

Recent changes in the distribution of fish species in the New River Basin in West Virginia and Virginia

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ABSTRACT

The New River Basin is home to a unique assemblage of 46 native fishes that includes 8 endemic species (found only within the New River Basin). The ratio of native species to drainage area is the lowest of 26 major drainages in the eastern United States, and the proportion of endemic species relative to total native species is among the highest for basins in eastern and central North America. Distribution patterns of native fish in the New River are puzzling, in part because several species are found as isolated populations scattered throughout the basin. Intentional and unintentional introductions of new species have nearly doubled the number of fish species in the New River from 46 to 89. Some introduced species, such as the telescope shiner (*Notropis telescopus*), are continuing to expand their range through the New River Basin.

Fish communities were surveyed throughout the New River Basin as part of the U. S. Geological Survey's National Water-Quality Assessment Program. We sampled fish communities by electrofishing and kick seining at 2 sites on the New River main stem and 10 sites on tributary streams in West Virginia and Virginia during 1996-98. Our collections add significant distributional records for the margined madtom (*Noturus insignis*), least brook lamprey (*Lampetra aepyptera*) and the telescope shiner. Additionally, we collected new records for spottail shiner (*Notropis hudsonius*), brown (*Ameiurus nebulosus*) and yellow bullheads (*Ameiurus natalis*), the fathead minnow (*Pimephales promelas*), and flathead catfish (*Pylodictis olivaris*). Several of these records are significant because they indicate that these species have been moved past barriers to migration, such as dams or reservoirs. These factors contribute to a dynamic assemblage of fish, with shifts in composition and distribution exceeding those of adjacent drainages.

INTRODUCTION

Few comprehensive fish surveys were done in the New River Basin until the 1970's (Cope, 1868; Addair, 1944). The New River fish assemblage was known to be depauperate, with the lowest ratio species to drainage area of 26 eastern United States basins, with few native game fish. Intentional introductions of game and forage fish were widespread in the New River, as elsewhere. Other fish species are believed to be introductions to the New River Basin (which includes the Gauley River Basin) on the basis of anomalous distribution patterns throughout the basin (Jenkins and Burkhead,

1994). In the 1970's, several comprehensive fish distribution surveys were conducted in the New River and tributary basins (Hocutt and others, 1978, 1979). The fish assemblage of the New River is considered to remain dynamic in composition and susceptible to invasion (Jenkins and Burkhead, 1994). Approximately 89 species of fish are found in the New River Basin of West Virginia, Virginia, and North Carolina. Of these 89 species, only 46 are considered native; 8 of these are endemic.

Although the New River and Kanawha River are essentially different names for the same river (Figure 1), their drainage basins have distinct fish assemblages (Jenkins and Burkhead, 1994). Barriers to migration, principally Kanawha Falls, have prevented many of the fish species that are widespread throughout the Upper Ohio River System from moving into the New River and Gauley River from the Kanawha River. The Kanawha River Basin has 92 native fish species; none are endemic.

This paper describes changes in distribution of fishes in the New River Basin. From the 12 sites we surveyed over two years (Figure 2), we collected several new records and found that other non-native species were expanding their ranges in the basin. Species accounts of new records and important range expansions are presented below. We also discuss the principal reason for these range expansions – human movement of fish.

MATERIALS AND METHODS: We collected fish using methods in described Meador and others (1993). We used three electrofishing methods – backpack, towed barge, and boat – selecting the appropriate method for the size of the stream. We used the boat only for collection in non-wadeable pools and used the towed barge to collect fish in riffles and pool margins at the sites where the boat was needed. All sites were fished using two passes per each electrofishing method, and a supplemental kick-seine with a four- by ten-foot seine with ¼-inch mesh was done between wading electrofishing passes. We did wading passes by zig-zagging upstream through the reach, targeting specific habitats, typically with three netters for backpack sites and three to seven netters for towed barge sites. A boat pass involved working downstream along the channel margin, with some supplemental zig-zagging across the middle of the pool, with two netters. We usually kick-seined in riffles, for 15-30 minutes. All the fishes we discuss below were collected by electrofishing. Site names, drainage areas, collection dates, and electrofishing methods used are listed in Table 1. At all sites, taxonomically resolvable fish were identified, counted, and measured in the field and then released. Taxonomically problematic fish and voucher specimens of most species were preserved and identified in the lab. Identification was based on the key of Jenkins and Burkhead (1994).

