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Freshwater Mussels of the Mississippi South/ South Central Basins

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Preface

While broad geographic information is available on the distribution and abundance of mussels in Illinois, systematically collected mussel-community data sets required to integrate mussels into aquatic community assessments do not exist. In 2009, a project funded by a US Fish and Wildlife Service State Wildlife Grant was undertaken to survey and assess the freshwater mussel populations at wadeable sites from 33 stream basins in conjunction with the Illinois Department of Natural Resources (IDNR)/Illinois Environmental Protection Agency (IEPA) basin surveys. Inclusion of mussels into these basin surveys contributes to the comprehensive basin monitoring programs that include water and sediment chemistry, instream habitat, macroinvertebrate, and fish, which reflect a broad spectrum of abiotic and biotic stream resources. These mussel surveys will provide reliable and repeatable techniques for assessing the freshwater mussel community in sampled streams. These surveys also provide data for future monitoring of freshwater mussel populations on a local, regional, and watershed basis.

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Introduction

Freshwater mussel populations have been declining for decades and are among the most seriously impacted aquatic animals worldwide (Bogan 1993, Williams et al. 1993). It is estimated that nearly 70% of the approximately 300 North American mussel taxa are extinct, federally-listed as endangered or threatened, or in need of conservation status (Williams et al. 1993, Strayer et al. 2004). In Illinois, 25 of the 62 extant species (44%) are listed as threatened or endangered (Illinois Endangered Species Protection Board 2011). While broad geographic information is available on the distribution and abundance of mussels in Illinois, systematically collected mussel-community data sets required to integrate mussels into aquatic community assessments do not exist. Sampling of mussels has been very sporadic and limited in the Mississippi South and South Central basins, and no known reports have been compiled on the mussel communities in these regions. This report summarizes the mussel survey conducted in the Mississippi South (MS) and Mississippi South Central (MSC) basins in 2009 and 2010 in conjunction with IDNR and IEPA basin surveys.

The Mississippi South basin consists of two separate drainages. The Mary's River drains an area of approximately 600 km^2 between the Kaskaskia River and the Big Muddy River and empties directly into the Mississippi River near Chester. To the south of the Big Muddy is the Clear Creek drainage, which drains approximately 1862 km^2 (Page et al. 1992). These two drainages occur in predominately rural areas with the major land use being agricultural (Page et al. 1992). The MS basin flows through three natural divisions including the Lower Mississippi River Bottomlands, Coastal Plains, and Ozark Southern divisions (Schwegman 1973). The Mississippi South Central basin includes the Cahokia Creek and Wood River drainages. The MSC basin, which flows through the area known as the American Bottoms, is highly impacted by urbanization, industry, and abandoned coal mines. The MSC basin flows through four natural divisions including the Western Forest-Prairie Division, Southern Till Plain, Middle Mississippi Border, and the Lower Mississippi River Bottomlands (Schwegman 1973). The MSC and MS basins combined drain the area from Honey Point Township in Macoupin County (headwaters of Cahokia Creek) to Thebes (Sammons Creek) in the southernmost county, Alexander, on the Mississippi.

Land-use and Instream Habitat

The primary land use of the Mary's River drainage is row-crop agriculture (75%) with 12% of the land being forested (IDA 2000). The city of Chester has a current population of approximately 8500 people, and is the only municipality located in the basin (US Census Bureau 2010). The Clear Creek drainage encompasses Union and Alexander counties in southwestern portion of the state. Land use in these counties includes approximately 30% forested lands, slightly over 50% agricultural and less than 2% urban (IDA 2000). In contrast, the MSC basin is located in the

Metro East region of St. Louis, which comprises the eastern suburbs of St. Louis, Missouri. It encompasses five southern Illinois counties including Clinton, Jersey, Madison, Monroe and St. Clair and has a population of over 700,000 (US Census Bureau 2010). This basin is impacted by commercial, agricultural, residential, and industrial discharges throughout the watershed (Page et al. 1992).

Substrates in the MS and MSC basins were highly variable ranging from predominately gravel, cobble and bedrock in the Clear Creek drainage, a sand-gravel mixture in the Mary's River drainage, to sand, silt, and gravel mixture in the MSC basin. Unstable shifting sand substrate (Figure 1) and claypan were recorded at a higher percentage in the MSC basin as compared to the other two basins. Shallow water depths, averaging 0.3 m, and ephemeral streams were predominant in the Clear Creek drainage (Figure 2), while the Mary's River drainage displayed stable substrates and a slightly deeper average water depth of 0.6 m.

