullivan and Wayne Counties due to the principal fishing resource shared among the four counties; that being the Delaware River, including its East and West Branches, the latter being a well-known fishery for anglers. This system, from Deposit in Broome and Delaware Counties to Callicoon, New York in Sullivan County, is the primary subject of this study.

Delaware County is clearly a major beneficiary of the fishing economy, but the economic contributions of the industry extend to the other counties as well. The map below identifies the primary study area, with the East and West Branches and the main stem of the Delaware (green) being those stretches most impacted by cold water reservoir releases.

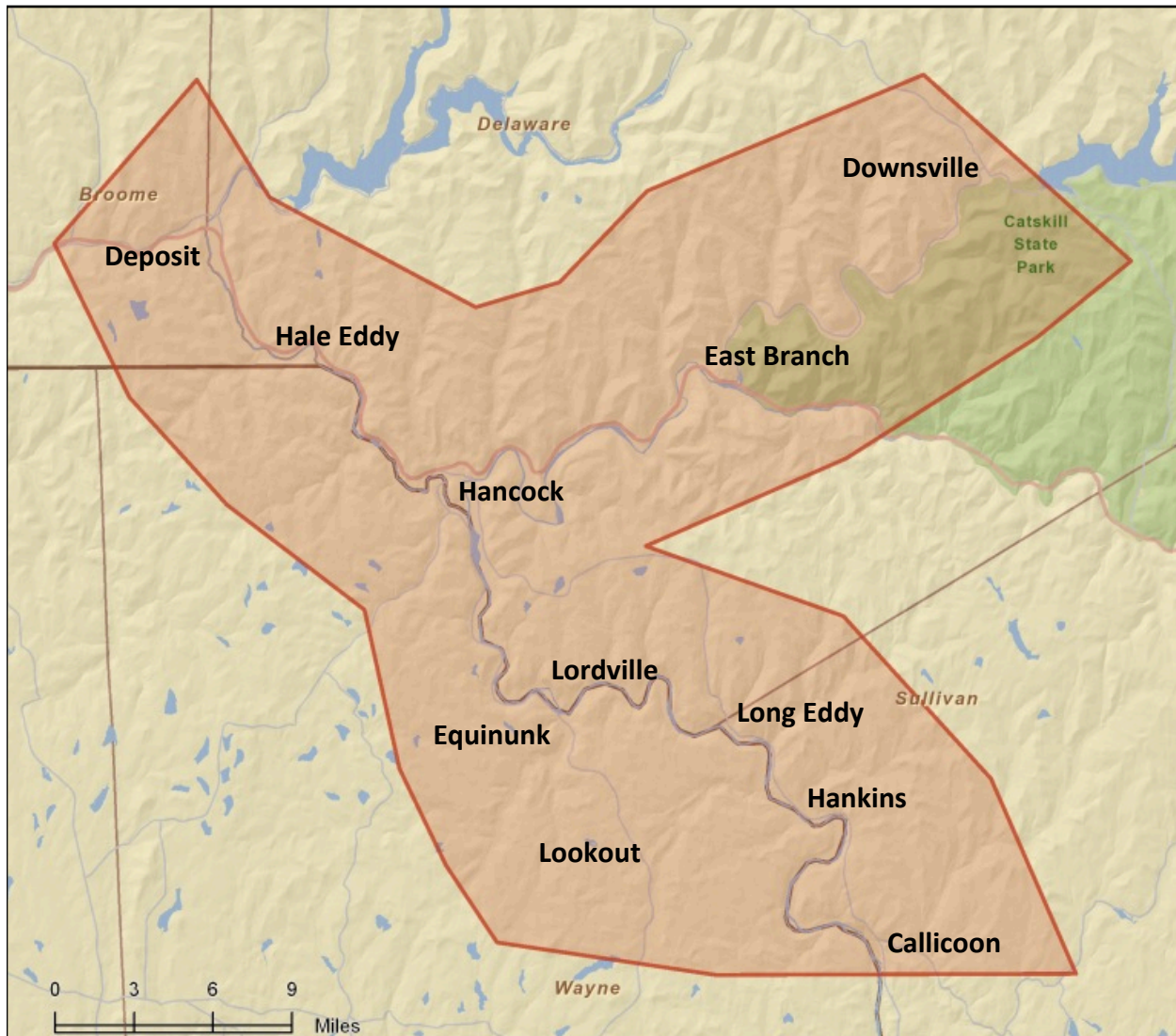
The Beaverkill (red), also a famous fishery in its own right, is not impacted itself, but impacts the East Branch and upper main stem by introducing somewhat warmer water not influenced by cold water releases.



Upper Delaware River Cold Water Fishing & Boating - *Economic Impact Study*

There are 28.0 miles of the main stem involved from Callicoon to the confluence of the East and West Branches. The West Branch below the dam at the Cannonsville Reservoir constitutes another 16.9 miles of fishery. The East Branch, from the Pepacton Reservoir dam to the confluence is approximately 33 miles, bringing the total stream length directly impacted by the cold water releases to 77.9 miles traversing two states and four counties.

The existing contributions of the fishing industry to the area involved are substantial and may be ascertained in several ways, starting with an inventory of businesses potentially impacted by cold water releases; due to a significance dependence on fishing as an industry. A market area defined as 5-10 miles from the affected streams may be roughly defined as follows:



An inventory of businesses identified within this area follows. It is assembled by NAICS code using Dun & Bradstreet data and information from ESRI, a standard source of estimates and projections in most market analyses. Potentially impacted sectors are highlighted in yellow.

