

Lehigh River

Carbon, Luzerne, Northampton, and Lehigh Counties

Trout Monitoring, 2006 - 2015

The Lehigh River originates in the Pocono Plateau, eventually discharging into the Delaware River. In 2007, the PFBC implemented the [Lehigh River Management Plan](#). This Plan outlines PFBC objectives for managing fishery resources of the river. Furthermore, since 2005, the U. S. Army Corps of Engineers (USACE) in partnership with PFBC, PA Department of Conservation and Natural Resources (DCNR), Delaware River Basin Commission (DRBC), and stakeholders, has employed a collaborative approach to managing flows out the FE Walter Dam. Specific actions are described in each annual [FE Walter Recreational Operations Plan](#). Both plans seek to protect and promote Lehigh River trout populations and recreational opportunities.

Both wild trout and stocked trout fisheries are supported by the Lehigh River. These fisheries are principally focused in main stem reaches above Palmerton, PA (River Mile (RM) 36); although, springtime opportunities are available downriver to Cementon Dam (RM 24). The PFBC annually stocks adult trout upriver in the Francis E. Walter (FE Walter, RM 77) tailwater, outlet downriver to the confluence of Sandy Run, RM 66.7. Several private clubs also stock legal-sized trout, but focus in downriver main stem reaches below Glen Onoko (RM 49.7). Fishing regulations for the Lehigh River main stem waters from F E Walter Reservoir downstream to the confluence with Sandy Run are Stocked Trout Waters [Open to Year-Round Fishing](#).

The PFBC annually surveys trout populations below FE Walter Dam downriver to the Cementon Dam (Table 1). The intent is to track annual trends of trout relative abundance (catch-per-unit-effort (CPUE): catch/hr.) of both young-of-the-year (YOY) and adults. In 2011, adult sampling did not occur due to resultant adverse river conditions from Hurricane Irene and Tropical Storm Lee.

Table 1. Fixed-station sites sampled for monitoring trout population in the Lehigh River

Station	River mile	YOY	Adult
F. E. Walter	76.5	2007 – present	2006 – 2010; 2012 – present
Powder Hole		2010 – 2011; 2014-present	
White Haven – Interstate 80 Brdg	71.7	2007 – present	
Rockport	63.3	2007 – present	
Glen Onoko	49.7		2006 – 2010; 2012 – present
Jim Thorpe – Mauch Chunk Creek	47.2	2006 – present	
Lehighon – Mahoning Creek	42.8	2006 – 2012	
Bowmanstown – Marvin Gardens	39.8	2006 – present	2006 – 2010; 2014 – present
East Penn Township Launch*	38.7	2011	2007; 2009 – 2010
Triboro Sportsmen's Club	24.2		2006 – present

* discontinued due to poor catchability

Young-of-the-year (YOY) Trout

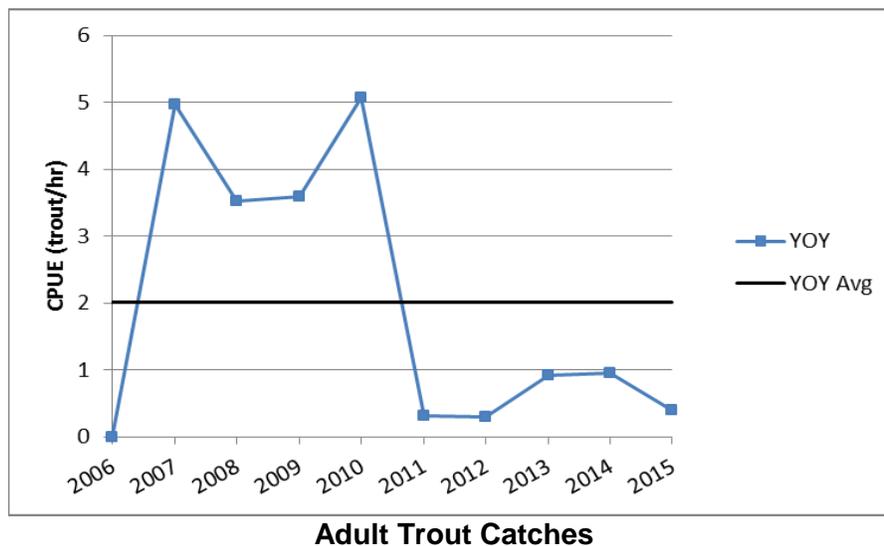
Catches of YOY trout were poor and inconsistent at any given site (Table 2). A total of 72 YOY Brown Trout were captured from 2006 – 2015. During 2009 – 2011, eight of these were PFBC stocked fingerling Brown Trout (Bowmanstown, 2009: n = 1; Jim Thorpe, 2009: n = 5; Lehigh, 2011, n = 2), as identified by adipose fin clips. The remainder of the total catch (n = 64), with adipose fins intact, were presumed to originate from wild populations. The highest recorded catch (n = 10) occurred at White Haven in 2008. Since 2012, YOY wild Brown Trout were only caught at White Haven (n = 5) and Rockport (n = 1). No YOY wild Brook Trout or YOY Rainbow Trout were captured at any site during the survey period.