Methods

During the 2009/2010 survey, freshwater mussel data were collected at 30 sites: 6 sites in Mary's River, 7 sites in Clear Creek, and 16 sites in the MSC basin (Figure 1). Locations of sampling sites are listed in Table 1 along with information regarding IDNR/IEPA sampling at the site. In most cases, mussel survey locations were the same as IDNR/IEPA sites.

Live mussels and shells were collected at each sample site to assess past and current freshwater mussel occurrences. Live mussels were surveyed by hand grabbing and visual detection (e.g. trails, siphons, exposed shell) when water conditions permitted. Efforts were made to cover all available habitat types present at a site including riffles, pools, slack water, and areas of differing substrates. A four-hour timed search method was implemented at each site. Live mussels were held in the stream until processing.

Following the timed search, all live mussels and shells were identified to species and recorded (Table 2). For each live individual, shell length (mm), gender, and an estimate of the number of growth rings recorded. Shell material was classified as recent dead (periostracum present, nacre pearly, and soft tissue may be present) or relict (periostracum eroded, nacre faded, shell chalky) based on condition of the best shell found. A species was considered extant at a site if it was represented by live or recently dead shell material (Szafoni 2001). The nomenclature employed in this report (Appendix 1) follows Turgeon et al. (1998) except for recent taxonomic changes to the gender ending of lilliput (*Toxolasma parvum*), which follows Williams et al. (2008). Voucher specimens were retained and deposited in the Illinois Natural History Survey Mollusk Collection. All non-vouchered live mussels were returned to the stream reach where they were collected.

Parameters recorded included extant and total species richness, presence of rare or listed species, and individuals collected, expressed as catch-per-unit-effort (CPUE) (Table 2). A population was considered to indicate recent recruitment if individuals less than 30 mm in length or with three or fewer growth rings were recorded. Finally, mussel resources were classified as Unique, Highly Valued, Moderate, Limited, or Restricted (Table 2) based on the above parameters (Table 3) and following criteria outlined in Table 4 (Szafoni, 2001).

Results

Species Richness

A total of 14 species of freshwater mussels were observed in the southern Mississippi basins, 10 of which were live (Table 2). Across all sites, the number of live species collected, the number of extant species collected (live + dead), and the total number of species collected (live + dead + relict) ranged from zero to six. The fragile papershell (*Leptodea fragilis*) had the most occurrences across sites sampled with live mussels present (four of nine sites; 44%; Figure 4). The giant floater (*Pyganodon grandis*), mapleleaf (*Quadrula quadrula*) and lilliput (*Toxolasma parvum*) were other commonly occurring species (Figure 4), occupying between 20% and 30% of these sites. Species richness varied greatly over the basin. Mary's River drainage displayed extant species richness (ESR) greater than four at 66% of the sites, while the Clear Creek drainage had only one site, Running Lake Ditch (site 27 , ESR=4) with species counts above zero. Nearly 60% of the sites in the MSC and over 85% of the sites in the Clear Creek drainage did not support an extant mussel species assemblage. Site 23, Mary's River near Welge, had the greatest species richness with five live species.

Abundance and Recruitment

A total of 101 individuals were collected across 30 sites. The number of live specimens collected at a given site ranged from 0 to 52, with an average of nine mussels per site where live mussels were collected (9 of 30 sites; Table 2). A total of 84 collector-hours were spent sampling with an average of 2.8 mussels collected per hour at sites where mussels were present. Three sites (sites 10, 23, 27) yielded more than 10 individuals and one of those sites (site 23) yielded more than 50 live individuals. The most common species collected were mapleleaf (n=28), giant floater (n=24), white heelsplitter (*Lasmigona complanata*; n=15) and fragile papershell (n=12), which together comprised over 80% of the collections (Table 2). Nearly 80% of the live individuals were collected at two sites (site 23- Mary's River and site 10- Cahokia Canal).

Mussel abundance at individual sites ranged from none to moderate with CPUE ranging from 0 - 13 individuals/collector-hour (Table 2) Mary's River (site 23) was the only site in the basin to display a moderate CPUE at 13. All other sites had a limited CPUE. Mussel abundance was

ranked according to Table 2 and is shown in Figure 5.

