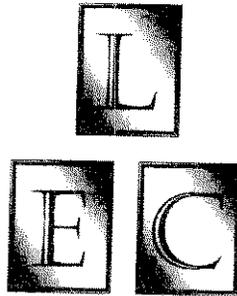


Appendix G

**Mussel Surveys at Tennessee River Miles 149.9 and 149.1 along
the Right Descending Bank in Perry County, Tennessee**

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TABLE OF CONTENTS

Title Page	1
Table of Contents	2
List of Figures	3
List of Tables	3
List of Photos	3
Abstract	4
Introduction	5
Methods	5
Results and Discussion	6
Conclusions	9
Acknowledgments	9
Figures	10 – 12
Tables	13 – 21
Photos	22 – 24

LIST OF FIGURES

Figure 1. Mussel survey areas at TRM 149.9 and 149.1 for proposed boat ramps along the right descending bank.	10
Figure 2. Mussel survey layout at TRM 149.9 for the proposed boat ramp along the right descending bank....	11
Figure 3. Mussel survey layout at TRM 149.1 for the proposed boat ramp along the right descending bank.	12

LIST OF TABLES

Table 1. Site coordinates for the shoreline end of the transect lines along the right descending bank at Tennessee River Mile 149.9 and 149.1 and approximate locations where qualitative samples were collected.	13
Table 2. Number of mussels collected and species percent abundance at Tennessee River Mile 149.9 and 149.1 along the right descending bank....	14
Table 3. Distribution of mussels along each 10 meter segment of the transect lines at Tennessee River Mile 149.9 and 149.1 R.	15
Table 4. Number of mussels of each species collected alive along the transects at Tennessee River Mile 149.9 and 149.1 R.	16
Table 5. Tennessee River Mile 149.9 and 149.1 Transects - Approximate bottom elevation, water depth at pool elevation 358', and type of sediment recorded at each 10-meter interval along the transects.....	17
Table 6. Number of mussels of each species collected alive during qualitative samples at Tennessee River Mile 149.9 and 149.1 along the right descending bank.....	19
Appendix A. Length and age data for mussels collected at TRM 149.9 and 149.1 along the right descending bank on August 1, 2008.....	20

LIST OF PHOTOS

Photo 1. Proposed boat ramp location at TRM 149.9.....	22
Photo 2. Mussel survey area at TRM 149.9.....	22
Photo 3. Proposed boat ramp location at TRM 149.1.....	23
Photo 4. Mussel survey area at TRM 149.1.....	23
Photo 5. Assortment of mussels collected from the TRM 149.1 survey area.....	24

**Mussel Surveys at Tennessee River Miles 149.9 and 149.1 along
the Right Descending Bank in Perry County, Tennessee**

ABSTRACT

GGP, LLC has proposed to construct two boat ramps within their development area at Tennessee River Mile (TRM) 149.9 and 149.1 along the right descending bank. The boat ramps are proposed to extend below the low water line and therefore could potentially impact freshwater mussels if any existed within the construction footprints. The purpose of the mussel survey was to determine if concentrations of mussels exist and if the potential exists for federally or state listed endangered or threatened mussel species to be present within the boat ramp footprints. At each boat ramp site, one transect was surveyed at the boat ramp centerline, one transect was surveyed 25 meters upstream of the boat ramp centerline to cover the upstream buffer, and four transects were surveyed downstream of the boat ramp centerline to cover the downstream buffer. The downstream buffer transects began 25 meters downstream of the boat ramp centerline and were spaced 25 meters apart. Five qualitative samples were also performed within each of the survey areas.

No mussels were located during the transect survey at TRM 149.9. During qualitative sampling one mussel was collected representing one unionid mussel species, *Truncilla donaciformis*. CPUE (Catch Per Unit Effort) ranged from 0 to 4 mussels per man hour and total CPUE for all of the qualitative samples was 0.8 mussels collected per man hour at TRM 149.9.

During the TRM 149.1 survey, a total of 45 live mussels from seven unionid species were encountered. *Fusconaia ebena* and *Megaloniais nervosa* were the dominant species, each representing 33.33% of the mussels in the area. The other species occurring at the site included *Potamilus alatus* (13.33%), *Quadrula quadrula* (11.11%), *Arcidens confragosus* (4.44%), *Ellipsaria lineolata* (2.22%), and *Quadrula apiculata* (2.22%). Very few mussels were located during the transect survey. Two mussels were located between 20 – 30 meters along transect GGP-10, which was 50 meters downstream of the boat ramp site. At 100 meters downstream of the boat ramp site along transect GGP-12, two mussels were located between 10 – 20 meters and 21 mussels were located between 20 – 30 meters. Estimated mussel density at TRM 149.1 ranged from 0.00 – 0.77. During qualitative sampling 20 mussels were collected representing six unionid mussel species. CPUE ranged from 0 to 52 mussels per man hour. Total CPUE was 16 mussels collected per man hour.

The areas along the right descending shoreline of the Tennessee River at TRM 149.9 and 149.1 contained very few mussels. The mussels that were encountered at the sites were very sparsely distributed, with the exception of the area approximately 100 meters downstream of the TRM 149.1 boat ramp site. Approximately 80% of the mussels collected during the mussel survey were located within the area from 75 – 100 meters downstream of the 149.1 boat ramp site. The majority of these mussels were located 20 – 30 meters from the shoreline in 16 – 24 feet of water. No federally or state listed threatened or endangered species were located during the survey.

INTRODUCTION

GGP, LLC has proposed to construct two boat ramps within their development area at Tennessee River Mile (TRM) 149.9 and 149.1 along the right descending bank (Figure 1). The boat ramps are proposed to extend below the low water line and therefore could potentially impact freshwater mussels if any existed within the construction footprints. The mussel survey areas covered the proposed boat ramp footprints plus buffer zones.

METHODS

The purpose of the mussel survey was to determine if concentrations of mussels exist and if the potential exists for federally or state listed endangered or threatened mussel species to be present within the boat ramp footprints on the Tennessee River along the right descending bank.