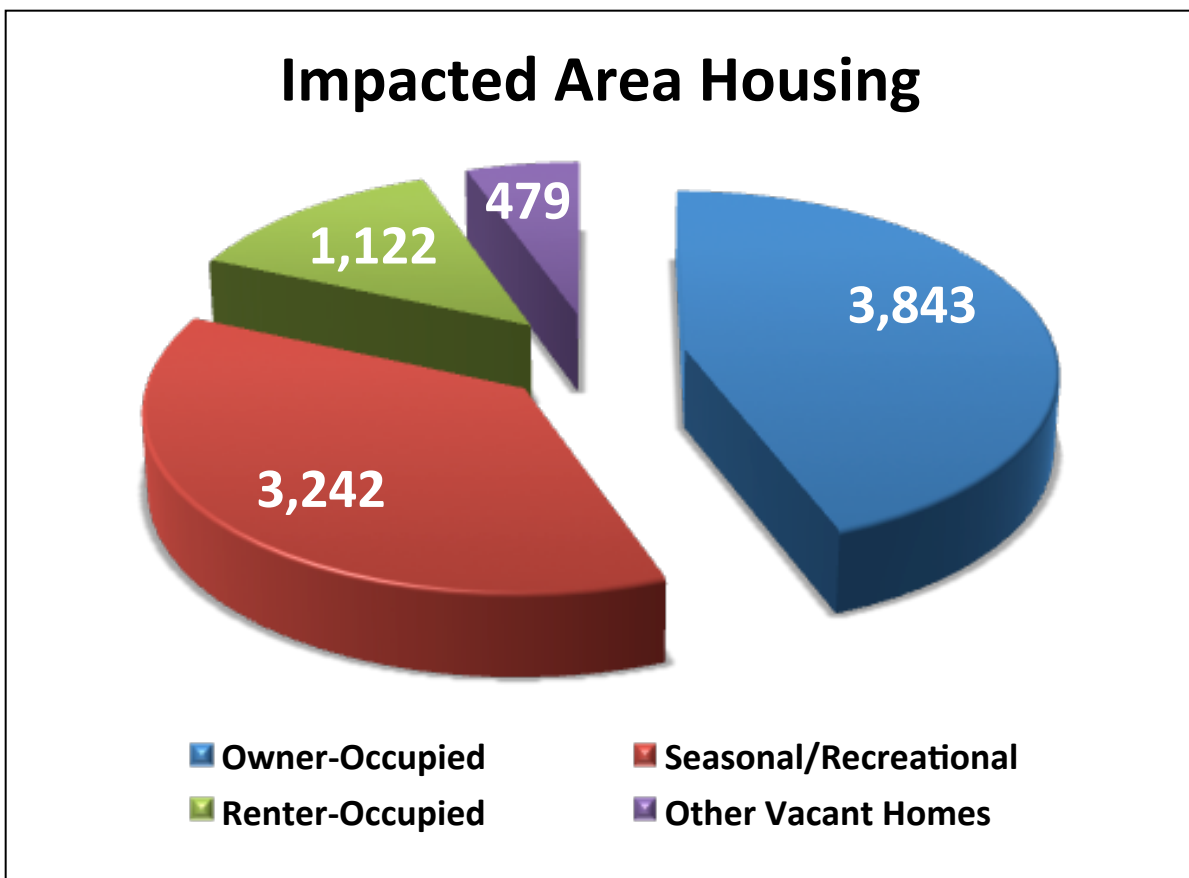
Impacted Area Business Summary

NAICS Codes	Businesses		Employees	
	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing & Hunting	53	7.3%	113	1.9%
Mining	5	0.7%	22	0.4%
Utilities	2	0.3%	6	0.1%
Construction	78	10.8%	193	3.3%
Manufacturing	22	3.0%	136	2.3%
Wholesale Trade	20	2.8%	103	1.7%
Retail Trade	82	11.3%	346	5.8%
Motor Vehicle & Parts Dealers	9	1.2%	63	1.1%
Furniture & Home Furnishings Stores	3	0.4%	6	0.1%
Electronics & Appliance Stores	3	0.4%	10	0.2%
Bldg Material & Garden Equipment & Supplies	7	1.0%	31	0.5%
Food & Beverage Stores	12	1.7%	75	1.3%
Health & Personal Care Stores	5	0.7%	42	0.7%
Gasoline Stations	3	0.4%	13	0.2%
Clothing & Clothing Accessories Stores	3	0.4%	5	0.1%
Sport Goods, Hobby, Book, & Music Stores	9	1.2%	19	0.3%
General Merchandise Stores	5	0.7%	26	0.4%
Miscellaneous Store Retailers	21	2.9%	43	0.7%
Nonstore Retailers	2	0.3%	12	0.2%
Transportation & Warehousing	38	5.3%	160	2.7%
Information	16	2.2%	2,749	46.4%
Finance & Insurance	14	1.9%	65	1.1%
Real Estate, Rental & Leasing	26	3.6%	76	1.3%
Professional, Scientific & Tech Services	40	5.5%	111	1.9%
Management of Companies & Enterprises	2	0.3%	5	0.1%
Administrative & Support & Waste Management &	105	14.5%	192	3.2%
Educational Services	21	2.9%	752	12.7%
Health Care & Social Assistance	22	3.0%	71	1.2%
Arts, Entertainment & Recreation	13	1.8%	40	0.7%
Accommodation & Food Services	57	7.9%	223	3.8%
Accommodation	25	3.5%	126	2.1%
Food Services & Drinking Places	33	4.6%	97	1.6%
Other Services (except Public Administration)	82	11.3%	210	3.5%
Automotive Repair & Maintenance	12	1.7%	25	0.4%
Total	723	100%	5,929	100%
Total of Potentially Impacted Businesses	169	23%	526	9%

Source: Copyright 2013 Dun & Bradstreet, Inc. All rights reserved. ESRI Total Residential Population

Altogether, the summary of businesses indicates there are some 169 potentially impacted businesses enterprises within this market area, which directly employ as many as 526 individuals. Not every miscellaneous store retailer will sell fishing tackle or goods used by anglers but we know many will and there are other non-retail sectors such as real estate services, that do gain at least tangential benefits from the fishing industry whenever an angler purchases a second home in the area, for example.

There are fully 3,242 homes in seasonal/recreational use within this relatively narrow corridor, representing 37% of all housing. This is addressed in further detail later but it's clear the second home activity is impacted by the streams and the activities around them, which means there are considerable indirect economic impacts on businesses far removed from fishing per se, including building and construction enterprises, for example.



Therefore, we can be reasonably confident these 169 businesses represent a fair accounting of those potentially impacted economically by fishing as an industry. They include, on a direct basis, activities such fishing guide services, food and beverage stores, sporting goods stores, lodging facilities, restaurants, taverns, gasoline stations, convenience stores and assorted other enterprises. **Note: It appears most gasoline sales locations are classified as convenience stores and not gas stations, so no one should assume there are only three – there are more than three in Hancock alone.** The indirect impacts, of course, extend much further into all sectors of the regional economy, and well beyond the defined market area.

How much is spent at these businesses and then recirculated throughout the broader economy? There are numerous studies regionally and elsewhere in the U.S. that provide a basis for estimating those amounts. The following are some examples:

Socioeconomic Value of the Delaware River Basin

University of Delaware, 2011

This study, which is essentially a compilation of other studies, indicates the following with respect to fishing values:

- A 2001 US Fish and Wild Service study indicated the economic value of fishing is approximately \$53 per trip in 2010 dollars, and each angler typically makes 11-18 trips
- A 2002 study by Johnson, et al, indicated the economic value of fishing per trip, in 2010 dollars was \$62.79.

Estimated Economic Impact of Recreational Fishing on Minnesota Waters of Lake Superior

University of Minnesota, 2009

This analysis summarizes studies of Minnesota-based charter and non-charter recreational fishing activity connected with Lake Superior and indicates the following:

- Non-charter fishing was by anglers who were 91% residents and 9% non-residents.
- Resident anglers were estimated to have spent \$41.25 (1990 dollars) per trip based on a 1985 US Fish and Wild Service study and non-resident anglers were estimated to have spent \$22.03 per trip.
- Economic output multipliers of 1.3 to 1.8 were estimated to yield total impacts.
- Minnesota DNR data from 1990 indicated 45% of anglers came from hometowns within 75 miles of where they fished and 47% came from 76-300 miles away.

Angler Utilization and Economic Survey of the American Shad Fishery in the Delaware River

US Fish and Wildlife Service and NJ Division of Fish, Game and Wildlife, 1987

This study is focused on the American Shad but includes some data with implications for the fishery as a whole and indicates the following:

- Shad anglers spent an average of \$25.50 per trip in 1986.
- Shad anglers estimated each trip had a recreational value to them of \$50 per day.

Impacts of Tourism Along the Upper Delaware Scenic and Recreational River

Cornell University, 1981

This study was conducted in conjunction with preparation of the Management Plan for the Upper Delaware River and indicates the following:

- Some 40.5% of non-resident recreational groups primarily headed to Delaware County for recreation went there for fishing purposes. This number was 40.2% for Wayne County and 21.5% for Sullivan County visitors. Some 29.2% of those headed to that portion of the river between Callicoon and Hancock said the same.
- Some 17.2% of all non-resident groups primarily headed to the region as a whole for fishing purposes went to Delaware County, 40.5% went to Sullivan County and 16.2% went to Wayne County. Some 38.6% went to that portion of the river between Callicoon and Hancock.
- Non-resident recreationists visiting the Upper Delaware spent an average of 2.1 days fishing altogether. Non-resident trout fisherman spent an average of 1.5 days fishing. Some 18.4% of non-resident recreationists engaged in fishing and 10.9% engaged in trout fishing.
- Non-resident recreational groups (as opposed to individual recreationists) spent an average of \$56.70 within the Upper Delaware River valley (\$12.60 at restaurants, \$11.85 for groceries, \$7.54 on lodging/camping, \$12.09 at gasoline service stations, \$6.81 for boat rentals and \$5.81 for other items). The average per recreationist (as opposed to groups) was \$10.59.
- Some 29.6% of non-resident recreationists came from counties bordering on the river, another 29.3% came from 50-100 miles, 30.3% came from 100-150 miles, 5.8% came from 150-200 miles and 5.0% came from further away.

Economic Effects of Rivers on Local and State Economies

National Park Service, 1989

This study was conducted for the NPS by the USDA Forest Service and The University of Georgia. It addresses the Upper Delaware region and two others and indicates the following:

- The average river visitor, whether a resident of adjoining counties or a non-resident, came 98.50 miles in a group of two people, stayed 11.91 hours and spent \$1.12 on lodging, \$1.47 on transportation, \$13.21 on food and \$0.01 on other expenditures, for a total of \$19.42 locally. Statewide, the total was \$33.42.
- Every 1,000 additional non-resident visitors were projected to generate \$65,300 in additional local output (\$85,600 statewide), \$17,000 of additional employee

compensation (\$24,700 statewide), \$9,900 of added property income (\$14,600 statewide), \$26,900 of total income (\$39,300 statewide) and \$29,900 in value added (\$44,000 statewide). This includes direct, indirect and induced impacts.

- Economic multipliers for current use were estimated at 2.03 for gross output (2.19 statewide), 2.16 for total income (2.53 statewide) and 1.57 for employment (1.53 statewide). The numbers were somewhat lower for new water-related visitation; estimated at 1.84/2.01 for gross output, 1.94/2.28 for total income and 1.46/1.44 for employment.

The Money Generation Model

National Park Service, 1996-1997

This study outlined the basis for evaluating the economic contributions of national park system units and indicates the following:

- Travel expenditures per person for New York were estimated at \$70.72 for lodging and \$43.95 for meals. Pennsylvania figures were \$57.40 and \$37.54, respectively.
- Economic multipliers of 2.00 were used for lodging and food in New York with a comparable figure of 2.24 for Pennsylvania.

