

# COLUMBIA LAKE DAM REMOVAL PROJECT

## ***Major Goals of the Columbia Lake Dam Removal:***

- Reconnect 10 miles of the Paulins Kill River to the Delaware River, restoring natural flow regime and sediment transport.
- Restore 10 miles of migratory pathways for fish such as American Shad and improve abundance of other migratory fish such as American Eel (particularly juveniles that are impeded by the dam).
- Restore 1.4 miles of riparian /stream habitat impounded by the lake.
- Reduce thermal impacts on the 1.4-mile impounded section of the Paulins Kill.
- Eliminate the turbine impacts on aquatic biota, especially, anadromous and resident fish populations.
- Eliminate costs associated with maintaining a 109-year old dam.

## ***Major Partners:***

The Nature Conservancy, American Rivers, USFWS, DEP Office of Natural Resource Restoration and DEP Fish and Wildlife.

## ***Project Timeline:***

### Remnant Dam Removal: COMPLETED

Located just upstream of the Rt 46 culvert the remnant dam removal began on June 21, 2018.

### Lake Lowering: COMPLETED

Lowering of Columbia Lake was initiated on June 4, 2018.

### Fish Salvage and Relocation: COMPLETED

Almost 2,000 fish were salvaged from the lake by NJ Fish and Wildlife. Invasive Carp encountered were humanely destroyed, all other fish were relocated to the Delaware River. Very few game species were present.

### Mussel Salvage and Relocation: COMPLETED

976 freshwater mussels representing 6 species were collected downstream of the dam and relocated to the Delaware River or further upstream in the Paulins Kill. An additional 8 mussels representing two species were also collected and relocated from within the lowered

### Breaching Columbia Dam: COMPLETED

Initial notching of Columbia Lake Dam occurred on August 3, 2018. The dam was notched several times over the ensuing months when stream conditions allowed.

### Scour Protection:

- Brugler Rd. COMPLETED
- Rt 80 COMPLETED
- Warrington Rd. NEAR COMPLETION

### Columbia Lake Dam Demolition: COMPLETED

The dam has been removed down to the apron and across up to the powerhouse. The powerhouse removal is scheduled to occur in the late spring 2019.

### Fish Passage through Rt. 80 bridge: COMPLETED

As of February 13, 2019, two of six weir structures have been installed. The structure will provide the depth and velocities needed to allow for the passage of American Shad through the Route 80 bridge.

Powerhouse Demolition: Late Spring 2019

Regrading and Stabilization Dam/Powerhouse Area: Late Spring 2019

Stabilization/Planting/Trails/Access: Spring through Fall 2019

Monitoring (Fish/Macroinvertebrates/Water Quality): Ongoing

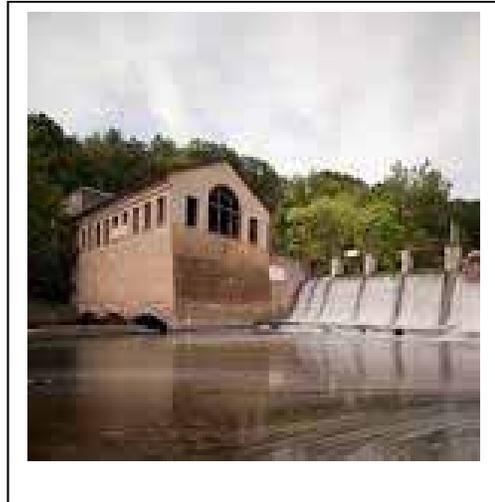
Two-three years of pre-construction data collected. Additional sampling planned for 2019 and subsequent years following removal.

### ***Background:***

The Columbia Lake dam located 1/4 mile upstream of the Paulins Kill River's confluence with the Delaware River in Knowlton Township, Warren County. The dam impounds a 43-acre lake that stretches more than 1.5 miles upstream of the dam. The dam and the lake (sold by NJ Power & Light Co. in 1955) is owned and managed by the NJ DEP Division of Fish and Wildlife as part of the 1,098-acre Columbia Wildlife Management Area.

