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PRE-IMPOUNDMENT SURVEYS OF SIX KENTUCKY STREAMS

by

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Abstract

The fish populations in 7 Kentucky streams, the Barren River, the Middle Fork of the Kentucky River, the Cumberland River, the Rough River, the Levisa Fork and Russell Fork of the Big Sandy River, and Drake's Creek, were sampled by seining, electric shocking, and/or rotenone, in order to determine the species composition prior to impoundment. Drake's Creek is not scheduled for impoundment.

The greatest number of species (51) was taken from the Middle Fork of the Kentucky River and was followed in order of decreasing number by the Rough River (50), the Levisa and Russell Forks combined (44), the Barren River (38), Drake's Creek (35), and the Cumberland River (27).

Rough fish constituted the majority of weight of all fishes taken. Forage species made up the greatest percentage of total numbers, but usually those fishes were so small that their total weight did not approach that of the rough fish.

Largemouth bass, Micropterus salmoides, were not taken in samples from 3 streams although it is believed that they would maintain satisfactory populations in those areas following impoundment. Muskellunge, Esox masquinongy, although not represented in any of the samples, are known to be present in 2 of the streams and it is hoped that a suitable "muskie" fishery might be developed in these impending impoundments.

Each of these streams will be subjected to continued study during the pre- and post-impoundment periods, in order to determine any change in species composition and relative abundance.

Introduction

The Corps of Engineers, U. S. Army, has proposed a large-scale reservoir-construction program in Kentucky for the purposes of flood prevention, navigation improvement, and power production. Numerous reservoirs have been recommended throughout the State, chiefly for flood control purposes, and with the impoundment of each stream segment a new and entirely different fishery will develop.

At present, dams are being constructed by the Corps of Engineers on the Rough River, Cumberland River, and Middle Fork of the Kentucky River. Other reservoir projects have been authorized in practically every major drainage in the State and are now pending congressional approval and allotment of construction funds.

Surveys of many of these streams are being conducted by personnel of the Department of Fish and Wildlife Resources in order to determine the existing stream conditions and the composition of the fish populations prior to reservoir formation. With an adequate knowledge of the pre-impoundment conditions and species composition, developmental programs and specific management practices can be initiated to the immediate benefit of each new fishery during the early stages of lake development.

Similar surveys will be continued subsequent to the impoundment of each stream in order to pursue the population trends and to apply various remedial measures as specific problems become manifest.

Materials and Methods

A cursory survey was made of each stream in order to select suitable areas for sampling the fish population and to gain a general knowledge of stream conditions. Most of the areas were originally selected to be sampled by using an electric shocker but the stream conditions that were later confronted often made this method impractical, and after the first year of study, many of these areas were replaced by alternate areas. Some of the factors that limited the effective operation of the electric shocker were stream depth, width, turbidity, and continual mechanical failure of the shocker. These limitations were circumvented by using rotenone.

When rotenone was employed for sampling stream fish populations, block nets were secured at both the upper and lower ends of each area. After treating the area with rotenone, potassium permanganate was introduced into the stream below the lower block net in order to detoxify the rotenone as it was carried downstream.

The electric shocker was employed for sampling fish populations by moving the shocker upstream followed by a crew of men using dip nets to

capture the disabled fish. The captive fish were held in a live-box until the entire area was sampled. Only shallow and comparatively clear waters could be effectively sampled in this manner, whereas when using rotenone these conditions were not regarded as limiting factors.

Data was recorded from the fishes collected from each sampling area and included identification, measurements to the nearest 0.10 inch, and weights to the nearest 0.01 pound. Fishes that could not be positively identified in the field were preserved in formalin and brought back to the laboratory for verification. These specimens were later identified at the University of Louisville in conjunction with Kentucky D.-J. Project F-7-R, The Classification, Distribution, and Ecology of Kentucky Fishes, Dr. William M. Clay, Leader.