The Economic Impact of Mountain Trout Fishing in North Carolina

Responsive Management and Southwick Associates, 2009

This study evaluates the economic contributions of mountain trout fishing in North Carolina and indicates the following:

- In total, 92,769 mountain trout anglers (76,761 residents and 16,008 nonresidents) fished for 1.42 million days in North Carolina in 2008. They spent \$146 million and had a total economic output of \$174 million when indirect economic effects are factored in. [Suggests an average daily expenditure for resident and non-resident anglers of \$103 per day, one of the higher such figures found in these economic impact studies.]
- The typical resident mountain trout angler spent approximately \$65 per day on trip expenditures when mountain trout fishing in North Carolina; nonresidents averaged \$158 on trip expenditures. Annually, the typical resident mountain trout angler spent a little over \$500 on mountain trout fishing equipment in North Carolina.
- The typical resident mountain trout angler fished for mountain trout about 10 days in North Carolina in a year; the typical nonresident fished for about 5 days for mountain trout in North Carolina. Most trips taken by mountain trout anglers lasted only 1 day.

Economic Impact and Social Benefits Study of Cold Water Angling in Minnesota University of Minnesota, 2002

This study examined cold water fishing on streams and Lake Superior in Minnesota and indicates the following:

- Anglers fishing streams year round spent on average \$29.37 per day in their home area and \$56.57 away from home while fishing. Money spent at home went primarily for fishing equipment (\$12.89) followed by fuel/oil (\$7.91) and non-restaurant food (\$5.14). The highest away expenses were recorded for lodging (\$11.59), restaurant food (\$11.07) and fuel/oil (\$10.38). Total direct sales due to anglers fishing streams year round amounted to over \$30 million, with another \$18 million in direct income. Total expenditures supported over 632 full and part time jobs.

Sportfishing in America

American Sportfishing Association, 2013

This study incorporates much of the data from the US Fish and Wildlife Service's 2011 study (see below) and indicates the following:

- The U.S. Fish & Wildlife Service's (USFWS) 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation identifies fishing as one of the most popular outdoor recreational activities in the United States. As many as 33 million people aged 16 or older participate in the activity, and spend \$48 billion annually on equipment, licenses, trips and other fishing-related items or events. These funds help create and support more than 828,000 jobs in the United States.
- Since the passage of the 1950 Federal Aid in Sport Fish Restoration Act, anglers have paid a federal excise tax on fishing tackle. These tax revenues are distributed annually to state fish and wildlife agencies. In 2010 alone, the excise tax on sportfishing tackle amounted to \$390 million. Along with the \$657 million contributed by anglers through fishing license fees and \$403 million in private donations, anglers generated \$1.45 billion for fisheries conservation efforts.
- Freshwater fishing involved an estimated 27,059,745 anglers in 2011, who generated expenditures and retail sales of \$30.6 billion, for a total economic output (including multiplier effects) of \$73.3 billion (which suggests a multiplier of 2.40). It included \$22.2 billion in salaries and wages for some 518,270 workers. This produced an estimated \$39.2 billion in Gross Domestic Product and \$9.5 billion in Federal, state and local taxes.
- New York had the second highest number of anglers in the US (1,882,280) and the sixth highest number of non-resident anglers (297,070) generating average expenditures of \$1,433 and \$951, respectively, for the year, with 29,874,128 fishing

days in total. It had 1,212,213 freshwater anglers and 19,199,694 freshwater fishing days.

- New York freshwater fisherman generated retail sales of \$839 million, with a total multiplier effect of \$1.39 billion, of which \$459 million was salaries and wages, \$109 million was Federal tax revenues and \$108 million was state tax revenues, with some 9,296 jobs involved.

National Survey of Fishing, Hunting, and Wildlife-Associated Recreation

US Fish and Wildlife Service, 2011

This study, conducted every five years, analyzes the extent and economic impacts of the fishing recreation industry and indicates the following:

- Freshwater anglers numbered 27.5 million. They fished 456 million days and took 369 million trips to freshwater in 2011. Freshwater anglers spent \$25.7 billion on freshwater fishing trips and equipment.
- Their expenditures for trips and equipment totaled \$25.7 billion for the year. Freshwater fishing can be separated into Great Lakes and freshwater other than the Great Lakes. There were 27.1 million anglers who fished for 443 million days on 354 million trips to freshwater other than the Great Lakes. Trip and equipment expenditures for non-Great Lakes freshwater fishing totaled \$23.8 billion for an average of \$879 per angler for the year. Food and lodging comprised \$5.0 billion, 37 percent of total expenditures. Transportation costs were \$4.5 billion or 33 percent of trip costs. Other trip expenses, which include guide fees, equipment rental, and bait were \$4.0 billion for 30 percent.
- Freshwater anglers, excluding the Great Lakes, averaged \$494 per participant for their trips in 2011, equaling \$30 per day.
- While residents of metropolitan statistical areas (MSA) had lower participation rates in fishing than non-MSA residents, they still accounted for the majority of anglers. Thirteen percent of all MSA residents fished in 2011, but they composed 89 percent of all anglers. By comparison, non-MSA residents composed 11 percent of all anglers, but their participation rate was almost twice as high at 24 percent.

Larger MSAs had lower participation rates in fishing than smaller MSAs but composed more of the angler population. Large MSAs with populations of 1,000,000 or more had the lowest participation rate at 10 percent, but they made up 38 percent of all anglers. Medium MSAs with a population of 250,000 to 999,999 had a 15 percent participation rate and made up 21 percent of all anglers. Those MSAs with a population from 50,000 to 249,999 had a participation rate of 20 percent and composed 29 percent of all anglers.

New York Statewide Angler Survey

Cornell University Department of Natural Resources, 2007

This was a random survey of approximately 20,000 anglers who fished the freshwaters of New York State during the 2007 calendar year. It may be found at <http://www.dec.ny.gov/outdoor/56020.html> and indicates the following:

- Anglers spent an estimated 18.7 million angler days fishing New York's freshwaters in 2007. An angler day is defined as any part of a day that a person spent fishing.
- New York's resident and nonresident anglers collectively spent an estimated \$331 million at the fishing site and \$202 million en route to the fishing site. Almost one-third (30%) of the total at-location expenditures were made by out-of-state anglers. Average daily trip-related expenses (\$17.62 at-site plus \$10.76 en route) for all anglers was \$28.38 -- \$22.36 for residents and \$90.10 for nonresidents.
- It was estimated the main stem of the Delaware River (Hancock to Port Jervis) had 128,344 angler days of use in 2007 (down from 163,219 in 1988). An estimated 46,558 were from anglers who resided in DEC Region 3, some 48,778 were from other regions and 32,925 were from out-of-state. Those anglers were estimated to have spent \$3,687,358 at their fishing location and another \$2,521,404 en route. The average distance traveled by anglers was 78 miles.
- Cold water fishing in New York State represented 5.7 million angler days in 2007, of which an estimated 28% were for January through May, 51% for June through September and 21% were for October through December. The breakdown for the Delaware River main stem was similar at 32%, 52% and 16%, respectively. An estimated 61% of the East Branch's 56,152 angler days and 68% of the West Branch's 96,365 angler days were June to September. Some 28% of the West Branch activity was January to May.
- Delaware County represented an estimated \$11,103,441 in angler expenditures at their fishing location. Sullivan County anglers spent an estimated \$8,497,470 and Broome anglers spent an estimated \$1,271,391, for a total of \$20.9 million. Angler days totaled 405,486 for Delaware, 514,652 for Sullivan and 214,658 for Broome County. Anglers traveled an average of 85 miles to fish in Delaware County, 74 miles in Sullivan County and 23 miles in Broome County.
- The East and West Branches represented a total of 152,517 angler days or roughly 38% of the Delaware County total. The Delaware River main stem's 128,344 angler days represented 25% of Sullivan County angler days.

There are numerous other economic impact studies indicating similar results. Overall, there are several factors that play into the economic impact of cold water fishing on the areas impacted by New York City's reservoir releases. These include the following:

Upper Delaware River Cold Water Fishing & Boating - *Economic Impact Study*

1. Freshwater anglers in New York spend roughly 16 days per year fishing and spend approximately \$879 per year or \$55 per fishing day on their hobby. Roughly 20% each is spent on lodging, food and transportation (gasoline), with the remainder going for other supplies and services.
2. Some 89% of anglers come from metropolitan areas, and 38% come from large metropolitan areas such as New York City. Fishing is also the primary reason visitors to the Delaware River region head to Delaware County.
3. There are direct, indirect and induced economic impacts from spending on fishing. The direct impacts consist of purchases made by anglers. The indirect impacts consist of the secondary effects of that spending as a restaurant pays for the food it uses to prepare meals, for example. The induced impacts are those relating to the fact a popular restaurant, for example, may attract a bank branch or bus stop to locate nearby. Multiplier effects can be segregated into these and other categories and range from a factor of 1.30 to 2.53, depending upon the extent of the area involved. Generally, a statewide multiplier will be higher than one applied to a local area such as being analyzed in this instance.