The mussel survey at TRM 149.9 and 149.1 extended through each boat ramp centerline, as well as upstream, downstream, and adjacent buffers (Figures 2, 3). At each boat ramp site, one transect was surveyed at the boat ramp centerline, one transect was surveyed 25 meters upstream of the boat ramp centerline to cover the upstream buffer, and four transects were surveyed downstream of the boat ramp centerline to cover the downstream buffer (Figures 2, 3). The downstream buffer transects began 25 meters downstream of the boat ramp centerline and were spaced 25 meters apart. Each transect extended 30 meters out from the shoreline. The zero-meter mark of each transect line was set at the 358 feet elevation during the mussel survey. Transects were set perpendicular to shore. Table 1 indicates the coordinates of the near shore end of each transect line along the right descending bank. Transect positions were located in the field using ArcPad GIS software with a Trimble GeoXT DGPS giving sub-meter position accuracy. Each transect was divided into 10 meter segments and the mussels from each section were recorded separately. Mussels were collected by commercial divers with considerable experience in mussel survey techniques and were certified to meet ADCI and OSHA requirements. The diver searched an area one meter wide along one side of each transect and all mussels located within the 10 meter segments were sent to the surface for identification. Substrate information and depth were recorded at each 10 meter increment. Substrate information was based on a visual description of the surface material provided by the diver. Depth readings were obtained from the diver's pneumofathometer (accuracy $\pm 6''$).

Five qualitative samples were performed within each of the survey areas (Figures 2, 3).

A qualitative sample was performed between each set of transects (Figures 2, 3; Table 1). Qualitative sampling was accomplished by conducting 15 minute timed searches in the areas. Mussels collected during each qualitative sampling effort were sent to the surface in separate bags.

Each mussel was identified to species and recorded on data sheets by LEC's malacologist. The length and age were recorded for each mussel collected. Age was determined by counting the external annuli. Mussels were returned to near the area from which they were collected.

Species diversity (Shannon-Weiner Index) and evenness were determined for the area. Species diversity was based on the following formula: $[H' = -\sum p_i \log_e p_i]$ where p_i is the proportion of the i^{th} species in the sample. Results were based on the natural logarithm. Evenness was based on the following formula: $[\text{Evenness} = H'/H_{\text{max}} = H'/\ln(\# \text{ species})]$.

RESULTS AND DISCUSSION

The Tennessee River was surveyed for freshwater mussels along the right descending bank at river miles 149.9 and 149.1 on August 1, 2008. The water temperature was 86° F at the time of the survey and flow was low. Visibility during the mussel survey was greater than one meter. Water elevation was 358 feet above mean sea level during the mussel survey.

TRM 149.9 Boat Ramp

During the survey at TRM 149.9, a total of one live mussel from one unionid species was encountered (Table 2). The mussel species located at the site was an individual of *Truncilla donaciformis*. Table 2 lists the scientific and common names of the species found, the number of each species, and the percent composition. Length and age were recorded for each mussel collected (Appendix A). No zebra mussels were located during the survey. No federal or state threatened or endangered species of freshwater mussels were located during the survey.

No mussels were located during the transect survey at TRM 149.9 (Table 3). Based on the transect survey, the estimated mussel density at TRM 149.9 was 0.00 mussels per square meter (Table 4).

The substrate was typical throughout the entire mussel survey area at TRM 149.9 (Table 5). From the shoreline out to 30 meters, the substrate was an even mix of soft silt and sand over hard clay (Table 5). The depth of the soft overburden varied on the hard clay, but was typically a few inches thick. Water depth was typically shallow for the first 10 meters from the shoreline ranging from 3 – 4 feet deep (Table 5). Once the diver went over the first main drop-off out from the shoreline the water became deeper and ranged from 10 – 14 feet deep at 20 meters from the shoreline (Table 5). The maximum water depth along the transects ranged from 27 – 30 feet at 30 meters from the shoreline (Table 5).

Five qualitative searches were conducted during the mussel survey at TRM 149.9 (Table 6). Qualitative searches Qual-01 – Qual-05 were conducted at the TRM 149.9 boat ramp area (Figure 2, Table 6). A total of one mussel was collected representing one unionid mussel species, *Truncilla donaciformis* (Table 6). Sampling time per search was 15 minutes. The number of mussels collected per sample ranged from 0 – 1 and the number of species collected per sample ranged from 0 – 1 (Table 6). CPUE (Catch Per Unit Effort) ranged from 0 to 4 mussels per man hour (Table 6). Total CPUE for all of the qualitative samples was 0.8 mussels collected per man hour (Table 6).

TRM 149.1 Boat Ramp

During the TRM 149.1 survey, a total of 45 live mussels from seven unionid species were encountered (Table 2). The mussel species located at the site included *Arcidens confragosus*, *Ellipsaria lineolata*, *Fusconaia ebena*, *Megaloniaias nervosa*, *Potamilus alatus*, *Quadrula apiculata*, and *Quadrula quadrula*. Table 2 lists the scientific and common names of the species found, the number of each species, and their percent composition. Length and age were recorded for each mussel collected (Appendix A). The species diversity for the mussel concentration was 1.552762 and the evenness was 0.7979616. No zebra mussels were located during the survey. No federal or state threatened or endangered species of freshwater mussels were located during the survey.

~~Overall, *Fusconaia ebena* and *Megalonaias nervosa* were the dominant species, each~~ representing 33.33% of the mussels in the area (Table 2). The other species occurring at the site included *Potamilus alatus* (13.33%), *Quadrula quadrula* (11.11%), *Arcidens confragosus* (4.44%), *Ellipsaria lineolata* (2.22%), and *Quadrula apiculata* (2.22%) (Table 2). Two species, *Ellipsaria lineolata* and *Quadrula apiculata*, were only found as single individuals (Table 2).

Overall, very few mussels were located during the transect survey (Table 3). Mussels were not consistently located along the transect lines and were typically found in low numbers (Table 3). During the survey of the transect lines no mussels were found in the area from the shoreline out to 10 meters (Table 3). Only one transect contained mussels between 10 – 20 meters and two transects contained mussels between 20 – 30 meters (Table 3). Two mussels were located between 20 – 30 meters along transect GGP-10, which was 50 meters downstream of the boat ramp site (Table 3). At 100 meters downstream of the boat ramp site along transect GGP-12, two mussels were located between 10 – 20 meters and 21 mussels were located between 20 – 30 meters (Table 3). Two mussel species were located along transect GGP-10 and four mussel species were located along transect GGP-12 (Table 4). Estimated mussel density at TRM 149.1 ranged from 0.00 – 0.77 mussels per square meter and averaged 0.14 mussels per square meter (Table 4). Maximum estimated density per 10-meter section ranged from 0.00 – 2.10 mussels per square meter (Table 4).