Table 2. Total catch of YOY Brown Trout. NS = not surveyed

Year	Bowmanstown	Lehigh	Jim Thorpe	Rockport	White Haven	Powder Hole	F. E. Walter	Total
2006	0	0	0	NS	NS	NS	NS	0
2007	1	0	2	1	7	NS	6	17
2008	1	0	0	3	10	NS	3	17
2009	2	1	6	2	2	NS	3	16
2010	2	0	2	2	1	5	1	13
2011	0	2	0	0	0	1	0	3
2012	0	0	0	0	1	NS	0	1
2013	NS	NS	0	0	2	NS	0	2
2014	0	NS	0	1	1	0	0	2
2015	0	NS	0	0	1	0	0	1
Total	6	3	10	9	25	6	13	72

Annual YOY wild Brown Trout CPUE trends reflected total catch. On average YOY wild Brown Trout CPUE ranged from a high of 5.1/hr. in 2010 to 0.29/hr. in 2012 (Figure 1). These catch rates exclude the eight known hatchery origin YOY Brown Trout. After 2011, YOY wild Brown Trout catch rates remained less than 1.0/hr. High catch rates were found at White Haven (2008: 12.6/hr.), Powder Hole (2010: 13.1/hr.), and F. E. Walter (2007: 12.7/hr.). After 2011, only the White Haven site demonstrated a consistent catch rate of approximately 2.0/hour.

Figure 1. Annual trend of YOY wild Brown Trout relative abundance



Catches of adult trout were varied (Table 3). A total of 84 wild Brown Trout, 105 hatchery Brown Trout, three wild Brook Trout, 27 hatchery Brook Trout, and 55 hatchery Rainbow Trout were captured during the time-series (2006-2015). Hatchery trout accounted for 68 percent (i.e., 187 of 274 trout) of the total trout catch. Total catch at any site, in any year was poor, generally less than 10 individuals. Wild Brown Trout were consistently caught at Bowmanstown, with the 2014 catch (n = 21) representing the best catch of wild Brown Trout in the time-series. Catches of hatchery Brown Trout were most consistent at the FE Walter site, being caught in all years surveyed. The 2006 catch at FE Walter (n = 35) represented the highest catch of hatchery Brown Trout over the time-series. Hatchery Rainbow Trout were captured at all sites, but not in all years. Brook Trout (wild or hatchery) were rarely caught.

The 2014 catch of two wild Brown Trout at the Triboro site are of particular interest. Besides being exceptionally large (~19 inches and ~22 inches, total length), both fish were females with fully hydrated eggs. Their presence could suggest potential for spawning in the main stem. Yet, all other captured trout, regardless of species, did not demonstrate development of eggs.

Relative abundance of adult trout as indicated by the average CPUE for all sites combined, varied among years (Figure 2). Hatchery Brown Trout catch rates (0.6 to 10.6/hr.) were higher than all other trout catches, 2006 through 2013. Thereafter, in 2014 and 2015, wild Brown Trout catch rates, 10.0 and 9.5/hr., respectively were the highest. Hatchery Rainbow Trout catch rates were relatively stable, varying from 0.4 to 2.0/hr., 2006 – 2014, but peaked in 2015 at 6.6/hr. In most years, Brook Trout catch rates for either wild or hatchery origins were extremely low. The exception being in 2009, the average hatchery Brook Trout catch rate (1.4/hr.) was similar to that of hatchery Rainbow Trout (1.2/hr.).

Hatchery Brown Trout and hatchery Rainbow Trout catch rates were generally highest at FE Walter site. This was not unexpected given the annual PFBC hatchery stockings at FE Walter. Stocking rates have remained static since 2006, thus, catch rates have remained relatively stable. Adult wild or hatchery Brook Trout were essentially nonexistent at any site. These poor catch rates suggest the Lehigh River main stem reaches do not support a stable wild Brook Trout population.

