

IV.—REPORT OF OPERATIONS AT THE TROUT-BREEDING STATION AT WYTHEVILLE, VA., FROM ITS OCCUPATION IN JANUARY, 1882, TO THE CLOSE OF 1884.

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The grounds, ponds, buildings, and other permanent improvements at this station are the property of the State of Virginia. Its occupation by the United States Fish Commission is under an agreement or contract which provides that the United States Commission shall have full use, occupation, and control of the station for fish-cultural purposes, conditioned upon the payment of an annual rental of \$500. The cost of the maintenance and conduct of the station is, of course, defrayed by the United States Commission. Such permanent improvements or alterations as may from time to time be required in the development of the work of the station or to increase the convenience and facilities for such work, are to be provided by the commissioner of fisheries of Virginia, and at the cost of the State.

The station was first occupied conditionally in January, 1882, with the view of determining experimentally its adaptations as a breeding and rearing station for the *Salmonida*, and the results of the season's work were so satisfactory that its permanent occupation was determined upon and definite articles of agreement entered into in July, 1882.

OBJECT OF THE STATION.

The Wytheville station is centrally situated in the Appalachians, an extensive tract of mountains stretching northeast and southwest from New York to Georgia, and having an average breadth of more than 100 miles. The thousands of streams which drain this area are well adapted to the trout. To most of them the red-speckled or brook trout is indigenous, and in many which have been protected from excessive or unlawful fishing this favorite of the angler still abounds.

It is believed that, with proper protective laws, enacted by the legislatures of the several States, and upheld and enforced by public opinion, it is practicable to make both the brook trout (*Salvelinus fontinalis*) and the rainbow or California trout (*Salmo irideus*) abundant in all the streams of the Appalachian region. The Wytheville station occupies

the geographical center of the region to be stocked, and is in easy communication by rail with all parts of it.

The supply of water for the hatchery and ponds is practically unlimited, and the facilities for the breeding, rearing, and distribution of the *Salmonidæ* so exceptional that this station has been selected for the prolonged, extensive, and systematic work necessary to re-establish the trout fishing in the Piedmont and mountain regions of Pennsylvania, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Tennessee, and the northern portions of Alabama and Georgia.

Experience has shown that it is not well, in general, to attempt the stocking of streams with fish less than one year old. To hold and feed the fish will require an extensive system of rearing-ponds, and entail considerable cost in feeding, and greater expense in distribution. But the assurance of success in stocking afforded by planting fish of such size and vigor of movement as will give immunity from capture by the small native predaceous fish of the waters will more than counterbalance the increased cost of the work.

DEVELOPMENT OF THE STATION.

Prior to the occupation of the Wytheville hatchery by the United States Commission the superintendent's house, hatchery, and other buildings were upon grounds not the property of the State, but occupied under a conditional grant from S. P. Browning, the owner. When it was definitely determined that the United States Commission would occupy and operate the station, the commissioner of fisheries of Virginia, to avoid the possibility of any embarrassment or complications arising from a presumed uncertainty of tenure, acquired by purchase from Mr. Browning the title in fee simple to 12 acres of land lying on both sides of Tate's Run, and extending to the line of the Atlantic, Mississippi and Ohio Railroad. Within the limits of this tract are all the buildings and other improvements belonging to the State.

At the time the station was occupied the improvements consisted of a rough hatchery, its dimensions being 25 feet by 50 feet, equipped to carry at one time 500,000 eggs of trout or other *Salmonidæ*; a comfortable and convenient superintendent's house, and all necessary outbuildings, &c. There were no ponds for brood fish and none for the fry, so that the California trout hatched out during the season of 1881-'82 and intended to be reared for breeders were retained in the hatching-troughs until the fall of 1883.

IMPROVEMENTS IN 1883 AND 1884.

During the summer and fall of 1883 the State commissioner constructed three ponds for the reception of the brood fish. These were 15 feet wide, 50 feet long, and 3 feet deep, and connected with each other

and the head of the spring by races for spawning. The ponds and races were constructed entirely of oak plank, supported and held together by trussed frames. The interior surface of both ponds and raceways was painted with coal-tar. Immediately after the completion of the ponds the California trout, then eighteen months old, were transferred to them. The paint was not thoroughly dry, and the coal-tar diffused in the water exerted a distinctly deleterious influence, and occasioned the loss of twelve or fifteen hundred fine fish. A number of those which survived this calamity became subsequently blind, doubtless from the same cause.

The springs which furnish the water-supply to the hatchery break out in an oval depression in the hillside, and after flowing a short distance, the waters enter a subterranean channel, which they follow for a distance of 200 yards, and finally reappear in the bed of Tate's Run, at too low a level to be used for the supply of the breeding-ponds to be located on the sloping hillside south of the hatchery. To obtain the necessary control of water-supply, the State commission caused to be excavated through solid rock a channel leading from the basin in which are the springs to the site of the proposed ponds, and, by intercepting the flow through the underground channel, diverted the whole volume of water (1,100 gallons per minute) so as to make it available for the supply of breeding-ponds.

In the latter part of 1884 four additional ponds, 12 feet by 50 feet, were constructed on the hillside sloping south from the hatchery. The lower sides and ends of these are formed of sheet-piling supported by triangular trusses and stringers. The bottom and upper side of each are of earth or rock. This modification in construction was adopted because experience had shown that trout in ponds with earth or rock bottoms thrive much better than where the sides and bottom are formed of plank. Various minor improvements, adding to the appearance of the station and the comfort and convenience of the work, were also made by the State commission.