The substrate was typical throughout the entire mussel survey area at TRM 149.1 (Table 5). From the shoreline out to 30 meters, the substrate was an even mix of soft silt and sand over hard clay (Table 5). The depth of the soft overburden varied on the hard clay, but was typically a few inches thick. Water depth was typically shallow for the first 10 meters from the shoreline ranging from 5 – 7 feet deep (Table 5). Once the diver went over the first main drop-off out from the shoreline the water became deeper and ranged from 16 – 19 feet deep at 20 meters from the shoreline (Table 5). The maximum water depth along the transects ranged from 19 – 24 feet at 30 meters from the shoreline (Table 5).

Five qualitative searches were conducted during the mussel survey at TRM 149.1 (Table 6). Qualitative searches Qual-06 – Qual-10 were conducted at the TRM 149.1 boat ramp area (Figure 3, Table 6). A total of 20 mussels were collected representing six unionid mussel species (Table 6). Sampling time per search was 15 minutes. The number of mussels collected per sample ranged from 0 – 13 and the number of species collected per sample ranged from 0 – 4

~~(Table 6) CPUE ranged from 0 to 52 mussels per man hour (Table 6). Total CPUE for all of~~
the qualitative samples was 16 mussels collected per man hour (Table 6). The three mussels collected during Qual-06 were located approximately 15 meters upstream of the boat ramp centerline. The majority of the mussels collected during the TRM 149.1 qualitative samples were encountered during sampling of Qual-09 and Qual-10 (Table 6). The mussels were located between 60 – 100 meters downstream of the boat ramp centerline and were primarily located between 20 – 30 meters from shoreline in 16 – 24 feet of water.

CONCLUSIONS

The areas along the right descending shoreline of the Tennessee River at TRM 149.9 and 149.1 contained very few mussels. The mussels that were encountered at the sites were very sparsely distributed, with the exception of the area approximately 100 meters downstream of the TRM 149.1 boat ramp site. The area 100 meters downstream of the 149.1 boat ramp site could constitute as a small mussel concentration with estimated densities of at least 2.1 mussels per square meter. Approximately 80% of the mussels collected during the mussel survey were located within the area from 75 – 100 meters downstream of the 149.1 boat ramp site. The majority of these mussels were located 20 – 30 meters from the shoreline in 16 – 24 feet of water. Several juvenile mussels (< 5 years old) were located during the mussel survey, which included individuals of *Fusconaia ebena*, *Megalonaias nervosa*, and *Truncilla donaciformis* (Appendix A). No federally or state listed threatened or endangered species were located during the survey.

ACKNOWLEDGMENTS

I would like to thank the divers from DAS Dive Boat, Inc. for conducting a professional survey.

Disclaimer:

Depth measurements are approximate and sediment types are subjective and are neither intended nor provided for engineering purposes. They are intended only to provide a description of mussel habitat.

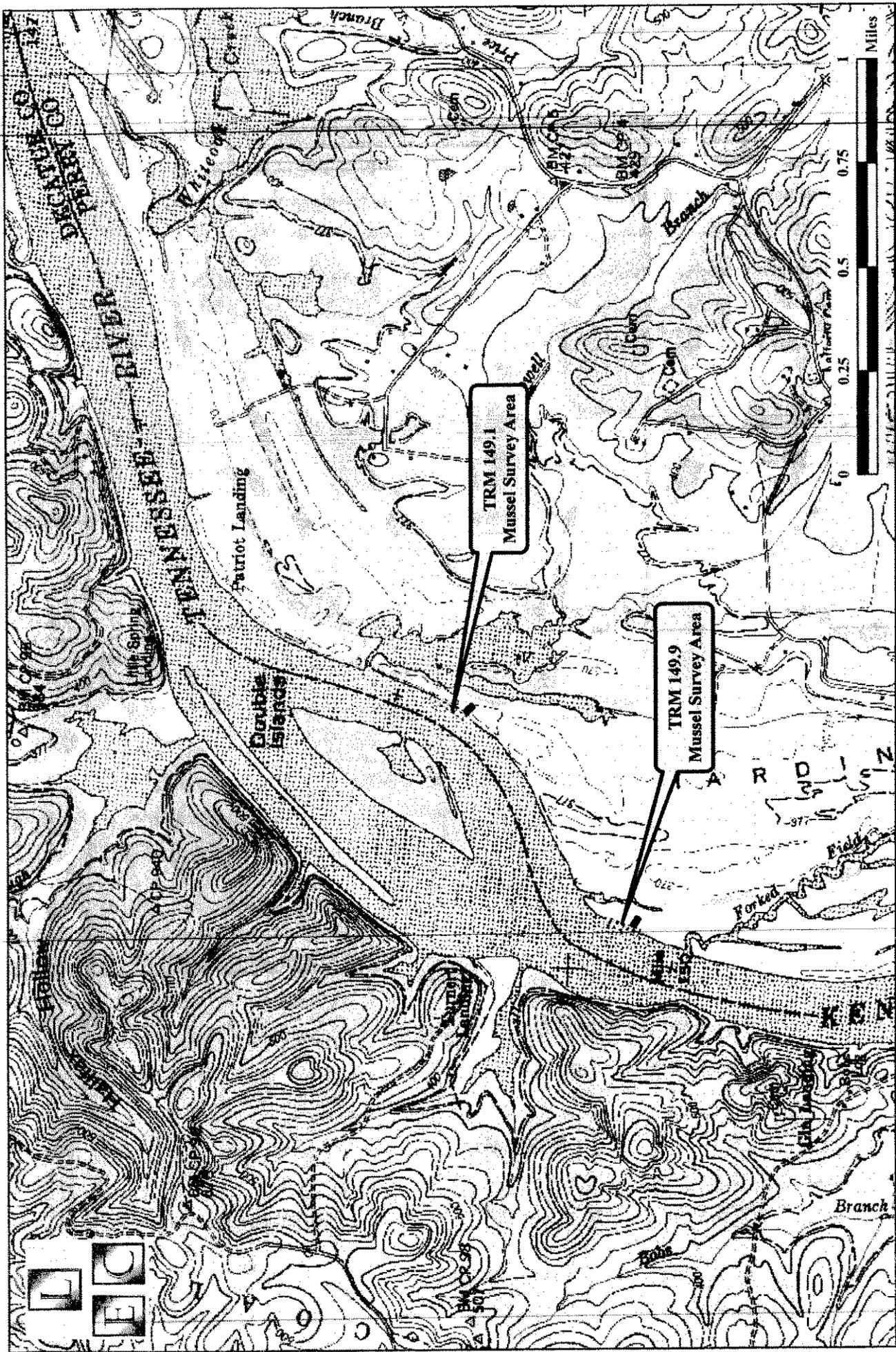


Figure 1. Mussel survey areas at TRM 149.9 and 149.1 for proposed boat ramps along the right descending bank.