In presenting the data in tabular form, all fishes were grouped into 5 major categories; game fish, panfish, edible rough fish, non-edible rough fish, and forage fish. Such groupings have never been standardized because many biologists disagree as to where certain species should be placed. Fishes were placed in the above categories on the following basis. Species on which there is a regulated creel limit were classified as game fish. An exception to this is the grass pickerel, Esox vermiculatus, which is considered a game fish because it is a member of the pike family. All of the centrarchids that are not included in the game fish category are classified as panfish except a few species that do not attain a size desirable to the angler, such as the orangespotted sunfish, Lepomis humilis, and the pigmy sunfish, Elassoma zonatum. These smaller sunfishes are classed as forage species. Rough fishes are divided into 2 groups, the edible rough fish and non-edible rough fish. The former group consists of those species that are usually catagorized as commercial fishes while the latter group includes such species as lampreys, gars, bowfin, goldeye, mooneye, etc.

Forage fishes include all of the smaller species such as minnows, shiners, chubs, darters, madtoms, etc. Gizzard shad, Dorosoma cepedianum, having a total length under 7.0 inches are classified as forage fish, and individuals 7.0 inches or more in length are placed in the non-edible rough fish category.

The physical characteristics of each sampling area were recorded and included the average and maximum depths, average width, surface acreage, and water temperature. Bottom types and the kinds and abundance of fish cover were also noted. Chemical determinations were made at 1 of the sampling areas in each stream and included total alkalinity measurements and pH recordings.

Barren River

The Barren River is located in the south-central section of Kentucky. From its source in North-central Tennessee and Monroe County, Kentucky, the stream flows northwest and forms the boundary between Allen and Barren Counties, then cuts its way through the karsted topography of Warren County and into Butler County where it empties into the Green River.

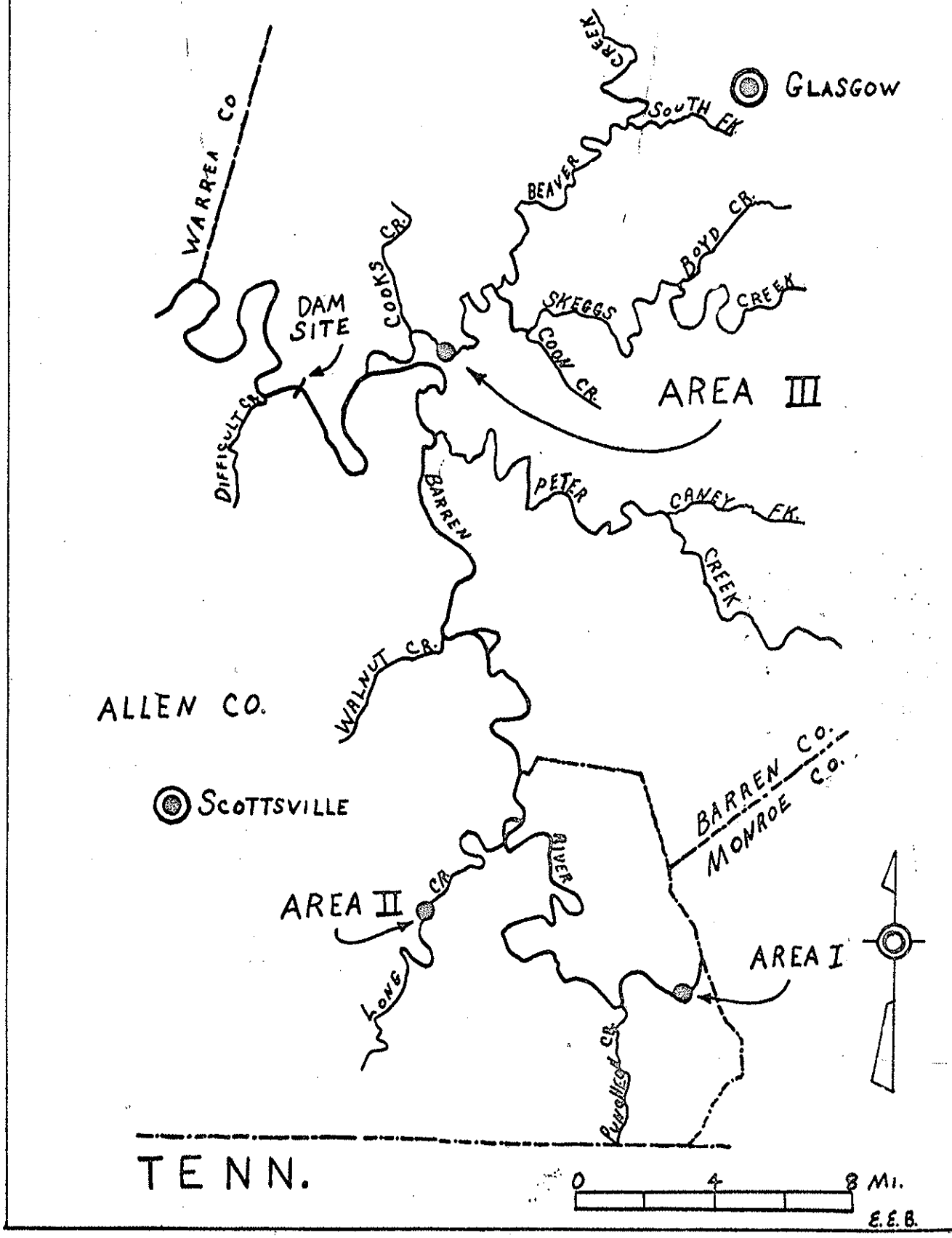
A flood-control dam has been authorized on the Barren River at a site 79.2 miles above the mouth of the stream near Port Oliver Ford on the Barren-Allen County boundary. A conservation pool of approximately 2,300 acres will be impounded by the proposed dam, 142 feet in height.