Recruitment for each species was determined by the presence of individuals less than 30 mm or with 3 or fewer growth rings. Smaller (i.e., younger) mussels are harder to locate by hand grab methods and large sample sizes can be needed to accurately assess population reproduction. However, a small sample size can provide evidence of recruitment if it includes individuals that are small or possess few growth rings. Alternatively, a sample consisting of very large (for the species) individuals with numerous growth rings suggests a senescent population.

Recruitment at individual sites ranged from none observed to very high across the basin. Ninety percent of the sites (27of 30) displayed no recruitment. Recruitment levels, referred to in Table 3 as Reproduction Factor, varied from one to five, with four sites exhibited high to very high recruitment (Table 3, Figure 5). Three sites in the Mary's River drainage, Cox Creek (site 20) and two mainstem sites (sites 19 and 23) had recruitment over 50% and 30-50%, respectively. Running Lake Ditch (site 27, 50% recruitment) was the only site in the Clear Creek drainage with recorded recruitment. The MSC system exhibited no observed recruitment during this survey.

Mussel Community Classification

Based on the data collected in the 2009/2010 basin surveys, many of the sites in the Mississippi South and South Central basins have Restricted or Limited mussel communities using the current MCI classification system (Table 4, Figure 5). Only four sites rank as Moderate mussel resources and one additional site (site 10) ranks as Limited. Three of the four Moderate mussel resource sites are in the Mary's River drainage and include two mainstem sites (sites 19 and 23) and Cox Creek (site 20). In the Clear Creek drainage, Running Lake Ditch (site 27) ranks as a Moderate mussel resource. One site in the MSC, Cahokia Canal (site 10), is listed as Limited; the 23 remaining sites in these basins are ranked as Restricted.

Noteworthy Finds

This survey collected 10 live species and 14 total species (live+ dead + relict). According to historical records, five species are known from the MSC basin, two species from the Clear Creek basin, and no historical data exists from the Mary's River drainage (Tiemann et al. 2007). To our knowledge, only 5 of the 30 sampled sites had previously been sampled for freshwater mussels. In the MSC basin, three new live species were recorded- mapleleaf, pink papershell (*Potamilus ohiensis*) and fragile papershell. New records for this basin also included two dead and three relict species: paper pondshell (*Utterbackia imbecillis*), pondhorn (*Uniomerus tetralasmus*), fatmucket (*Lampsilis siliquoidea*), cylindrical papershell (*Anodontoides ferussacianus*), and threeridge (*Amblema plicata*). Three new species (two live, one dead shell) were detected in Running Lake Ditch (site 27, Clear Creek drainage) - giant floater, mapleleaf, and white heelsplitter. All mussels detected in the Mary's River drainage were new records as

no historical data were available from this basin (Table 2). Live records for this drainage included giant floater, white heelsplitter, mapleleaf, pondhorn, fragile papershell, lilliput, and yellow sandshell (*Lampsilis teres*).

Discussion

There is very limited historical mussel information from the Mississippi South and Mississippi South Central basins; nearly 85% of the sites sampled had no historical data available (Table 2), and no intensive survey for mussels has been completed in these drainages. The known historical data includes six species from five sites in these basins (Tiemann et al. 2007). Our surveys documented the existence of 14 species in the MS/MSC basins, and 10 of these species were represented by live individuals. All historically known species were found live during the 2009/2010 surveys at one or more sites except paper pondshell, which was represented at three sites by dead or relict shells (Table 2). Five additional live species were collected during this survey including mapleleaf, pondhorn, white heelsplitter, yellow sandshell, and pink papershell. These species are widespread and fairly common throughout the state. New species records were collected at 16 of the 30 sites, including 5 of the 6 sites in the Mary's River Basin.

Recruitment

Only four sites in the MS exhibited high to very high recruitment; these included three Mary's River drainage sites (two mainstem and Cox Creek) and Running Lake Ditch in the Clear Creek drainage. This finding suggests that the mussel communities of the Mary's River are viable and self-maintaining at this time. Data collected during this survey indicate that very recent recruitment may not be occurring at any site in the MSC basin or in 85% of the Clear Creek drainage. Sampling methods to target juvenile mussels would be necessary to better assess the reproductive status of these populations.

Mussel community of the Mississippi South/South Central basin

Based on limited historical information it is uncertain if the mussel communities of the MSC and MS basins have changed over time. In the MSC basin, only 7 out of 17 sites had an extant population greater than 0 and 6 of those sites contained only 1 to 2 extant species. Relict shells were recorded at 15 of the 17 sites in this basin and the majority of 8 species detected were recorded as dead or relict shell. From this survey, it would appear that the majority of the MSC region does not support extant mussel communities. Due to minimal historical data, it cannot be determined whether the MSC basin lacks mussel diversity because streams lack suitable habitat or if it has suffered species extirpations. The presence of relict shell at a large percentage of sites (88%) points towards the extirpation of species in this drainage.