Table 3. Total catch of adult trout captured. NS = not surveyed

Year	Triboro Sportsman's Club	Bowmanstown	Glen Onoko	FE Walter	Total
Wild Brown Trout					
2006	0	3	2	15	20
2007	0	2	0	0	2
2008	0	1	0	1	2
2009	0	3	0	0	3
2010	0	2	0	1	3
2011	NS	NS	NS	NS	
2012	0	NS	2	1	3
2013	0	NS	3	1	4
2014	2	21	2	3	28
2015	2	13	4	0	19
Total	4	45	13	22	84
Hatchery Brown Trout					
2006	1	1	15	35	52
2007	0	0	6	2	8

2008	0	0	0	4	4
2009	0	3	1	6	10
2010	2	2	1	7	12
2011	NS	NS	NS	NS	
2012	2	NS	0	1	3
2013	0	NS	6	3	9
2014	0	1	0	2	3
2015	1	0	0	3	4
Total	6	7	29	63	105
Wild Brook Trout					
2006	0	0	1	0	1
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	1	0	0	1
2010	0	0	1	0	1
2011	NS	NS	NS	NS	
2012	0	NS	0	0	0
2013	0	NS	0	0	0
2014	0	0	0	0	0
2015	0	0	0	0	0
Total	0	1	2	0	3
Hatchery Brook Trout					
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	4	0	1	5
2010	0	0	0	21 ^a	21
2011	NS	NS	NS	NS	
2012	0	NS	0	0	0
2013	0	NS	0	1	1
2014	0	0	0	0	0
2015	0	0	0	0	0
Total	0	4	0	23	27
Hatchery Rainbow Trout					
2006	1	1	4	0	6
2007	0	0	0	3	3
2008	0	0	0	4	4
2009	0	5	0	0	5
2010	0	0	0	6	6
2011	NS	NS	NS	NS	
2012	0	NS	0	2	2
2013	0	NS	1	6	7
2014	0	0	2	1	3
2015	4	2	3	10	19
Total	5	8	10	32	55

a - These represent an unallocated fingerling stocking just prior to the survey.

The wild Brown Trout biomass present in each survey site, based on CPUE estimations whether by individual site or aggregated yearly, reflected that of a Class D population (>0.00 but <10.00 kg/ha; Table 4). The yearly aggregated site biomass estimate ranged from a low of 0.03 kg/ha to a high of 0.80 kg/ha in 2014. The highest site-specific biomass estimate was recorded at Bowmanstown in 2014 (2.23 kg/ha). Similar biomass estimates for wild Brook Trout were exceptionally poor, less than 0.02 kg/ha, on average. These findings are similar to the historical

surveys conducted in 1977 (wild Brown Trout 0.95 kg/ha), and 1982 (wild Brown Trout 0.41 kg/ha).

Figure 2. Annual trend of adult trout relative abundance in the Lehigh River

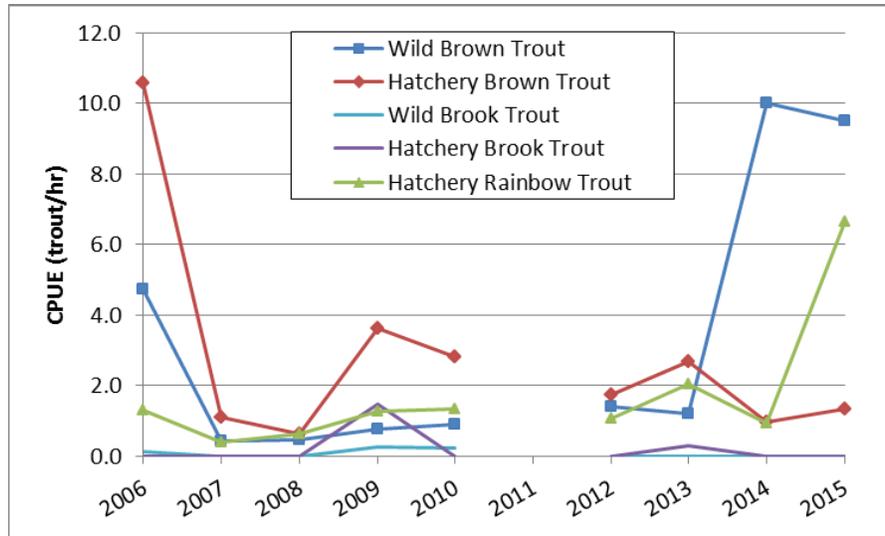


Table 4. Estimated wild trout biomass (kg/ha) in the Lehigh River. NS = not surveyed; WBT = wild Brown Trout; WST = wild Brook Trout

