



Eastern Rivers and Mountains Network Stream Fish Monitoring Program

Summary of 2013-2014 Pilot Sampling

Natural Resource Data Series NPS/ERMN/NRDS—2017/1084





ON THIS PAGE

Photograph of a Rosyside Dace (*Clinostomus funduloides*) found at New River Gorge National River.

Photograph courtesy of Evan A. Faulk

ON THE COVER

Photograph of a Golden Shiner (*Notemigonus crysoleucas*) found at Delaware Water Gap National Recreation Area.

Photograph courtesy of Evan A. Faulk

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Summary of 2013-2014 Pilot Sampling

Natural Resource Data Series NPS/ERMN/NRDS—2017/1084

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The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts.

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Contents

	Page
Figures.....	v
Tables.....	vii
Photographs.....	ix
Abstract.....	xi
Delaware Water Gap National Recreation Area.....	xii
New River Gorge National River	xii
Allegheny Portage Railroad National Historic Site.....	xiii
Bluestone National Scenic River.....	xiii
Fort Necessity National Battlefield	xiii
Friendship Hill National Historic Site.....	xiii
Acknowledgments.....	xv
Introduction.....	1
Methods.....	3
Fish Sampling.....	3
Results and Discussion	5
Delaware Water Gap National Recreation Area.....	5
New River Gorge National River	10
Allegheny Portage Railroad National Historic Site.....	15
Bluestone National Scenic River.....	16
Fort Necessity National Battlefield	19
Friendship Hill National Historic Site.....	20
Literature Cited	21
Appendix A: Preserved specimens and associated data.....	23

Figures

	Page
Figure 1. Number of species (native and introduced) and percentage of native individuals at sampling sites at Delaware Water Gap National Recreation Area.....	8
Figure 2. Number of species (native and introduced) and percentage of native individuals at sampling sites at New River Gorge National River. UNT=Unnamed tributary	13
Figure 3. Number of species (native and introduced) and percentage of native individuals at sampling sites at Allegheny Portage Railroad National Historic Site.....	16
Figure 4. Number of species (native and introduced) and percentage of native individuals at sampling sites at Bluestone National Scenic River.....	18

Tables

	Page
Table 1. Summary of changes that were made from Faulk (2015) by ASW and included in this report.	1
Table 2. Fish species observed and number captured at Delaware Water Gap National Recreation Area (DEWA) sampling sites across all sampling occasions (n=3 site visits per site).....	6
Table 3. Species richness and composition (native vs. introduced) of local fish communities at Delaware Water Gap National Recreation Area sampling sites.....	9
Table 4. Fish species observed and number captured at New River Gorge National River (NERI) sampling sites across all sampling occasions (n=3 site visits per site)	11
Table 5. Species richness and composition (native vs. introduced) of local fish communities at New River Gorge National River sampling sites	14
Table 6. Fish species observed and number captured at Allegheny Portage Railroad National Historic Site targeted sampling sites across all sampling occasions (n=3 site visits per site).	15
Table 7. Species richness and composition (native vs. introduced) of local fish communities at Allegheny Portage Railroad National Historic Site sampling sites.....	16
Table 8. Fish species observed and number captured at Bluestone National Scenic River targeted sampling sites across all sampling occasions (n=3 site visits per site)	17
Table 9. Species richness and composition (native vs. introduced) of local fish communities at Bluestone National Scenic River sampling sites.	19
Table 10. Fish species observed and number captured at Fort Necessity National Battlefield targeted sampling sites across all sampling occasions (n=3 site visits per site)	19
Table 11. Fish species observed and number captured at Friendship Hill National Historic Site targeted sampling site across all sampling occasions (n=3 site visits)	20
Table 12. Species richness and composition (native vs. introduced) of local fish communities at Fort Necessity National Battlefield and Friendship Hill National Historic Site sampling sites.....	20
Table A-1. Fish specimens preserved and retained at Pennsylvania State University	23

Photographs

	Page
Photo 1. A Variegate Darter (<i>Etheostoma variatum</i>) found at New River Gorge National River. Photograph courtesy of Evan A. Faulk	xi
Photo 2. Van Campen Creek at Delaware Water Gap National Recreation Area. Photograph courtesy of Evan A. Faulk	xii

Abstract

In 2012, the Eastern Rivers and Mountains Network (ERMN) of the National Park Service (NPS) initiated a pilot effort to evaluate the feasibility of including a stream fish monitoring component to its long-term “vital signs” monitoring program. The effort was a collaboration between the ERMN and The Pennsylvania State University with full details of the project available in Faulk (2015). Recognizing that priority information from a Master’s Thesis (Faulk 2015) is not always readily available to park managers, specific information was excerpted from the Thesis and presented here. This report is intended to summarize 1) which fish species were found, 2) where they were found, 3) nativity status of each species, and 4) detailed sampling site descriptions. While much of this report is taken directly from Faulk (2015), some revisions have been made to fit with the theme of this report.



Photo 1. A Variegate Darter (*Etheostoma variatum*) found at New River Gorge National River. Photograph courtesy of Evan A. Faulk

Seventy eight sites were sampled throughout six ERMN parks with fish being captured at 67 sites. In all, 22,790 individuals were sampled. Fifty two species (including one hybrid) representing 10 families were encountered throughout the network.

See Faulk (2015) for species- and community-specific occupancy estimates that account for imperfect detection, as well as analyses that explore important habitat and landscape covariates affecting species (and community) detection and occupancy dynamics.

Delaware Water Gap National Recreation Area

- Thirty-two species comprised of nine families were encountered at Delaware Water Gap National Recreation Area. Seventy-five percent of the species and 77% of the individual fish encountered were native to the Delaware River Drainage.
- The most commonly encountered species was the native Blacknose Dace (*Rhinichthys atratulus*), followed by the introduced Brown Trout (*Salmo trutta*).
- Species of management interest such as Brook Trout (*Salvelinus fontinalis*) and American Eel (*Anguilla rostrata*) were among the most frequently encountered both in terms of the number of sites and number of individuals.

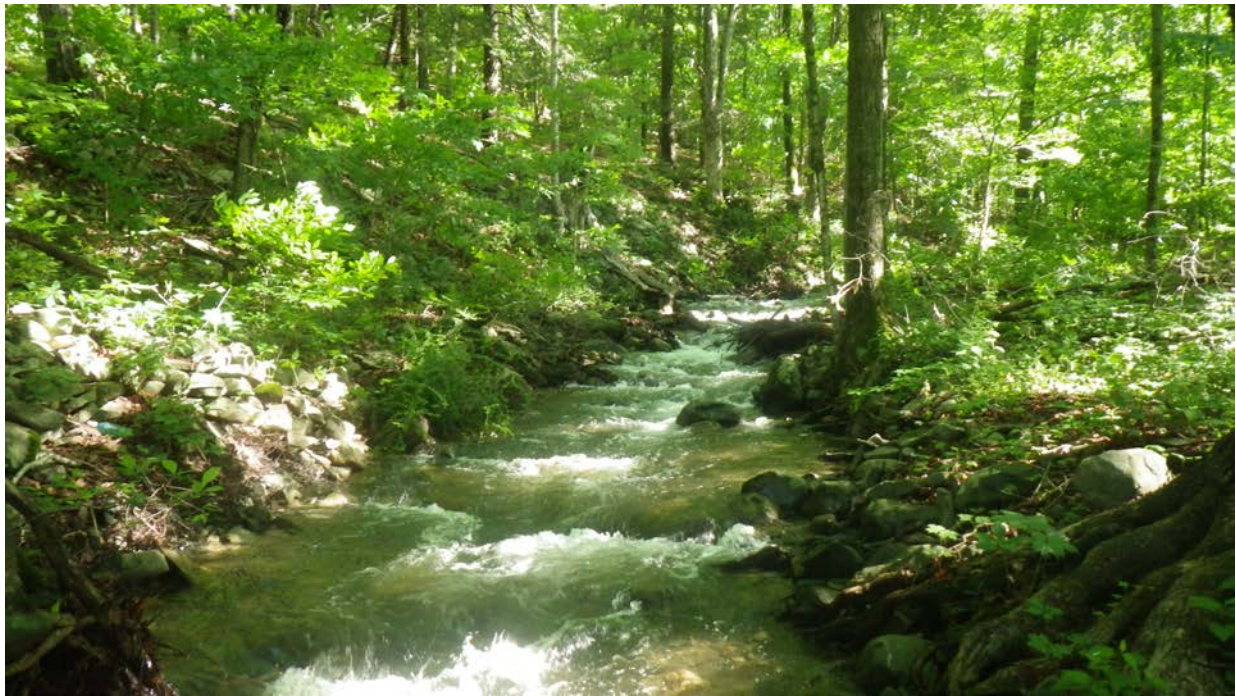


Photo 2. Van Campen Creek at Delaware Water Gap National Recreation Area. Photograph courtesy of Evan A. Faulk

New River Gorge National River

- Twenty-one species comprised of five families were encountered at New River Gorge National River. Fifty-two percent of the species and 99% of the individual fish encountered were native to the New River Drainage.
- The most commonly encountered species was the native Blacknose Dace, followed by Central Stoneroller (*Campostoma anomalum*), and Creek Chub (*Semotilus atromaculatus*).
- The nine most commonly encountered species were all native.