Urbanization and industrialization have impacted many streams in this basin, and have led to alterations in stream side vegetation cover, loss of instream habitat, and changes in stream depth and velocity. Other factors that may be affecting stream ecosystems in this area include elevated concentrations of fecal coliform, phosphorus, iron, manganese, and aquatic algae (IEPA 2010). The combination of these factors may be having a detrimental effect on mussel communities in this basin.

In the Clear Creek drainage, 85% of the streams lacked mussel occurrence. Live, dead, and relict shells were recorded from only one stream in the drainage, Running Lake Ditch, which ranked as a Moderate mussel resource. Nearly all of the streams in this drainage are considered full support for aquatic life based on biological, physiochemical, physical habitat, and toxicity data collected by the IEPA (IEPA 2010). Although able to support aquatic life based on these standards, many of the streams sampled in this drainage are considered ephemeral and may lack the water availability needed to support a mussel community.

In the Mary's River drainage, live specimens, or dead and relict shells were collected at five of six sites sampled. Piney Branch, a bedrock laden ephemeral creek located in Piney Branch Ravine, was the only site in the drainage with no mussel presence detected. Three of the streams in the Mary's River drainage appear to support a moderate mussel fauna and high to very high recruitment at this time. This suggests that the mussel communities of the Mary's River drainage appear to be viable and self-maintaining. Located in close proximity to the diverse mussel communities of the Kaskaskia River basin, it seems reasonable to assume that the Mary's River drainage could be capable of supporting a biologically significant freshwater mussel fauna in the future.

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Table 1. 2009-2010 Mississippi South/South Central Intensive Basin Survey. Types of samples include MU-mussel sampling, BE-boat electrofishing, ES-electric fish seine, FF-fish flesh contaminate, H-habitat, M-macroinvertebrate, S-sediment, W-water chemistry.

Site Number	IEPA Code	Stream	Types of Sample	County	Location	Watershed Area (km^2)
	Mississippi South Central					
1	JQ-04	Cahokia Creek	MU,ES,M,H,S,W	Macoupin	Rt 138, 2 mi SE Benld	112.76
2	JQE-01	Sherry Creek	MU,ES,M,H,S,W	Madison	Possum Hill Rd, E of Holiday Shores	71.69
3	JV-02	Piasa Creek	MU,ES,M,H,S,W	Madison	Airport Road, NW of Alton	155.77
4	JVA-01	Mill Creek	MU,SH,M,H,S,W	Jersey	Lockhaven Rd, 3 mi E Elsah	37.76
5	JRB-01	W Fk Wood River	MU,SH,M,H,S,W	Madison	Wood Station Rd, 1 mi N Alton	100.40
6	JRA-02	E Fk Wood River	MU,SH,M,H,S,W	Madison	Culp Lane, NW edge Bethalto	113.84
7	JR-02	Wood River	MU,ES,M,H,S,W	Madison	Rt 3, at Milton Rd East Alton	312.01
8	JQA-01	Indian Creek	MU	Madison	Rt 143, 2 Mi E Wood River	104.76
9	JQ-05	Cahokia Creek	MU,ES,FF,M,H,S,W	Madison	Rt 143, NW Edwardsville	544.78
10	JN-02	Cahokia Canal	MU,ES,M,H,S,W	Madison	N Br, Sand Prairie Ln Horseshoe Lk	196.02
11	JNA-01	Canteen Creek	MU,ES,M,H,S,W	Madison	S Br, Sand Prairie Ln Horseshoe Lk	68.61
12	JMAC-02	Harding Ditch	MU,ES,M,H,S,W	St. Clair	Lake Dr, Frank Holten St Pk	84.95
13	JMAA-03	Prairie DuPont	MU,ES,M,H,S,W	St. Clair	Zingg Road, 1.5 mi N Millstadt	39.44
14	JI-01	Carr Creek	MU,ES,M,H,S,W	Monroe	Valmeyer Rd, W of Rt 3, Columbia	16.91
15	JH-03	Fountain Creek	MU	Monroe	HH Rd Br, UPS Andys Run	98.09
16	JH-04	Fountain Creek	MU,ES,M,H,S,W	Monroe	Rt. 156 Br, 2mi W Waterloo	65.42
17	JD-02	Maeystown Creek	MU,ES,M,H,S,W	Monroe	Bluff Rd Br, NE Chalfin Br.	25.81
	Mary's River					
18	IIK-27	Maxwell Creek	MU,ES,H,M,S,W	Randolph	2 Mi SE Sparta on Pierce Lane	23.48
19	II-91	Marys River	MU,ES,H,M,W	Randolph	Eden Rd, 1.5 Mi N Steeleville	126.35
20	IIH-36	Cox Creek	MU,ES,H,M,W	Randolph	Chester St, 0.5 Mi S Steeleville	261.28
21	IIC-39	Little Marys River	MU,ES,H,M,W	Randolph	3 Mi NE Chester At Covered Br	178.13
22	IIBB-01	Piney Branch	MU,ES,H,M,S,W	Randolph	Piney Creek Road 2.3 Mi SW of Shiloh Hi	13.66
23	II-03	Marys River	MU,BE,H,M,W	Randolph	0.5 Mi E of Welge	288.88
	Clear Creek					
24	ICE-02	Hutchins Creek	MU,ES,H,M,S,W	Union	Beech Grove Rd, 5 mi. SW Alto Pass	52.78
25	IC-02	Clear Creek	MU,ES,H,M,W	Union	1 Mi SSE of Bald Knob	46.28
26	ICDB-01	Green Creek	MU,ES,H,M,S,W	Union	Next To Rt 146 Br, 2.9 Mi W Jonesboro	23.54
27	ICIA-02	Running Lake Ditch	MU,ES,H,M,S,W	Union	Ware-Wolf Lake Rd, 2 Mi W of Wolf Lak	61.52
28	ICD-01	Dutch Creek	MU,ES,H,M,S,W	Union	Farm Rd, 2 Mi W Jonesboro	50.93
29	IB-03	Sexton Creek	MU,ES,H,M,W	Alexander	2.8 Mi NE of Gale	32.15
30	IBAA-01	Sammons Creek	MU,ES,H,M,S,W	Alexander	Bean Ridge Rd 1.7 Mi NE of Thebes	8.63