Because the primary study objective was to characterize relative abundance of the fish community to relate to other water-quality characteristics, site selection was stratified on the basis of geology and land use (Gilliom and others, 1995). Study reaches were selected to represent typical conditions for the stream segment; therefore, the selected reaches were sometimes less diverse in habitat than reaches that would have been selected to maximize species richness (Meador and others, 1993). All study reaches were selected to include multiple geomorphic channel units, either riffle-and-pool or riffle-and-

This map illustrates the Kanawha-New River drainage basin in West Virginia. The basin is bounded by the Kanawha-New River drainage basin boundary. Major rivers shown include the Kanawha River, New River, Gauley River, Cheat River, and Bluestone River. Towns such as Charleston, Marmet, Peysora, Whitesville, Fayetteville, Beckley, Princeton, Bluefield, and Galax are marked. Recreational areas like Gauley River National Recreation Area and Meadow River wetlands complex are indicated. The map also shows the location of the study area within the larger context of West Virginia, Virginia, and North Carolina. A scale bar in miles and kilometers is provided at the bottom.

Figure 2. Locations of fish community collections in the New River Basin in West Virginia and Virginia, 1996-1998.

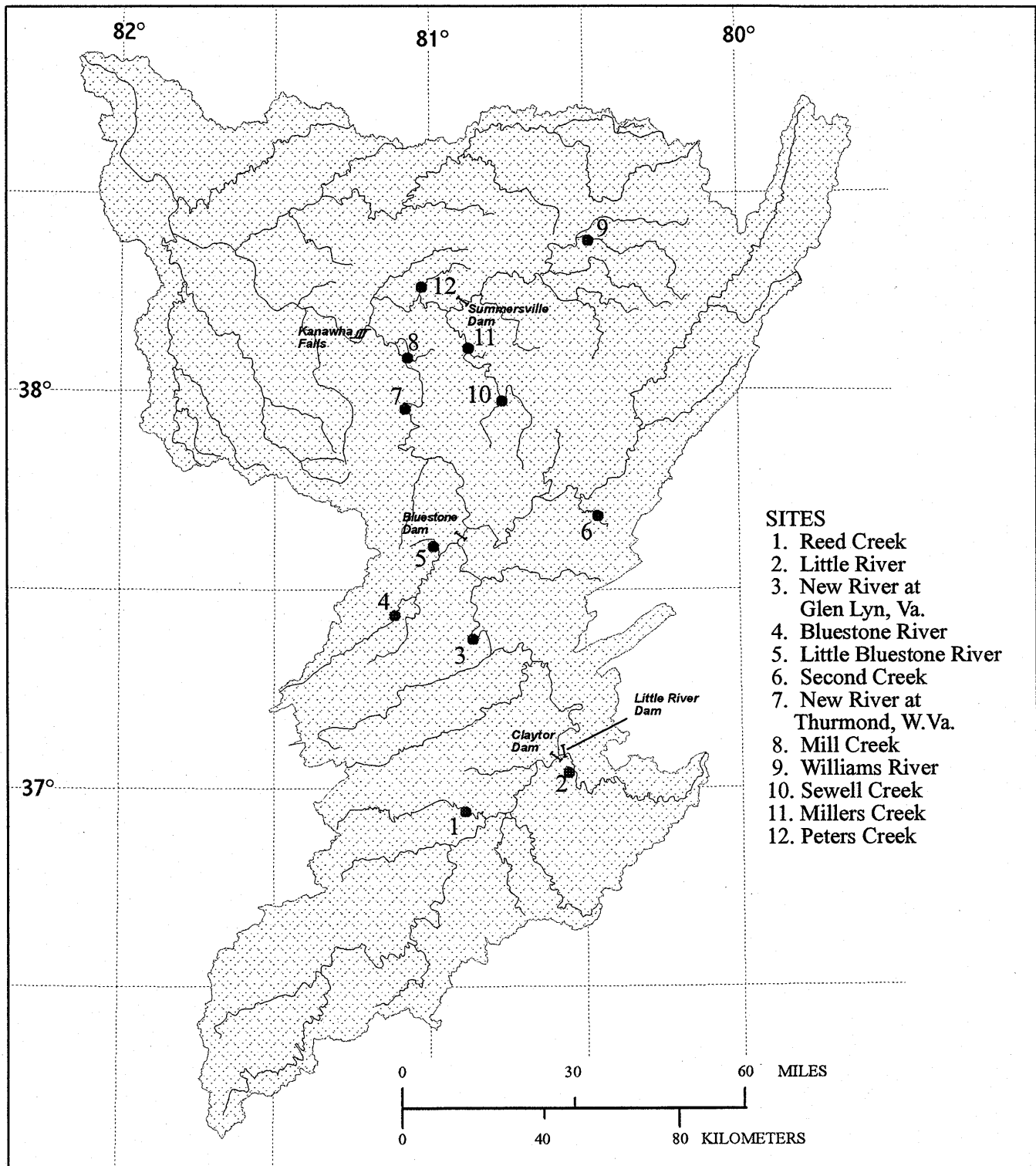


Table 1. Sites, drainage areas, collection dates, electrofishing methods, current types, and number of passes where Kanawha-New River NAWQA fish community data were collected.

Site	Map reference number	Drainage area (mi ²)	Collection date(s)	Electrofishing method(s)	Current type	Number of passes
Reed Creek at Grahams Forge, Va.	1	247	August 12, 1997	Towed barge	pulsed DC	1
			October 2, 1997	Towed barge	pulsed DC	2
			September 1, 1998	Towed barge	pulsed DC	2
			September 2, 1998	Towed barge	pulsed DC	2
			September 3, 1998	Towed barge	pulsed DC	2
Little River at Graysontown, Va.	2	300	September 18, 1997	Towed barge	pulsed DC	2
New River at Glen Lyn, Va.	3	3,768	October 6, 1997	Boat	pulsed DC	2
			October 6, 1997	Towed barge	pulsed DC	2
Bluestone River at Spanishburg, W.Va.	4	199	August 7, 1997	Towed barge	pulsed DC	2
Little Bluestone River near Jumping Branch, W.Va.	5	26.4	September 24, 1998	Backpack	pulsed DC	2
Second Creek near Second Creek, W.Va.	6	80.8	August 28, 1997	Towed barge	pulsed DC	2