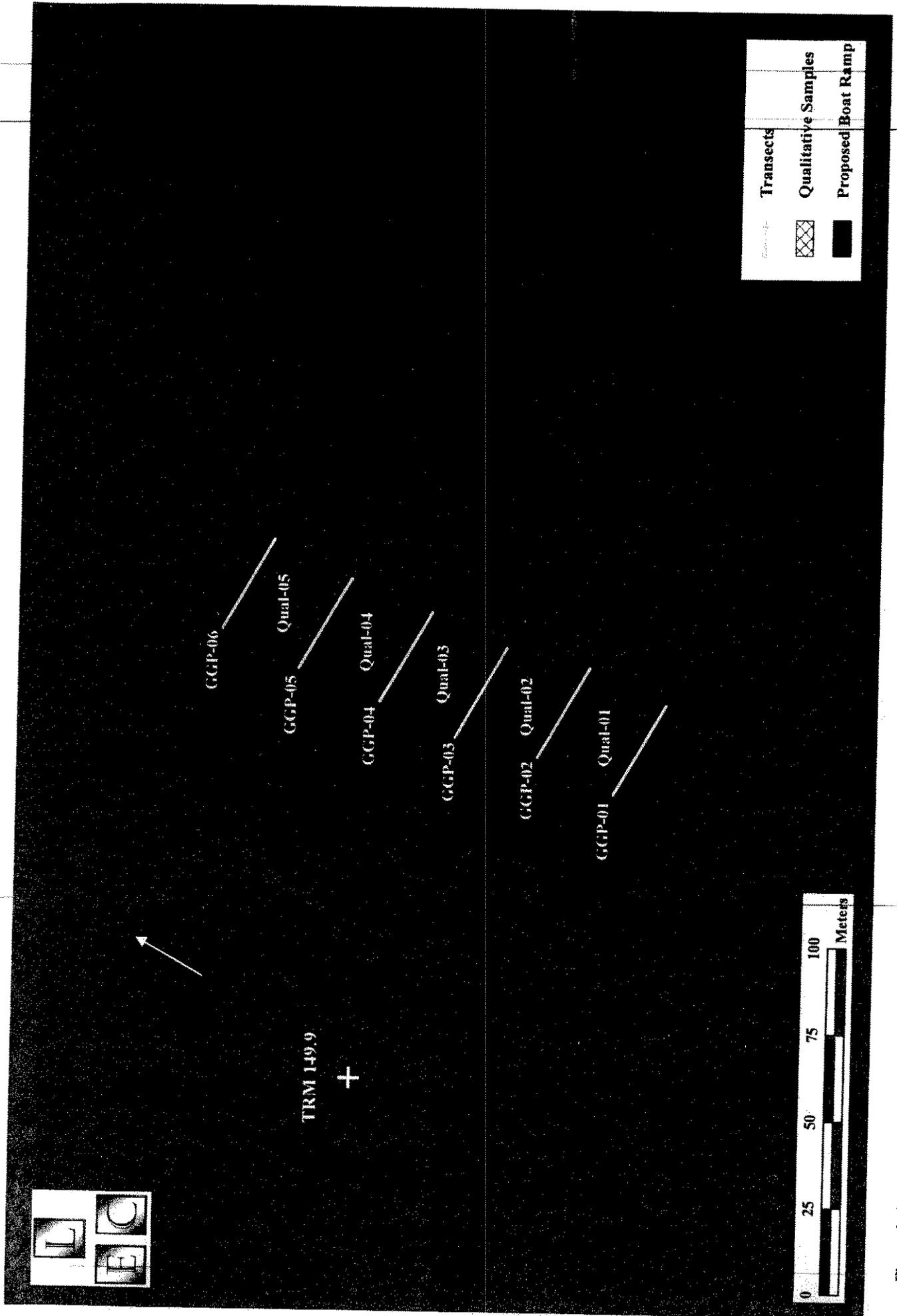


Figure 2. Mussel survey layout at TRM 149.9 for the proposed boat ramp along the right descending bank.