Table 2. Mussel data for sites sampled during 2009-10 surveys (Table 1). Numbers in columns are live individuals collected; "D" and "R" indicates that only dead or relict shells were collected. Shaded boxes indicate historic collections at the specific site location obtained from the INHS Mollusk Collection records. Species in bold are federally or state-listed species or species in Greatest Need of Conservation by IL DNR. Proportion of total is number of individuals of a species divided by total number of individuals at all sites. Extant species is live + dead shell and total species is live + dead + relict shell. NDA represents no historical data available. MCI scores and Resource Classification are based on values in Tables 3 and 4 (R= Restricted, L= Limited, M= Moderate, HV= Highly Valued, and U= Unique).

	Site Number																					Proportion of
Species	1	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19	20	21	23	27	**Total**
Subfamily Anodontinae																						
Anodonta suborbiculata																					5	5%
Anodontoides ferussacianus		R													R							0%
Lasmigona complanata																	1			14	D	15%
Pyganodon grandis				R					21		R					D	D	D	R	2	1	24%
Utterbackia imbecillis	D				R				D													0%
Subfamily Ambleminae																						
Amblema plicata		R					R															0%
Quadrula quadrula									1											22	5	28%
Uniomerus tetralasmus	R		R	R			R			D		R		R		D		2	R			2%
Subfamily Lampsilinae																						
Lampsilis siliquoidea		R																				0%
Lampsilis teres																		D		7		7%
Leptodea fragilis								1	3	R			1					D		7		12%
Ligumia subrostrata	2	R			R		R	R					R			D	D			D		2%
Potamilus ohiensis									3									R	R			3%
Toxolasma parvum	R					D	D			1	R					D	2	D				3%
																						TOTAL
Individuals collected	2	0	0	0	0	0	0	1	28	1	0	0	1	0	0	0	3	2	0	52	11	101
Live Species	1	0	0	0	0	0	0	1	4	1	0	0	1	0	0	0	2	1	0	5	3	10
Extant Species	2	0	0	0	0	1	1	1	5	2	0	0	1	0	0	4	4	5	0	6	4	11
Total Species	4	4	1	2	2	1	4	2	5	3	2	1	2	1	1	4	4	6	3	6	4	14
Historical Species	3	NDA	NDA	NDA	NDA	1	1	NDA	2	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	2	7
Catch per unit effort (CPUE)	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	7.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.8	0.5	0.0	13.0	2.8	
Mussel Community Index (MCI)	4	0	0	0	0	0	0	4	7	4	0	0	4	0	0	0	8	9	0	8	11	
Resource Classification	R	R	R	R	R	R	R	R	L	R	R	R	R	R	R	R	M	M	R	M	M	

Table 3. Mussel Community Index (MCI) parameters and scores.