During September 1958 the fish population of the Barren River was sampled in 3 areas by an electric shocker (Figure 1). A brief description of the sampling areas follows.

Area I is located in Allen County about 1.5 stream miles below the Monroe County boundary and within the proposed limits of the flood-control pool. The stream banks in this area are lined with flood-plain trees which

BARREN RIVER

FIG. 1



yield to cropped bottomlands on one side and are met by rather densely wooded hillsides on the other. Limestone ledges project into the stream along the banks and supplemented by partially submerged logs and overhanging tree roots provide a substantial amount of fish shelter. The bottom is composed chiefly of bedrock and rubble and contains shallow deposits of silt in the deeper sections of the pools. The maximum depth of the pool that was sampled was 6.3 feet and the average depth 3.3 feet. On 16 September the waters were dingy because of current rain and the surface temperature was 68° F. A pH of 7.9 was recorded on that date and the total alkalinity was 108 ppm. The average stream gradient of the headwaters is approximately 20 feet per mile. A total of 0.3 surface acre was sampled on the above date.

Area II is located on Long Creek in Allen County and is also within the proposed limits of the flood-control pool. The immediate stream banks are covered with underbrush and beyond are cropped bottomlands on one side and steep wooded hills on the other. The stream bottom of Long Creek is composed of bedrock, rubble, and a few small boulders. The maximum depth of the area that was sampled was 3.5 feet and the average depth was 1.8 feet. Most of the available fish shelter was made up of overhanging plant roots, snags, boulders, and jutting ledges that had been undercut by the stream. The average gradient of the Barren River in this section is 3.3 feet per mile. A total of 0.9 surface acre was sampled and the recovery of fish was estimated as being exceptionally good due to the relatively clear and shallow water.

Area III is located on Skegg's Creek in Barren County and about 2 miles above the mouth of Cook's Creek. This area is within the limits of the proposed permanent pool of the reservoir. The stream banks in this area are rather steep and densely wooded on both sides. The stream bottom

Table I. List of fishes collected from Barren River on September 16, 17, and 18, 1958.

