

## = Toby Creek =

Toby Creek ( also known as Toby 's Creek ) is a tributary of the Susquehanna River in Luzerne County , Pennsylvania , in the United States . It is approximately 10 @. @ 5 miles ( 16 @. @ 9 km ) long and flows through Dallas Township , Dallas , Kingston Township , Courtdale , Luzerne , Pringle , Kingston , Edwardsville , and Larksville . The watershed of the creek has an area of 36 @. @ 5 square miles ( 95 km<sup>2</sup> ) . The entire drainage basin is designated as a Migratory Fishery and parts are designated as either a Coldwater Fishery , a Warmwater Fishery , or a Trout Stocking Fishery . The creek has two named tributaries : Huntsville Creek and Trout Brook . It is said to show " some degraded conditions " , but does not experience severe pollution and is not considered to be impaired . The creek is piped underground in Pringle , but resurfaces in Edwardsville .

The watershed of Toby Creek occupies part or all of ten boroughs and four townships . The creek 's watershed is mainly rural . Pennsylvania Route 309 , Pennsylvania Route 118 , and US Route 11 are partially within it . The two @-@ billion @-@ gallon Huntsville Reservoir is also in the creek 's drainage basin . Several mills were built along the creek in the 1800s and many bridges have been constructed over it . The creek experienced significant floods in 1942 and 1972 .

## = = Course = =

Toby Creek begins in Dallas Township . It flows south @-@ southeast for a short distance before turning south and then southeast . The creek then flows east @-@ southeast alongside Pennsylvania Route 415 for a few miles , passing through Dallas on the way . It then crosses Pennsylvania Route 309 and enters Dallas Township . At this point , it turns east for a few tenths of a mile and receives the tributary Trout Brook from the left . The creek then turns south and slightly east for a few miles , flowing not far from Pennsylvania Route 309 and entering Kingston Township . It then turns south @-@ southeast , crossing Pennsylvania Route 309 and receiving the tributary Huntsville Creek from the right . At this point , the creek enters a water gap , flowing very close to Pennsylvania Route 309 . After several tenths of a mile , it gradually turns northeast and then turns south @-@ southeast , briefly passing through Courtdale and into Luzerne , where it exits the water gap . After several tenths of a mile , the creek turns south , crossing Pennsylvania Route 309 and entering Pringle , where it disappears from the surface . The creek reappears in Edwardsville and flows west for a few tenths of a mile before turning south and then south @-@ southwest . Several tenths of a mile further downstream , it reaches its confluence with the Susquehanna River on the border between Edwardsville and Larksville .

Toby Creek joins the Susquehanna River 187 @. @ 79 miles ( 302 @. @ 22 km ) upriver of its mouth .

## = = = Tributaries = = =

Toby Creek has two named tributaries : Huntsville Creek and Trout Brook . Huntsville Creek joins Toby Creek 5 @. @ 04 miles ( 8 @. @ 11 km ) upstream of its mouth . Its watershed has an area of 14 @. @ 7 square miles ( 38 km<sup>2</sup> ) . Trout Brook joins Toby Creek 7 @. @ 60 miles ( 12 @. @ 23 km ) upstream of its mouth . Its watershed has an area of 4 @. @ 20 square miles ( 10 @. @ 9 km<sup>2</sup> ) .

## = = Hydrology = =

The lower reaches of Toby Creek were polluted by coal mining waste in the early 1900s . However , in modern times , no part of the watershed of Toby Creek is considered to be impaired . It has been described as showing " some degraded conditions " , but does not rank among the most polluted watersheds in the Middle Susquehanna Subbasin . However , the creek has high levels of nutrients and sodium . There is one combined sewer overflow in the watershed , near the mouth of the creek .

The discharge of Toby Creek in its lower reaches is lowest in August and September , when it

averages 15 and 19 cubic feet per second . In July and October , the average discharge is also relatively low ( 22 and 21 cubic feet per second , respectively ) . The highest average discharges occur in April and March : 83 and 82 cubic feet per second , respectively . The highest average monthly discharge between 1941 and 1993 was 269 @. 3 cubic feet per second , in April 1993 . However , during severe floods , the discharge can top 3000 cubic feet per second . The lowest recorded average monthly discharge during that time , 3 @. 00 cubic feet per second , occurred in September 1951 . The average discharge of the creek between 1941 and 1993 was 41 @. 2 cubic feet per second . The gage height of the creek between 1986 and 1993 ranged from 0 @. 25 feet ( 0 @. 076 m ) to 1 @. 46 feet ( 0 @. 45 m ) , but can be over 4 to 6 feet ( 1 @. 2 to 1 @. 8 m ) during severe floods .