New River at Thurmond, W.Va.	7	6,687	September 23, 1997	Boat	pulsed DC	2
			September 23, 1997	Towed barge	pulsed DC	2
Mill Creek near Hopewell, W.Va.	8	22.4	September 21, 1998	Backpack	pulsed DC	2
Williams River at Dyer, W.Va.	9	128	August 27, 1997	Towed barge	AC	2
			August 19, 1998	Towed barge	AC	2
			August 20, 1998	Towed barge	AC	2
Sewell Creek at East Rainelle, W.Va.	10	40.1	September 15, 1998	Backpack	pulsed DC	2
Millers Creek at Nallen, W.Va.	11	8.8	September 15, 1998	Backpack	pulsed DC	2
Peters Creek near Lockwood, W.Va.	12	40.2	August 26, 1997	Towed barge	pulsed DC	2

run; and, except at the two main stem sites, contained a repeated, adjacent sequence of the paired geomorphic channel units. Reach lengths ranged from 150 to 500 meters.

NEW DISTRIBUTIONAL RECORDS

For all our sites, fish species collected, their abundances, lengths, and weights are published elsewhere (Ward and others, 1999). We will discuss only those fish records we collected that represent significant range expansion.

Lampetra aepyptera: The least brook lamprey is considered native to the Mississippi River basin and Atlantic Slope drainages from Pennsylvania to North Carolina (Trautman, 1981). Stauffer and others (1995) indicate that least brook lamprey are not present upstream from Kanawha Falls. Hocutt and others (1979), however, collected one least brook lamprey from the Cherry River in the Gauley River Subbasin upstream from Summersville Dam. Least brook lamprey were well established in the Williams River at Dyer in 1997 and 1998: 51 of 710 individuals collected. Its range expansion, given its previous absence from the well-sampled Williams River (Addair, 1944; Hocutt and others, 1979; West Virginia Division of Natural Resources, unpublished data), suggests that this popular baitfish, locally known as "mud eel", is a relatively recent introduction.

Notropis hudsonius: The spottail shiner is considered "one of the most widely ranging North American minnows" (Jenkins and Burkhead, 1994). In West Virginia the spottail shiner has been collected in the New River near Kanawha Falls (Stauffer and others, 1995). The spottail shiner was introduced to Claytor Lake as forage or was introduced inadvertently with other stockings (Jenkins and Burkhead, 1994). We collected new records for the spottail shiner at Reed Creek, a New River tributary, where it was abundant (853 of 8,159 individuals).