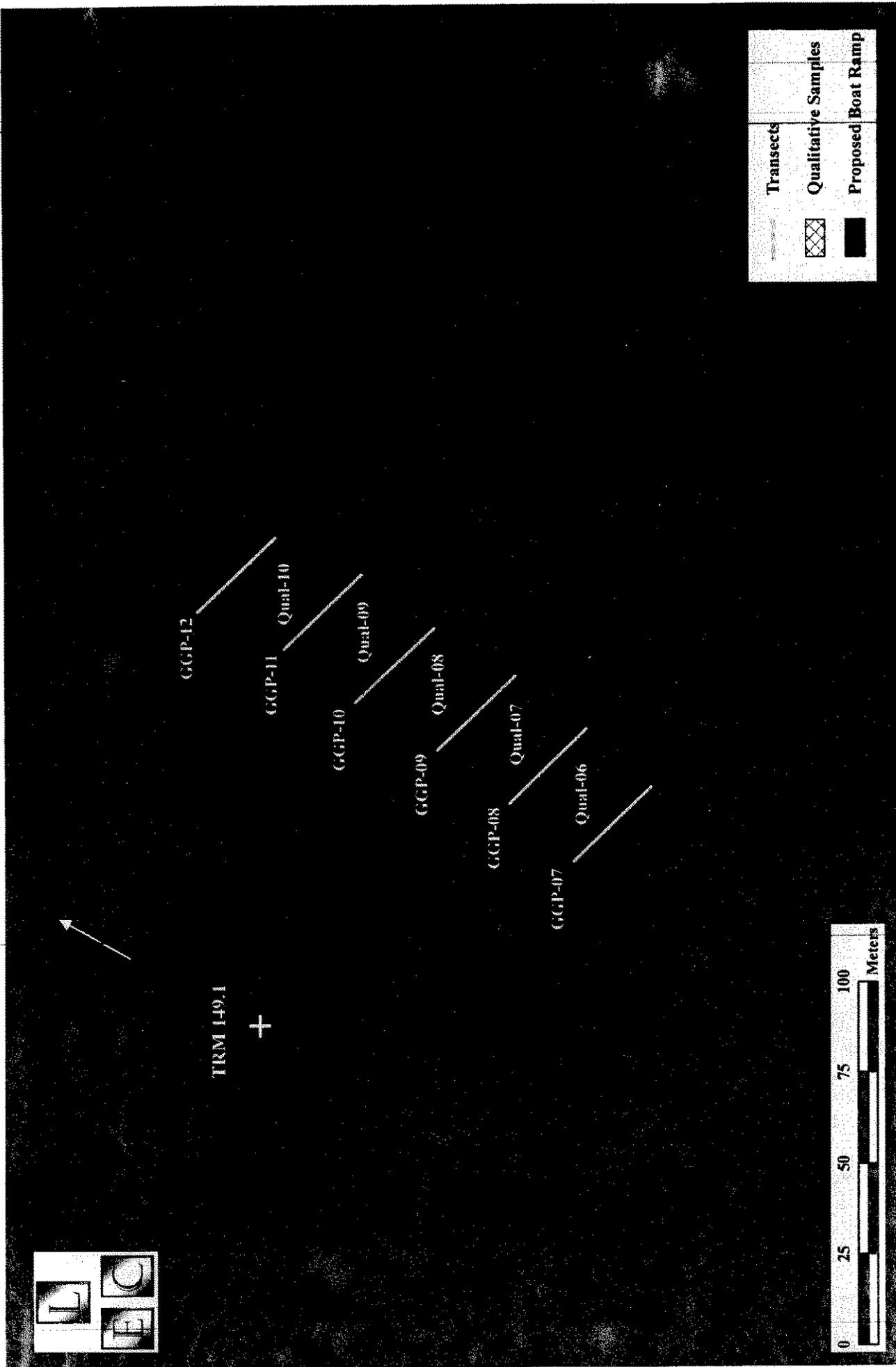


Figure 3. Mussel survey layout at TRM 149.1 for the proposed boat ramp along the right descending bank.

Table 1. Site coordinates for the shoreline end of the transect lines along the right descending bank at Tennessee River Mile 149.9 and 149.1 and approximate locations where qualitative samples were collected. Coordinates are provided in Tennessee State Plane (Feet) NAD83 and Geographic (Degrees-Decimal Minutes) NAD83 or WGS84.

Sample Area	TN State Plane (Feet)		Geographic	
	Easting	Northing	Latitude	Longitude
GGP-01	1361011	414968	35 27.3564440	88 02.3953723
GGP-02	1361045	415041	35 27.3685914	88 02.3888306
GGP-03	1361063	415121	35 27.3818374	88 02.3855409
GGP-04	1361097	415194	35 27.3939847	88 02.3789991
GGP-05	1361127	415272	35 27.4069423	88 02.3732839
GGP-06	1361164	415346	35 27.4192648	88 02.3661420
GGP-07	1363747	417130	35 27.7221252	88 01.8533263
GGP-08	1363800	417189	35 27.7320298	88 01.8428969
GGP-09	1363849	417255	35 27.7430743	88 01.8333024
GGP-10	1363892	417330	35 27.7555815	88 01.8249542
GGP-11	1363941	417396	35 27.7666261	88 01.8153596
GGP-12	1363975	417475	35 27.7797617	88 01.8088409
Qual-01	1360981	415029	35 27.3663939	88 02.4016710
Qual-02	1361010	415104	35 27.3788537	88 02.3961448
Qual-03	1361032	415183	35 27.3919486	88 02.3920452
Qual-04	1361071	415255	35 27.4039483	88 02.3844921
Qual-05	1361103	415334	35 27.4170776	88 02.3783783
Qual-06	1363739	417191	35 27.7321508	88 01.8551928
Qual-07	1363793	417256	35 27.7430476	88 01.8445870
Qual-08	1363838	417326	35 27.7547377	88 01.8358150
Qual-09	1363884	417397	35 27.7665959	88 01.8268457
Qual-10	1363924	417470	35 27.7787633	88 01.8190933

Table 2. Number of mussels collected and species percent abundance at Tennessee River Mile 149.9 and 149.1 along the right descending bank.

TRM 149.9

Scientific Name	Common Name	Total	% Abundance
<i>Truncilla donaciformis</i> (Lea, 1828)	Fawnsfoot	1	100.00%
TOTAL		1	100.00%

TRM 149.1

Scientific Name	Common Name	Total	% Abundance
<i>Fusconaia ebena</i> (Lea, 1831)	Ebonyshell	15	33.33%
<i>Megaloniaias nervosa</i> (Rafinesque, 1820)	Washboard	15	33.33%
<i>Potamilus alatus</i> (Say, 1817)	Pink Heelsplitter	6	13.33%
<i>Quadrula quadrula</i> (Rafinesque, 1820)	Mapleleaf	5	11.11%
<i>Arcidens confragosus</i> (Say, 1829)	Rock Pocketbook	2	4.44%
<i>Ellipsaria lineolata</i> (Rafinesque, 1829)	Butterfly	1	2.22%
<i>Quadrula apiculata</i> (Say, 1829)	Southern Mapleleaf	1	2.22%
TOTAL		45	100.00%

Table 3. Distribution of mussels along each 10 meter segment of the transect lines at Tennessee River Mile 149.9 and 149.1 R.

TRM 149.9

	GGP-01	GGP-02	GGP-03	GGP-04	GGP-05	GGP-06	Total	% of Mussels Collected
0m - 10m							0	0.0%
10m - 20m							0	0.0%
20m - 30m							0	0.0%
Total	0	0	0	0	0	0	0	0.0%

TRM 149.1

	GGP-07	GGP-08	GGP-09	GGP-10	GGP-11	GGP-12	Total	% of Mussels Collected
0m - 10m							0	0.0%
10m - 20m						2	2	8.0%
20m - 30m				2		21	23	92.0%
Total	0	0	0	2	0	23	25	100.0%

Table 5. Tennessee River Mile 149.9 and 149.1 Transects - Approximate bottom elevation, water depth at pool elevation 358', and type of sediment recorded at each 10-meter interval along the transects. (Elevations and Depths are only approximate and should not be used for engineering or navigational purposes. Depth and substrate are only intended to describe mussel habitat.)

