Monongahela River Biotic Evaluations of the Point Marion and Hildebrant Pools, West Virginia, 2003 - 2004

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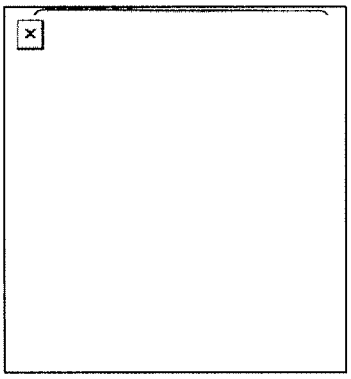
Monongahela River Biotic Evaluations
Monongahela River Mine Pool Study 2003



Introduction

The Monongahela River is formed by the confluence of the Tygart and West Fork Rivers at Fairmont in Marion County, West Virginia. The Monongahela River then flows North 37 miles through the Opekiska, Hildebrant, and Morgantown lock and dams before entering Pennsylvania. The Monongahela River basin has been historically impacted by acid mine drainage but since the 1970's improvements in water has resulted in a thriving fish populations (Weller et al. 1991).

Recent concerns for new sources of acid mine drainage from abandoned deep mines have prompted more aggressive monitoring of the fish and mussels in the Monongahela River. The new threats of acid mine drainage are a result of the long-term filling of mine pool voids which will eventually reach the surface. These new sources of acid mine drainage have the potential to reverse the long-term trend of aquatic life recovery in the Monongahela River.

In response to the threat of mine pool filling in the Monongahela River system, multiple agencies collaborated in efforts to evaluate the current status of aquatic resources currently in the Monongahela River. Participants included the West Virginia Division of Natural Resources (WVDNR), Pennsylvania Fish and Boat Commission, West Virginia Department of Environmental Protections, Pennsylvania Department of Environmental Protection, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, ORSANCO, Canaan Valley Institute, and West Virginia University. The Monongahela River Biotic Evaluations were proposed in four distinct tasks.

Task 1. Assessment of fish community characteristic in selected lock chambers

Task 2. Assessment of fish population and community characteristics in selected tailwaters

Task 3. Recreational fishery and river-based activities survey

Task 4. Unionid population and community survey

This report provides a summary of results from Task 1 and Task 2 conducted in West Virginia waters.

Methods

Task 1. Assessment of Fish Community Characteristics in Selected Lock Chambers

Lock chamber rotenone surveys were proposed at the Opekiska and Morgantown locks in West Virginia. A survey was conducted at the Morgantown Lock (river mile 102) in September 2003 but the survey at the Opekiska Lock was cancelled due to unfavorable water conditions.

The WVDNR supervised the rotenone surveys in both states to ensure methods were consistent with previous efforts. Summaries of species diversity, density, and biomass per unit

area were calculated and compared to historical records. Length frequency analysis of target species and selected game fish was also analyzed.

Task 2. Assessment of Fish Population and Community Characteristics in Selected Tailwaters

Fish population and community characteristics were assessed by night electrofishing surveys at the Morgantown and Opekiska tailwaters during April 2004. Electrofishing surveys were originally proposed for spring, 2003 but high flows and inadequate water clarity resulted in rescheduling for 2004.

Boat electrofishing surveys were conducted at night in 10-minute shoreline transects using pulsed DC current. Five consecutive transects were located on each shoreline starting at the lock and dam and progressing downstream. Transects numbered 1 – 5 were located on the right descending shoreline and transects 6 – 10 were located on the left descending shoreline.

Sauger *Sander canadense*, walleye *Sander vitreum*, saugeye *S. vitreum X S. canadense*, largemouth bass *Micropterus salmoides*, smallmouth bass *Micropterus dolomieu*, spotted bass *Micropterus punctulatus*, hybrid striped bass *M. chrysops X M. saxatilis*, white bass *Morone chrysops*, muskellunge *Esox masquinongy*, tiger musky *E. masquinongy X E. lucius*, and northern pike *Esox lucius* were considered target species because of their importance to anglers. Target species were collected from all 10 electrofishing transects. All other fish were collected from transects 1, 5, 6, and 10 in addition to the target species. Fish species number, relative abundance, and catch per hour was calculated for each sampling location.

Results

A total of 38 fish species including three species listed on the West Virginia Rare, Threatened, or Endangered (RTE) species list were collected during the lock rotenone and night electrofishing surveys (Table 1.)

Task 1. Assessment of Fish Community Characteristics in Selected Lock Chambers

A total of 24 fish species were collected from the 2003 lock rotenone survey at the Morgantown (Table 2). Ghost shiners *Notropis buchanani*, emerald shiners *Notropis atherinoides*, and mimic shiners *Notropis volucellus* were the most abundant species captured. White bass was the most abundant target species captured (Table 2). Freshwater drum *Aplodinotus grunniens* and common carp *Cyprinus carpio* comprised the largest percentage of the biomass, 33 kg and 16 kg respectively. The total fish biomass for the Morgantown Lock was 75 kg (162 kg/ha) (Table 3).

White bass, walleye, sauger, freshwater drum, and channel catfish *Ictalurus punctatus* were placed in size classes to conduct length frequency analysis. Cohorts could be identified from length frequency charts from all species except walleye due to low capture success (Figures 1 – 5).