Allegheny Portage Railroad National Historic Site

- Thirteen species comprised of six families were encountered at Allegheny Portage Railroad National Historic Site. Eighty-five percent of the species and 90% of the individual fish encountered were native to the region.
- The most commonly encountered species was the native Blacknose Dace. The second most common species was the introduced Brown Trout.
- Brook Trout, a species of management interest, were fairly abundant at two of the three sites.

Bluestone National Scenic River

- Twenty-three species comprised of six families were encountered at Bluestone National Scenic River. Fifty-two percent of the species and 58% of the individual fish encountered were native to the Bluestone River Drainage.
- Rainbow Darter (*Etheostoma caeruleum*), an introduced species, was the most commonly encountered species. The next most common species encountered were Central Stoneroller, Rosyside Dace (*Clinostomus funduloides*), and Creek Chub, all native.
- This was the only park sampled where the most commonly encountered species was introduced.

Fort Necessity National Battlefield

- Six species comprised of five families were encountered at Fort Necessity National Battlefield. All of the fish encountered were native to the region.
- Creek Chub and Johnny Darter (*Etheostoma nigrum*) were the two most commonly encountered species.

Friendship Hill National Historic Site

- Four species comprised of three families were encountered at Friendship Hill National Historic Site. All of the fish encountered were native to the region.
- Creek Chub was the most commonly encountered species.

Acknowledgments

We would first like to thank the Pennsylvania Cooperative Fish and Wildlife Research Unit, especially T. Wagner, for providing additional support and expertise for this project. Thanks also to M. Marshall, C. Tzilkowski, and D. Miller who provided valuable insight and comments. A special thanks to technicians J. Hickey, B. Kline, J. Held, D. Hickey, and others that helped out in the field. We appreciate the help of K. Callahan, R. Evans, J. Shreiner, and J. Perez for providing support during field and planning phases of this project.

Introduction

In 2012 the Eastern Rivers and Mountains Network (ERMN) of the National Park Service (NPS) initiated a pilot effort to evaluate the feasibility of including a stream fish monitoring component to its long-term “vital signs” monitoring program. The effort was a collaboration between the ERMN and The Pennsylvania State University with full details of the project available in Faulk (2015). Recognizing that priority information from a Master’s Thesis (Faulk 2015) is not always readily available to park managers, specific information was excerpted from the Thesis and presented here. This report is intended to summarize 1) which fish species were found, 2) where they were found, 3) nativity status of each species, and 4) detailed sampling site descriptions. While much of this report is taken directly from Faulk (2015), some revisions have been made to fit with the theme of this report.

A number of changes/revisions were made from the original Thesis for this report (see Table 1). Tables 2-10 and 11 were modified from Faulk (2015) by Andrew S. Weber (ASW). Additionally, tables, 7, 9, 12, and figures 1-4, were created by ASW.

Table 1. Summary of changes that were made from Faulk (2015) by ASW and included in this report.

Faulk 2015		This Report	
page	original	page	revision
102	NERI.3044: Native: 7 Introduced: 6 Proportion Native: 0.54	14	NERI.3044: Native: 8 Introduced: 5 Proportion Native: 0.62 (changed to be consistent with database)
324	Blair Gap Run (FOT): Margined Madtom: 30	15	Blair Gap Run (FOT): Margined Madtom: 32 (changed to reflect database and field sheets)
324	Blair Gap Run (FOT): Slimy Sculpin: 142	15	Blair Gap Run (FOT): Slimy Sculpin: 144 (changed to reflect database; added the 2 individuals that were preserved)
324	Dublin Run: Creek Chub: 167	20	Dublin Run: Creek Chub: 170 (3 young-of-year were not added)
326	Mountain Creek: Mountain Redbelly Dace: 0	17	Mountain Redbelly Dace: 4 (individuals listed in database and field sheets were likely missed)
326	Mountain Creek: Telescope Shiner: 0	17	Mountain Creek: Telescope Shiner: 1 (preserved specimen confirmed by Jay Stauffer)
326	Little Bluestone River: Bluntnose Minnow: 16	17	Little Bluestone River: Bluntnose Minnow: 18 (changed to reflect database and field sheets)
326	Little Bluestone River: Mountain Redbelly Dace: 28	17	Little Bluestone River: Mountain Redbelly Dace: 25 (removed 3 individuals added by mistake)
326	Little Bluestone River: Telescope Shiner: 1	17	Little Bluestone River: Telescope Shiner: 2 (preserved specimen confirmed by Jay Stauffer)

Table 1 (continued). Summary of changes that were made from Faulk (2015) by ASW and included in this report.

Faulk 2015		This Report	
page	original	page	revision
326	Little Bluestone River: Blacknose Dace: 0	17	Little Bluestone River: Blacknose Dace: 2 (individuals listed in database and field sheets were likely missed)

Methods

All six member park units of the ERMN with ongoing streamside bird monitoring (Marshall et al. 2016) and stream benthic macroinvertebrate monitoring (Tzilkowski et al. 2016) were included in this study: Allegheny Portage Railroad National Historic Site (ALPO), Bluestone National Scenic River (BLUE), Delaware Water Gap National Recreation Area (DEWA), Fort Necessity National Battlefield (FONE), Friendship Hill National Historic Site (FRHI), and New River Gorge National River (NERI). The intent was to co-locate stream fish sampling at all 78 sites sampled for benthic macroinvertebrates and streamside birds as part of the core efforts of the ERMN monitoring program focused on wadeable streams. The rationale, methods, and approach for selecting these 78 sampling sites are explained in Marshall et al. (2016). However, because the final 78 sampling sites had not been completely established in 2012 when this project began, only 73 of the 78 sites were sampled for stream fish. In addition, five sites were sampled for stream fish that were not part of the final sampling plan for benthic macroinvertebrates and streamside birds.

Nativity of species for each park was established using the following sources:

- DEWA: Horwitz et al. (2014)
- NERI: Wellman (2004); Welsh et al. (2004)
- BLUE: Welsh et al. (2006)
- ALPO, FONE, FRHI: Cooper (1983); Page and Burr (1991)

Fish Sampling

Single-pass, pulsed-DC backpack electrofishing with a Smith-Root LR 24 unit (Smith-Root, Vancouver, Washington) was conducted in an upstream direction to sample fishes at all sites. A block net was only placed at the upstream boundary to conserve time, although no block nets were placed when water levels were extremely low. While most backpack electrofisher settings remained constant across all sites, voltage settings were altered to account for water conductivity differences at each time of sampling according to standardized curves (i.e., Kolz and Reynolds 1989; Miranda and Dolan 2003). The sampling crew size was variable depending on stream size, but typically consisted of one or two backpack electrofisher operators and 2-4 netters. DEWA was sampled in 2013 while ALPO, BLUE, FONE, FRHI, and NERI were sampled in 2014. Jarrell Branch (BLUE.1004) was only visited on one occasion due to difficult access and no fish being found during the first visit. Every other site was visited on three occasions during the spring/summer of the same year.