TRM 149.9

Transect Mark	GGP-01		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	355	3	50% soft silt, 50% sand mixture over hard clay
20 m	349	9	50% soft silt, 50% sand mixture over hard clay
30 m	331	27	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-02		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	354	4	50% soft silt, 50% sand mixture over hard clay
20 m	347	11	50% soft silt, 50% sand mixture over hard clay
30 m	331	27	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-03		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	355	3	50% soft silt, 50% sand mixture over hard clay
20 m	348	10	50% soft silt, 50% sand mixture over hard clay
30 m	330	28	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-04		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	355	3	50% soft silt, 50% sand mixture over hard clay
20 m	346	12	50% soft silt, 50% sand mixture over hard clay
30 m	330	28	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-05		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	355	3	50% soft silt, 50% sand mixture over hard clay
20 m	344	14	50% soft silt, 50% sand mixture over hard clay
30 m	330	28	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-06		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	355	3	50% soft silt, 50% sand mixture over hard clay
20 m	345	13	50% soft silt, 50% sand mixture over hard clay
30 m	328	30	50% soft silt, 50% sand mixture over hard clay

Table 5. Cont'd

TRM 149.1

Transect Mark	GGP-07		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	351	7	50% soft silt, 50% sand mixture over hard clay
20 m	340	18	50% soft silt, 50% sand mixture over hard clay
30 m	339	19	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-08		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	352	6	50% soft silt, 50% sand mixture over hard clay
20 m	339	19	50% soft silt, 50% sand mixture over hard clay
30 m	338	20	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-09		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	351	7	50% soft silt, 50% sand mixture over hard clay
20 m	340	18	50% soft silt, 50% sand mixture over hard clay
30 m	336	22	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-10		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	353	5	50% soft silt, 50% sand mixture over hard clay
20 m	342	16	50% soft silt, 50% sand mixture over hard clay
30 m	336	22	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-11		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	353	5	50% soft silt, 50% sand mixture over hard clay
20 m	341	17	50% soft silt, 50% sand mixture over hard clay
30 m	335	23	50% soft silt, 50% sand mixture over hard clay

Transect Mark	GGP-12		
	Bottom Elev. (Ft)	Depth (Ft)	Sediment
0 m	358	0	50% soft silt, 50% sand mixture over hard clay
10 m	353	5	50% soft silt, 50% sand mixture over hard clay
20 m	342	16	50% soft silt, 50% sand mixture over hard clay
30 m	334	24	50% soft silt, 50% sand mixture over hard clay

Table 6. Number of mussels of each species collected alive during qualitative samples at Tennessee River Mile 149.9 and 149.1 along the right descending bank.

TRM 149.9

	Qual-01	Qual-02	Qual-03	Qual-04	Qual-05	Total
<i>Truncilla donaciformis</i>	1					1
Number of mussels collected	1	0	0	0	0	Total Mussels = 1
Number of species collected	1	0	0	0	0	Total Species = 1
Collection Time (minutes)	15	15	15	15	15	Total Time = 75
CPUE (# mussels per man hour)	4	0	0	0	0	Total CPUE = 0.8

TRM 149.1

	Qual-06	Qual-07	Qual-08	Qual-09	Qual-10	Total
<i>Arcidens confragosus</i>	1			1		2
<i>Fusconaia ebena</i>					3	3
<i>Megaloniaias nervosa</i>				2	4	6
<i>Potamilus alatus</i>	1				5	6
<i>Quadrula apiculata</i>	1					1
<i>Quadrula quadrula</i>				1	1	2
Number of mussels collected	3	0	0	4	13	Total Mussels = 20
Number of species collected	3	0	0	3	4	Total Species = 6
Collection Time (minutes)	15	15	15	15	15	Total Time = 75
CPUE (# mussels per man hour)	12	0	0	16	52	Total CPUE = 16

Appendix A. Length and age data for mussels collected at TRM 149.9 and 149.1 along the right descending bank on August 1, 2008.

Date	River	River Mile	Bank	Sample Type	Sample #	Interval	Mussel	Age (yr - annuli)	Length (mm)
8/1/2008	Tennessee	149.1	Right	Transect	GGP-10	20-30	<i>Fusconaita ebena</i>	4	38.8
8/1/2008	Tennessee	149.1	Right	Transect	GGP-10	20-30	<i>Megaloniais nervosa</i>	16	103.6
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	10-20	<i>Fusconaita ebena</i>	13	64.3
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	10-20	<i>Quadrula quadrula</i>	11	62.5
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Ellipsaria lineolata</i>	12	65.7
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	9	52.9
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	64.0
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	67.8
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	70.1
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	64.6
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	62.3
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	5	38.4
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	5	44.7
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	14	60.3
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Fusconaita ebena</i>	15	65.8
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	4	59.2
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	15	105.9
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	15	117.8
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	14	97.1
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	14	104.7
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	15	100.9
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	19	120.5
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Megaloniais nervosa</i>	15	114.3
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Quadrula quadrula</i>	9	51.5
8/1/2008	Tennessee	149.1	Right	Transect	GGP-12	20-30	<i>Quadrula quadrula</i>	12	61.9
8/1/2008	Tennessee	149.9	Right	Qualitative	Qual-01	1-2	<i>Truncilla donaciformis</i>	3	17.7
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-06	7-8	<i>Arcidens confragosus</i>	11	84.4
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-06	7-8	<i>Potamilus alatus</i>	3	69.4
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-06	7-8	<i>Quadrula apiculata</i>	13	64.6
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-09	10-11	<i>Arcidens confragosus</i>	14	101.0
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-09	10-11	<i>Megaloniais nervosa</i>	11	64.0
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-09	10-11	<i>Megaloniais nervosa</i>	16	109.7

Appendix A. Length and age data for mussels collected at TRM 149.9 and 149.1 along the right descending bank on August 1, 2008.