Since the construction of the dam in 1909 by Warren County Power Co., the 18-foot high, 330-foot long dam has served as a barrier to fish passage, severing New Jersey's third largest tributary to the Delaware River from its watershed. This obstruction blocks American Shad access to their historic spawning grounds, and impedes the movement of American Eel.

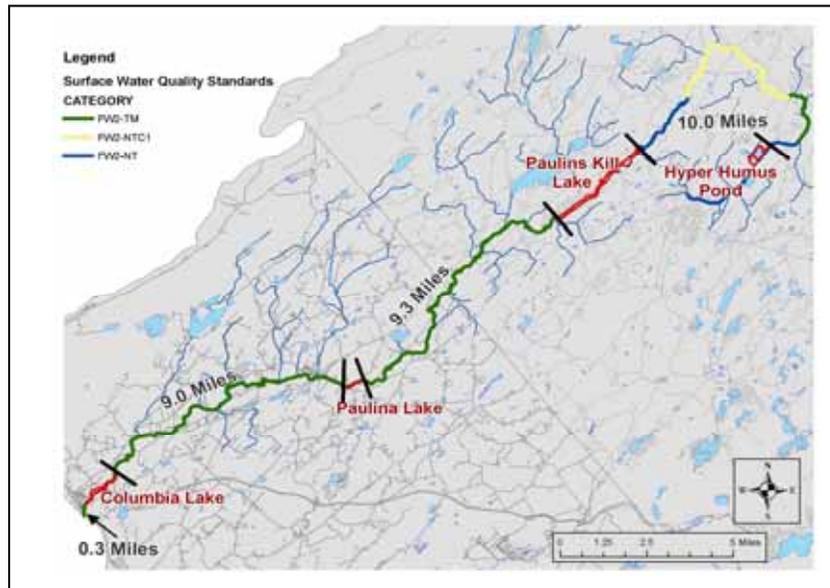
The proposed removal of the dam will restore fish passage to over 10 miles of river, restore natural flow regime, and reclaim 1.5 miles of stream habitat. The dam removal project is just one aspect of a larger initiative led by The Nature Conservancy with the goals of improving riparian and in-stream habitat throughout the Paulins Kill watershed.



### ***Paulins Kill Watershed***

The Paulins Kill is 41 miles long, its headwaters beginning in the Hyper Humus marshes (part of Paulins Kill Wildlife Management Area) around Newton and flowing west, entering the Delaware River in Knowlton Twp. There are four on-stream impoundments; Columbia Lake (Knowlton Twp.), Paulina Lake (Blairstown Twp.), Paulins Kill Lake (Stillwater/Hampton Twp.) and Hyper Humus (Hampton/Andover Twps.).

Downstream of Paulins Kill Lake the Paulins Kill is classified as Trout Maintenance meaning it has suitable habitat and water temperatures to support trout year-round. The Paulins Kill is stocked annually with trout by Fish and Wildlife from just below the Hyper Humus ponds downstream to Columbia Lake. Upstream of Paulins Kill Lake is Non-trout meaning its habitat and temperatures are not conducive to trout and therefore supports a more general warmwater fish assemblage. This section of the Paulins Kill also provides the critical habitat to support important mussel species.



### ***Paulins Kill River***

Fish and Wildlife's Bureau of Freshwater Fisheries has been monitoring sites within the Paulins Kill for two years to collect baseline data. Ten sampling locations, over 17 field days, were sampled in 2015 and 2016, involving a total of 499 man hours. These activities are funded by Hunters & Anglers and Federal Sport Fish Restoration Funds. Sampling techniques included; stream electrofishing, boat electrofishing, gill nets, trap nets, seines, cast nets and a dissolved oxygen / temperature probe. The Paulins Kill being a large, wide and deep river complicates typical sampling methods used for wadeable streams so several techniques were utilized. Below average water levels during the spring of 2015 aided sampling efforts, however 2016 water levels were closer to average making sampling more difficult.