At all park units, captured fishes that were readily and reliably identifiable were identified, enumerated, and released. Photo vouchers of many species per park unit were taken to provide verification of field identification accuracy. Some photo vouchers at NERI and BLUE could not be assigned to a specific park (NERI or BLUE) because of a loss of camera and date stamps not on photos, these were retained as “NERI or BLUE” in the file name, in the archive link below. At DEWA, NERI, and BLUE, the remaining fish that could not be reliably identified were anesthetized with MS-222 and preserved in a 10% formalin solution for future identification, vouchering, and archiving purposes following Pennsylvania State University Institutional Animal Care and Use

Committee approved protocols (IACUC #40398). Two slimy sculpin at ALPO were retained in order to confirm identification. These preserved collections remain property of the NPS, but are currently archived at The Pennsylvania State University Fish Museum curated by Dr. Jay Stauffer (see Appendix A). Fishes were not permanently retained at FONE or FRHI.

Photo vouchers, project databases, scanned field datasheets, site descriptions, and other project documents are archived and can be accessed here:

<https://irma.nps.gov/DataStore/Reference/Profile/2237727>

Results and Discussion

Delaware Water Gap National Recreation Area

Across all sampling sites and visits, a total of 10,535 individuals representing 32 species (including one hybrid) and nine families were encountered (Table 2). Fish were found at 33 of 34 sampling sites. No fish were found at Yards Creek 07. Eight of the 32 species were not native to the Delaware River drainage (Horwitz et al. 2014). Native species comprised 75% of the species and 77% of individuals encountered. Of the 33 sampling sites where fish were found, 29 contained at least one introduced species, and in only four did native species make up 100% of the fish sampled (Figure 1). Species composition and relative abundance varied by sampling site. The most abundant species encountered were Blacknose Dace (*Rhinichthys atratulus*; n = 3,758), Brown Trout (*Salmo trutta*; n = 1,909), and Brook Trout (*Salvelinus fontinalis*; n = 1,567). Besides Blacknose Dace and Brook Trout, the native species captured in greatest numbers were American Eel (*Anguilla rostrata*; n = 741), Longnose Dace (*Rhinichthys cataractae*; n = 559), and Margined Madtom (*Noturus insignis*; n = 347). Introduced species were generally encountered in lesser numbers than native species, and, other than Brown Trout, were most commonly Bluegill (*Lepomis macrochirus*; n = 249), Rainbow Trout (*Oncorhynchus mykiss*; n = 201), and Largemouth Bass (*Micropterus salmoides*; n = 41). Species richness and proportion of native species varied by sampling site (Table 3).

See Faulk (2015) for species- and community-specific occupancy estimates that account for imperfect detection, as well as analyses that explore important habitat and landscape covariates affecting species (and community) detection and occupancy dynamics.

Table 2. Fish species observed and number captured at Delaware Water Gap National Recreation Area (DEWA) sampling sites across all sampling occasions (n=3 site visits per site). N=Native; I=Introduced. Shading represents different watersheds within DEWA. Within each watershed sites are arranged in ascending order (i.e. downstream to upstream). UNT=Unnamed tributary

Species	Adams Creek 03 (DEWA.3027)	Adams Creek 14 (DEWA.3011)	Adams Creek 33 (DEWA.3012)	Caledonia Creek 13 (DEWA.3001)	Conashaugh Creek 02 (DEWA.3040)	Dingmans Creek 05 (DEWA.3004)	Dingmans Creek 30 (DEWA.3031)	Dingmans Creek 39 (DEWA.3015)	Dingmans Creek 57 (DEWA.3008)	UNT to Dingmans Creek 07 (DEWA.3023)	Dunnfield Creek 03 (DEWA.3005)	Dunnfield Creek 26 (DEWA.3033)	Dunnfield Creek 53 (DEWA.3037)	Hornbecks Creek 15 (DEWA.3035)	Hornbecks Creek 23 (DEWA.3019)	Deckers Creek 03 (DEWA.3003)	Little Bushkill Creek 01 (DEWA.3013)	Sand Hill Creek 08 (DEWA.3029)	Mill Creek 25 (DEWA.3020)	Raymondskill Creek 13 (DEWA.3032)	Spackmans Creek 08 (DEWA.3007)	Toms Creek 03 (DEWA.3034)	Toms Creek 07 (DEWA.3018)	Toms Creek 20 (DEWA.3006)	Toms Creek 25 (DEWA.3022)	Van Campen Creek 12 (DEWA.3002)	Vancampens Brook 22 (DEWA.3025)	Vancampens Brook 28 (DEWA.3009)	Vancampens Brook 43 (DEWA.3014)	Vancampens Brook 76 (DEWA.3038)	Vancampens Brook 95 (DEWA.3010)	UNT to Vancampens Brook 05 (DEWA.3026)	White Brook 15 (DEWA.3028)	Yards Creek 07 (DEWA.3030)	All of DEWA			
Anguillidae																																						
Anguilla rostrata (American eel) - N	33	73			1	29					44		5	45	9	12	202	66				56	59	38	66	2							1		741			
Catostomidae																																						
Catostomus commersonii (white sucker) - N						33	15	2	17					7			14	4		13							26	24		1					156			
Hypentelium nigricans (northern hogsucker) - N						2								7			6																		15			
Centrarchidae																																						
Enneacanthus gloriosus (bluespotted sunfish) - N																				1															1			
Lepomis auritus (redbreast sunfish) - N						2								1	1												4	1		5					14			
Lepomis cyanellus (green sunfish) - I						1													20				1						1						23			
Lepomis gibbosus (pumpkinseed) - N						10	7		3	9					24	4	35		17	1	13	6	2		1		9	2		9		8			160			
Lepomis macrochirus (bluegill) - I	13	4	3			11	29	4	21					2	24	112	5		1		5	1					3		1	1			9		249			
Micropterus dolomieu (smallmouth bass) - I						2											1																		3			
Micropterus salmoides (largemouth bass) - I	3		8			1	5		10	1					4		4	1	1								2	1							41			
Pomoxis nigromaculatus (black crappie) - I																											1									1		
Cyprinidae																																						
Exoglossum maxillingua (cutlips minnow) - N						17								16			22	2				6	6												69			
Luxilus cornutus (common shiner) - N														2			51			4															57			
Notemigonus crysoleucas (golden shiner) - N							1								1	1		1	1																5			
Notropis amoenus (comely shiner) - N																				2		1											1		4			
Rhinichthys atratulus (blacknose dace) - N	10	95	162			194	66	87	166	156				22	169	30	352	227	188	101	656		21	12	19	33	372	184	262	45			129		3758			
Rhinichthys cataractae (longnose dace) - N					17	92								22			122			274		27	5												559			
Semotilus atromaculatus (creek chub) - N			3				1	1	15										153				1				29	12	24	5					244			
Semotilus corporalis (fallfish) - N						14								48	19		78	6		2		2													169			

Table 2 (continued). Fish species observed and number captured at Delaware Water Gap National Recreation Area (DEWA) sampling sites across all sampling occasions (n=3 site visits per site). N=Native; I=Introduced. Shading represents different watersheds within DEWA. Within each watershed sites are arranged in ascending order (i.e. downstream to upstream). UNT=Unnamed tributary