Date	River	River Mile	Bank	Sample Type	Sample #	Interval	Mussel	Age (yr - annuli)	Length (mm)
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-09	10-11	<i>Quadrula quadrula</i>	20	111.2
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Fusconia ebena</i>	6	47.6
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Fusconia ebena</i>	13	65.3
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Fusconia ebena</i>	12	62.0
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Megaloniais nervosa</i>	15	105.0
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Megaloniais nervosa</i>	12	91.2
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Megaloniais nervosa</i>	15	99.1
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Megaloniais nervosa</i>	15	121.1
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Potamilus alatus</i>	10	95.8
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Potamilus alatus</i>	7	76.7
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Potamilus alatus</i>	10	109.1
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Potamilus alatus</i>	13	135.8
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Potamilus alatus</i>	8	78.3
8/1/2008	Tennessee	149.1	Right	Qualitative	Qual-10	11-12	<i>Quadrula quadrula</i>	12	68.2



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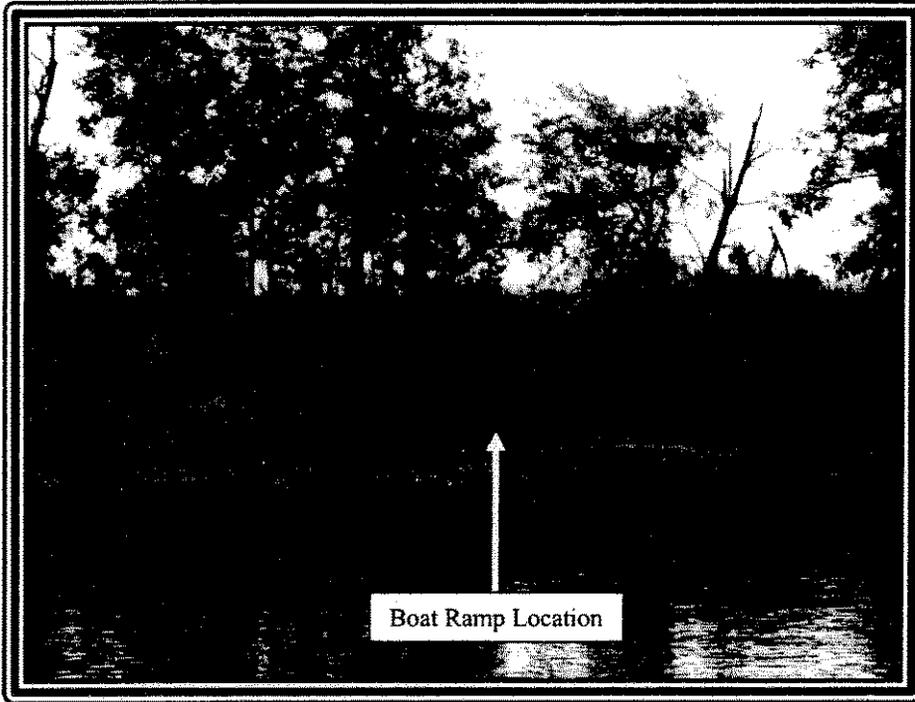
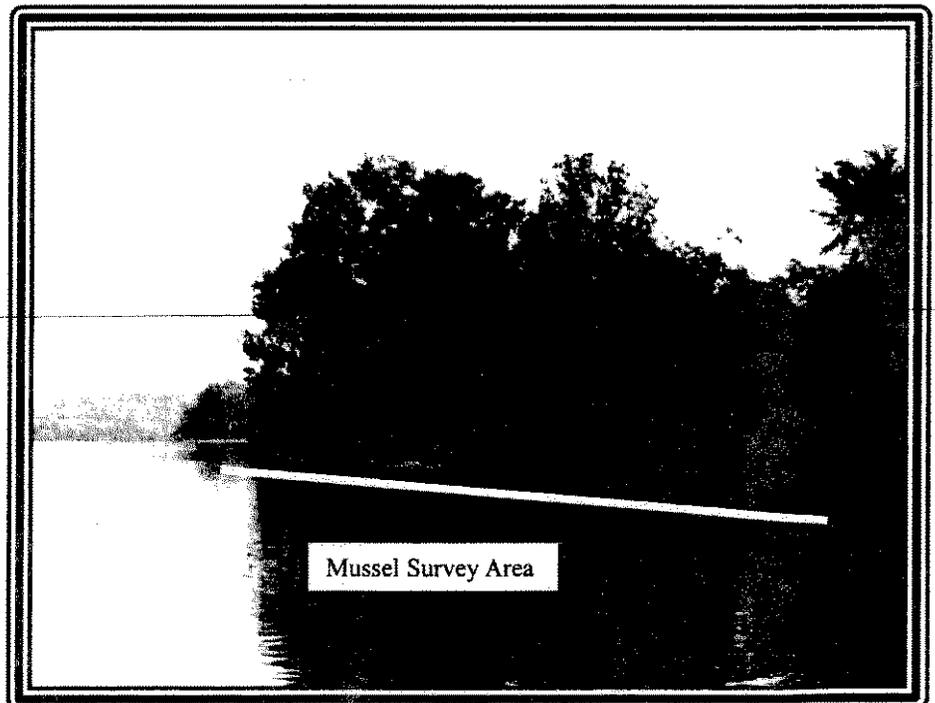


Photo 1.

Proposed boat ramp location at TRM 149.9

Photo 2.