Extant species in sample	Species Richness		Catch per Unit Effort (CPUE)	Abundance (AB) Factor
0	1		0	0
1-3	2		1-10	2
4-6	3		>10-30	3
7-9	4		>30-60	4
10+	5		>60	5
% live species with recent recruitment	Reproduction Factor		# of Intolerant species	Intolerant species Factor
0	1		0	1
1-30	3		1	3
>30-50	4		2+	5
>50	5			

Table 4. Freshwater mussel resource categories based on species richness, abundance, and population structure. MCI = Mussel Community Index Score

Unique Resource MCI ≥ 16	Very high species richness (10 + species) &/or abundance (CPUE > 80); intolerant species typically present; recruitment noted for most species
Highly Valued Resource MCI = 12- 15	High species richness (7-9 species) &/or abundance (CPUE 51-80); intolerant species likely present; recruitment noted for several species
Moderate Resource MCI = 8 - 11	Moderate species richness (4-6 species) &/or abundance (CPUE 11-50) typical for stream of given location and order; intolerant species likely not present; recruitment noted for a few species
Limited Resource MCI = 5 - 7	Low species richness (1-3 species) &/or abundance (CPUE 1-10); lack of intolerant species; no evidence of recent recruitment (all individuals old or large for the species)
Restricted Resource MCI = 0 - 4	No live mussels present; only weathered dead, sub-fossil, or no shell material found