Species	Adams Creek 03 (DEWA.3027)	Adams Creek 14 (DEWA.3011)	Adams Creek 33 (DEWA.3012)	Caledonia Creek 13 (DEWA.3001)	Conashaugh Creek 02 (DEWA.3040)	Dingmans Creek 05 (DEWA.3004)	Dingmans Creek 30 (DEWA.3031)	Dingmans Creek 39 (DEWA.3015)	Dingmans Creek 57 (DEWA.3008)	UNT to Dingmans Creek 07 (DEWA.3023)	Dunnfield Creek 03 (DEWA.3005)	Dunnfield Creek 26 (DEWA.3033)	Dunnfield Creek 53 (DEWA.3037)	Hornbecks Creek 15 (DEWA.3035)	Hornbecks Creek 23 (DEWA.3019)	Deckers Creek 03 (DEWA.3003)	Little Bushkill Creek 01 (DEWA.3013)	Sand Hill Creek 08 (DEWA.3029)	Mill Creek 25 (DEWA.3020)	Raymondskill Creek 13 (DEWA.3032)	Spackmans Creek 08 (DEWA.3007)	Toms Creek 03 (DEWA.3034)	Toms Creek 07 (DEWA.3018)	Toms Creek 20 (DEWA.3006)	Toms Creek 25 (DEWA.3022)	Van Campen Creek 12 (DEWA.3002)	Vancampens Brook 22 (DEWA.3025)	Vancampens Brook 28 (DEWA.3009)	Vancampens Brook 43 (DEWA.3014)	Vancampens Brook 76 (DEWA.3038)	Vancampens Brook 95 (DEWA.3010)	UNT to Vancampens Brook 05 (DEWA.3026)	White Brook 15 (DEWA.3028)	Yards Creek 07 (DEWA.3030)	All of DEWA
Esocidae																																			
<i>Esox americanus</i> (redfin pickerel) - N																				2														2	
<i>Esox niger</i> (chain pickerel) - N															1				3	2									1						7
Ictaluridae																																			
<i>Ameiurus natalis</i> (yellow bullhead) - N									1							1													4						6
<i>Ameiurus nebulosus</i> (brown bullhead) - N						3	1								4				40	2		6		2					1						59
<i>Noturus insignis</i> (margined madtom) - N						47	15	31	44					90			38	13		45		14	10												347
Percidae																																			
<i>Etheostoma olmsted</i> (tessellated darter) - N																	41			20															61
<i>Perca flavescens</i> (yellow perch) - N						2	5		12							2	2		4							1									28
<i>Percina peltata</i> (shield darter) - N						7								10			42			5		2													66
Petromyzontidae																																			
<i>Petromyzon marinus</i> (sea lamprey) - N																	12																		12
Salmonidae																																			
<i>Oncorhynchus mykiss</i> (rainbow trout) - I						4	14	1	8								19									27	20	104	3		1				201
<i>Salmo trutta</i> (brown trout) - I	74	44			66	55	48	66	10		214	133		106			24	23				286	248	230	154	83	12	33							1909
<i>Salmo trutta</i> × <i>Salvelinus fontinalis</i> (tiger trout) - I											1																								1
<i>Salvelinus fontinalis</i> (brook trout) - N	3	5	16	173	433					121	6	26	54					1				1	6		1		16	23	260	234	22	164	2		1567
Number of Species	6	5	5	1	4	19	12	7	11	4	4	2	2	13	10	7	19	10	10	14	3	12	10	4	5	3	12	9	5	12	1	3	5	0	32

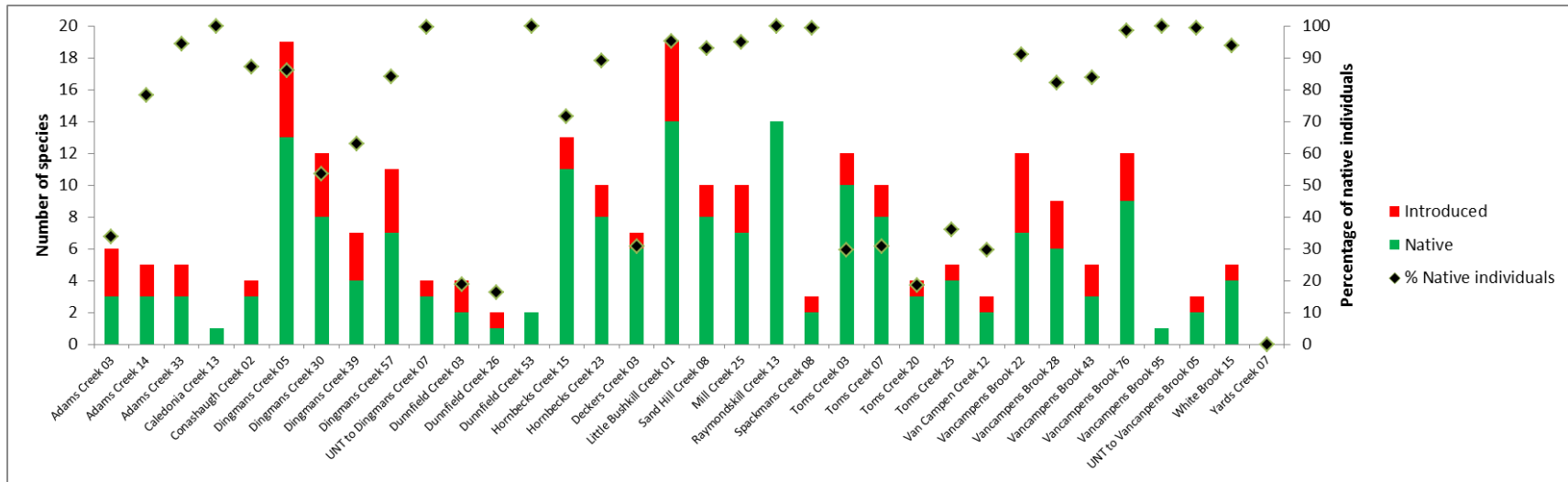


Figure 1. Number of species (native and introduced) and percentage of native individuals at sampling sites at Delaware Water Gap National Recreation Area. UNT=Unnamed tributary

Table 3. Species richness and composition (native vs. introduced) of local fish communities at Delaware Water Gap National Recreation Area sampling sites. UNT=Unnamed tributary

Site Name	Site ID	Total richness	Native	Introduced	Proportion native
Dingmans Creek 05	DEWA.3004	19	13	6	0.68
Little Bushkill Creek 01	DEWA.3013	19	14	5	0.74
Raymondskill Creek 13	DEWA.3032	14	14	0	1.00
Hornbecks Creek 15	DEWA.3035	13	11	2	0.85
Dingmans Creek 30	DEWA.3031	12	8	4	0.67
Toms Creek 03	DEWA.3034	12	10	2	0.83
Vancampens Brook 22	DEWA.3025	12	7	5	0.58
Vancampens Brook 76	DEWA.3038	12	9	3	0.75
Dingmans Creek 57	DEWA.3008	11	7	4	0.64
Hornbecks Creek 23	DEWA.3019	10	8	2	0.80
Mill Creek 25	DEWA.3020	10	7	3	0.70
Sand Hill Creek 08	DEWA.3029	10	8	2	0.80
Toms Creek 07	DEWA.3018	10	8	2	0.80
Vancampens Brook 28	DEWA.3009	9	6	3	0.67
Deckers Creek 03	DEWA.3003	7	6	1	0.86
Dingmans Creek 39	DEWA.3015	7	4	3	0.57
Adams Creek 03	DEWA.3027	6	3	3	0.50
Adams Creek 14	DEWA.3011	5	3	2	0.60
Adams Creek 33	DEWA.3012	5	3	2	0.60
Toms Creek 25	DEWA.3022	5	4	1	0.80
Vancampens Brook 43	DEWA.3014	5	3	2	0.60
White Brook 15	DEWA.3028	5	4	1	0.80
Conashaugh Creek 02	DEWA.3040	4	3	1	0.75
Dunnfield Creek 03	DEWA.3005	4	2	2	0.50
Toms Creek 20	DEWA.3006	4	3	1	0.75
UNT to Dingmans Creek 07	DEWA.3023	4	3	1	0.75
Spackmans Creek 08	DEWA.3007	3	2	1	0.67
UNT to Vancampens Brook 05	DEWA.3026	3	2	1	0.67
Van Campen Creek 12	DEWA.3002	3	2	1	0.67
Dunnfield Creek 26	DEWA.3033	2	1	1	0.50
Dunnfield Creek 53	DEWA.3037	2	2	0	1.00
Caledonia Creek 13	DEWA.3001	1	1	0	1.00
Vancampens Brook 95	DEWA.3010	1	1	0	1.00
Yards Creek 07	DEWA.3030	0	0	0	0

New River Gorge National River

Across all sampling sites and visits, a total of 8,010 individuals representing 21 species and five families were encountered (Table 4). Fish were found at 24 of 34 sampling sites. Ten of the 21 species were not native to the New River drainage (Wellman 2004, Welsh et al. 2004). Native species comprised only 52% of the species but 99% of individuals encountered. Of the 24 sampling sites where fish were found, nine contained at least one introduced species, while native species made up 100% of the fish encountered at 15 sampling sites (Figure 2). Species composition and relative abundance varied by sampling site. The most abundant species encountered were Blacknose Dace ($n = 3,833$), Central Stoneroller (*Campostoma anomalum*; $n = 1,136$), and Creek Chub (*Semotilus atromaculatus*; $n = 888$), which are all native species to the New River drainage. In fact, the nine species encountered in the greatest quantities were all native, and introduced species were generally encountered in lesser numbers than native species. The most common introduced species detected were Rainbow Darter (*Etheostoma caeruleum*; $n = 29$), Rock Bass (*Ambloplites rupestris*; $n = 25$), and Variegate Darter (*Etheostoma variatum*; $n = 10$). Less than 10 individuals of the other five introduced species were encountered. Species richness and proportion of native species varied by sampling site (Table 5).