Historical comparisons of the Monongahela River fish community were made using lock rotenone surveys conducted by the WVDNR since 1973 (Table 4). Trends based on the number of species, number of individuals, and fish biomass substantiate the improvement in the overall fish communities in the Monongahela River since 1973 (Figures 6 – 8 respectively).

Task 2. Assessment of Fish Population and Community Characteristics in Selected Tailwaters

Night electrofishing surveys were conducted at the Morgantown and Opekiska tailwaters in May 2004. GPS coordinates were recorded at the beginning of each transect for the Morgantown (Table 5) and Opekiska Tailwater (Table 6).

A total of 116 fishes representing 24 species were captured during the ten 10-minute electrofishing surveys at the Morgantown tailwater (Table 7). Golden redhorse *Moxostoma erythrurum* was the most abundant species captured and comprised 18% of the sample. Smallmouth bass was the most abundant target species and comprised 9% of the total catch. The overall catch rate was 153 fish per electrofishing hour.

Opekiska tailwater had a total catch of 191 fishes representing 20 species (Table 8). Smallmouth bass was the most species captured and comprised 19% of the sample. Largemouth bass was the second most abundant, 17%. The overall catch rate was 199 fish per electrofishing hour.

Discussion

The West Virginia Surface Mining and Reclamation Act of 1971 increased restrictions on the surface mining industry. As a result, substantial water quality improvements occurred in the Monongahela River (Weller et al. 1991). Weller et al. (1991) summarized historical lock rotenone survey data from the upper Monongahela River. These data were collected between, 1973 and 1990 by the WVDNR at three lock and dam structures on the upper Monongahela River. Mean fish biomass and fish diversity increased substantially during that period.

Based on lock rotenone survey data from the Monongahela River, the increasing trend in fish diversity and biomass has continued through the 1990's and appears to be continuing today. Black bass tournaments are commonly held on the upper Monongahela River and catch rates remain high (WVDNR 2003). Recent evaluations of native mussel beds show a recovering mussel population, particularly near tailwater areas where clean swept gravel is present (Janet Clayton 2004, Personal Communication).

Water quality improvements as indicated by pH and alkalinity have occurred in the upper Monongahela River since 1973 (Weller et al. 1991). The threat of new sources of acid mine drainage could result in the disruption or reverse the trend in water quality improvement and fish community recovery.

Literature Cited / References

Weller, R., W. B. Perry, F. Jernejcic, and S. A. Perry. 1991. Improvements in fish populations of the Monongahela River, West Virginia, after reduction of acid mine drainage. Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies. 45:407-414.

West Virginia Division of Natural Resources. 2003. West Virginia bass tournament summary, 2003. Annual summary report.

West Virginia Division of Natural Resources Fisheries Survey Database (2004).

Figure 1. Length frequency of white bass captured during the 2003 Morgantown Lock rotenone survey of the Monongahela River, September 2003.

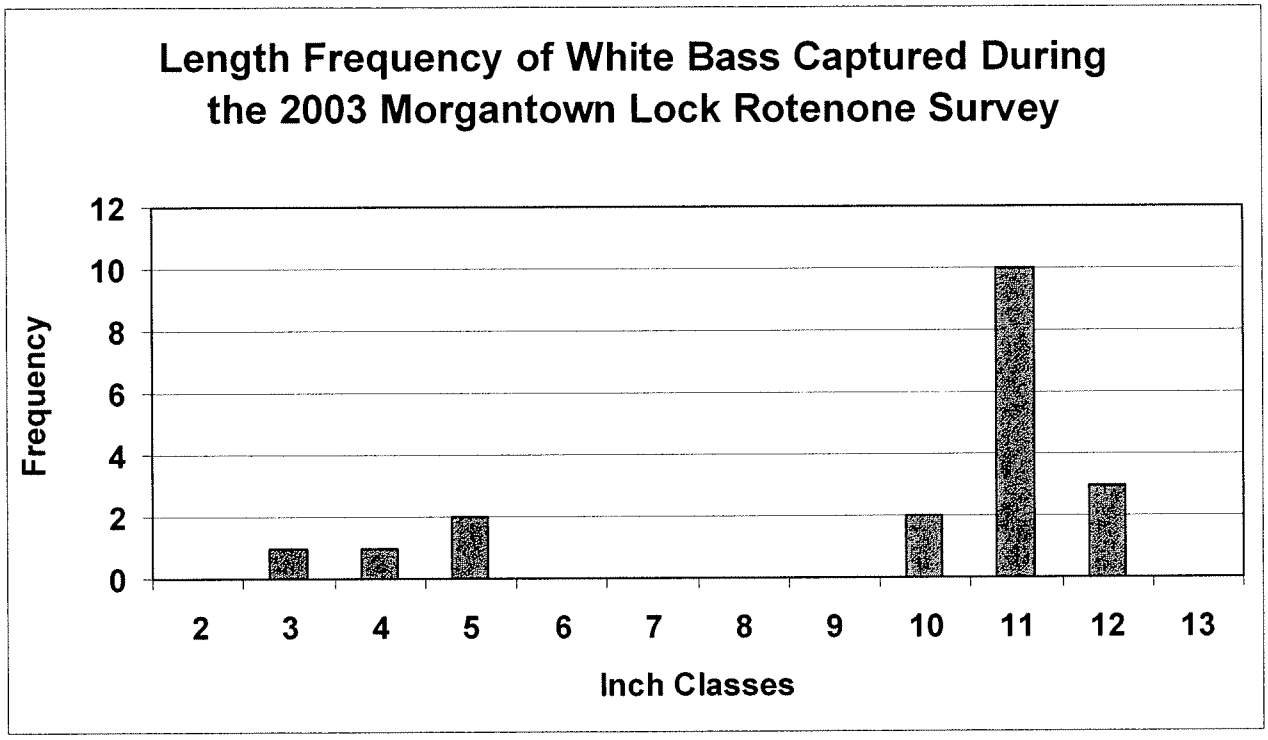


Figure 2. Length frequency of sauger captured during the 2003 Morgantown Lock rotenone survey of the Monongahela River, September 2003.