PETROMYZONTIDAE	
Ichthyomyzon fossor Reighard and Cummins	Northern brook lamprey
Lampetra lamottei (Le Sueur)	American brook lamprey
LEPISOSTEIDAE	
Lepisosteus osseus (Linnaeus)	Longnose gar
CLUPEIDAE	
Dorosoma cepedianum (Le Sueur)	Gizzard shad
ESOCIDAE	
Esox americanus Le Sueur	Central redfin pickerel
CATOSTOMIDAE	
Hypentelium nigricans (Le Sueur)	Hogsucker
Minytrema melanops (Rafinesque)	Spotted sucker
Moxostoma anisurum (Rafinesque)	Silver redhorse
Moxostoma duquesnei (Le Sueur)	Black redhorse
Moxostoma erythrurum (Rafinesque)	Golden redhorse
CYPRINIDAE	
Campostoma anomalum (Rafinesque)	Stoneroller
Hybopsis aestrivalis (Girard)	Speckled chub
Hybopsis amblops (Rafinesque)	Bigeye chub
Hybopsis dissimilis (Kirtland)	Spotted chub
Notropis ardens Jordan	Rosefin shiner
Notropis boops Gilbert	Bigeye shiner
Notropis cornutus Mitchill	Common shiner
Notropis photogenis (Cope)	Silver shiner
Notropis rubellus (Agassiz)	Rosyface shiner
Notropis spilopterus (Cope)	Spotfin shiner
Pimephales notatus (Rafinesque)	Bluntnose minnow
Semotilus atromaculatus (Mitchill)	Creek chub
ICTALURIDAE	
Ictalurus punctatus (Rafinesque)	Channel catfish
Noturus sp.	Madtom
Pilodictis olivaris (Rafinesque)	Flathead catfish
CYPRINODONTIDAE	
Fundulus catenatus (Storer)	Northern studfish
CENTRARCHIDAE	
Ambloplites rupestris (Rafinesque)	Rock bass
Lepomis humilis (Girard)	Orangespotted sunfish
Lepomis macrochirus Rafinesque	Bluegill
Lepomis megalotis (Rafinesque)	Longear sunfish
Micropterus dolomieui Lacepede	Smallmouth bass
Micropterus punctulatus (Rafinesque)	Spotted bass
Micropterus salmoides (Lacepede)	Largemouth bass

Table I (Cont.)

PERCIDAE	
Etheostoma blennioides Rafinesque	Greenside darter
Etheostoma caeruleum Storer	Rainbow darter
Etheostoma rufilineatum (Cope)	Redlined darter
Percina caprodes (Rafinesque)	Logperch
COTTIDAE	
Cottus carolinae Gill	Banded sculpin

is composed of silt in the pools and rubble on the riffles. The maximum depth of the area that was sampled was 7.5 feet and the average depth was 4.6 feet. Available fish shelter consisted mainly of fallen timber and projecting tree roots. A total of 0.9 surface acre was sampled.

During the 3-day sampling period a total of 38 species of fish were collected from the Barren River. A list of the various species that were taken is presented in Table I. One species of madtom, *Noturus sp.*, has not as yet been positively identified.

A total of 2.1 surface acres of stream was sampled during 1958. The results of the population studies are summarized both by individual and combined areas (Table II).

A total of 1,164 fish which weighed 81.0 pounds was collected from the 3 areas. The game-fish population was made up of 4 species and constituted 3.9 percent of the total number and 17.6 percent of the total weight of all the samples. Panfish were represented by 2 species and made up 2.2 percent of the total number and 2.5 percent of the total weight of the samples. Edible rough fish made up 24.1 percent of the total number and 64.4 percent of the total weight of the samples. The bulk of this weight, 52.7 percent, or slightly more than one-half of the weight of the total sample, was composed of redhorses. Non-edible rough fish made up 0.3 percent of the total number and 4.4 percent of the total weight of the

Table II. Composition of fish population samples collected from Barren River prior to impoundment - September 1958.

Species	Area I		Area II		Area III		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.	No.	Wt.					
Smallmouth bass	1	0.26	20	5.25			1.9-11.3	21	5.51	1.80	6.80
Largemouth bass			3	0.25			3.3- 7.8	3	0.25	0.26	0.31
Spotted bass	5	2.64			2	1.94	5.7-12.6	7	4.58	0.60	5.65
Rock bass	3	0.15	12	3.76			3.5- 9.5	15	3.91	1.29	4.83
GAME FISH	9	3.05	35	9.26	2	1.94		46	14.25	3.95	17.59
Bluegill	3	0.05			1	0.02	2.1- 3.4	4	0.07	0.34	0.09
Longear sunfish	1	0.10	21	1.85			2.3- 6.3	22	1.95	1.89	2.40
PANFISH	4	0.15	21	1.85	1	0.02		26	2.02	2.23	2.49
Hogsucker	15	1.72	45	3.61	1	0.04	2.0-11.9	61	5.37	5.24	6.63
Spotted sucker	1	0.74					12.0	1	0.74	0.09	0.91
Redhorses	25	4.51	183	34.55	6	3.62	2.1-14.1	214	42.68	18.38	52.68
Channel catfish	1	2.00					18.0	1	2.00	0.09	2.47
Flathead catfish	4	1.41					5.5-13.6	4	1.41	0.34	1.74
EDIBLE ROUGH FISH	46	10.38	228	38.16	7	3.66		281	52.20	24.14	64.43
Longnose gar					1	0.53	19.8	1	0.53	0.08	0.65
Gizzard shad	3	3.02					12.7-13.8	3	3.02	0.26	3.73
NON-EDIBLE ROUGH FISH	3	3.02			1	0.53		4	3.55	0.34	4.38
Lampreys	3	0.02					6.3- 7.3	3	0.02	0.26	0.03
Misc. minnows	11	0.18	765	8.59	11	0.07	1.1- 8.3	800	8.94	68.72	11.03
Misc. darters	3	0.03	13	0.10			2.4- 5.1	3	0.03	0.26	0.04
Orangespotted sunfish			1	0.01			3.7	1	0.01	0.09	0.01
FORAGE FISH	17	0.23	779	8.70	11	0.07		807	9.00	69.33	11.11
TOTALS	79	16.83	1,063	57.97	22	6.22		1,164	81.02	99.99	100.00