See Faulk (2015) for species- and community-specific occupancy estimates that account for imperfect detection, as well as analyses that explore important habitat and landscape covariates affecting species (and community) detection and occupancy dynamics.

Table 4. Fish species observed and number captured at New River Gorge National River (NERI) sampling sites across all sampling occasions (n=3 site visits per site). N=Native; I=Introduced. Shading represents different watersheds within NERI. Within each watershed sites are arranged in ascending order (i.e. downstream to upstream). UNT=Unnamed tributary

Species	Arbuckle Creek 02 (NERI.3038)	Arbuckle Creek 05 (NERI.3054)	Batoff Creek 07 (NERI.3064)	Big Branch 09 (NERI.3072)	Big Branch 10 (NERI.3024)	Buffalo Creek 04 (NERI.3069)	Buffalo Creek 16 (NERI.3005)	UNT to Buffalo Creek 06 (NERI.3049)	Dowdy Creek 02 (NERI.3077)	Ephraim Creek 08 (NERI.3050)	Fall Branch 07 (NERI.3052)	UNT to Fall Branch 02 (NERI.3036)	Fire Creek 17 (NERI.3021)	Keeney Creek 10 (NERI.3018)	Laurel Creek 08 (NERI.3044)	Laurel Creek 47 (NERI.3037)	Bucklick Branch 03 (NERI.3042)	Little Laurel Creek 06 (NERI.3026)	Richlick Branch 17 (NERI.3058)	UNT to Laurel Creek 03 (NERI.3041)	Manns Creek 24 (NERI.3074)	Meadow Creek 12 (NERI.3075)	Meadow Creek 17 (NERI.3011)	Meadow Creek 39 (NERI.3043)	Meadow Creek 58 (NERI.3059)	Meadow Fork 01 (NERI.3001)	Meadow Fork 06 (NERI.3065)	Mill Creek 01 (NERI.3080)	Mill Creek 12 (NERI.3048)	River Branch 04 (NERI.3016)	River Branch 06 (NERI.3032)	Slater Creek 13 (NERI.3053)	Slater Creek 20 (NERI.3009)	UNT 21 New River 01 (NERI.3034)	All of NERI
Catostomidae																																			
<i>Catostomus commersonii</i> (white sucker) - N																					1	1	2		3									7	
<i>Hypentelium nigricans</i> (northern hogsucker) - N															2	13						8	9											32	
Centrarchidae																																			
<i>Ambloplites rupestris</i> (rock bass) - I															1						24													25	
<i>Lepomis cyanellus</i> (green sunfish) - N														5	2	8		1			49					14	43							122	
<i>Lepomis macrochirus</i> (bluegill) - I	2																										2							4	
<i>Micropterus dolomieu</i> (smallmouth bass) - I															4																			4	
Cyprinidae																																			
<i>Campostoma anomalum</i> (central stoneroller) - N	133	78													35							357	445	56	32									1136	
<i>Clinostomus funduloides</i> (rosyside dace) - N	3	13	4											10		2					109	56	255	206	180									838	
<i>Cyprinella galactura</i> (whitetail shiner) - I															1																			1	
<i>Luxilus albeolus</i> (white shiner) - N															1																			1	
<i>Nocomis leptcephalus</i> (bluehead chub) - I																					3													3	
<i>Pimephales promelas</i> (fathead minnow) – I																											1								1
<i>Rhinichthys atratulus</i> (blacknose dace) - N	1	2	583						347		189	304		40	52	81		11				199	729	503	328			35	429						3833
<i>Rhinichthys cataractae</i> (longnose dace) - N															52	57						51	29											189	
<i>Semotilus atromaculatus</i> (creek chub) - N	13	43	28								4			117	2	60		54	86		130	14	49	75	170	1	1	1				25	15		888
Percidae																																			
<i>Etheostoma caeruleum</i> (rainbow darter) - I															28								1											29	
<i>Etheostoma flabellare</i> (fantail darter) - N										50					39	88						67	231	234	119									828	

Table 4 (continued). Fish species observed and number captured at New River Gorge National River (NERI) sampling sites across all sampling occasions (n=3 site visits per site). N=Native; I=Introduced. Shading represents different watersheds within NERI. Within each watershed sites are arranged in ascending order (i.e. downstream to upstream). UNT=Unnamed tributary

Species	Arbuckle Creek 02 (NERI.3038)	Arbuckle Creek 05 (NERI.3054)	Batoff Creek 07 (NERI.3064)	Big Branch 09 (NERI.3072)	Big Branch 10 (NERI.3024)	Buffalo Creek 04 (NERI.3069)	Buffalo Creek 16 (NERI.3005)	UNT to Buffalo Creek 06 (NERI.3049)	Dowdy Creek 02 (NERI.3077)	Ephraim Creek 08 (NERI.3050)	Fall Branch 07 (NERI.3052)	UNT to Fall Branch 02 (NERI.3036)	Fire Creek 17 (NERI.3021)	Keeney Creek 10 (NERI.3018)	Laurel Creek 08 (NERI.3044)	Laurel Creek 47 (NERI.3037)	Bucklick Branch 03 (NERI.3042)	Little Laurel Creek 06 (NERI.3026)	Richlick Branch 17 (NERI.3058)	UNT to Laurel Creek 03 (NERI.3041)	Manns Creek 24 (NERI.3074)	Meadow Creek 12 (NERI.3075)	Meadow Creek 17 (NERI.3011)	Meadow Creek 39 (NERI.3043)	Meadow Creek 58 (NERI.3059)	Meadow Fork 01 (NERI.3001)	Meadow Fork 06 (NERI.3065)	Mill Creek 01 (NERI.3080)	Mill Creek 12 (NERI.3048)	River Branch 04 (NERI.3016)	River Branch 06 (NERI.3032)	Slater Creek 13 (NERI.3053)	Slater Creek 20 (NERI.3009)	UNT 21 New River 01 (NERI.3034)	All of NERI
<i>Etheostoma variatum</i> (variegate darter) - I															10																				10
Salmonidae																																			
<i>Oncorhynchus mykiss</i> (rainbow trout) - I																								3										3	
<i>Salmo trutta</i> (brown trout) - I		1												1									2	3										7	
<i>Salvelinus fontinalis</i> (brook trout) - N						3	4																	2				28	12						49
Number of Species	5	5	3	0	0	1	1	0	1	0	3	1	0	5	13	7	0	3	1	0	5	9	10	8	6	2	4	3	2	0	0	1	1	0	21