The National Park Service multipliers developed in evaluating the economic impacts of new water-related recreation visits to the Upper Delaware River are mid-range among the studies examined and, therefore, probably the closest to reality. They are 1.84 for gross output on a local basis and 2.01 on a statewide basis, 1.94/2.28 for total income and 1.46/1.44 for employment.

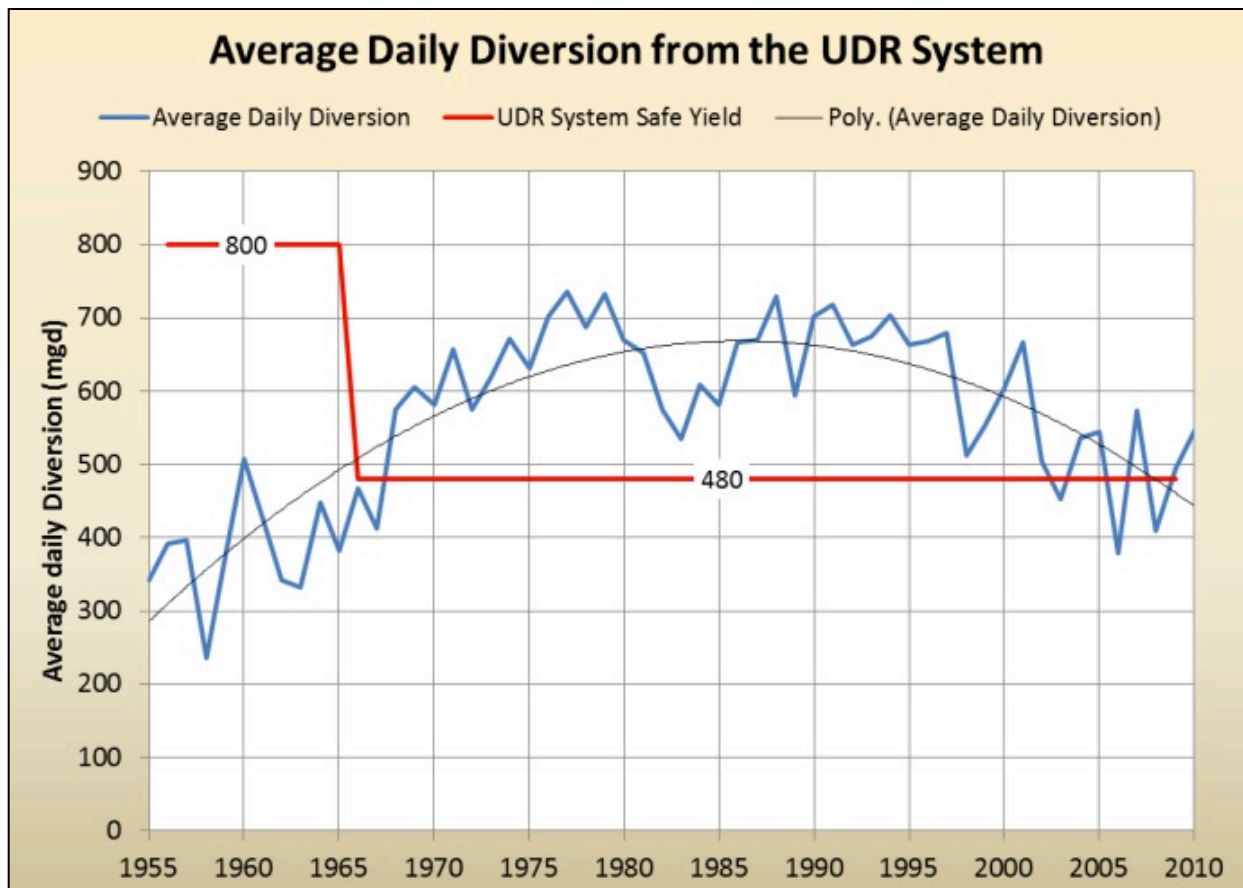
Given these as basic assumptions it is possible to assess the existing economic impact of fishing on the impacted area, which yields the following with respect to non-property value impacts:

Current Estimated Non-Property Value of Local Fishing Economy				
	Estimated Angler Days	Estimated Expenditures at Location	Indirect & Induced Value (Local)	Total Value
New York				
East Branch	56,152	\$1,917,912	\$1,611,046	\$3,528,958
West Branch	96,365	\$3,291,416	\$2,764,790	\$6,056,206
Delaware River	42,739	\$1,459,766	\$1,226,204	\$2,685,970
Total New York	195,256	\$6,669,094	\$5,602,039	\$12,271,134
Pennsylvania	139,104	\$4,751,182	\$3,990,993	\$8,742,175
Totals	334,359	\$11,420,277	\$9,593,032	\$21,013,309

Data from the *New York Angler Survey* was used to estimate angler days with one-third of the main stem days allocated to the study area. Pennsylvania side activity is assumed to be comparable to the New York side figures for the main stem and West Branch. Value per angler day, based on national data, is estimated at \$55. The *New York Angler Survey* indicates 62% of

those expenditures or \$34.15 are made at or near the fishing location. This figure is then subjected to a multiplier of 1.84 for indirect and induced impacts (another approach to estimating expenditures is addressed in Section 4.0).

It is also assumed, based on diversions exceeding safe yield, that flows are inadequate at minimum of 25% of the fishing season, which means considerable business is being lost. This figure, will be further developed (see Section 3.0) but the following chart, developed for a [Upper Delaware Council presentation by Trout Unlimited](#), illustrates the fundamental issue; that even with progress in reducing demand, inconsistent releases are still resulting in low flows during much of the fishing season. Notice the wide swings between 2005 and 2010.



Notwithstanding the lost business, the current fishing economy generates minimum gross output of approximately \$21 million altogether or an average of roughly \$124,300 for each of the 169 businesses impacted in some way by it. This alone, net present valued over 20 years at a 5% discount rate, represents a \$261.9 million value to the impacted area, not including property value impacts or state level multiplier effects.

More importantly, there is a minimum of another 25% or \$65.5 million of value to be had from a consistent reservoir water releases regimen that enables a season long cold water fishery. See Section 4.0 for further development of this number.

2.2 Property Value Impacts of the Boating and Fishing Industry

The property value impacts from fishing are considerable. As noted above, some 3,242 or 37% of all housing units in the impacted area are second homes and these are occupied by households focused on recreation as a pursuit while staying in the area. Housing units within the impacted area have a current estimated average value of \$115,152 according to ESRI.

Assuming the value of a second home is relative to the recreational pursuits to which it is put, and applying the NPS data indicating 29.2% of those headed to that portion of the river between Callicoon and Hancock were there to fish, suggests a similar number of second homes have that as an underlying purpose. Therefore, it is reasonable to assign that much of the second home value to this purpose, meaning the 3,242 second homes in the impacted area represent a total value of \$109.0 million attributable to the fishing sector.

This brings the total current property and non-property value of the fishing industry in the impacted area to an estimated \$370.9 million with the potential to add as much as \$65.5 million from a consistent releases program that delivers a season long cold water fishery. These numbers may be considered minimums based upon national and state trends and are refined in Section 4.0 to address the unique nature of this particular fishery and the higher spending patterns within it.

3.0 *Impact of Releases*

Variability in stream flow is a very serious issue for the boating and fishing industry. Indeed, the economics of fishing and boating depend upon instant information obtained by recreational users who acquire it over the internet. Boaters and anglers make decisions, based upon that data, about whether or not to drive to these streams, and the communities near them, to spend the weekend and considerable money with local suppliers of goods and services. Decisions whether to reserve rooms, rent equipment and/or dine out may get made on the basis of flow and temperature data from Thursday that is completely different on Saturday, given the current conditions of high variability in stream flows.

Stream flow, or the amount of water going down the stream at a given location at a given time, are influenced by amounts of precipitation, rates and velocities of runoff (which can be a factor of development conditions) and water releases from the New York City reservoirs (the Cannonsville and Pepacton, in this case). The precipitation factor is, obviously, not controllable and runoff is only controllable over the long-term and in small proportion. The releases from the reservoirs are, therefore, by far, the most important factor, if for no other reason than they are more controllable in the short-term.



