The entire navigable portion of the river was surveyed by diving, hand picking, and brailing to determine the extent and location of mussel beds. In addition, selected sites in the three tributary forks were examined for mussel fauna.

The three forks of the river are relatively shallow and are made up of a series of pools and riffles. Most of the mussel collections in the forks were made either just below or above a riffle or in the riffle proper. Diving was utilized in some of the deeper pools; however, this was not productive since few mussels inhabited the pools. A list of species collected in the forks is given in Table 2. Number of individuals is not included since there were no concentrations in any given area and usually only one or two individuals of a given species were collected from a single site.

Samples of mussels were collected from the beds in the main body of the river and returned to the laboratory for study. They were shucked out, the soft parts examined, and the valves scrubbed with detergent, and dried. The left valve was used in all weight and measurement data in keeping with past studies. Age was resolved by the method described by Iseley (1914), Grier (1922), Howard (1922), and Chamberlain (1931). The valve was placed, nacre side down, on a ground-glass plate with a strong light under it. The

light was thus projected through the shell and the annuli could be counted. Measurements were made in millimeters along the long axis of the valve; weight was determined to the nearest gram on an Chaus Model 1000 balance.

Population density samples were taken in beds of adequate size, by diving. In taking these samples, an anchor was dropped at random spots within the bed. A nylon rope 20.6 inches in length was attached to the anchor center by a swivel. The diver then made a 360-degree sweep around the circle (a one-meter sample). This technique was established in a previous study (Williams, 1969). The mussels were counted and recorded at each site.

Job 2. Mussel Bed Surveys

Freshwater mussels were collected in all pools with the exception of Pools 6 and 14. Despite intensive efforts, no beds could be located in these pools. Interviews with older residents of the city of Beattyville, Kentucky indicated that a bed had existed in Pool 14 in the distant past but it is no longer extant. Of the beds located, the majority were small and confined to the outwash rubble area of creek mouths. Only three beds were located that could be considered commercially valuable; however, these were considered so marginal in size that they could withstand commercial musseling for only a short period of time. The location of these beds and the dominant species are: below Lock No. 3, made up primarily of washboard (Megalonaias gigantea) and mapleleaf (Quadrula quadrula); below Lock No. 5, approximately 75% three-ridge (Amblema costata) and 25% washboard (M. gigantea); and below Lock No. 8, approximately 50% three-ridge (A. costata) and 50% washboard (M.gigantea). Two of these beds, below Lock Nos. 5 and 8, were in the typical habitat of freshwater mussels according to Isom (1966) and Scruggs (1960): a mixture of rubble, gravel, and sand. The bed below Lock No. 3 is highly unusual in that it is practically all sand with small amounts of organic debris in isolated spots. Less than 100 yards away is a typical

habitat (rubble, gravel, and sand) in which there are practically no mussels. The population density figures for the mussels in the afore-mentioned beds are shown in Table 12.

The majority of the mussels was collected by diving. Only a few areas of the main river were shallow enough to permit hand picking and the brail was less than satisfactory in collecting. During the collecting period when the water was very warm, the mussels retreated into the substrate and reduced the opening between their valves. The crowfeet of the brail would not go into the small opening, thus resulted in very few specimens being taken by brailing.

A total of 24 species of native and one species of exotic mussel was collected in the main river during the study. The exotic, Corbicula manilensis, the Asiatic clam, was found in large numbers in almost every mussel bed and is not included in the data. Several sources were utilized in identification and classification of the mussels collected. The authors of the major publications are:

Baker, 1898
_____, 1928
Goodrich, 1932
Murray and Leonard, 1962
Neel, 1941
Ortman, 1911
_____, 1919
_____, 1926
Ortman and Walker, 1922
Simpson, 1900
Stansbery, 1965
Starrett, 1971

The 24 species of native forms collected and numbers of each are shown in Table 8. Of the total, only three, Amblema costata, Megalonaias gigantea, and Quadrula quadrula were in sufficient abundance to warrant the compilation of data. Figures 1, 2, and 3 are concerned with the number of individuals in various age groups. The greatest numbers of A. costata are in the 10 to 20 year age groups, M. gigantea in the 13 to 27 year age groups, and Q. quadrula in the 10 to 16 year age groups. Tables 9, 10, and 11 show age, number of individuals, average length in millimeters and average weight in grams of the above-mentioned three species.

The minimum legal size for mussels in Kentucky is 63.5 millimeters. The previously-mentioned tables show that only one collected mussel, a six-year-old Q. quadrula, was smaller than the legal size limit. Occasionally a few sublegal relic shells were picked up on outwash rubble piles, but they were never abundant. Coker, et al. (1921) states that young mussels require a very delicately-balanced habitat but that older mussels may live and even thrive in an area where the young cannot survive. Observations by the author indicate that recruitment of commercially-valuable mussels in the main body of the river is at best, marginal.

No areas in any of the three forks of the river was found to contain beds of mussels; however, several areas were surveyed that had an abundance of scattered mussels,

both living and relic. According to McClanahan (1972), a portion of the Middle Fork, near Athol, Breathitt County, Kentucky, is called "mussel shoals" and the local people gathered mussels at this site for the button industry about the turn of the century. Only a few scattered shells were found in that area during the study. Many relic shells were found in various areas of the three forks but very few living specimens. This is probably due to drastic environmental changes that have taken place in the past 50 to 75 years.