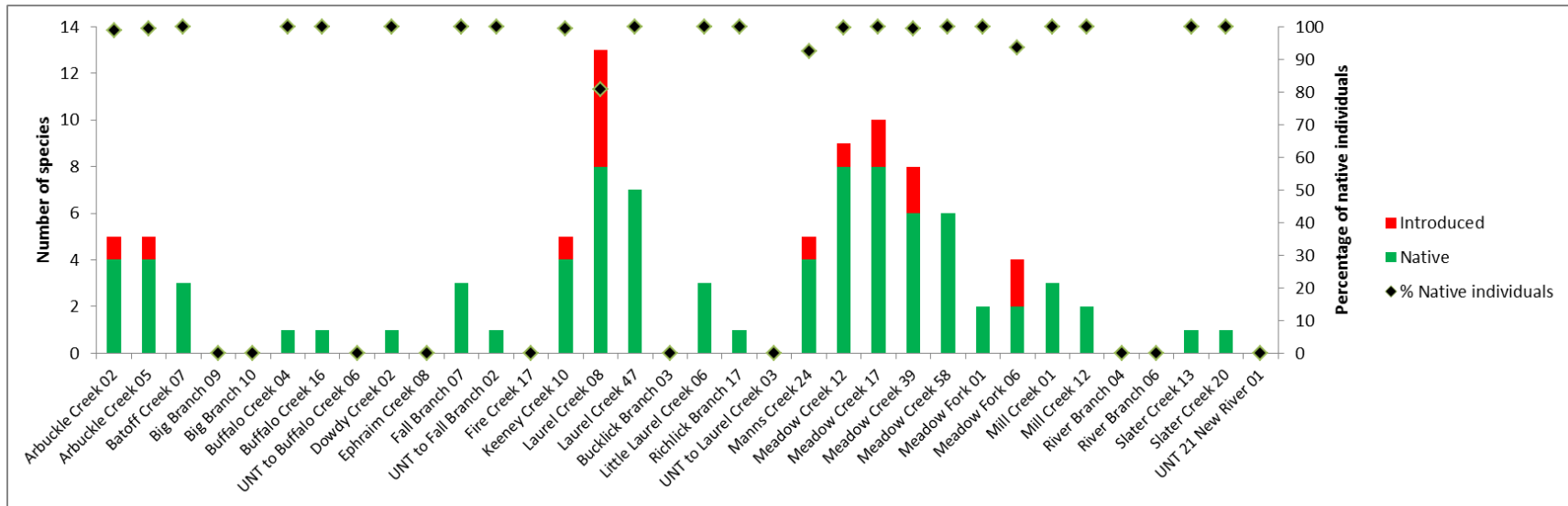


Figure 2. Number of species (native and introduced) and percentage of native individuals at sampling sites at New River Gorge National River. UNT=Unnamed tributary

Table 5. Species richness and composition (native vs. introduced) of local fish communities at New River Gorge National River sampling sites. UNT=Unnamed tributary

Site Name	Site ID	Total richness	Native	Introduced	Proportion Native
Laurel Creek 08	NERI.3044	13	8	5	0.62
Meadow Creek 17	NERI.3011	10	8	2	0.80
Meadow Creek 12	NERI.3075	9	8	1	0.88
Meadow Creek 39	NERI.3043	8	6	2	0.75
Laurel Creek 47	NERI.3037	7	7	0	1.00
Meadow Creek 58	NERI.3059	6	6	0	1.00
Arbuckle Creek 02	NERI.3038	5	4	1	0.80
Arbuckle Creek 05	NERI.3054	5	4	1	0.80
Keeney Creek 10	NERI.3018	5	4	1	0.80
Manns Creek 24	NERI.3074	5	4	1	0.80
Meadow Fork 06	NERI.3065	4	2	2	0.50
Batoff Creek 07	NERI.3064	3	3	0	1.00
Fall Branch 07	NERI.3052	3	3	0	1.00
Little Laurel Creek 06	NERI.3026	3	3	0	1.00
Mill Creek 01	NERI.3080	3	3	0	1.00
Meadow Fork 01	NERI.3001	2	2	0	1.00
Mill Creek 12	NERI.3048	2	2	0	1.00
Buffalo Creek 04	NERI.3069	1	1	0	1.00
Buffalo Creek 16	NERI.3005	1	1	0	1.00
Dowdy Creek 02	NERI.3077	1	1	0	1.00
Richlick Branch 17	NERI.3058	1	1	0	1.00
Slater Creek 13	NERI.3053	1	1	0	1.00
Slater Creek 20	NERI.3009	1	1	0	1.00
UNT to Fall Branch 02	NERI.3036	1	1	0	1.00
Big Branch 09	NERI.3072	0	0	0	0
Big Branch 10	NERI.3024	0	0	0	0
Bucklick Branch 03	NERI.3042	0	0	0	0
Ephraim Creek 08	NERI.3050	0	0	0	0
Fire Creek 17	NERI.3021	0	0	0	0
River Branch 04	NERI.3016	0	0	0	0
River Branch 06	NERI.3032	0	0	0	0
UNT to Buffalo Creek 06	NERI.3049	0	0	0	0
UNT to Laurel Creek 03	NERI.3041	0	0	0	0
UNT 21 New River 01	NERI.3034	0	0	0	0

Allegheny Portage Railroad National Historic Site

Across all sampling sites and visits, 1,715 individuals representing 13 species and six families were encountered (Table 6). Fish were found at all three sampling sites. Species composition and relative abundance varied by sampling site. Only two species (Brown Trout and Rainbow Trout) were introduced. Native species comprised 85% of the species and 90% of individuals encountered. All three sampling sites contained at least one introduced species (Figure 3). By far, the most common species encountered was the native Blacknose Dace ($n = 1,039$). The next most common species was the introduced Brown Trout ($n = 163$) followed by the native Slimy Sculpin (*Cottus cognatus*; $n = 144$), although sculpin were only found at one of the three sampling sites. Species richness and proportion of native species varied by sampling site (Table 7). Sampling site descriptions including maps, site photos, and species detected for ALPO are in Appendix D.

Table 6. Fish species observed and number captured at Allegheny Portage Railroad National Historic Site targeted sampling sites across all sampling occasions ($n=3$ site visits per site). N=Native; I=Introduced

Species	Blair Gap Run – Foot of Ten (ALPO.2001)	Blair Gap Run – Muleshoe (ALPO.1003)	Millstone Run (ALPO.1001)	All of ALPO
Catostomidae				
<i>Hypentelium nigricans</i> (northern hogsucker) - N	4			4
Centrarchidae				
<i>Lepomis auritus</i> (redbreast sunfish) - N		1		1
<i>Lepomis gibbosus</i> (pumpkinseed) - N	1			1
Cottidae				
<i>Cottus cognatus</i> (slimy sculpin) - N		144		144
Cyprinidae				
<i>Campostoma anomalum</i> (central stoneroller) - N	6			6
<i>Exoglossum maxillingua</i> (cutlips minnow) - N	119			119
<i>Rhinichthys atratulus</i> (blacknose dace) - N	710	11	318	1039
<i>Rhinichthys cataractae</i> (longnose dace) - N	114			114
<i>Semotilus atromaculatus</i> (creek chub) - N	14		1	15
Ictaluridae				
<i>Noturus insignis</i> (margined madtom) - N	32			32

Table 6 (continued). Fish species observed and number captured at Allegheny Portage Railroad National Historic Site targeted sampling sites across all sampling occasions (n=3 site visits per site). N=Native; I=Introduced

Salmonidae				
<i>Oncorhynchus mykiss</i> (rainbow trout) - I	1			1
<i>Salmo trutta</i> (brown trout) - I	96	56	11	163
<i>Salvelinus fontinalis</i> (brook trout) - N		63	13	76
Number of Species	10	5	4	13

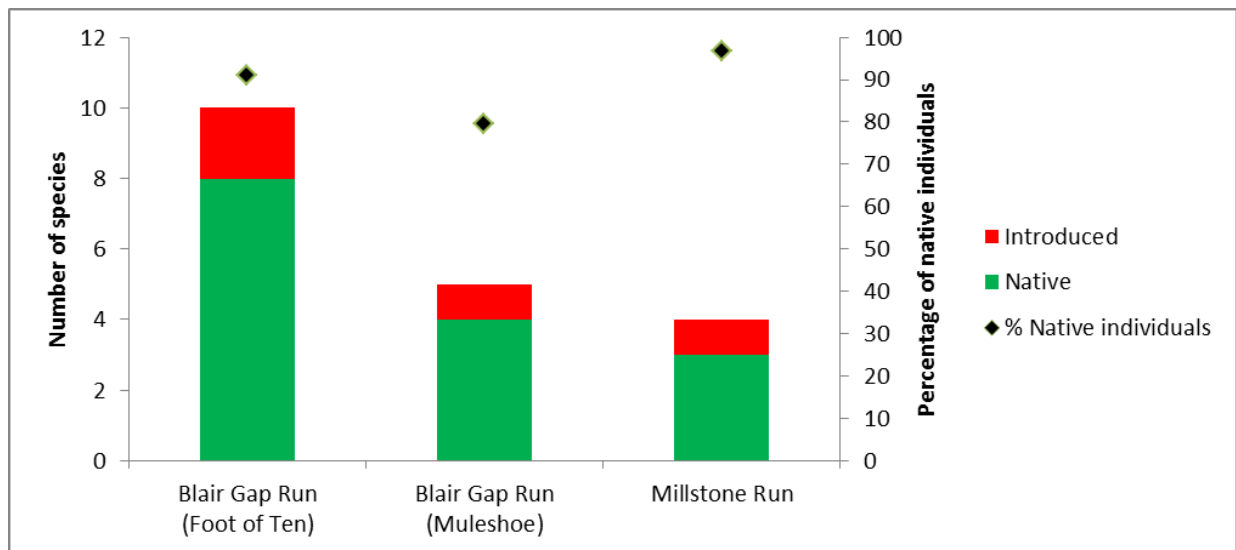


Figure 3. Number of species (native and introduced) and percentage of native individuals at sampling sites at Allegheny Portage Railroad National Historic Site.