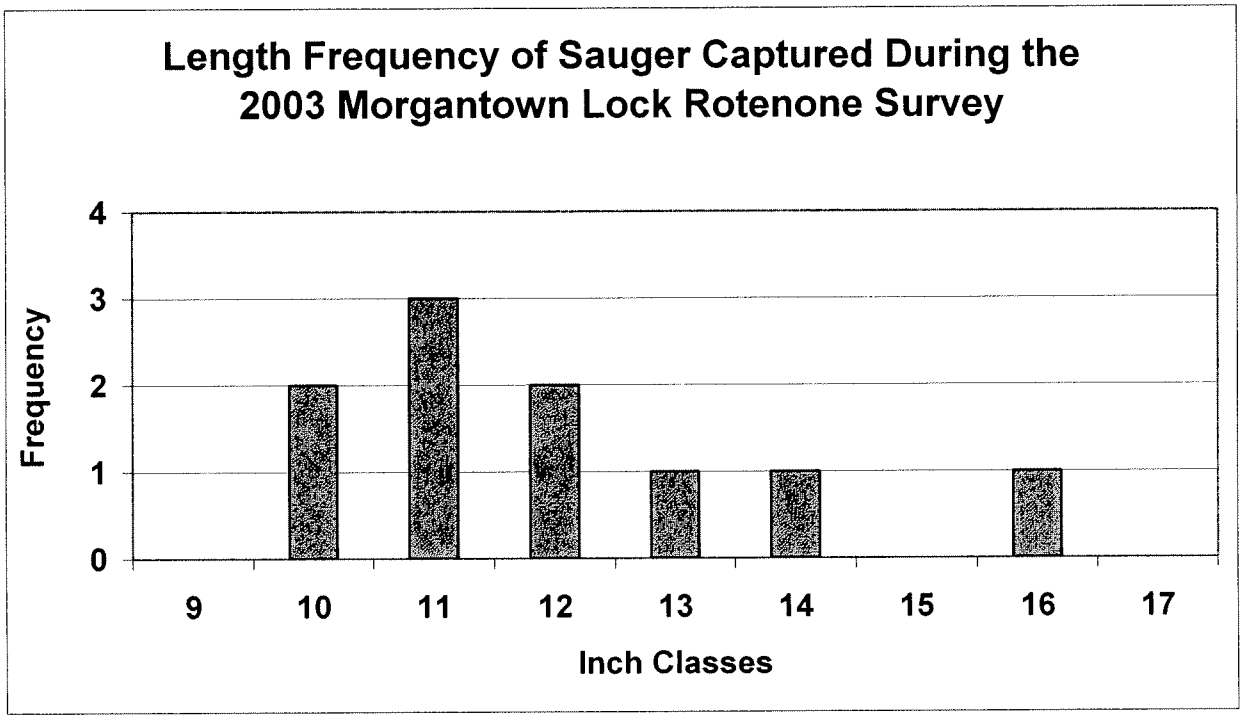


Figure 3. Length frequency of walleye captured during the 2003 Morgantown Lock rotenone survey of the Monongahela River, September 2003.