Notropis telescopus: The telescope shiner is considered native in the Tennessee River Drainage (Etnier and Starnes, 1993). It was first collected from the New River Drainage in Virginia in 1958, and from West Virginia in 1973 (Hambrick and others, 1973; Jenkins and Burkhead, 1994). We collected telescope shiners throughout the basin, but the collections of interest are from the Gauley River Basin. We collected juvenile telescope shiners in the Williams River near Dyer, upstream from Summersville Lake, in 1997; adults were collected in 1998. These records represent the first collection of this species upstream from Summersville Dam. The species presence above the dam supports the assertion that this popular baitfish was introduced by anglers. We also collected telescope shiners from Sewell Creek at East Rainelle, and from Millers Creek at Nallen. Both streams are in the Meadow River Subbasin. The Williams River and Sewell Creek populations were well established: 45 of 710 and 45 of 920 individuals, respectively.

Pimephales promelas: The fathead minnow is a widespread North American species. However, it is not native to the New River (Jenkins and Burkhead, 1994). We collected the fathead minnow at Reed Creek, the first reported collection upstream from Claytor Dam. This species is among the most common commercial baitfishes. Our

collection of one specimen of this species probably represents an isolated bait-bucket introduction.

Ameiurus natalis: The yellow bullhead is native to much of eastern and central North America. This bullhead catfish was unknown from the New River until recently (Jenkins and Burkhead, 1994). The yellow bullhead has been collected throughout the main stem of the New River (Easton and Orth, 1994; Hess, 1983). It was also taken from Indian Creek and a Meadow River tributary (Stauffer and others, 1995). We collected one yellow bullhead from Reed Creek. This record represents the first collection of this species from a New River tributary upstream from Claytor Dam. This species has been widely transplanted in North America and Europe and is commonly stocked in farm ponds.

Ameiurus nebulosus: The brown bullhead is native to the Atlantic and Gulf slopes, as well as the Mississippi and Great Lakes Basins. The brown bullhead was probably introduced to the New River and previously had been collected only from a few widely isolated sites, including one from West Virginia (Jenkins and Burkhead, 1994). We collected brown bullhead from Reed Creek in 1997 and 1998. Like the yellow bullhead, the brown bullhead is widely stocked.

Noturus insignis: The margined madtom is regarded as native to Atlantic Slope Basins. Jenkins and Burkhead (1994) consider this fish to be indigenous to the New River, although some populations may stem from introductions. Although this fish is present in the New River in Virginia, it is primarily restricted to the Valley and Ridge Physiographic Province. We took the margined madtom from Second Creek near Second Creek, W. Va., where it is well established: 69 of 2,011 individuals collected. This collection marks the first occurrence of this species from Greenbrier River Subbasin of the New River and the first occurrence in the New River in West Virginia (Stauffer and others, 1995).

Pylodictis olivaris: The flathead catfish is widespread in large rivers west of the Appalachian Divide (Etnier and Starnes, 1993). In the New River, where it is considered a native, it is common in the main stem (Jenkins and Burkhead, 1994). We collected flathead catfish from Little River at Graysontown, Va., the first record of the flathead catfish from this stream. The presence of this fish upstream from the Little River Hydropower Dam suggests that it was recently introduced.

Other incidental records for the New River Basin include the first record in Reed Creek for the logperch (*Percina caprodes*) and golden shiner (*Notemigonus crysoleucas*). These fish are well known from elsewhere in the New River Basin.

Our collections have expanded the recorded ranges of several fish species. Most of these expansions are likely attributable to human movement of fish, whether deliberate or incidental. Several species discussed are popular baitfish, such as the fathead minnow, least brook lamprey, and margined madtom. Release of baitfish at the end of a day's

angling may be responsible for movement of introduced fish species around dams and waterfalls that would otherwise be insurmountable barriers to migration

The collection of several new distribution records at a limited number of sites emphasizes the dynamic nature of the New River fish assemblage. Jenkins and Burkhead (1994) have suggested that the New River can be thought of as a laboratory in the interaction of introduced fish species. In view of trends in water quality and the likelihood of continued human movement of fish, it seems likely that the composition of the New River fish assemblage will continue to change. Information collected in the near future may be of great value in interpreting the results of the ongoing undesigned experiment in fish species interaction.

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