Table 7. Species richness and composition (native vs. introduced) of local fish communities at Allegheny Portage Railroad National Historic Site sampling sites.

Site Name	Site ID	Total richness	Native	Introduced	Proportion native
Blair Gap Run – Foot of Ten	ALPO.2001	10	8	2	0.80
Blair Gap Run – Muleshoe	ALPO.1003	5	4	1	0.80
Millstone Run	ALPO.1001	4	3	1	0.75

Bluestone National Scenic River

Across all sampling sites and visits, 1,935 individuals representing 23 species and six families were encountered (Table 8). Fish were found at three of the four sampling sites sampled. No fish were found at Jarrell Branch. Species composition and relative abundance varied by sampling site. Eleven of the 23 species were introduced. Native species comprised 52% of the species and 58% of individuals encountered. Of the three sampling sites where fish were found, two contained at least

one introduced species, while in the remaining sampling site only native species were encountered (Figure 4). The most common species encountered was Rainbow Darter (n = 629), an introduced species. The next most common species were the native Central Stoneroller (n = 422), Rosyside Dace (*Clinostomus funduloides*; n = 289), and Creek Chub (n = 239), followed by the introduced Margined Madtom (n = 64). Species richness and proportion of native species varied by sampling site (Table 9).

Table 8. Fish species observed and number captured at Bluestone National Scenic River targeted sampling sites across all sampling occasions (n=3 site visits per site). No fish were detected at BLUE.1004 (Jarrell Branch; n=1 site visit). N=Native; I=Introduced

Species	Indian Branch (BLUE.1001)	Jarrell Branch (BLUE.1004)	Little Bluestone River (BLUE.1003)	Mountain Creek (BLUE.1002)	All of BLUE
Catostomidae					
<i>Catostomus commersonii</i> (white sucker) - N				7	7
<i>Hypentelium nigricans</i> (northern hogsucker) - N			6	22	28
Centrarchidae					
<i>Ambloplites rupestris</i> (rock bass) - I			18	12	30
<i>Lepomis cyanellus</i> (green sunfish) - N	2		1	1	4
<i>Micropterus dolomieu</i> (smallmouth bass) - I			5	8	13
Cyprinidae					
<i>Campostoma anomalum</i> (central stoneroller) - N			339	83	422
<i>Chrosomus oreas</i> (mountain redbelly dace) - N	3		25	4	32
<i>Clinostomus funduloides</i> (rosyside dace) - N	5		20	264	289
<i>Cyprinella galactura</i> (whitetail shiner) - I			1		1
<i>Nocomis leptocephalus</i> (bluehead chub) - I			9	31	40
<i>Notropis telescopus</i> (telescope shiner) - I			2	1	3
<i>Pimephales notatus</i> (bluntnose minnow) - I			18		18
<i>Rhinichthys atratulus</i> (blacknose dace) - N	2		2	19	23
<i>Rhinichthys cataractae</i> (longnose dace) - N			1	30	31

Table 8 (continued). Fish species observed and number captured at Bluestone National Scenic River targeted sampling sites across all sampling occasions (n=3 site visits per site). No fish were detected at BLUE.1004 (Jarrell Branch; n=1 site visit). N=Native; I=Introduced

Species	Indian Branch (BLUE.1001)	Jarrell Branch (BLUE.1004)	Little Bluestone River (BLUE.1003)	Mountain Creek (BLUE.1002)	All of BLUE
<i>Semotilus atromaculatus</i> (creek chub) - N	13		16	210	239
Ictaluridae					
<i>Noturus insignis</i> (marginated madtom) - I			53	11	64
Percidae					
<i>Etheostoma blennioides</i> (greenside darter) - N			12		12
<i>Etheostoma caeruleum</i> (rainbow darter) - I			460	169	629
<i>Etheostoma flabellare</i> (fantail darter) - N			3	24	27
<i>Etheostoma simotermum</i> (snubnose darter) - I				16	16
<i>Percina caprodes</i> (logperch) - N			1		1
<i>Percina roanoka</i> (Roanoke darter) - I			2		2
Salmonidae					
<i>Oncorhynchus mykiss</i> (rainbow trout) - I			1	3	4
Number of species	5	0	21	18	23

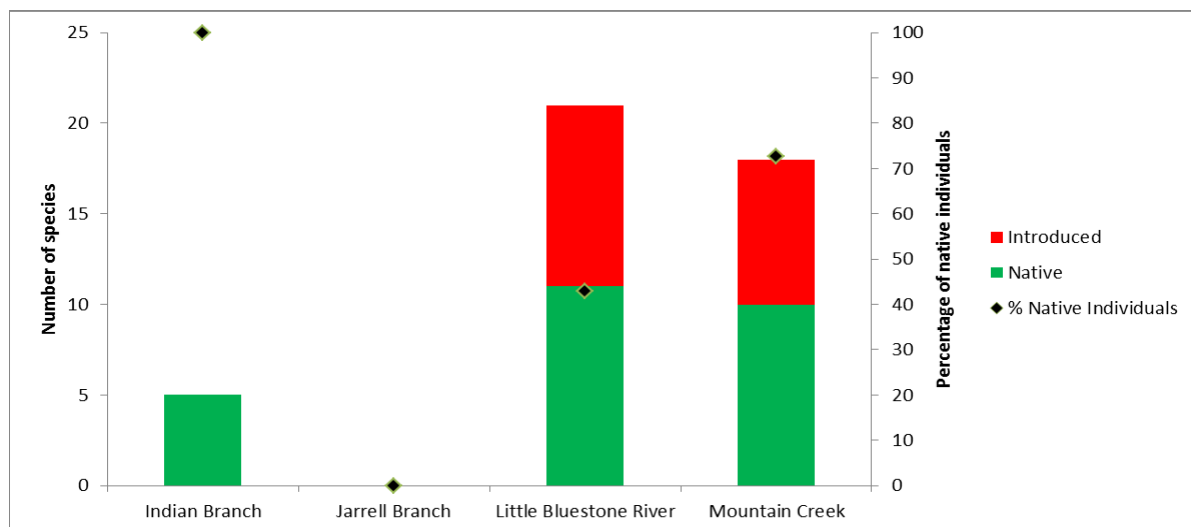


Figure 4. Number of species (native and introduced) and percentage of native individuals at sampling sites at Bluestone National Scenic River.

Table 9. Species richness and composition (native vs. introduced) of local fish communities at Bluestone National Scenic River sampling sites.

Site Name	Site ID	Total richness	Native	Introduced	Proportion native
Indian Branch	BLUE.1001	5	5	0	1.00
Jarrell Branch	BLUE.1004	0	0	0	0
Little Bluestone River	BLUE.1003	21	11	10	0.52
Mountain Creek	BLUE.1002	18	10	8	0.56

Fort Necessity National Battlefield

Across both sampling sites and visits, 358 individuals representing six species and five families were encountered, all of which were native (Table 10). Fish were found at both sampling sites. Species composition and relative abundance varied by sampling site. Creek Chub ($n = 189$) was the most abundant species encountered, followed by Johnny Darter (*Etheostoma nigrum*; $n = 141$). Species richness varied by sampling site (Table 12).