TABLE 2

Species of Mussels Collected in the North, Middle and South Forks

NORTH FORK	MIDDLE FORK	SOUTH FORK
Actinonaias carinata	Actinonaias carinata	Actinonaias carinata
Amblema costata	Amblema costata	Amblema costata
Lampsilis fallaciosa	Corbicula manilensis	Corbicula manilensis
Lasmigona costata	Dysnomia triquetra	Dysnomia triquetra
Leptodea fragilis	Elliptio crassidens	Elliptio dilatatus
Obovaria subrotunda	Elliptio dilatatus	Lampsilis fallaciosa
Pleurobema spp.	Lampsilis fallaciosa	Lasmigona costata
Proptera alata	Lampsilis radiata	Leptodea fragilis
Tritogonia verrucosa	Lasmigona costata	Leptodea laevissima
	Leptodea fragilis	Obliquaria reflexa
	Megalonaias gigantea	Obovaria olivaria
	Obovaria olivaria	Obovaria subrotunda
	Obovaria subrotunda	Pleurobema spp.
	Pleurobema spp.	Ptychobranchus fasciolare
	Proptera alata	Quadrula pustulosa
	Ptychobranchus fasciolare	Tritogonia verrucosa
	Quadrula pustulosa	Truncilla truncata
	Villosa iris	

TABLE 8

Mussel Collections from the Main Body of the Kentucky River, 1972

Pool Number	1	2	3	4	5
Species					
Amblema costata	34	4	3	45	15
Megalonaias gigantea	17	32	2	19	3
Quadrula quadrula	9	77	10	6	7
Lampsilis radiata siliquoidea	1	0	0	0	3
Actinonaias carinata	0	0	0	0	0
Lasmigona costata	0	0	0	0	2
Actinonaias ligamentina	0	0	0	0	0
Lampsilis ovata ventricosa	0	0	0	0	2
Fusconaia flava	0	0	1	0	3
Pleurobema cordatum	0	1	0	1	2
Lampsilis anodontoides	0	0	0	0	0
Fusconaia undata	1	0	0	0	0
Proptera alata	0	0	0	0	2
Quadrula nodulata	3	2	0	2	0
Tritogonia verrucosa	1	0	0	0	0
Elliptio dilatatus	1	0	0	0	0
Obliquaria reflexa	0	3	0	0	1
Leptodea fragilis	0	1	1	0	0
Quadrula pustulosa	1	0	0	0	0
Anodonta spp	0	1	0	0	0
Ptychobranchus fasciolare	1	0	0	0	0
Lasmigona complanata	0	0	0	0	0
Plagiola lineolata	0	0	0	0	0
Obovaria olivaria	0	0	0	0	0
Totals for Pools	69	121	17	73	40
% for Pools	9.5	16.6	2.3	10.0	5.5

TABLE 8 (continued)

Mussel Collections from the Main Body of the Kentucky River, 1972

Pool Number	6	7	8	9	10
Species					
Amblema costata	0	24	41	22	7
Megalonaias gigantea	0	13	27	30	2
Quadrula quadrula	0	3	7	2	7
Lampsilis radiata siliquoidea	0	2	15	6	20
Actinonaias carinata	0	2	15	7	0
Carmiogena costata	0	0	7	8	0
Actinonaias ligamentina	0	0	7	2	11
Lampsilis ovata ventricosa	0	1	8	1	0
Fusconaia flava	0	1	3	3	0
Pleurobema cordatum	0	0	0	5	0
Lampsilis anodontoides	0	1	5	4	0
Fusconaia undata	0	8	0	0	0
Proptera alata	0	3	1	2	0
Quadrula nodulata	0	0	0	0	0
Tritogonia verrucosa	0	0	3	0	1
Elliptio dilatatus	0	0	0	0	4
Obliquaria reflexa	0	1	0	0	0
Leptodea fragilis	0	2	0	0	0
Quadrula pustulosa	0	0	0	1	2
Anodonta spp	0	2	0	0	0
Ptychobranchus fasciolare	0	0	0	0	1
Lasmigona complanata	0	0	0	0	1
Plagiola lineolata	0	1	0	0	0
Obovaria olivaria	0	1	0	0	0
Totals for Pools	0	65	139	93	56
% for Pools	0	8.9	19.0	12.7	7.7

TABLE 8 (continued)

Mussel Collections from the Main Body of the Kentucky River, 1972

Pool Number	11	12	13	Total	% of Total
Species					
Amblema costata	0	0	13	208	28.5
Megalonaias gigantea	0	0	6	151	20.7
Quadrula quadrula	1	0	8	137	18.3
Lampsilis radiata siliquoidea	0	8	0	55	7.5
Actinonaias carinata	0	2	0	26	3.6
Lasmigona costata	0	6	0	23	3.2
Actinonaias ligamentina	0	0	0	20	2.7
Lampsilis ovata ventricosa	0	3	0	15	2.1
Fusconaia flava	0	1	0	12	1.6
Pleurobema cordatum	3	0	0	12	1.6
Lampsilis anodontoides	0	0	0	10	1.4
Fusconaia undata	0	0	0	9	1.2
Proptera alata	0	0	0	8	1.1
Quadrula nodulata	0	0	0	7	1.0
Tritogonia verrucosa	0	2	0	7	1.0
Elliptio dilatatus	1	0	0	6	0.8
Obliquaria reflexa	1	0	0	6	0.8
Leptodea fragilis	0	0	1	5	0.7
Quadrula pustulosa	0	0	0	4	0.5
Anodonta spp	0	0	0	3	0.4
Ptychobranchus fasciolare	0	0	0	2	0.3
Lasmigona complanata	0	0	0	1	0.1
Plagiola lineolata	0	0	0	1	0.1
Obovaria olivaria	0	0	0	1	0.1
Totals for Pools	6	22	28	729	99.3
% for Pools	1.0	3.0	3.8		