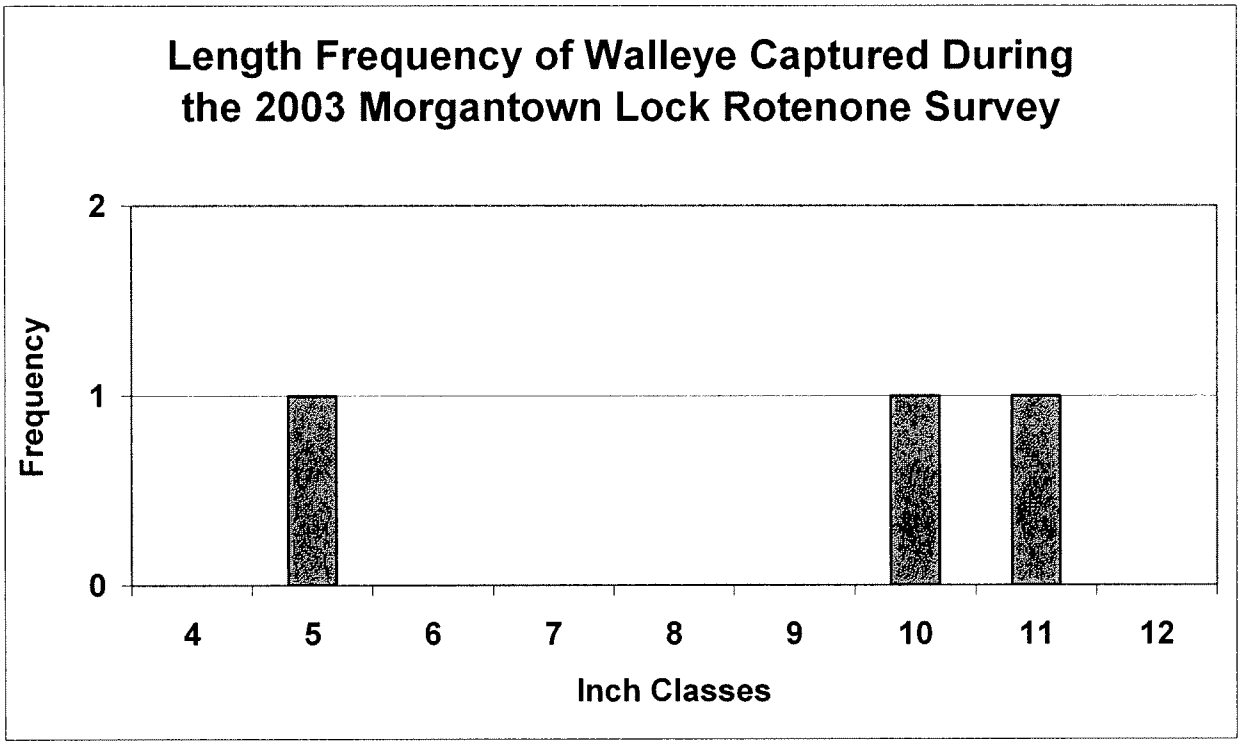


Figure 4. Length frequency of freshwater drum captured during the 2003 Morgantown Lock rotenone survey of the Monongahela River, September 2003.

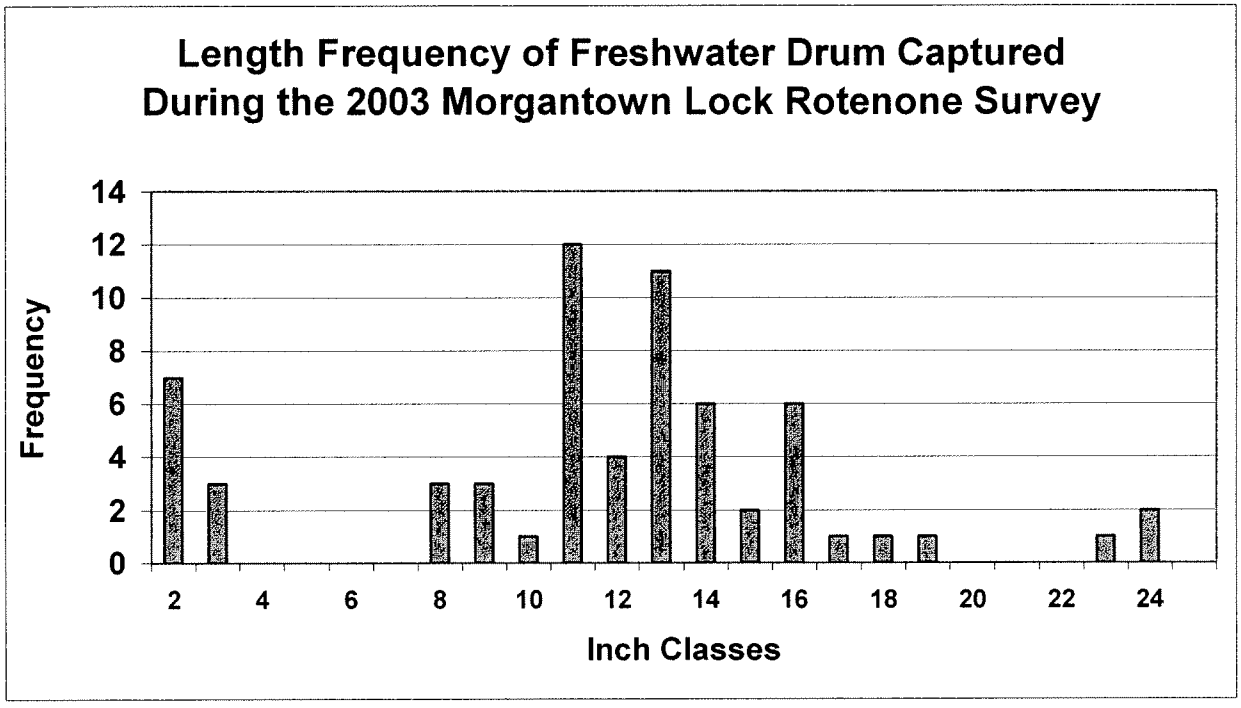


Figure 5. Length frequency of channel catfish captured during the 2003 Morgantown Lock rotenone survey of the Monongahela River, September 2003.