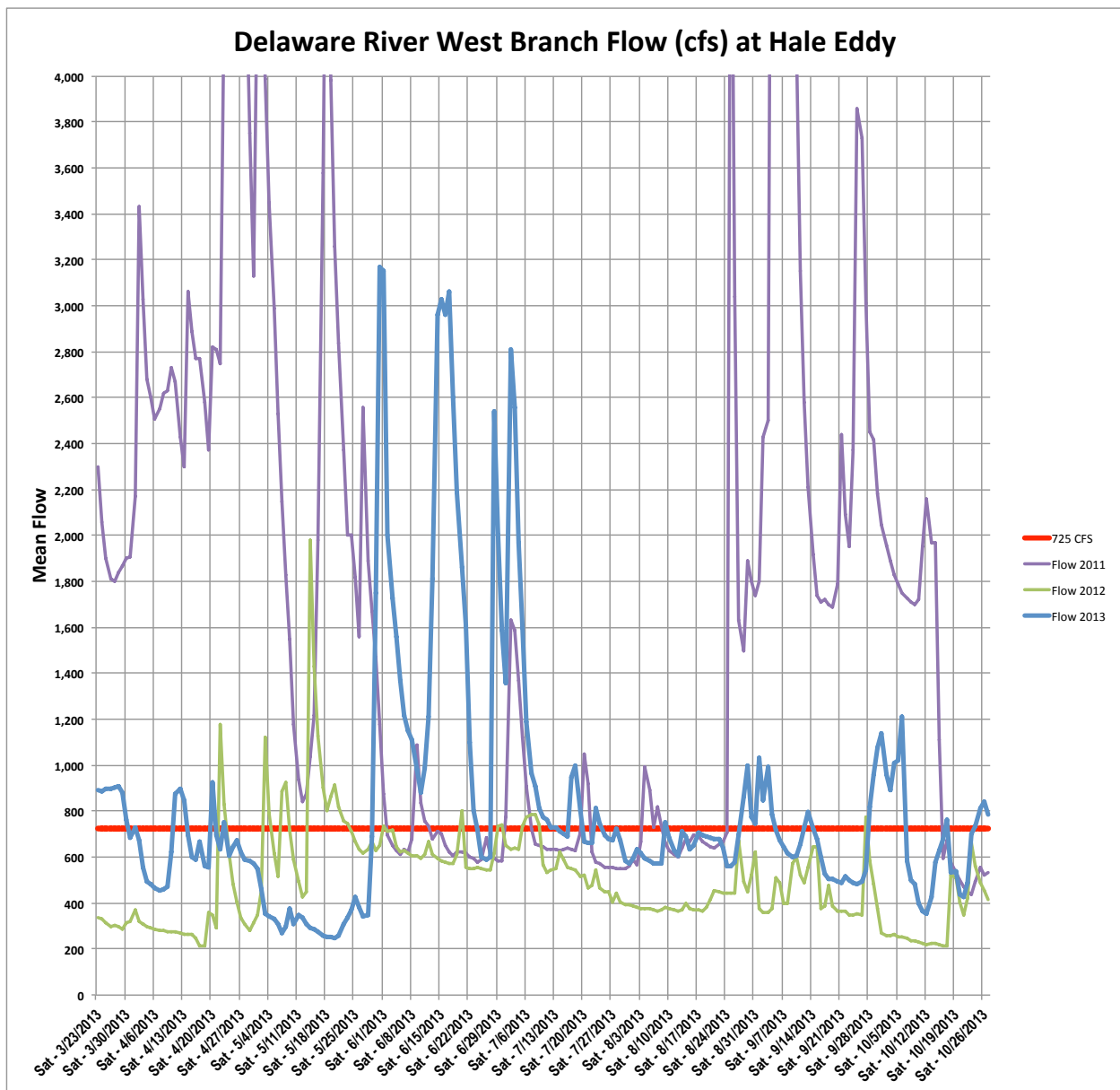
Cannonsville Reservoir Spillway

Detailed data on reservoir releases provides additional insights into their impact on the cold water fishery as well as the boating industry. While releases per se are not the sole determinant of the quality of the fishery, *consistent* flows are the critical factor and inconsistent reservoir releases exacerbate heavy precipitation issues and runoff problems insofar as their

impact on stream flows. Inconsistent water releases directly impact the overall flow and can magnify the effects of these other issues, when they ideally should be helping to offset them.

Moreover, the number of days of low flow is misleading if anglers are under the impression low flows will persist and fishing might not be good. The timing of high and low flows is also instrumental to these sorts of judgments by anglers. That timing has been anything but even, as charts that follow indicate.

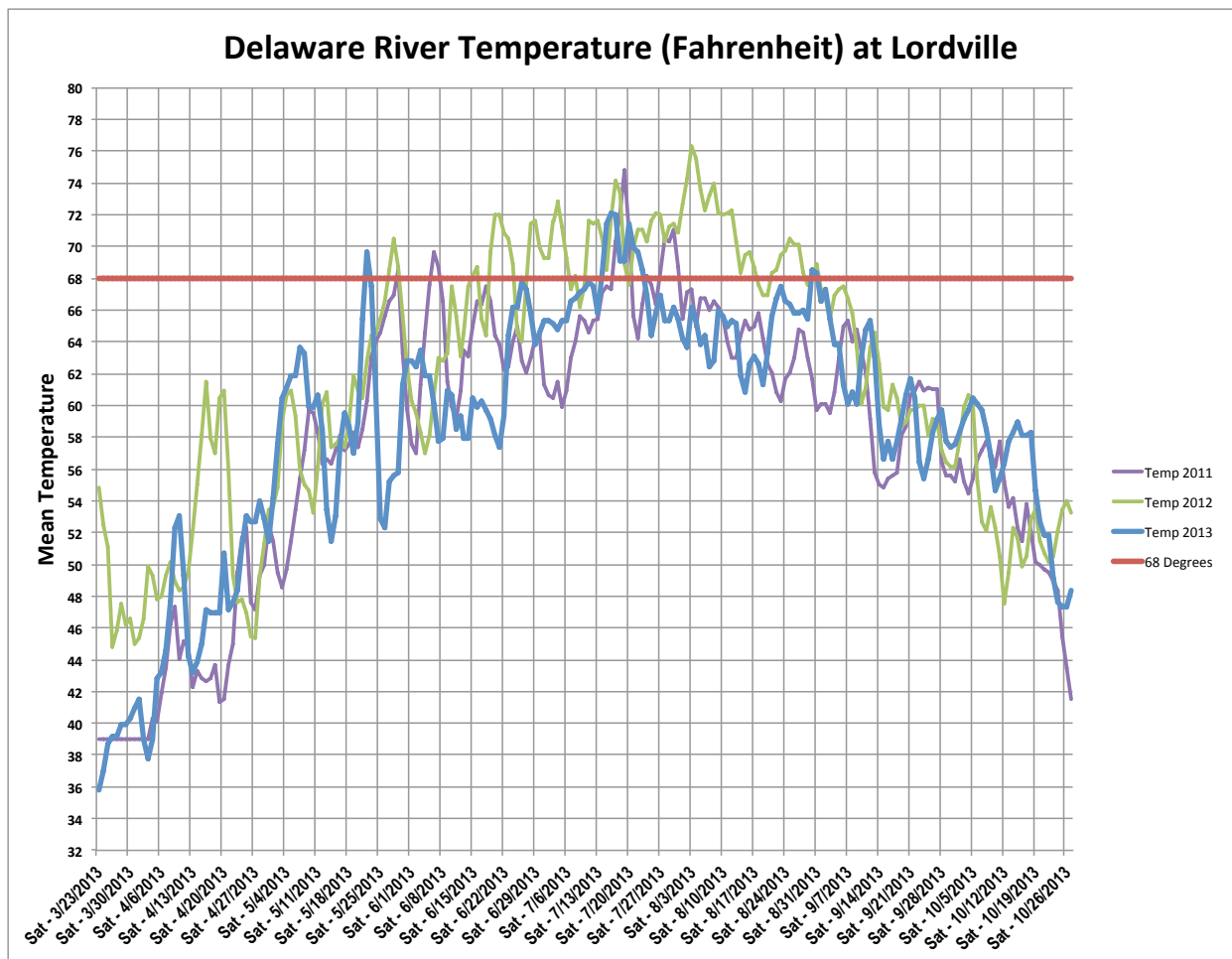
A 725 cfs standard at Hale Eddy is suggested by fishing guides as the proper level of even flow (600 cfs discharge from the reservoir plus 125 cfs of existing flow) desirable for anglers, but there are additional factors as well, including, of course, temperature in the cases of some stream stretches (see discussion below regarding Lordville).