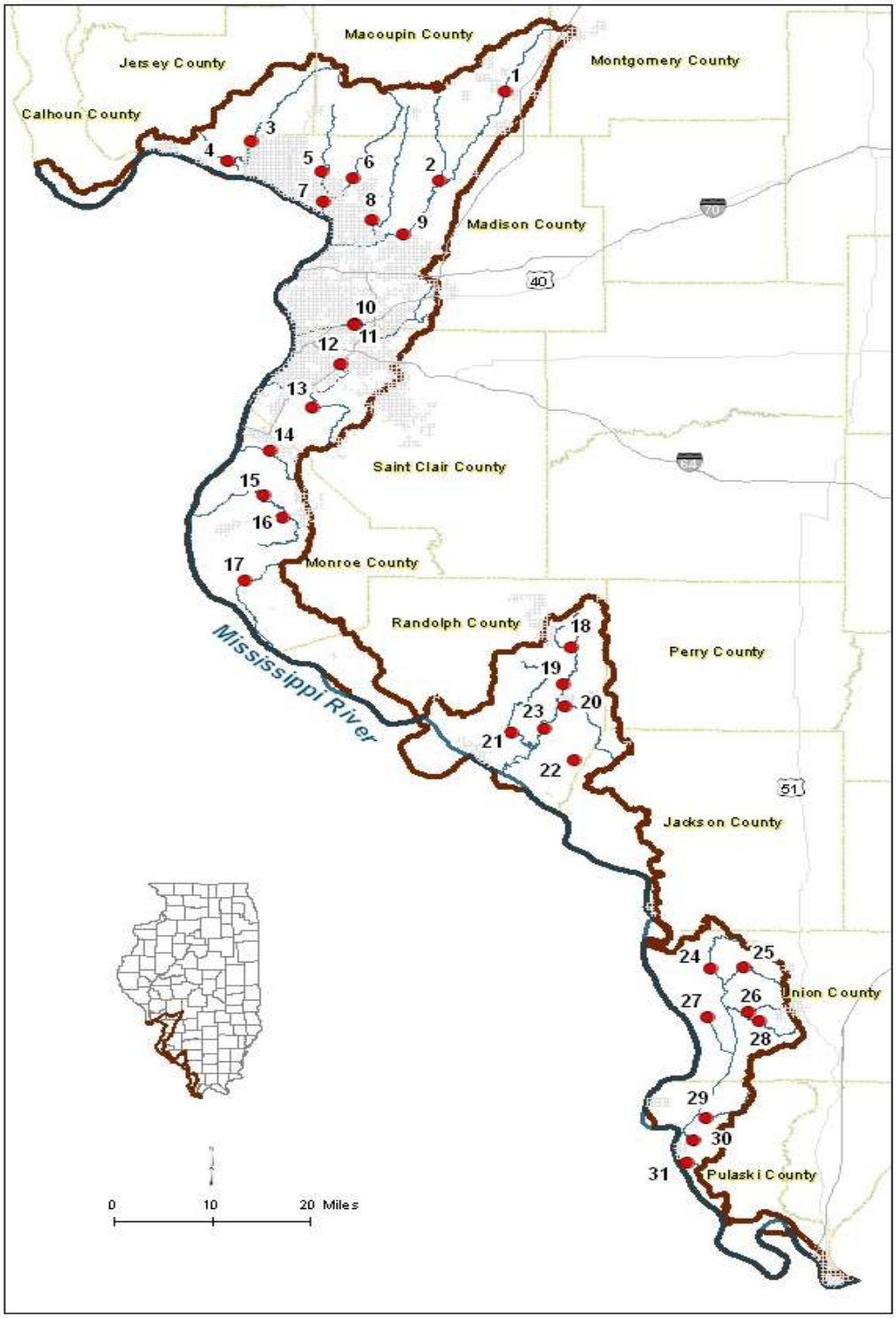

Figure 1. Sites sampled in the Mississippi South and Mississippi South Central basins during 2009- 2010. Site codes referenced in Table 1.

Figure 2. East Fork Wood River in the Mississippi South Central basin. Substrate predominately shifting unstable sand, large sand pile can be seen in the upper right hand corner of the picture.

Figure 3. Sammons Creek in the Mississippi South basin. Substrates predominately small to medium gravel mix, water levels reduced to intermittent pools.

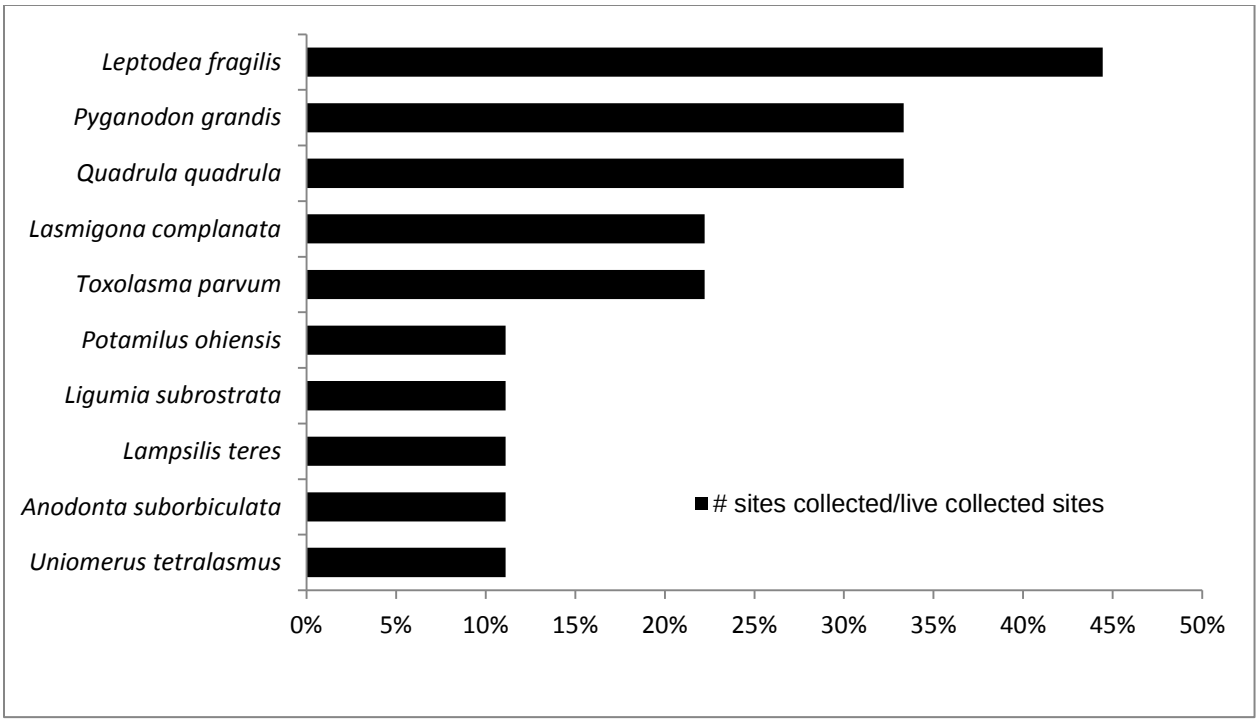

Figure 4. Number of sites where a species was collected live compared to the number of sites sampled with live specimens (9 total sites).