The turbidity of Toby Creek ranges from 1 to 150 JTU . The creek 's specific conductance ranges from 70 to 210 micro @-@ siemens per centimeter at 25 ° C ( 77 ° F ) . This value was historically somewhat higher . The creek is very slightly alkaline , with an average pH of 7 @. 1 . Its pH ranges from 6 @. 4 to 7 @. 7 . The concentration of water hardness in the creek 's waters ranges from 26 to 84 milligrams per liter ( 0 @. 026 to 0 @. 084 oz / cu ft ) .

The concentration of dissolved oxygen in the waters of Toby Creek ranges from 9 @. 1 to 13 @. 6 milligrams per liter ( 0 @. 0091 to 0 @. 0136 oz / cu ft ) and is typically over 10 milligrams per liter ( 0 @. 0100 oz / cu ft ) . The concentration of carbon dioxide in the waters of the creek ranges from 0 @. 9 to 12 milligrams per liter ( 0 @. 00090 to 0 @. 01199 oz / cu ft ) and the ammonia concentration ranges from 0 @. 05 to 0 @. 76 milligrams per liter ( 5 @. 0 × 10<sup>-5</sup> to 0 @. 000759 oz / cu ft ) per liter . The nitrite concentration ranges from 0 @. 048 to 0 @. 124 milligrams per liter ( 4 @. 8 × 10<sup>-5</sup> to 0 @. 000124 oz / cu ft ) and the nitrate concentration ranges from 0 @. 94 to 1 @. 60 milligrams per liter ( 0 @. 00094 to 0 @. 00160 oz / cu ft ) . The phosphorus concentration ranges between 0 @. 06 and 0 @. 62 milligrams per liter ( 6 @. 0 × 10<sup>-5</sup> and 0 @. 000619 oz / cu ft ) . The concentration of chloride ranges from 7 to 25 milligrams per liter ( 0 @. 0070 to 0 @. 0250 oz / cu ft ) and the sulfate concentration ranges from 2 to 24 milligrams per liter ( 0 @. 0020 to 0 @. 0240 oz / cu ft ) . The average concentration of total dissolved solids in the creek is 117 milligrams per liter ( 0 @. 117 oz / cu ft ) , but this was historically slightly higher . A total of 10 @, 200 tons of dissolved solids flow through the creek per day .

The calcium concentration in the waters of Toby Creek ranges from 8 @. 8 to 152 micrograms per liter ( 8 @. 8 × 10<sup>-6</sup> to 0 @. 0001518 oz / cu ft ) and the magnesium concentration ranges from 1 to 13 micrograms per liter ( 1 @. 00 × 10<sup>-6</sup> to 1 @. 299 × 10<sup>-5</sup> oz / cu ft ) . The concentration of recoverable iron in the creek ranges from 20 to 21 @, 000 micrograms per liter ( 2 @. 0 × 10<sup>-5</sup> to 0 @. 020976 oz / cu ft ) and the concentration of recoverable aluminum was once measured to be 12 @, 000 milligrams per liter ( 12 oz / cu ft ) . The concentrations of chromium and copper were both once measured to be 20 micrograms per liter ( 2 @. 0 × 10<sup>-5</sup> oz / cu ft ) and the arsenic concentration was measured to be 1 microgram per liter ( 1 @. 00 × 10<sup>-6</sup> oz / cu ft ) . The manganese and zinc concentrations were once measured to be 520 and 70 micrograms per liter ( 0 @. 000519 and 7 @. 0 × 10<sup>-5</sup> oz / cu ft ) .

= = Geography , geology , and climate = =

The elevation near the mouth of Toby Creek is 518 feet ( 158 m ) above sea level . The elevation of the creek 's source is between 1 @, 220 and 1 @, 240 feet ( 370 and 380 m ) above sea level . Its gradient is relatively low . In its upper 8 miles ( 13 km ) , the creek 's elevation decreases at a rate of 92 @. 5 feet ( 28 @. 2 m ) per mile . In its lower 3 miles ( 4 @. 8 km ) , its elevation decreases at a rate of 24 feet ( 7 @. 3 m ) per mile .