samples. Forage species constituted 69.3 percent of the total number and 11.1 percent of the total weight of the samples.

The population samples obtained from Areas I and III were considerably smaller than the sample from Area II. This may be attributed to the comparatively greater depths and turbidity in these 2 areas and also as the result of mechanical failure of the electric shocker.

Middle Fork of the Kentucky River

The headwaters of the Middle Fork of the Kentucky River rise in the mountains of Harlan and Leslie Counties. After leaving Leslie County the stream flows northwest through Perry and Breathitt Counties and into Lee County where it joins the North and South Forks to form the Kentucky River.

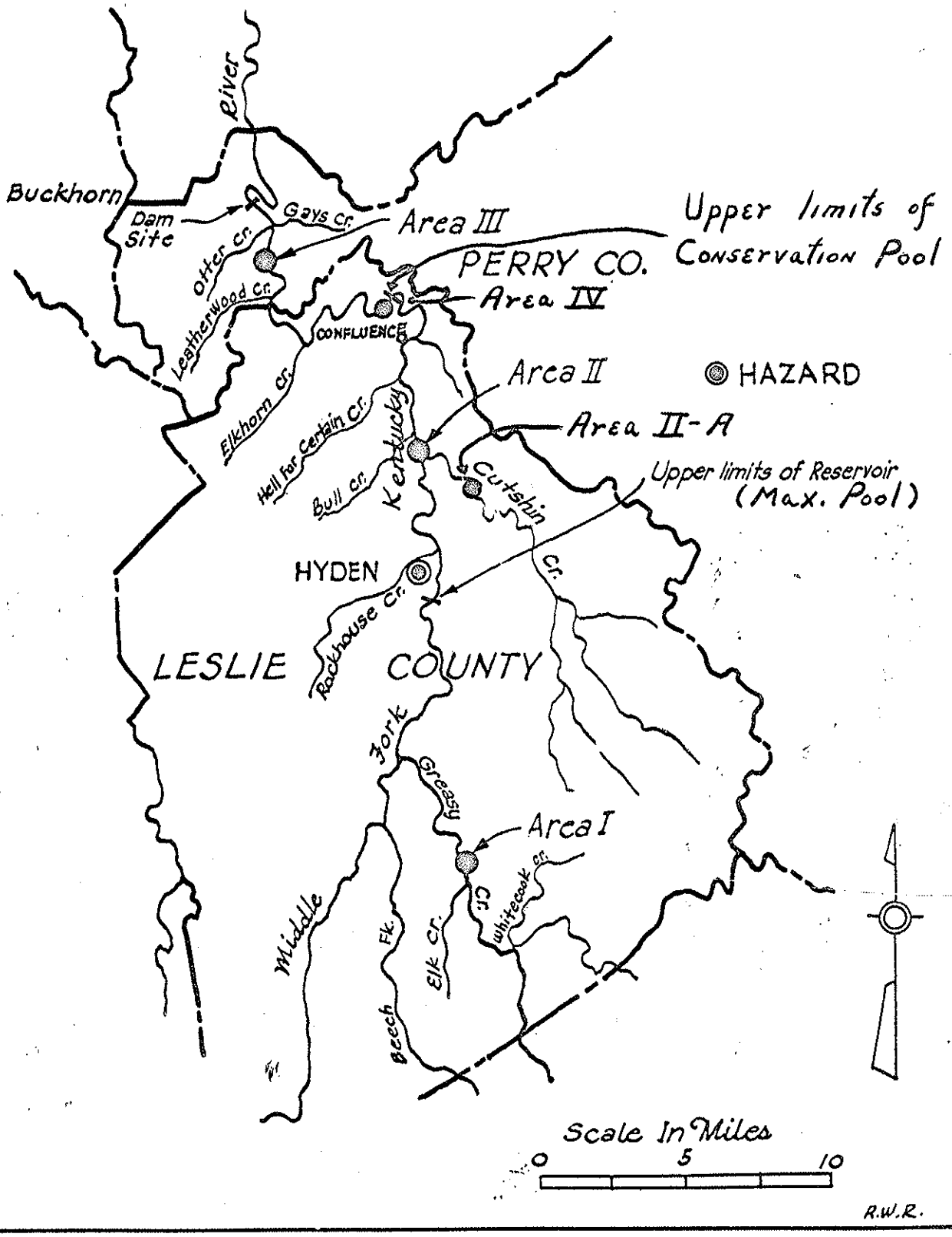
A dam now under construction at Buckhorn, Kentucky, is scheduled to be completed in 1960, and will impound waters to a point some 3 miles above the town of Hyden. The flood-control reservoir will have a permanent winter pool consisting of 555 surface acres, a summer conservation pool of approximately 1,200 surface acres, and a flood-control pool of approximately 3,610 surface acres.