Year	Triboro Sportsman's Club		Bowmanstown		Glen Onoko		FE Walter		Average	
	WBT	WST	WBT	WST	WBT	WST	WBT	WST	WBT	WST
2006	0.00	0.00	0.28	0.00	0.43	0.05	0.34	0.00	0.26	0.01
2007	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.04	0.00
2008	0.00	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.03	0.00
2009	0.00	0.00	0.24	0.09	0.00	0.00	0.00	0.00	0.06	0.02
2010	0.00	0.00	0.15	0.00	0.00	0.03	0.17	0.00	0.08	0.01
2011	NS		NS		NS		NS		NS	
2012	0.00	0.00	NS		0.98	0.00	0.06	0.00	0.35	0.00
2013	0.00	0.00	NS		0.95	0.00	0.01	0.00	0.32	0.00
2014	0.39	0.00	2.23	0.00	0.40	0.00	0.19	0.00	0.80	0.00
2015	0.32	0.00	2.17	0.00	0.50	0.00	0.00	0.00	0.75	0.00

River Temperature and Trout Abundance

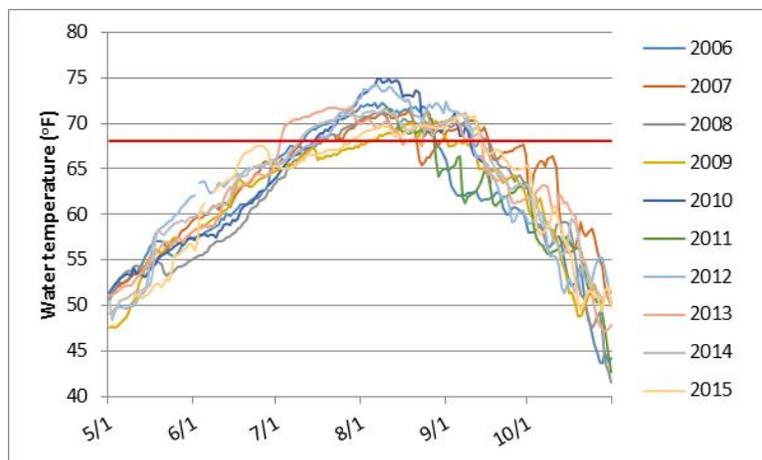
Temperature is probably the single most important environmental variable determining the suitability for a water to support trout. Young-of-the-year Brown Trout prefer water temperatures 60 °F or colder for optimal growth. Optimal water temperatures for adult Brown Trout growth and survival are 53 to 62 °F. Water temperatures above 68 °F begin to introduce thermal stress to trout. The upper temperature tolerance for Brown Trout is 78 °F, becoming lethal for prolonged exposure.

The low and inconsistent trout catches reflected the transitional water temperatures of the Lehigh River. Any cool water storage in the FE Walter Reservoir is typically depleted by mid-

July. Main stem reaches below FE Walter in late summer become susceptible to warming for extended periods (Figure 3). The warmest river temperatures during this period occurred in 2010 and 2012. In all years, average daily water temperatures at FE Walter outflow were routinely above 68 °F by mid-July through early September. Furthermore, maximum daily water temperatures consistently exceeded 72 °F over several consecutive days (> 10) in 2006, 2010, 2012 – 2014; and exceeded 75 °F in 2010 (n = 10 days) and 2012 (n = 3 days). The Lehigh River trout population as well as the anglers pursuing them, have benefitted from the unseasonably mild daily summer temperatures experienced these past years. Such, temperate conditions, also assist the timed release flows in mitigating thermal conditions within the downriver reaches as noted above.

The annual FE Walter Recreational Operations plans seek to compensate the warming of main stem waters by providing augmented outflows for flushing downriver habitats. Higher river flows limit solar radiation heating effects on in-river substrates, which can warm river temperatures if left exposed. Higher flows, also allow trout have a better chance of finding thermal refugia. Without colder water temperatures during summertime months, the Lehigh River trout populations will remain suppressed.

Figure 3. Daily average water temperature at FE Walter outflow. The horizontal red line represents a 68 °F reference line when thermal stress is introduced to trout



Conclusion

The Lehigh River below the FE Walter Dam represents an opportunity for experiencing a tailwater trout fishery. The FE Walter Recreational Operations Plan caters to both wade and drift boat anglers, in addition to whitewater enthusiasts. A spring fishing season is defined as weekend days from March through mid-May. This season specifically targets trout anglers, and outfitter guided trips seeking optimal river conditions during peak trout action. “Fishing Release” weekends of up to 400 cfs are provided to allow for wade angling in the immediate reach below FE Walter Dam. Further downriver, as tributary input increases, drift boat angling is supported. During the warm summer months, daily augmentation of inflows, termed “Fisheries Enhancement” releases, provide some thermal relief to trout populations.

The PFBC is highly invested in the Lehigh River. We encourage all anglers to take up the challenge and enjoy the scenic Lehigh River trout fishery.

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