American Shad caught electrofishing below the Columbia Lake Dam

Overall, 2,313 individual fish representing 41 different species were collected, inspected and released back into the Paulins Kill River. Anadromous fish species such as American Shad (33) and Blueback Herring (1) were documented below the Columbia Lake Dam, but not found in any locations above the Dam confirming the Dam as a barrier to fish passage for these anadromous species. 461 American Eels (365 smaller than 200mm) were found in 2 locations below the Columbia Lake Dam. This compares to only 87 American Eels (8 smaller than 200mm) found in 8 locations above the Dam. These data illustrate that the Columbia Lake Dam is restricting the passage of this catadromous (live in fresh water but spawn in marine waters) species as well.

### ***Biological Monitoring***

The Columbia Lake dam removal project includes comprehensive pre and post project monitoring. This includes:

**Water Chemistry** (American Rivers/The Nature Conservancy)

**Freshwater Mussels** (United States Geological Survey)

**Macroinvertebrates** (The Nature Conservancy)

**American Eel and Lamprey** (Academy of Natural Sciences)

**Freshwater Fisheries** (NJDEP Division of Fish and Wildlife)

**Stream Temperature** (The Nature Conservancy/NJDEP Division of Fish and Wildlife)

**Angler Use** (NJDEP Division of Fish and Wildlife/ Stockton State University)

### ***Frequently Asked Questions***

#### ***How many private homes are located on the lake?***

There are no private homes on the lake. The lake and surrounding property is owned by the State of New Jersey and managed by the Division of Fish and Wildlife as part of the Columbia Wildlife Management Area.

#### ***How do we know American Shad will migrate up the river once the dam is removed?***

The Paulins Kill is a known historic migratory pathway for American Shad. Local historic documents, from the late 1700's, reference the runs of shad as well as concern that the construction of mill dams at the time was limiting shad from migrating up the river. To this day, American Shad continue to migrate to the base of the dam. In 2016, a Blueback Herring, another migratory species, was documented at the base of the dam.

#### ***Why remove the dam - why not just build a fish ladder?***

Dam removal or breaching (partial removal) are the preferred options when restoring fish passage. Fish ladders are used when removing the dam is not a feasible option. Fish ladders require considerable maintenance as they often become clogged with debris or sediment requiring clean out. As such, a fish ladder adds to maintenance costs, in addition to continuing dam maintenance costs. The effectiveness of a fish ladder to pass fish also varies considerably as ever changing hydrologic conditions affects water depth, velocities and turbulence through the ladder. Fish ladders also do not achieve the added benefits of dam removal such as restoring natural flow regime, sediment transport, and reducing thermal stressors, as well as eliminating dam maintenance costs.

#### ***Is Columbia Lake Dam the only dam slated for potential removal in the Paulins Kill?***

No. Paulina Dam, located 9 miles upstream, directly on the Paulins Kill mainstem, is also being considered for removal. Paulina Dam, is owned by Blairstown Township. The township is interested in having the dam removed.

***Wasn't the dam used to generate hydropower?***

Warren County Power Co. constructed the Columbia Lake dam in 1909 to generate electricity. Hydropower was generated until 1955 when the dam and surrounding acres were sold to the state. Great Bear Hydropower Inc., a small hydropower company, restored hydropower operations in 1986, leasing the dam from Fish and Wildlife. Approximately 530 KW of electricity could be generated. The company's 40-year Federal Energy Regulatory Commission (FERC) license for generating power was set to expire in 2025 and would require renewal. Great Bear Hydropower Inc. sold its hydropower operations at Columbia in 2016 and surrendered its FERC license. All hydropower generating components have been removed from the dam and powerhouse.

***Will American Shad migrate upstream past the dam site?***

Yes. Each spring, American Shad migrated up the Paulins Kill, from the Delaware River, to the base of the Columbia Lake Dam. As of April, 2019, shad have been confirmed upstream of the dam site.

***What happened to the fish in the lake?***

Prior to the removal of the dam, lake levels in Columbia Lake were lowered to help congregate fish in the lake and the fish from the lake were collected via boat electrofishing and transferred to hatchery trucks and relocated to the Delaware River (no suitable impoundments are in the same watershed). Any invasive species present such as Common Carp or any other of the ten potentially dangerous fish species that were encountered cannot be relocated and were humanely destroyed.