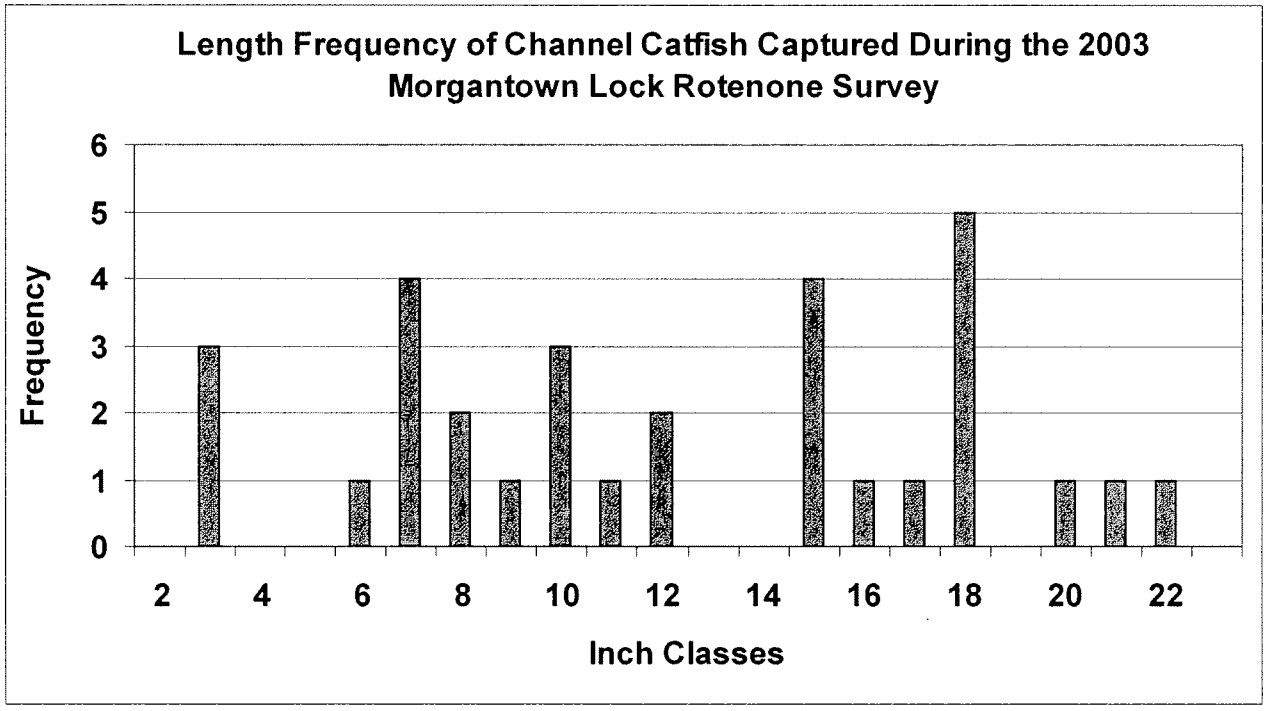


Figure 6. Number of fish species observed from the Monongahela River lock rotenone surveys, 1973-2004. Values represent average number of species observed from all locks surveyed.

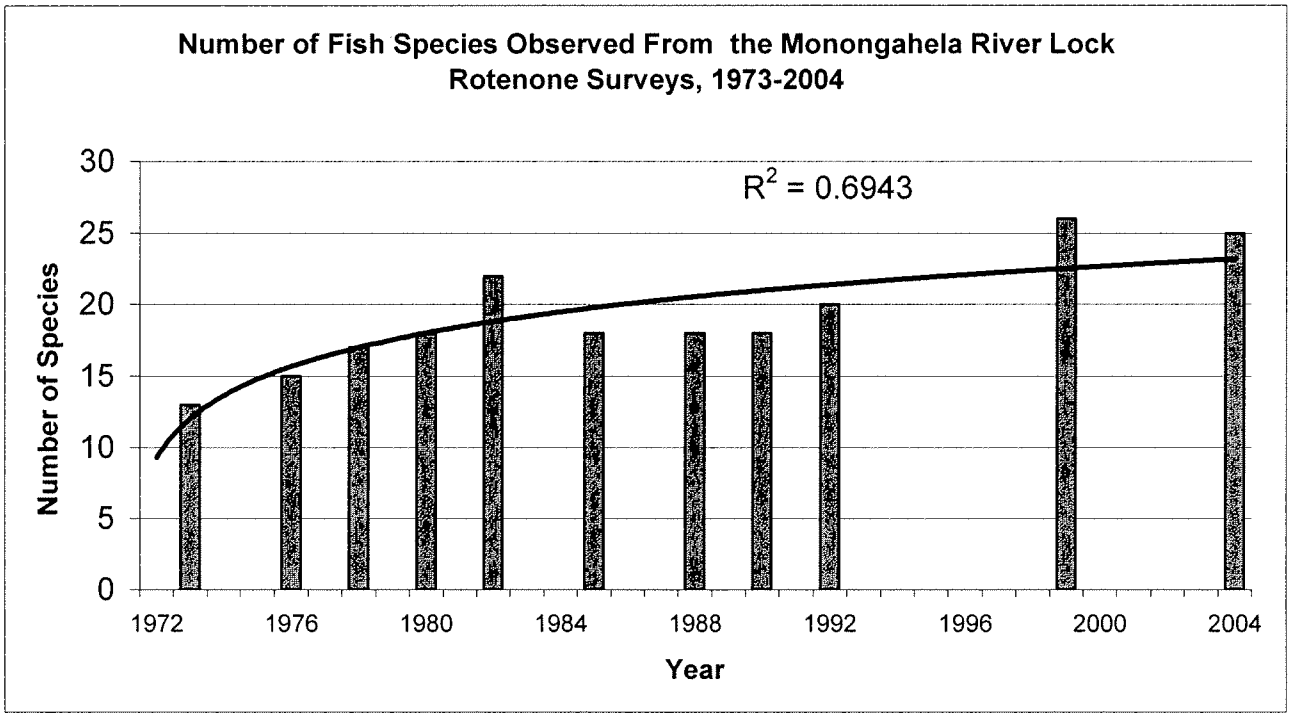


Figure 7. Number of individuals observed from the Monongahela River lock rotenone surveys, 1973-2004. Values represent average number of species observed from all locks surveyed.