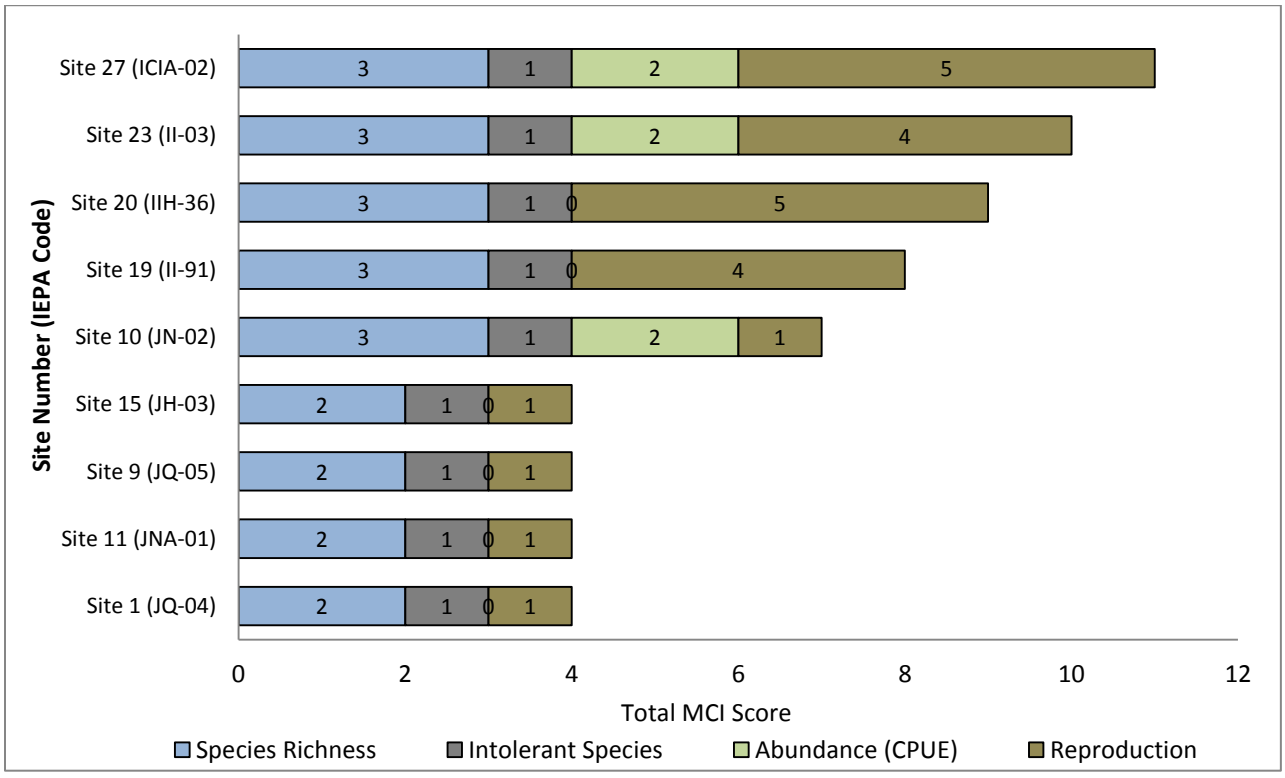

Figure 5. Comparison of Mussel Community Index (MCI) and MCI component scores for Mississippi South and Mississippi South Central River basin sites based on factor values from Table 3.

Appendix 1. Scientific and common names of species.

Scientific name	Common name
Subfamily Anodontinae	
Anodonta suborbiculata	flat floater
Anodontoides ferussacianus	
Lasmigona complanata	white heelsplitter
Pyganodon grandis	giant floater
Utterbackia imbecillis	paper pondshell
Subfamily Ambleminae	
Amblema plicata	threeridge
Quadrula quadrula	mapleleaf
Uniomerus tetralasmus	pondhorn
Subfamily Lampsilinae	
Lampsilis siliquoidea	fatmucket
Lampsilis teres	yellow sandshell
Leptodea fragilis	fragile papershell
Ligumia subrostrata	pondmussel
Potamilus ohiensis	pink papershell
Toxolasma parvum	lilliput