Table 10. Fish species observed and number captured at Fort Necessity National Battlefield targeted sampling sites across all sampling occasions ($n=3$ site visits per site). N=Native; UNT=unnamed tributary

Species	Great Meadows Run (FONE.2001)	UNT to Great Meadows Run (FONE.1002)	All of FONE
Catostomidae			
<i>Catostomus commersonii</i> (white sucker) - N	7		7
Centrarchidae			
<i>Micropterus salmoides</i> (largemouth bass) - N	1		1
Cottidae			
<i>Cottus bairdii</i> (mottled sculpin) - N	4		4
Cyprinidae			
<i>Rhinichthys atratulus</i> (blacknose dace) - N	16		16
<i>Semotilus atromaculatus</i> (creek chub) - N	176	13	189
Percidae			
<i>Etheostoma nigrum</i> (johnny darter) - N	136	5	141
Number of species	6	2	6

Friendship Hill National Historic Site

At Dublin Run, which was the only sampling site sampled at FRHI, 237 individuals representing four species and three families species were encountered, all of which were native (Table 11). Creek Chub (n = 170) were the most abundant species encountered, followed by Blacknose Dace (n = 58).

Table 11. Fish species observed and number captured at Friendship Hill National Historic Site targeted sampling site across all sampling occasions (n=3 site visits). N=Native

Species	Dublin Run (FRHI.1002)
Catostomidae	
<i>Catostomus commersonii</i> (white sucker) - N	6
Centrarchidae	
<i>Micropterus salmoides</i> (largemouth bass) - N	3
Cyprinidae	
<i>Rhinichthys atratulus</i> (blacknose dace) - N	58
<i>Semotilus atromaculatus</i> (creek chub) - N	170
Number of species	4

Table 12. Species richness and composition (native vs. introduced) of local fish communities at Fort Necessity National Battlefield and Friendship Hill National Historic Site sampling sites. UNT=Unnamed tributary

Site Name	Site ID	Total richness	Native	Introduced	Proportion native
Dublin Run	FRHI.1002	4	4	0	1.00
Great Meadows Run	FONE.2001	6	6	0	1.00
UNT to Great Meadows Run	FONE.1002	2	2	0	1.00

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Appendix A: Preserved specimens and associated data.

Table A-1. Fish specimens preserved and retained at Pennsylvania State University. Cat=catalog; TBD=to be determined; EAF=Evan A. Faulk; CJT=Caleb J. Tzilkowski; JRS=Jay R. Stauffer

NPS Cat #	Penn State Cat #	Family	Genus	Species	# of individuals	Field Collection #	Determined by	Date	State	Locality	Site ID
DEWA 127763	6100	Centrarchidae	Lepomis	auritus	1	eaf_003_13	EAF	5/31/2013	NJ	Vancampens Brook 28	DEWA.3009
DEWA 127764	6100	Salmonidae	Salmo	trutta	1	eaf_003_13	EAF	5/31/2013	NJ	Vancampens Brook 28	DEWA.3009
DEWA 127765	6100	Catostomidae	Catostomus	commersonii	1	eaf_003_13	EAF	5/31/2013	NJ	Vancampens Brook 28	DEWA.3009
DEWA 127766	6101	Catostomidae	Catostomus	commersonii	3	eaf_004_13	EAF	5/31/2013	NJ	Vancampens Brook 22	DEWA.3025
DEWA 127767	6102	Cyprinidae	Semotilus	corporalis	7	eaf_001_13	EAF	5/21/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127768	6102	Petromyzontidae	Petromyzon	marinus	1	eaf_001_13	EAF	5/21/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127769	6102	Cyprinidae	Luxilus	cornutus	2	eaf_001_13	EAF	5/21/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127770	6103	Petromyzontidae	Petromyzon	marinus	3	eaf_008_13	EAF	7/22/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127771	6103	Cyprinidae	Luxilus	cornutus	10	eaf_008_13	EAF	7/22/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127772	6104	Catostomidae	Catostomus	commersonii	2	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127773	6104	Cyprinidae	Semotilus	corporalis	8	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127774	6104	Petromyzontidae	Petromyzon	marinus	7	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127775	6104	Cyprinidae	Luxilus	cornutus	8	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127776	6104	Cyprinidae	Luxilus	cornutus	11	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013

Table A-1 (continued). Fish specimens preserved and retained at Pennsylvania State University. Cat=catalog; TBD=to be determined; EAF=Evan A. Faulk; CJT=Caleb J. Tzilkowski; JRS=Jay R. Stauffer

NPS Cat #	Penn State Cat #	Family	Genus	Species	# of individuals	Field Collection #	Determined by	Date	State	Locality	Site ID
DEWA 127777	6104	Cyprinidae	Luxilus	cornutus	9	eaf_010_13	EAF	8/6/2013	PA	Little Bushkill Creek 01	DEWA.3013
DEWA 127778	6105	Esocidae	Esox	americanus	1	eaf_005_13	EAF	6/4/2013	PA	Raymondskill Creek 13	DEWA.3032
DEWA 127779	6106	Catostomidae	Catostomus	commersonii	3	eaf_007_13	EAF	6/26/2013	PA	Dingmans Creek 30	DEWA.3031
DEWA 127780	6107	Catostomidae	Catostomus	commersonii	8	eaf_009_13	EAF	7/31/2013	PA	Dingmans Creek 05	DEWA.3004
DEWA 127781	6108	Salmonidae	Salmo	trutta	8	eaf_002_13	EAF	5/22/2013	PA	Toms Creek 07	DEWA.3018
DEWA 127782	6109	Cyprinidae	Notemigonus	crysoleucas	1	eaf_006_13	EAF	6/17/2013	PA	Sand Hill Creek 08	DEWA.3029
TBD	TBD	Cottidae	Cottus	cognatus	2	ALPO-14-001	EAF, CJT	6/30/2014	PA	Blair Gap Run (Muleshoe)	ALPO.1003
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	2	BLUE-14-001	EAF, CJT	6/16/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	22	BLUE-14-001	EAF, CJT	6/16/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Cyprinidae	Chrosomus	oreas	3	BLUE-14-001	EAF, CJT	6/16/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Percidae	Etheostoma	simoterum	5	BLUE-14-001	EAF, CJT	6/16/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	1	BLUE-14-003	EAF, CJT	6/19/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Cyprinidae	Notropis	telescopus	1	BLUE-14-003	JRS	6/19/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Percidae	Etheostoma	simoterum	1	BLUE-14-003	EAF, CJT	6/19/2014	WV	Mountain Creek	BLUE.1002
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	7	BLUE-14-002	EAF, CJT	6/18/2014	WV	Little Bluestone River	BLUE.1003
TBD	TBD	Cyprinidae	Pimephales	notatus	2	BLUE-14-002	EAF, CJT	6/18/2014	WV	Little Bluestone River	BLUE.1003

Table A-1 (continued). Fish specimens preserved and retained at Pennsylvania State University. Cat=catalog; TBD=to be determined; EAF=Evan A. Faulk; CJT=Caleb J. Tzilkowski; JRS=Jay R. Stauffer

NPS Cat #	Penn State Cat #	Family	Genus	Species	# of individuals	Field Collection #	Determined by	Date	State	Locality	Site ID
TBD	TBD	Cyprinidae	Chrosomus	oreas	22	BLUE-14-002	EAF, CJT	6/18/2014	WV	Little Bluestone River	BLUE.1003
TBD	TBD	Percidae	Percina	roanoka	1	BLUE-14-004	EAF, JRS	6/22/2014	WV	Little Bluestone River	BLUE.1003
TBD	TBD	Cyprinidae	Notropis	telescopus	1	BLUE-14-004	EAF, JRS	6/22/2014	WV	Little Bluestone River	BLUE.1003
TBD	TBD	Cyprinidae	Notropis	telescopus	1	BLUE-14-002	EAF, JRS	6/18/2014	WV	Little Bluestone River	BLUE.1003
TBD	TBD	Cyprinidae	Clinostomus	funduloides	7	NERI-14-001	EAF, CJT	4/11/2014	WV	Keeney Creek 10	NERI.3018
TBD	TBD	Cyprinidae	Pimephales	promelas	1	NERI-14-002	EAF, CJT	4/17/2014	WV	Meadow Fork 06	NERI.3065
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	2	NERI-14-003	EAF, CJT	6/11/2014	WV	Meadow Creek 12	NERI.3075
TBD	TBD	Cyprinidae	Nocomis	leptocephalus	1	NERI-14-004	EAF, CJT	6/18/2014	WV	Meadow Creek 12	NERI.3075

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior



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