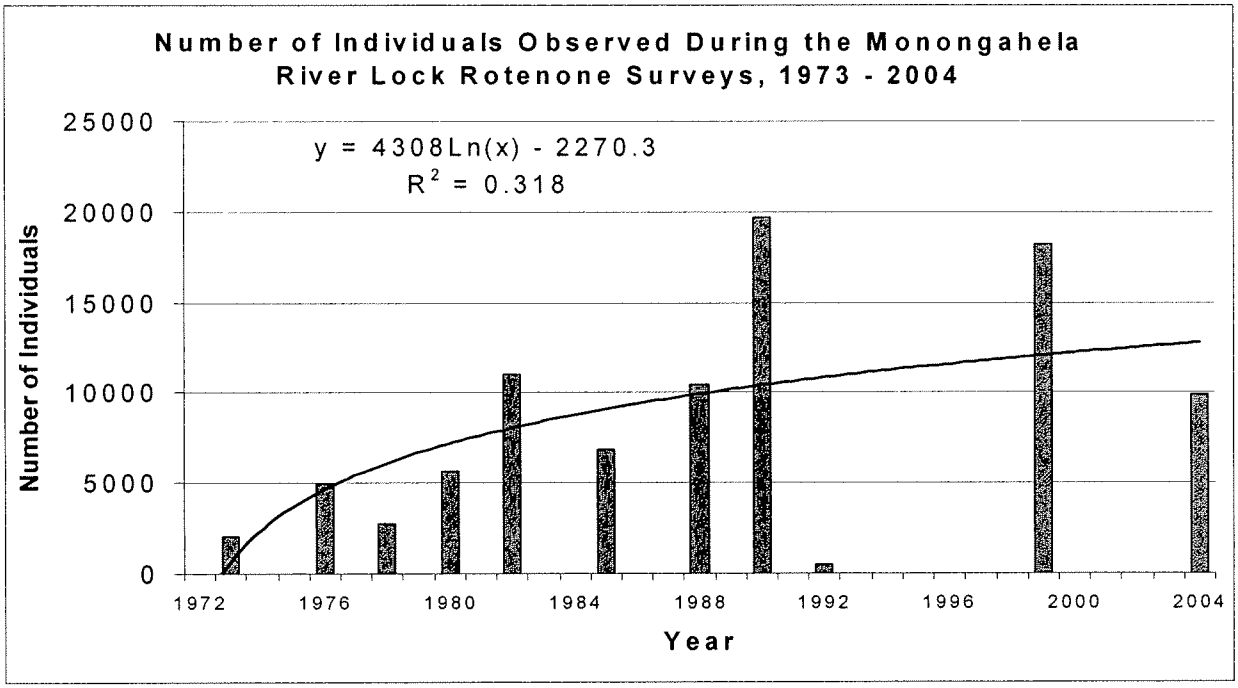


Figure 8. Number of individuals observed from the Monongahela River lock rotenone surveys, 1973-2004. Values represent average number of species observed from all locks surveyed.