Toby Creek passes through a gorge between Trucksville and Luzerne . Downstream of Luzerne , it flows through broad bottom lands . The creek is surrounded by steep slopes in the borough of Courtdale . The topography of the creek 's watershed is described as " rough and hilly " in a 1921 book . The watershed has been affected by glaciation .

The channel of Toby Creek is sinuous . Rock formations consisting of sandstone and shale occur in

its vicinity . There are also coal deposits along the creek in its lower reaches . Rocks of the Chemung Formation occur in the vicinity of Toby Creek . The bedrock is 4 @. @ 4 feet ( 1 @. @ 3 m ) underground in some areas of the watershed .

A large impounding basin diverts water away from Kingston and Pringle . The creek is then piped via gravity into a " massive " underground pipe for some distance . The creek resurfaces in Edwardsville . There is also a pressure conduit on the creek . A levee is situated on the creek in Edwardsville Township , as are flumes and conduits . It is protected by riprap in Dallas Township . The creek is channelized for much of its length and has been relocated in places .

In the uppermost 31 @. @ 8 square miles ( 82 km<sup>2</sup> ) of the watershed of Toby Creek , the annual rate of precipitation ranges from 35 to 50 @. @ 4 inches ( 89 to 128 cm ) , with an average of 40 @. @ 6 inches ( 103 cm ) . The waters of the creek at one site have a velocity of 10 @. @ 7 feet ( 3 @. @ 3 m ) per second . The water temperature was measured several times between January and August 1976 . In January , February , and March , it ranged from 0 @. @ 0 to 5 @. @ 0 ° C ( 32 @. @ 0 to 41 @. @ 0 ° F ) .

= = Watershed = =

The watershed of Toby Creek has an area of 36 @. @ 5 square miles ( 95 km<sup>2</sup> ) . The watershed is situated in north @-@ central Luzerne County . The creek is entirely within the United States Geological Survey quadrangle of Kingston . The stream density of the uppermost 31 @. @ 8 square miles ( 82 km<sup>2</sup> ) of the watershed is 1 @. @ 6 miles ( 2 @. @ 6 km ) per 1 square mile ( 2 @. @ 6 km<sup>2</sup> ) . A total of 59 @. @ 7 percent of this segment of the watershed is forested and 17 @. @ 7 percent is urban .

Toby Creek 's watershed is in part or all of 14 municipalities . It is in ten boroughs : Swoyersville , Pringle , Luzerne , Larksville , Kingston , Harveys Lake , Fort Fort , Edwardsville , Dallas , and Courtdale . It is also in four townships : Lehman Township , Kingston Township , Jackson Township , and Dallas Township . It is adjacent to watersheds such as those of Harveys Creek and Abrahams Creek . A 9 @-@ mile ( 15 @-@ kilometer ) long stretch of land along the main stem of Toby Creek is highly urbanized . This stretch of land begins in Dallas , near the creek 's headwaters , and passes through Shavertown , Luzerne , Kingston , and Edwardsville . Both the Back Mountain and Endless Mountain regions are associated with the creek 's watershed and are adjacent to it .

The watershed of Toby Creek is predominantly rural . Most of it ( 61 @. @ 3 percent ) is forested land . Considerably less common are grassland ( 19 @. @ 6 percent ) and urban land ( 16 @. @ 4 percent ) . A total of 2 @. @ 1 percent of the creek 's watershed consists of wetlands and 0 @. @ 6 percent consists of mining lands . The mining land is confined to one area near the mouth of the creek .

The watershed of Toby Creek is very narrow in its lower reaches . However , it becomes much broader in its middle and upper reaches . The watershed is developed . The number of employees in the creek 's drainage basin is expected to increase until 2030 . Pennsylvania Route 309 runs through the watershed in a north @-@ south direction . Pennsylvania Route 118 is in the watershed 's northwestern portion and US Route 11 passes through its southernmost part .

A total of 4 @. @ 03 million gallons of water per day are withdrawn from Toby Creek and its tributaries . 3 @. @ 38 million gallons per day ( 84 percent ) are removed by registered water suppliers and 0 @. @ 51 million gallons per day ( 13 percent ) are removed for commercial and industrial purposes . 0 @. @ 10 million gallons per day ( 2 percent ) are removed for mineral purposes and 0 @. @ 04 million gallons per day ( 1 percent ) are removed for residential purposes . A reservoir known as the Huntsville Reservoir is located in the watershed of Toby Creek . It has a capacity of approximately 1 @. @ 915 billion gallons .