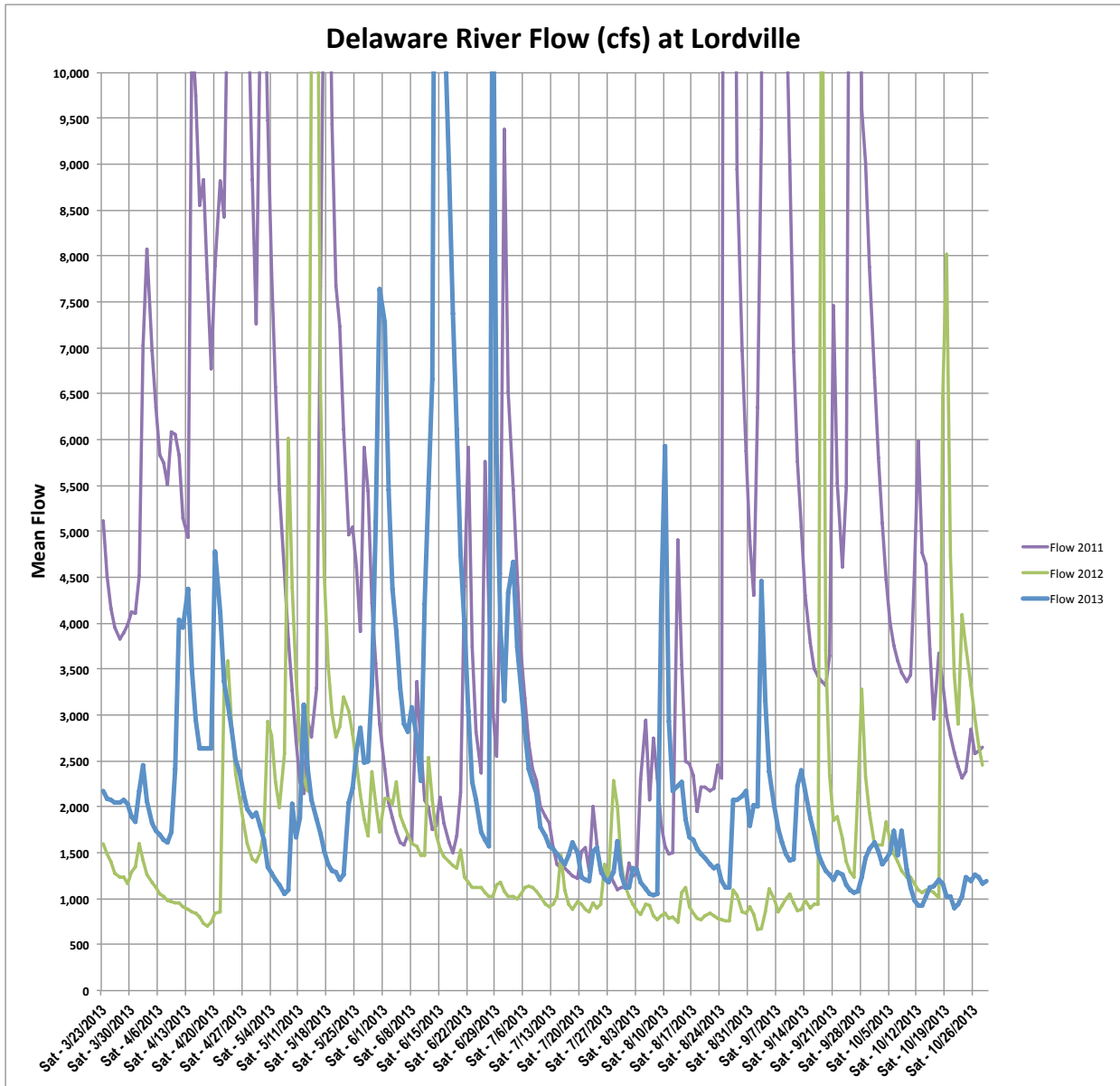
The preceding chart examines flows at the USGS station in Hale Eddy, New York. Three years of comparable flow data for the 32-week period running from March 23 to October 26 in 2013 is plotted and, as the chart illustrates, there were extremely wide variations in flows, even leaving aside flooding periods when flows as high as 19,800 cfs were recorded (which are too high to display and literally off the chart).

There were 15 weekends in 2013, 26 in 2012 and 3 in 2011 during which the weekend flows were lower than 725 cfs or immediately preceded by such low flows (resultant from inadequate releases) that would lead anglers to expect poor weekend fishing conditions. This suggests the real impact on the fishing economy is much greater than the 25% crudely estimated in Section 2.0. It is, in fact, arguably greater than 40% based on the average number of weekends where poor fishing conditions existed over the last three years.

There is also the fact waders benefit by somewhat lower flows than anglers fishing from boats, particularly if the temperature is correct for that sort of fishing. The following chart displays temperature changes, which have also been volatile in nature and were particularly so during 2011 and 2013, as this chart for the main branch at Lordville illustrates, as compared to a desirable maximum temperature of 68 degrees Fahrenheit:

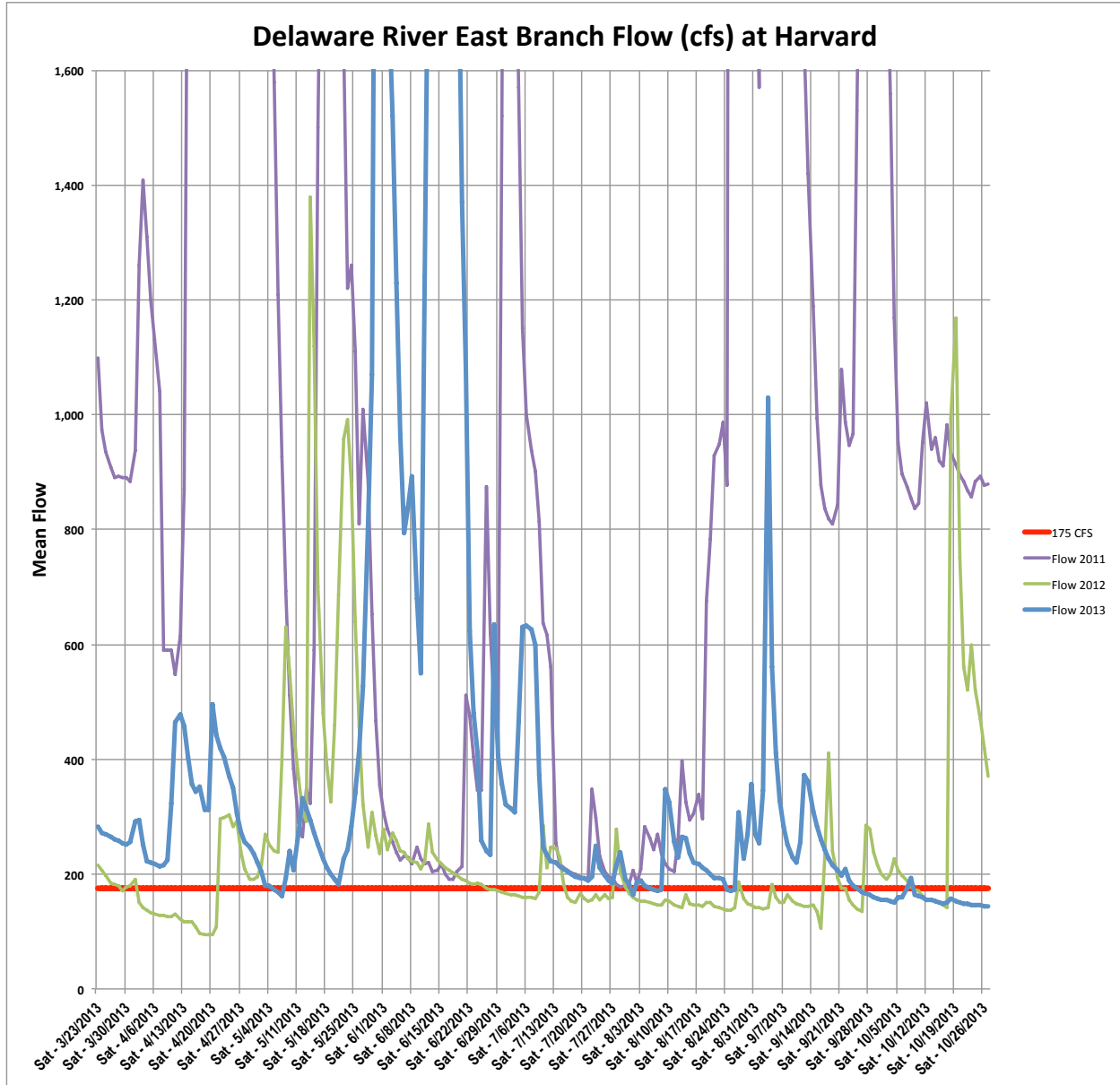


The data for the flow at Lordville shows great fluctuation as it is not only affected by releases, but also natural runoff and ambient temperature.



Additional charts were also developed for the East Branch, applying a standard of 175 cfs of flow at the Harvard Station, which is approximately halfway between the Pepacton Reservoir dam and the mouth of the Beaverkill.

The flows in this case have also widely varied although there was a period of relatively stable flows during the summer of 2012. Unfortunately, that flow was still often slightly below the desirable level of 175 cfs.



Overall, the data indicates the impacts of uneven releases are much greater when examined in detail than month by month or annual data might otherwise suggest. It is the weekends that count economically and the Thursday and Friday leading into them are critical. Using that criteria as a basis evaluating the bottom line economic impact of uneven releases indicates a minimum of a third and as many as 40% of weekends are being negatively effected.