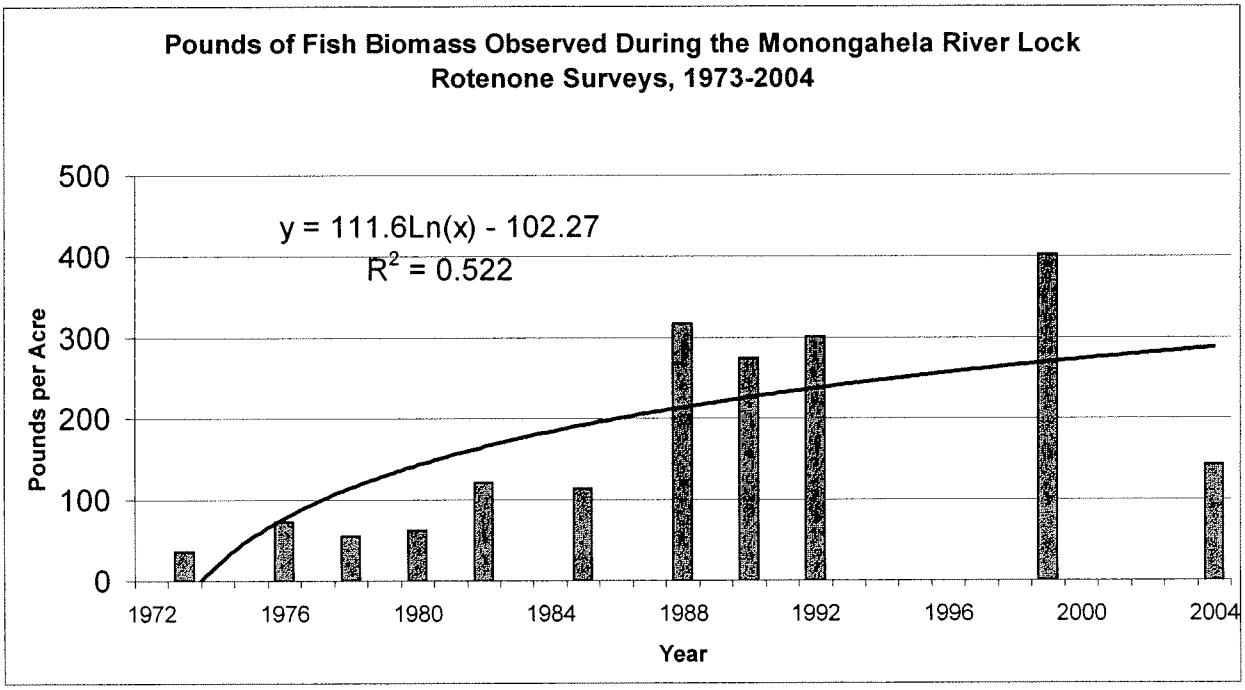


Table 1. List of species captured during the 2003 lock rotenone (Morgantown Lock and Dam) and 2004 night electrofishing surveys at the Morgantown and Opekiska tailwaters of the Monongahela River. Species listed as West Virginia rare, threatened, or endangered (RTE) indicated by "*".

Common Name	Scientific Name	Captured During Night Electrofishing Survey	Captured During Roentone Survey
Black Crappie	Pomoxis Nigromaculatus	X	
Bluegill	Lepomis macrochirus	X	X
Bluntnose Minnow	Pimephales notatus	X	X
Brook Silverside	Lathestheis sicclius		X
Channel Catfish	Ictalurus punctatus	X	X
Channel Shiners	Notropis wickliffi		X
Common Carp	Cyprinus carpio	X	X
Emerald Shiners	Notropis atherinoides	X	X
Flathead Catfish	Pylodictus olivaris		X
Freshwater Drum	Aplodinotus grunniens	X	X
Ghost Shiners*	Notropis buchanani	X	X
Gizzard Shad	Dorosoma cepedianum	X	X
Golden Redhorse	Moxostoma erythrurum	X	
Green Sunfish	Lepomis cyanellus	X	
Hybrid Striped Bass	M. chrysops X M. saxatilis	X	
Largemouth Bass	Micropterus salmoides	X	
Logperch	Percina caprodes	X	
Longnose Gar	Lepisosteus osseus		X
Mimic Shiners	Notropis volucellus	X	X
Northern Hogsucker	Hypentelium nigricans	X	
Pumpkinseed	Lepomis gibbosus	X	
Quillback Carpsucker	Carpiodes cyprinus	X	X
River Carpsucker	Carpiodes carpio		X
River Redhorse*	Moxostoma carinatum	X	
Rockbass	Ambloplites rupestris	X	X
Rosyface Shiners	Notropis rubellus		X
Sand Shiner	Notropis ludibundus		X
Sauger	Sander canadense	X	X
Silver Shiner	Notropis photogenis		X
Sivler Chub*	Macrhybopsis storeriana	X	
Skipjack Herring	Alosa chrysochloris		X
Smallmouth Bass	Micropterus dolomieu	X	
Smallmouth Buffalo	Ictiobus bubalus	X	
Spotfin Shiners	Cyprinella spiloptera		X
Spotted Bass	Micropterus punctulatus	X	
Walleye	Sander vitreum	X	X
White Bass	Morone chrysops		X
Yellow Perch	Perca flavescens	X	X

Table 2. Fishes captured from the Morgantown Lock and Dam of the Monongahela River during rotenone survey, September 2003.

Common Name	Number Captured	Density Per Acre	Percent Relative Abundance
Bluegill	75	65	0.76
Bluntnose Minnow	14	12	0.14
Brook Silverside	6	5	0.06
Channel Catfish	38	33	0.38
Channel Shiners	21	18	0.21
Common Carp	6	5	0.06
Emerald Shiners	3,813	3,316	38.46
Flathead Catfish	3	3	0.03
Freshwater Drum	108	94	1.09
Ghost Shiners	4,985	4,335	50.28
Gizzard Shad	18	16	0.18
Longnose Gar	1	1	0.01
Mimic Shiners	686	597	6.92
Quillback	1	1	0.01
River Carpsucker	1	1	0.01
Rockbass	2	2	0.02
Rosyface Shiners	39	34	0.39
Sand Shiner	16	14	0.16
Sauger	10	9	0.10
Silver Shiner	14	12	0.14
Skipjack Herring	1	1	0.01
Spotfin Shiners	33	29	0.33
Walleye	3	3	0.03
White Bass	19	17	0.19
Yellow Perch	1	1	0.01
Total Catch	**9,914**	**8,621**	**100.00**

Table 3. Biomass of fishes captured from the September 2003 Morgantown Lock rotenone survey.