The improvements contemplated are as follows :

- (1) The construction of a railroad siding on the hatchery grounds for the greater convenience and economy of distribution.
- (2) The erection of a new hatchery, 30 feet by 50 feet in plan, two stories high, and thoroughly equipped for the most extensive work of propagation.
- (3) The construction of eight additional ponds for rearing the *Salmonidae*.
- (4) The construction of a complete series of ponds for breeding carp and other warm-water species.

The estimated cost of these and a number of minor improvements is \$3,200, the entire expense of which, under our agreement with the State commissioner, is to be borne by the State of Virginia.

PROPAGATION AND DISTRIBUTION.

No fish or eggs were distributed from this station in 1882. Twenty-five thousand eggs of the California trout, forwarded from the collecting station at Baird, Cal., were hatched out at the station and yielded 12,000 fry, which were retained at the station to be reared for breeders. Twenty-five thousand eggs of the Penobscot salmon were hatched, yielding 22,000 fry, which were retained in the hatching-troughs and fed until they were fifteen months old, and then turned out in the tributaries of New River, with the view of making a conclusive test of the adaptation of this species of migratory fish to the rivers of the Mississippi Basin. It is not expected that they will ever reappear in the waters in which they were planted, since the falls of the Great Kanawha River present an insuperable barrier to their return; but should they live to mature, we would expect them to be found in some of the tributaries of the Ohio which are unobstructed by falls or dams.

The only eggs hatched at the station in 1883 were those of the California trout. Eighty-two thousand ova, forwarded from the McCloud River station, were hatched out, yielding 44,000 fry, of which number 6,000 were retained to rear for breeders, and the remainder distributed as follows:

To streams in South Carolina, under the direction of the State commissioner	8,000
To the Roanoke and its tributaries, in Virginia	4,000
To tributaries of the Holston, in Smyth County, Virginia.....	5,000
To headwaters of James River, in Virginia	2,000
To tributaries of the Shenandoah, in the Valley of Virginia.....	0,000
To tributaries of the Potomac, in Maryland and West Virginia.....	13,000

Of the yearlings 500 were furnished to stock the ponds of the South Side Sportmen's Club, on Long Island, and 50 were placed in the Roanoke River, in the vicinity of Big Spring, Va. Those furnished the South Side Club are now breeding, and the great financial success that has attended the fish-cultural enterprise of this club is a conspicuous example of what may be accomplished in this direction by individual or associated effort when intelligently directed.

The eggs hatched in 1884 were as follows:

From the Bucksport station, Maine, 100,000 salmon ova.

From the Northville station, Michigan, 75,000 brook trout ova.

In both cases the mortality after hatching was, for some unexplained reason, very large.

Full details of the distribution of fish from this station during the season will be found in the following table :

Distribution of Salmonidae from Wytheville Station during 1884.

Date.	Water in which placed and locality.	California trout.			Brook trout.		Range-ley trout, one year.	Penobscot salmon fry.
		One year.	Two years.	Three years.	Fry.	One year.		
1884.								
Feb. 25	Spring Creek, near Warm Springs, N. C.				4,500			
25	Laurel River, near Warm Springs, N. C.				5,500			
Mar. 5	Mill Creek, near Round Knob, N. C.		150		5,000			
19	Watauga River, near Carter's Depot, Tenn.		350					
10	Hiawassee River, Calhoun, Tenn.		324					
10	In pond of Tipton Jobe, Johnson City, Tenn.		100					
10	Wills Creek, De Kalb County, railroad crossing, Ala.		368					
10	Warrior River, Warrior Station, Ala.		387					
10	Cahawba River, Shelby County, railroad crossing, Ala.		308					
10	Chocolocco Cr., Oxford, Ala.		400					
10	Tallapoosa River, at railroad crossing, Ala.		370					
10	Etowah River, Cartersville, Ga.		400					
10	Coosawatee River, E. Tenn., Va. & Ga. R. R. crossing.		308					
Apr. 10	Morgan's Run, near Berryville, Clarke County, Va.	100	100			50	50	
10	Harris Run, 3½ miles from Oswego, N. Y.	350	100					
10	E. G. Blackford, New York F. C., for exhibition.	30	6	6			6	
10	Oswego River, near Fulton, N. Y.							50,000
10	Ponds of Hon. C. Delano, Mount Vernon, Ohio.		50					
		480	3,890	6	15,000	50	56	50,000

Distribution made by car No. 1, Messenger George H. H. Moore being in charge.

A notable feature of the work was the stocking of a number of streams in Georgia, Tennessee, and Northern Alabama with two-year-old California trout. The rivers thus stocked were :

- Mill Creek, near Round Knob, N. C.
- Watauga River, near Carter's Depot, Tenn.
- Hiawassee River, near Calhoun, Tenn.
- Wills Creek, De Kalb County, Ala.
- Warrior River, Warrior Station, Ala.
- Cahawba River, Shelby County, Ala.
- Chocolocco Creek, Oxford, Ala.
- Tallapoosa River, Ala.
- Etowah River, Cartersville, Ga.
- Coosawatee River, near Rome, Ga.

From 300 to 500 nearly adult fish were planted at each locality, and, if the waters prove suitable and reasonable protection is afforded, we may in a few years expect to find the California trout common in the streams above referred to.

In the fall and early winter of 1884-'85 some of the rainbow trout bred at the station spawned. . The spawning began in December and continued up to the first of March, yielding 49,000 eggs of fair quality.

WASHINGTON, D. C., *April* 14, 1886.