Using the lower number to quantify economic impacts is conservative and reflects the fact the releases do not govern all activity. This is, nonetheless, a higher estimate than our earlier crude measurement of a 25% impact suggested.

4.0 Potential Gains from Consistent Releases

4.1 Potential Value of Consistent Cold Water Releases

Section 2.0 of this study began the process of accounting for economic impacts using national and state level data, but that undervalues the unique aspects of the affected area in terms of its extraordinarily high value as a fishery (the West Branch is a nationally recognized fishery), as well as a well-known canoeing and kayaking destination in the case of the main stem.

So as to gain a better perspective on the value of the resource economically, a survey was widely distributed to area businesses likely to be affected by the fishing and boating industry. A copy of the survey is attached.

Some 13 businesses responded with detailed data. These included realtors, fishing guides and training, restaurants, retail stores and lodging places; a small but very representative sample that accounts for about 10% of the businesses identified earlier as being located within the impacted area. Seven were from Delaware County, four were from Sullivan County and two from Wayne, so the geographical representation was also good.

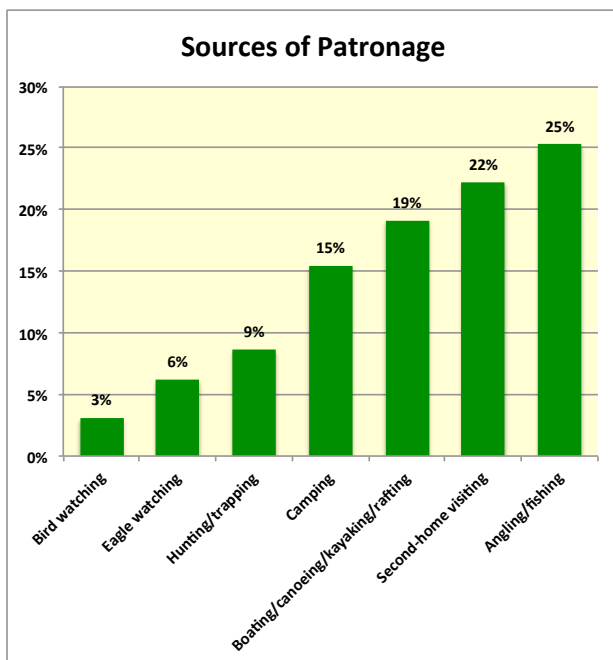
The following are the results:

- The typical business impacted has been in existence approximately 15 years.
- The average amount of land owned by respondents was 116 acres, although the range was wide; from one acre to well over 1,000.
- Businesses were asked “How much of your customer base is related to each of the following activities, in your estimation?”

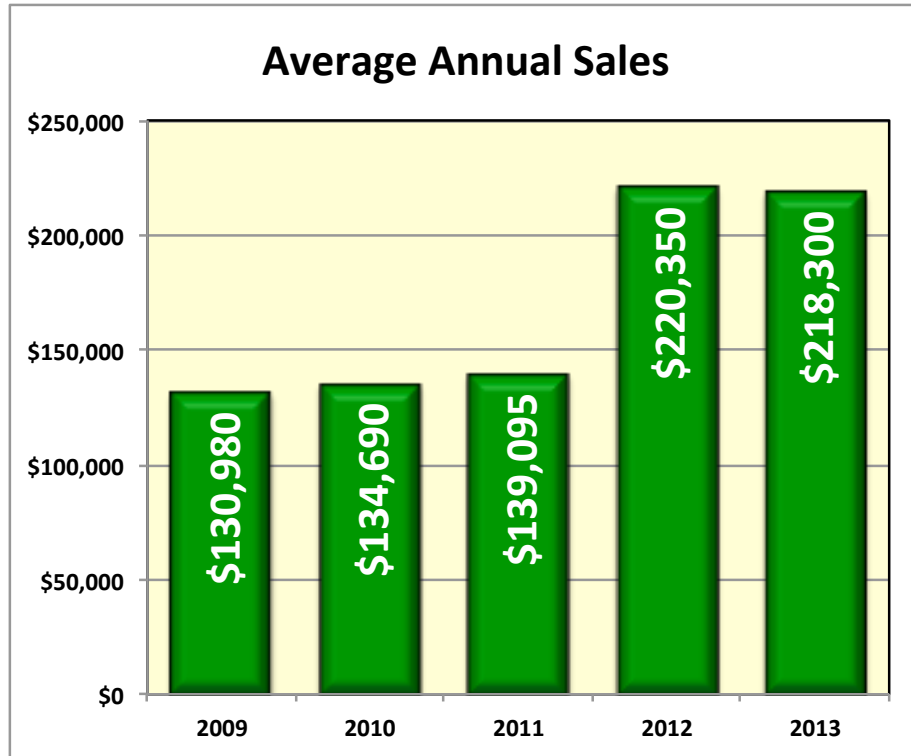
This was explained as follows:

“That is to say how many of your customers do you estimate come to the area for these activities and, in the course of their visits visit your business or use your services, regardless the services you provide directly relate to these activities or not?”

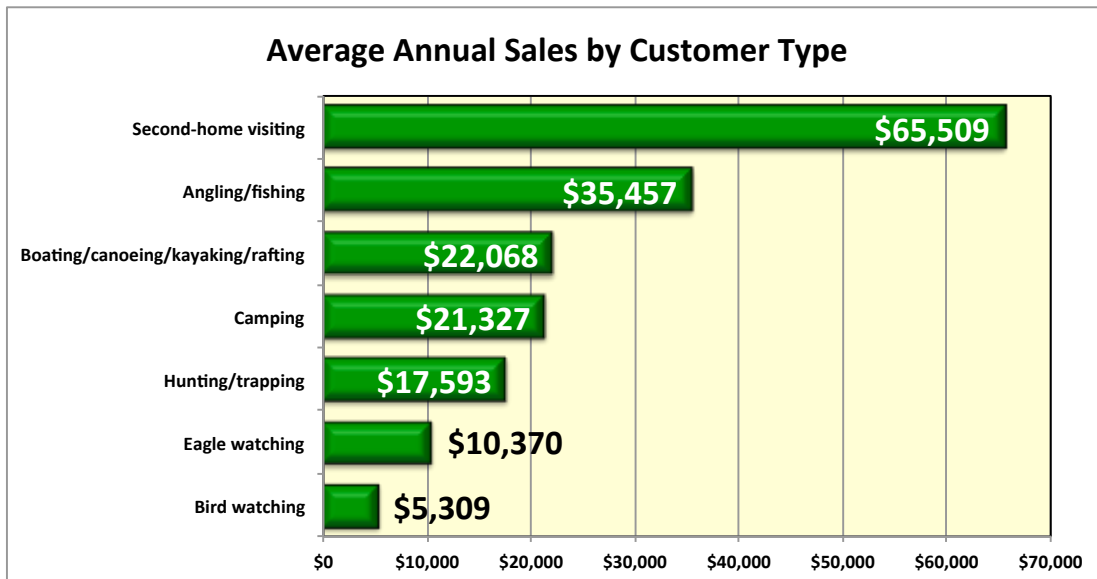
Their responses are indicated in the chart to the right, which is otherwise self-explanatory:



- The average sales of businesses answering the survey amounted to \$218,000 in 2013 but have climbed rapidly in the last five years as the following chart illustrates:



- Those sales, allocated by proportions businesses attributed to various recreation pursuits, indicated the following average expenditures per year; fishing and boating alone (including [37% of camping and second home activity](#)) accounting for spending of \$89,691 at each:



- Expenditures by these businesses generate significant ripple or multiplier effects across the economy, as the following chart illustrates:

Average Annual Expenses by Category	
Category	Amount
Advertising and marketing	\$7,515
Entertainment expenses	\$1,505
Food and beverages	\$29,467
Insurance	\$9,405
Labor expenses	\$29,160
Maintenance and repairs	\$8,614
Rent (land, buildings or equipment)	\$4,960
Retail goods for resale	\$5,500
Taxes (sales & other)	\$21,409
Transportation/vehicular expenses	\$7,874
Utility expenses	\$5,061
Other and miscellaneous	\$3,904
Total	\$134,372

- Impacted businesses have been spending heavily on new capital items to grow their enterprises and plan to spend much more in the next five years:

Total Capital Expenses, Last 5 Years	
Category	Amount
Buildings	\$53,222
Equipment	\$17,389
Land	\$3,500
Other and miscellaneous	\$28,571
Total	\$102,683

Total Capital Expenses Planned, Next 5 Years	
Category	Amount
Buildings	\$26,429
Equipment	\$37,286
Land	\$84,167
Other and miscellaneous	\$85,929
Total	\$233,810

- Impacted businesses spend an estimated 83% of their operating expenditures and 82% of their capital expenditures within Broome, Delaware, Sullivan or Wayne Counties.
- Impacted businesses are drawing new dollars into the region with 81% coming from outside it to experience recreational opportunities in the area.