Common Name	Number	Weight (g)	Percent of Biomas	Weight (lbs.)	LBS/AC	KG/HA
Bluegill	75	1,406	1.87	3.10	2.69	3.023
Bluntnose Minnow	14	11	0.01	0.02	0.02	0.023
Brook Silverside	6	2	0.00	0.00	0.00	0.003
Channel Catfish	38	10,816	14.35	23.82	20.72	23.259
Channel Shiners	21	5	0.01	0.01	0.01	0.010
Common Carp	6	15,619	20.73	34.40	29.92	33.589
Emerald Shiners	3,813	2,230	2.96	4.91	4.27	4.796
Flathead Catfish	3	484	0.64	1.07	0.93	1.041
Freshwater Drum	108	32,571	43.22	71.74	62.38	70.045
Ghost Shiners	4,985	1,509	2.00	3.32	2.89	3.245
Gizzard Shad	18	1,140	1.51	2.51	2.18	2.451
Longnose Gar	1	32	0.04	0.07	0.06	0.069
Mimic Shiners	686	325	0.43	0.72	0.62	0.699
Quillback	1	963	1.28	2.12	1.84	2.071
River Carpsucker	1	992	1.32	2.19	1.90	2.133
Rockbass	2	12	0.02	0.03	0.02	0.025
Rosyface Shiners	39	28	0.04	0.06	0.05	0.060
Sand Shiner	16	5	0.01	0.01	0.01	0.010
Sauger	10	1,992	2.64	4.39	3.82	4.284
Silver Shiner	14	28	0.04	0.06	0.05	0.060
Skipjack Herring	1	922	1.22	2.03	1.77	1.983
Spotfin Shiners	33	14	0.02	0.03	0.03	0.029
Walleye	3	248	0.33	0.55	0.48	0.533
White Bass	19	4,002	5.31	8.81	7.67	8.606
Yellow Perch	1	4	0.01	0.01	0.01	0.009
Totals	**9,914**	**75,356**	**100**	**165.98**	**144.33**	**162.055**

Table 4. Historical lock rotenone data collected from the West Virginia waters of the Monongahela River. Data represents the average values observed from lock rotenone surveys in a specific year.

Year	AverageNumber of Species	Average Total Catch	Average lbs/arce
1973	13	2,032	37
1976	15	4,931	73
1978	17	2,742	56
1980	18	5,641	62
1982	22	10,983	122
1985	18	6,850	114
1988	18	10,423	317
1990	18	19,691	275
1992	20	470	301
1999	26	18,240	402
2003	25	9,914	144

Table 5. Beginning survey time and GPS coordinates for night electrofishing survey conducted at the Morgantown tailwater of the Monongahela River, May 06, 2004. River Mile 201.

Transect Number	Survey Start Time	Northing	Easting
1	2015	4386157	0588617
2	2027	4386403	0588754
3	2055	4386749	0588942
4	2106	4387057	0589178
5	2126	4387376	0589387
6	2158	4386452	0588598
7	2224	4386739	0588760
8	2240	4386988	0588960
9	2300	4387265	0589120
10	2313	4387506	0589283

Table 6. Beginning survey time and GPS coordinates for night electrofishing survey conducted at the Opekiska tailwater of the Monongahela River, May 10, 2004. River Mile 115.5.

Transect Number	Survey Start Time	Northing	Easting
1	2020	4380173	0581836
2	2031	4380538	0581942
3	2043	4380875	0581759
4	2058	4381150	0581442
5	2120	4381471	0581343
6	2153	4380052	0581608
7	2215	4380340	0581758
8	2234	4380662	0581784
9	2248	4380887	0581588
10	2305	4381108	0581324

Table 7. Fishes captured from the Morgantown Tailwater (Point Marion Pool) of the Monongahela River during night electrofishing surveys, May 6, 2004.

Common Name	Number Captured	Catch Per Hour	Percent Relative Abundance
Black Crappie	2	1.32	1.72
Bluegill	13	8.58	11.21
Bluntnose Minnow	1	0.66	0.86
Common Carp	5	3.3	4.31
Channel Catfish	1	0.66	0.86
Freshwater Drum	2	1.32	1.72
Emerald Shiner	18	11.88	15.52
Golden Redhorse	21	13.86	18.10
Gizzard Shad	2	1.32	1.72
Ghost Shiner	2	1.32	1.72
Green Sunfish	2	1.32	1.72
Largemouth Bass	8	13.28	6.90
Mimic Shiner	5	3.3	4.31
Pumpkinseed	1	0.66	0.86
Quillback Carpsucker	3	1.98	2.59
River Redhorse	1	0.66	0.86
Rockbass	2	1.32	1.72
Smallmouth Buffalo	3	1.98	2.59
Sauger	5	3.3	4.31
Silver Chub	1	0.66	0.86
Smallmouth Bass	10	16.6	8.62
Spotted Bass	3	4.98	2.59
Walleye	4	6.64	3.45
Yellow Perch	1	0.66	0.86
Total Catch	**116**	**152.94**	**100**

Table 8. Fishes captured from the Opekiska Tailwater (Hildebrant Pool) of the Monongahela River during night electrofishing surveys, May 10, 2004.

Common Name	Number Captured	Catch Per Hour	Percent Relative Abundance
Bluegill	25	16.50	13.09
Channel Catfish	1	0.66	0.52
Freshwater Drun	3	1.98	1.57
Golden Redhorse	29	19.14	15.18
Gizzard Shad	4	2.64	2.09
Hybrid Striped Bass	1	0.66	0.52
Largemouth Bass	32	21.12	16.75
Longnose Gar	3	1.98	1.57
Northern Hogsucker	1	0.66	0.52
Emerald Shiner	15	9.90	7.85
Ghost Shiner	2	1.32	1.05
Mimic Shiner	1	0.66	0.52
Logperch	1	0.66	0.52
Bluntnose Minnow	1	0.66	0.52
Quillback Carpsucker	2	1.32	1.05
River Carpsucker	1	0.66	0.52
Rockbass	3	1.98	1.57
Sauger	4	2.64	2.09
Smallmouth Bass	36	23.76	18.85
Spotted Bass	26	17.16	13.61
Total Catch	**191**	**199.03**	**100**