Three areas were sampled on the Middle Fork during 1957 by means of the electric shocker. In 1958, 2 of these same areas plus 2 different areas were sampled. One of the areas (Area IV) was sampled by rotenone. The location of these areas is shown in Figure 2. A brief description of the sampling areas are given below.

Area I is located on Greasy Creek about 2.5 miles below the mouth of Elk Creek. The immediate banks are very precipitous and in many places outcroppings of sandstone and shale border the stream. Vegetation along the banks is predominantly laurel, Laurus sp., rhododendron, Rhododendron sp., hemlock, Tsuga canadensis, bigleaf magnolia, Magnolia macrophylla,

MIDDLE FORK OF THE KENTUCKY RIVER

FIG. 2



and other shade and moisture tolerant species indigenous to the mountainous areas of Eastern Kentucky. Bottomlands are essentially limited, the stream banks themselves giving way to steep mountains with extensive stands of beech, Fagus grandifolia. The bottom composition of the stream ranges from pebbles to large boulders, the latter providing most of the available fish shelter. The maximum depth of the pools was 5.5 feet and the average depth 3.3 feet. On 7 June 1957, the surface temperature of the stream was 77° F., the pH was 7.5, and the total alkalinity 29 ppm. On 10 June 1958, the surface temperature was 75° F., the pH was 7.3, and the total alkalinity 8 ppm. A total of 2.9 surface acres was sampled during 1957 and 1958.

Area II is located on the Middle Fork proper approximately mid-way between the towns of Hyden and Confluence, near the mouth of Bull Creek. The stream banks are narrowly fringed with typical flood-plain trees, chiefly black willow, Salix nigra, red birch, Betula nigra, and a few large sycamores, Platanus occidentalis. Beyond this fringe of trees is a narrow strip of bottomland which gives way abruptly to steep mountains covered with dense stands of beech and its hardwood associates. The stream bottom is mainly of sand and silt composition with a few very large and scattered boulders. The pools are long and deep and at the time the study was made the maximum depth was 8.1 feet and the average depth 4.5 feet. Aquatic vegetation was present but it was sparse and consisted of small amounts of water willow, Dianthera americana, on the riffles. Fish shelter consisted of large boulders and numerous submerged logs and plant roots along the banks. A total of 3.9 surface acres was sampled in this area during 1957, but the water was too deep to sample effectively with the electric shocker and was therefore replaced by an alternate area in 1958, Area II-A.

Area II-A is located on Cutshin Creek about 2.5 miles above its mouth. The immediate watershed is much the same as that in Area II, but the stream

conditions are somewhat different, chiefly in respect to depth. The maximum depth of the study pool was 4.8 feet and the average depth was 2.7 feet. Large boulders were also very numerous and they provided a maximum of fish shelter. A total of 1.0 surface acre was sampled during 1958.