Customers by Region	
Category	Share
Home county	7%
Adjoining counties	12%
Elsewhere in Pennsylvania	11%
Elsewhere in New York	36%
New England	6%
New Jersey	17%
Other states	8%
Other countries	1%
Total	100%

- The typical business employs an average of 6.3 full and part-time workers.
- Businesses were asked “How much more business could you generate if reservoir releases were more consistent and provided for a full uninterrupted cold water fishing season?” The average was \$39,760 or 18%. Applied to the two categories of customers most impacted by cold water releases, anglers and boaters, this is equal to average additional revenue of \$10,355 per business, or another \$1,750,000 annually; \$6,720,000 if all categories are considered.

The generalized analysis from Section 2.0 led to a baseline estimate of \$11.4 million spent by anglers at the 169 businesses inventoried in the Census of Commerce, or \$67,575 each on average before multiplier effects of indirect and induced spending. The survey data suggests the combined number for anglers and boaters combined with campers and second home visitors primarily engaged in angling and boating, all of whom are directly impacted by cold water releases, is somewhat higher at \$89,691.

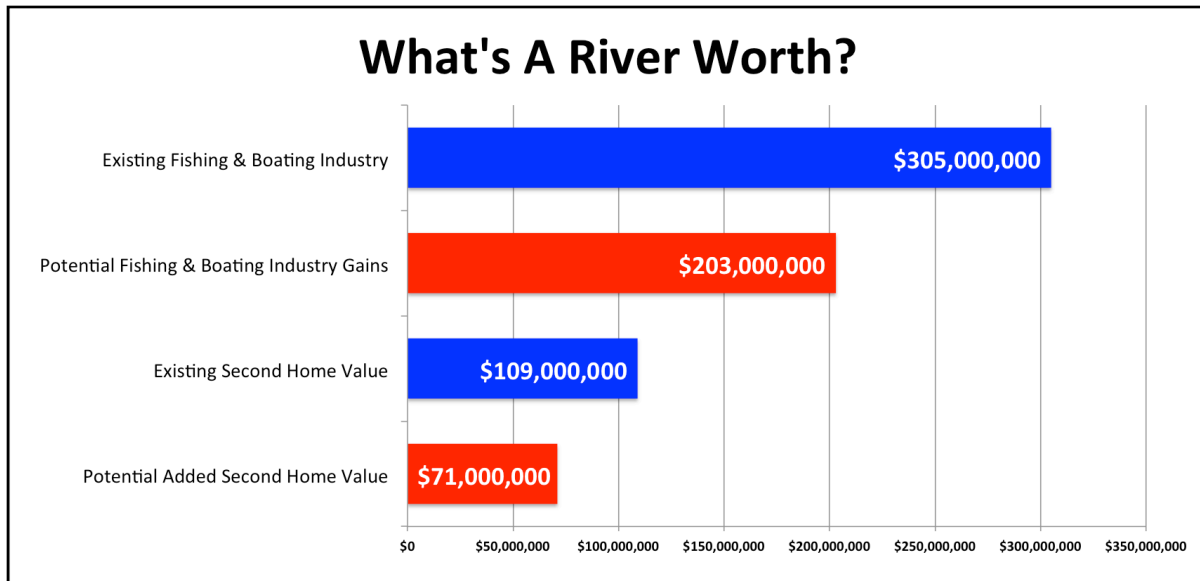
The average number derived using these two different approaches is \$78,600, which yields a conservative total annual direct economic impact of \$13.3 million plus another \$11.2 million of indirect and induced impacts for a combined existing economic impact of \$24.5 million. This income stream, net present valued over 20 years at a discount rate of 5%, is \$305 million, significantly higher than estimated using New York State angler data alone.

Moreover, there is substantial additional business that those surveyed indicate is realizable with more consistent cold water releases. If [40% of prime angling and boating time is already](#)

negatively impacted by uneven releases, which appears to be reasonable based on the foregoing, there is a potential gain of \$16.3 million annually or \$203 million net present value. This is all before considering the second values discussed earlier, which may also be expected to increase in value by a similar factor, adding another \$71 million of value that would be contributed by a more consistent cold water release regimen.

Altogether then, the final estimate of the current net present value of the cold water fishery, after considering both objective and subjective data sources, is an estimated \$414 million (\$305 million in economic activity plus another \$109 million in second home real estate values connected with that activity).

It is further estimated the value of the cold water fishery as both a boating and fishing resource, as well as a foundation for camping and second home visitation, would be enhanced by \$274 million with more consistent cold water releases (\$203 million in economic activity plus another \$71 million in second home real estate values connected with that activity).



4.2 Benefits of Consistent Releases to New York City

The benefits of the cold water fishery and the boating, camping and second-home activity are not limited to the local and regional impacts, but also extend to New York City and New York State as a whole.

First of all, it must be remembered every dollar spent at the fishing destination by anglers is accompanied by [another 61 cents spent en route to the location](#) for clothing, food, gasoline, supplies, etc. This means another \$186 million is now being spent on boating and fishing related activities *outside the immediately impacted area*, with the potential to add another \$124 million from more consistent releases. Assuming 75% of that money is spent in New York, that's another potential \$7.5 million in sales tax revenue for these areas.

Secondly, many of these boaters and anglers come from the New York City metropolitan area. Some 52,000 fishing licenses are sold annually in New York City. They are direct beneficiaries of a vibrant boating and fishing industry in the region.

Most importantly, it is residents of the New York City metro area who own many of the second homes in the immediately impacted region. A review of seasonal residence sales over the last years in the towns of Sanford, Deposit, Hancock and Fremont, which represent the four New York State communities along the West Branch and Upper Delaware portions of the study area indicates 21% of the buyers came from New York City and another 26% came from immediately adjoining parts of the metro area (not including Connecticut, New Jersey or Pennsylvania).

This means New York City residents potentially own as much as \$22.8 million of that \$109 million in second home value related to boating and fishing. Their properties could gain as much as \$15.2 million in value from a more consistent cold water releases protocol.

Finally, it is important to recognize the aesthetic, cultural and historical value of the boating and fishing area to the region. It is a clear benefit to New York City residents to maintain those values as well within a region many of them call their second home or vacation area.

5.0 Conclusions

The recreational industry, particularly fishing, is one of the principle economic engines of the Upper Delaware region and is directly driven by river conditions. Some of these are influenced by natural weather patterns, but the majority result from the controlled cold water releases out of Cannonsville and Pepacton Reservoirs.

Virtually all anglers fishing in the area are connected to the internet, and therefore have instant access to current flow information and water conditions on the Delaware River and its branches. If the water flows are suddenly altered due to changes in release, they are unlikely to make the journey for a fishing trip that will likely be unproductive. As many fishermen tend to only be able to visit the fishery on the weekend, it is of particular importance that flows be consistent during those times.

Unfortunately, within the combined 2011, 2012 and 2013 seasons, there were 44 “lost” weekends of fishing due to inconsistent and/or low flows as the result of unreliable application of the OST/FFMP. These weekends saw high water temperatures which are detrimental to the wild trout population, which adversely affects fishing opportunities. This correlates directly to a loss of business for not only the fishing industry, but all ancillary businesses in and around the river basin. Additionally, a season with frequent times of poor flows may discourage anglers from ever returning to the area, for fear of repeat conditions.

A more reliable, consistent pattern of water releases from the NYC Delaware River basin reservoirs as articulated in the Equitable Apportionment Plan (EAP), an approach strongly supported by the regional conservation and business communities, would address chronic thermal stress concerns, alleviate dramatic fluctuations in river flows, and provide more water at the right time to protect cold water habitat and enhance recreational opportunities in the Upper Delaware River. Adoption of the EAP in the next water management plan for the NYC Delaware River basin reservoirs would be a significant step in the right direction and would create more economic opportunities as a direct result of a better flow regime. While it would not totally remove the possibility of low-flow days during peak weekends, it will definitely reduce the number of those days dramatically to great economic benefit to the region as a whole.

That such a reliable, consistent pattern of water releases is possible is evidenced by a review of the USGS flow data for the West Branch of the Delaware River at Hale Eddy which, for the period of April through October for 2011-2013 showed an average flow of 1,078 cfs against the desirable level of 725 cfs. Unfortunately this excess occurs during periods of flooding, the early Spring, late Fall and on weekday periods when it does nothing to cure the deficit in flows now negatively impacting prime fishing and boating weekends. The average deficit compared to this standard was 87 cfs per day for the weekends (Thursday through Sunday) during this period, meaning there is plenty of room to cure the low releases problem with better flow management.