Toby Creek is the main source of flooding in Courtdale , Dallas , Luzerne , Pringle , and Kingston Township . It is also one of the main sources of flooding in the borough of Kingston . However , the creek 's floods cause little damage in Courtdale , since its floodplain is relatively undeveloped in that borough . The creek has an Act 167 Stormwater Management Plan .

There are numerous swamps , lakes , and ponds in the watershed of Toby Creek .

## == History ==

Toby Creek was entered into the Geographic Names Information System on August 2 , 1979 . Its identifier in the Geographic Names Information System is 1189612 .

An ancient fortification is located on a plain near Toby Creek in Kingston Township . The fort is elliptical and measures 337 by 272 feet ( 103 by 83 m ) . It is 150 feet ( 46 m ) from the creek and 0 @. @ 5 miles ( 0 @. @ 80 km ) from the Susquehanna River .

In the beginning of the 1800s , there were no roads going through the valley of Toby Creek . However , one was built by the late 1800s or early 1900s . Peter Grubb operated a gristmill and sawmill on Toby Creek in the late 1700s and / or early 1800s . They were the only gristmill and sawmill that were ever built in Kingston up to 1893 . The later came to be owned by Thomas Borbridge , who tore them down in 1826 . In 1812 , a Mr. Buckingham , a Mr. Carbon , a Mr. Tuttle , and a Mr. Parker constructed a paper mill on Toby Creek . Later , in 1836 , George W. Little built a small charcoal furnace on the creek at the site of the paper mill . Jude Baldwin constructed a mill on the creek in 1813 . In 1847 , Miner Fuller built another mill approximately 0 @. @ 5 miles ( 0 @. @ 80 km ) further upstream . Both were torn down in the late 1800s since they were no longer needed . In the early 1900s , the main industries in the watershed were agriculture and coal mining . The creek was also used as water power for several mills . Around this time , the Lehigh Valley Railroad crossed the watershed , following the creek for its entire length . The Delaware , Lackawanna , and Western Railroad followed also traversed the watershed and followed the creek in its lower reaches .

The two most severe floods in the watershed of Toby Creek occurred on December 30 , 1942 and June 22 , 1972 . During these floods there were peak discharges of 3 @. @ 010 and 3 @. @ 390 cubic feet per second ( 85 and 96 m<sup>3</sup> / s ) , respectively . The gage heights reached 4 @. @ 8 feet ( 1 @. @ 5 m ) and 6 @. @ 1 feet ( 1 @. @ 9 m ) .

Numerous bridges have been built over Toby Creek . One was built in 1920 and repaired in 1989 . Another was built in 1928 and repaired in 1963 and a third was built in 1939 . Six bridges were built over the creek in 1941 , all of them in Kingston Township or Dallas Township . Another bridge was built over Toby Creek in 1955 and four more were built in 1963 , one of which was repaired in 1988 . One was built in 1970 and repaired in 1980 and another was built in 1976 and repaired in 1997 . Two more bridges were built across the creek in 1980 , one more in 1984 , and one in 1989 .

The streambank of Toby Creek underwent a stabilization project after 2005 .

## == Biology ==

The drainage basin of Toby Creek upstream of the tributary Huntsville Creek is designated as a Coldwater Fishery and a Migratory Fishery . From below Huntsville Creek downstream to Pringle , where Toby Creek disappears from the surface , Toby Creek and its drainage basin are designated as a Trout Stocking Fishery and a Migratory Fishery . From that point downstream to the creek 's mouth , the drainage basin is designated as a Warmwater Fishery . Wild trout naturally reproduce in the creek from its headwaters downstream to its mouth .

The concentration of fecal coliform bacteria in the waters of Toby Creek was once measured to be 1000 colonies per 100 millilitres ( 3 @. @ 5 imp fl oz ; 3 @. @ 4 US fl oz ) .

Out of a number of stream segments studied by the Susquehanna River Basin Commission , a section of Toby Creek was found to be the poorest habitat . Specific problems faced by the creek at this site include embeddedness , a lack of riffles , poor epifaunal substrate , low instream cover , low @- @ quality streambanks , and sediment deposition . The borough of Dallas has plans to construct a greenway along the creek .