Area III is located approximately 2 miles above the dam site on the Middle Fork and is physiographically similar to Area II. The bottomlands are perhaps a little more extensive and the channel somewhat deeper. The bottom composition is of sand and silt in the pools and rubble in the riffles. Water willow is very dense on the riffles and the flow of water is restricted to a narrow passage and during the drought years a series of potholes are formed. The maximum depth of the pools was 9.7 feet and the average depth 4.8 feet. A total of 1.5 surface acres was sampled in 1957 and again in 1958.

Area IV is located on the Middle Fork about 5 stream miles below the town of Confluence. A pool consisting of 2.0 surface acres was sampled by rotenone on 24 September 1958. The maximum depth of this pool was 7.6 feet and the average depth 4.1 feet. On the above date the surface temperature was 71° F. and the total alkalinity 63 ppm.

The stream gradient from the mouth of Greasy Creek downstream to the town of Buckhorn, Kentucky, is 5.4 feet per mile.

During the 3 population studies in 1957, 37 species of fishes were collected. During the 1958 studies, 14 additional species were collected (Table III). Of these 14 additional species taken in 1958, 11 were collected by rotenone from Area IV. Two specimens, 1 madtom (Noturus sp.) and 1 darter (Etheostoma sp.) have not as yet been positively identified.

A total of 12.9 surface acres of stream was sampled on Middle Fork during 1957 and 1958. The results of the population studies, both years

Table III. List of fishes collected from Middle Fork of the Kentucky River during 1957 and 1958 population studies.

PETROMYZONTIDAE	
Ichthyomyzon sp.	Lamprey (ammocoete)
Lampetra lamottei (Le Sueur)	American brook lamprey
LEPISOSTEIDAE	
Lepisosteus osseus (Linnaeus)	Longnose gar
CATOSTOMIDAE	
Carpiodes cyprinus (Le Sueur)	Quillback carpsucker
Hypentelium nigricans (Le Sueur)	Hogsucker
Moxostoma anisurum (Rafinesque)	Silver redhorse
Moxostoma breviceps (Cope)	Ohio redhorse
Moxostoma duquesnei (Le Sueur)	Black redhorse
Moxostoma erythrurum (Rafinesque)	Golden redhorse
CYPRINIDAE	
Campostoma anomalum (Rafinesque)	Stoneroller
Ericymba buccata Cope	Silverjaw minnow
Hybopsis amblops (Rafinesque)	Bigeye chub
Hybopsis dissimilis (Kirtland)	Spotted chub
Hybopsis micropogon (Cope)	River chub
Notropis ariommus (Cope)	Popeye shiner
Notropis atherinoides Rafinesque	Emerald shiner
Notropis buchanani Meek	Ghost shiner
Notropis cornutus Mitchill	Common shiner
Notropis deliciosus (Girard)	Sand shiner
Notropis photogenis (Cope)	Silver shiner
Notropis rubellus (Agassiz)	Rosyface shiner
Notropis spilopterus (Cope)	Spotfin shiner
Notropis volucellus (Cope)	Mimic shiner
Notropis whipplei (Girard)	Steelcolor shiner
Phenacobius mirabilis (Girard)	Suckermouth minnow
Pimephales notatus (Rafinesque)	Bluntnose minnow
Semotilus atromaculatus (Mitchill)	Creek chub
ICTALURIDAE	
Ictalurus punctatus (Rafinesque)	Channel catfish
Noturus sp.	Madtom
Pilodictis olivaris (Rafinesque)	Flathead catfish
ATHERINIDAE	
Labidesthes sicculus (Cope)	Brook silversides
CENTRARCHIDAE	
Ambloplites rupestris (Rafinesque)	Rock bass
Lepomis cyanellus Rafinesque	Green sunfish
Lepomis megalotis (Rafinesque)	Longear sunfish
Micropterus dolomieui Lacepede	Smallmouth bass
Micropterus punctulatus (Rafinesque)	Spotted bass
Pomoxis annularis Rafinesque	White crappie

Table III (Cont.)