Mussel survey area at TRM 149.9





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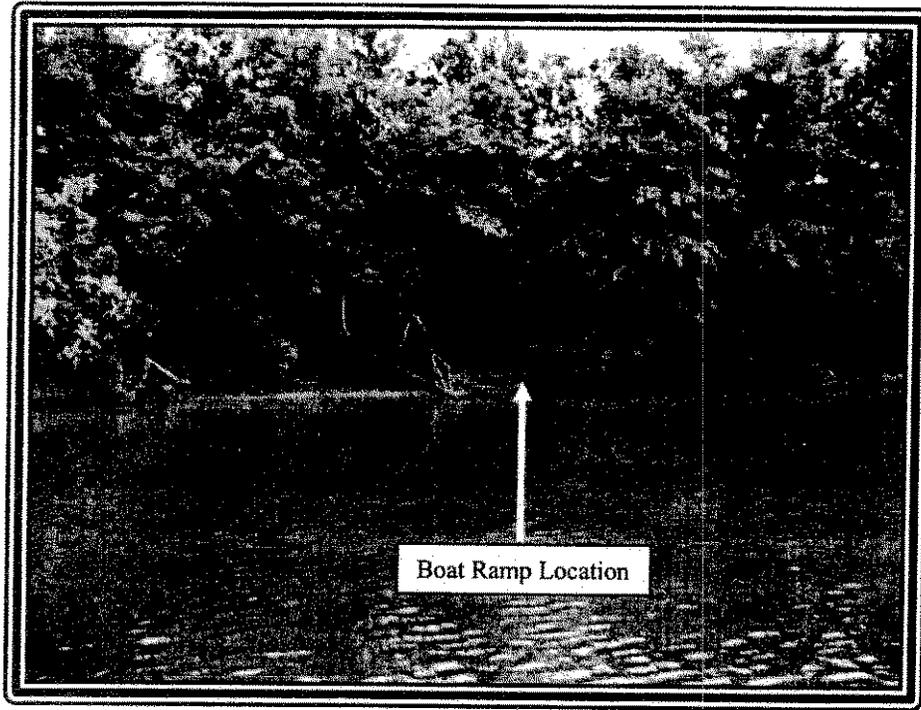
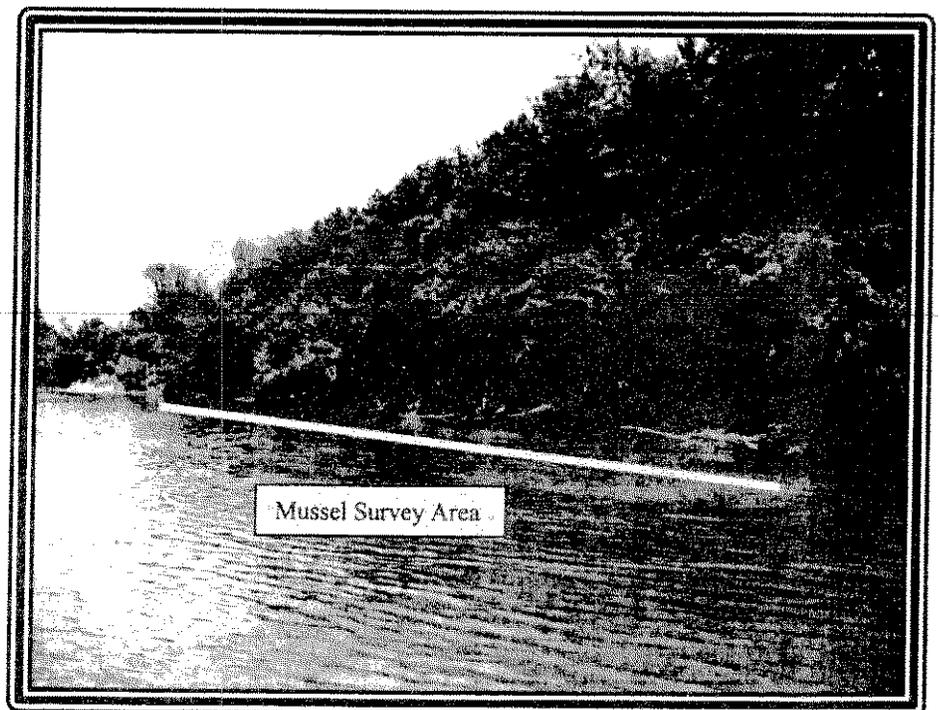


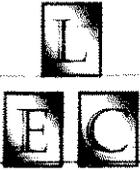
Photo 3.

Proposed boat ramp location at TRM 149.1

Photo 4.

Mussel survey area at TRM 149.1





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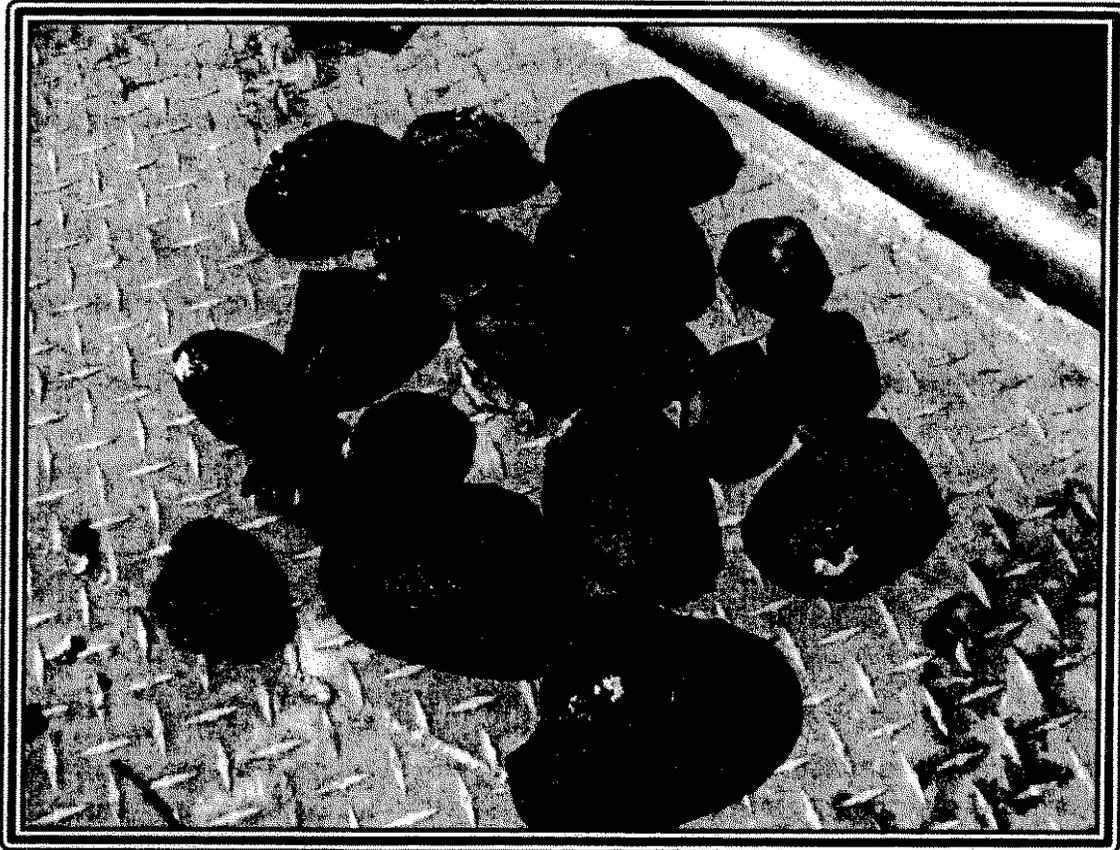


Photo 5.

Assortment of mussels collected from the TRM 149.1 survey area.