PERCIDAE	
Ammocrypta pellucida (Baird)	Eastern sand darter
Etheostoma blennioides Rafinesque	Greenside darter
Etheostoma caeruleum Storer	Rainbow darter
Etheostoma flabellare Rafinesque	Fantail darter
Etheostoma kennicotti Putnam	Stripetail darter
Etheostoma nigrum Rafinesque	Johnny darter
Etheostoma variatum Kirtland	Variegated darter
Etheostoma zonale (Cope)	Banded darter
Etheostoma sp.	
Percina caprodes (Rafinesque)	Logperch
Percina maculata (Girard)	Blackside darter
Percina phoxocephala (Nelson)	Slenderhead darter
Percina sciera (Swain)	Dusky darter
SCIAENIDAE	
Aplodinotus grunniens Rafinesque	Freshwater drum

combined, are summarized in Table IV. The total weights and total numbers of fish are compiled separately for each study area, and the 4 areas are also summarized collectively. The population sample collected from alternate Area II-A is combined with Area II for presentation in the table.

A total of 2,526 fish which weighed 184.3 pounds was collected during the studies. Game fish, represented by 4 species, made up 4.3 percent of the total number and 11.9 percent of the total weight of the combined samples. Panfish, represented by 2 species, made up 2.5 percent of the total number and 1.3 percent of the total weight of the samples. Edible rough fish constituted 34.3 percent of the total number 73.7 percent of the total weight of the samples. More than one-half of the total weight of the combined samples (55.2 percent) was made up of 4 species of redhorses. Non-edible rough fish, consisting solely of longnose gar, represented 0.5 percent of the total number and 1.7 percent of the total weight of the samples. Forage species constituted 58.3 percent of the total number and 11.4 percent of the total weight of the samples.

Table IV. Composition of fish population samples collected from Middle Fork of the Kentucky River prior to impoundment - 1957 and 1958 study areas combined.

Species	Area I		Area II		Area III		Area IV		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.					
Smallmouth bass	30	5.80	15	4.95	15	4.05	6	1.11	2.0-14.3	66	15.91	2.61	8.63
Spotted bass	4	0.62	3	0.20	6	0.67	3	0.69	4.1- 9.0	16	2.18	0.63	1.18
Rock bass	12	1.94	5	0.49	4	0.81	5	0.20	2.1- 8.2	26	3.44	1.03	1.87
White crappie							1	0.35	9.0	1	0.35	0.04	0.19
GAME FISH	46	8.36	23	5.64	25	5.53	15	2.35		109	21.88	4.31	11.87
Green sunfish							11	0.24	2.0- 5.2	11	0.24	0.43	0.13
Longear sunfish	8	0.59	12	0.63	22	0.73	11	0.22	1.5- 6.0	53	2.17	2.10	1.18
PANFISH	8	0.59	12	0.63	22	0.73	22	0.46		64	2.41	2.53	1.31
Hogsucker	20	1.64	19	2.34	13	2.32	2	0.06	3.0-11.8	54	6.36	2.14	3.45
Redhorses	119	34.19	356	34.19	140	20.01	86	13.35	2.3-14.0	701	101.74	27.75	55.22
Channel catfish	2	4.29			1	2.44	44	3.15	2.1-21.0	47	9.88	1.86	5.36
Flathead catfish	5	4.45					37	0.60	2.0-18.2	42	5.05	1.66	2.74
Quillback	2	0.59	4	0.94	2	0.60	6	2.72	8.3-11.0	14	4.85	0.55	2.63
Freshwater drum					1	1.10	7	6.86	9.0-16.0	8	7.96	0.32	4.32
EDIBLE ROUGH FISH	148	45.16	379	37.47	157	26.47	182	26.74		866	135.84	34.28	73.72
Longnose gar			2	0.30	9	2.52	2	0.34	9.4-19.2	13	3.16	0.51	1.72
NON-EDIBLE ROUGH FISH			2	0.30	9	2.52	2	0.34		13	3.16	0.51	1.72
Lampreys	12	0.13			1	0.04			4.4- 6.4	13	0.17	0.51	0.09
Madtoms							3	0.02	1.6- 2.7	3	0.02	0.12	0.01
Brook silversides			2	0.02			3	0.03	2.0- 2.8	5	0.05	0.20	0.03
Misc. minnows	327	4.44	247	4.79	400	5.79	251	2.68	1.3- 7.0	1,225	17.70	48.49	9.61
Misc. darters	53	0.52	14	0.21	62	0.83	99	1.47	1.3- 5.6	228	3.03	9.03	1.64
FORAGE FISH	392	5.09	263	5.02	463	6.66	356	4.20		1,474	20.97	58.35	11.38
TOTALS	594	59.20	679	49.06	676	41.91	577	34.09		2,526	184.26	99.98	100.00

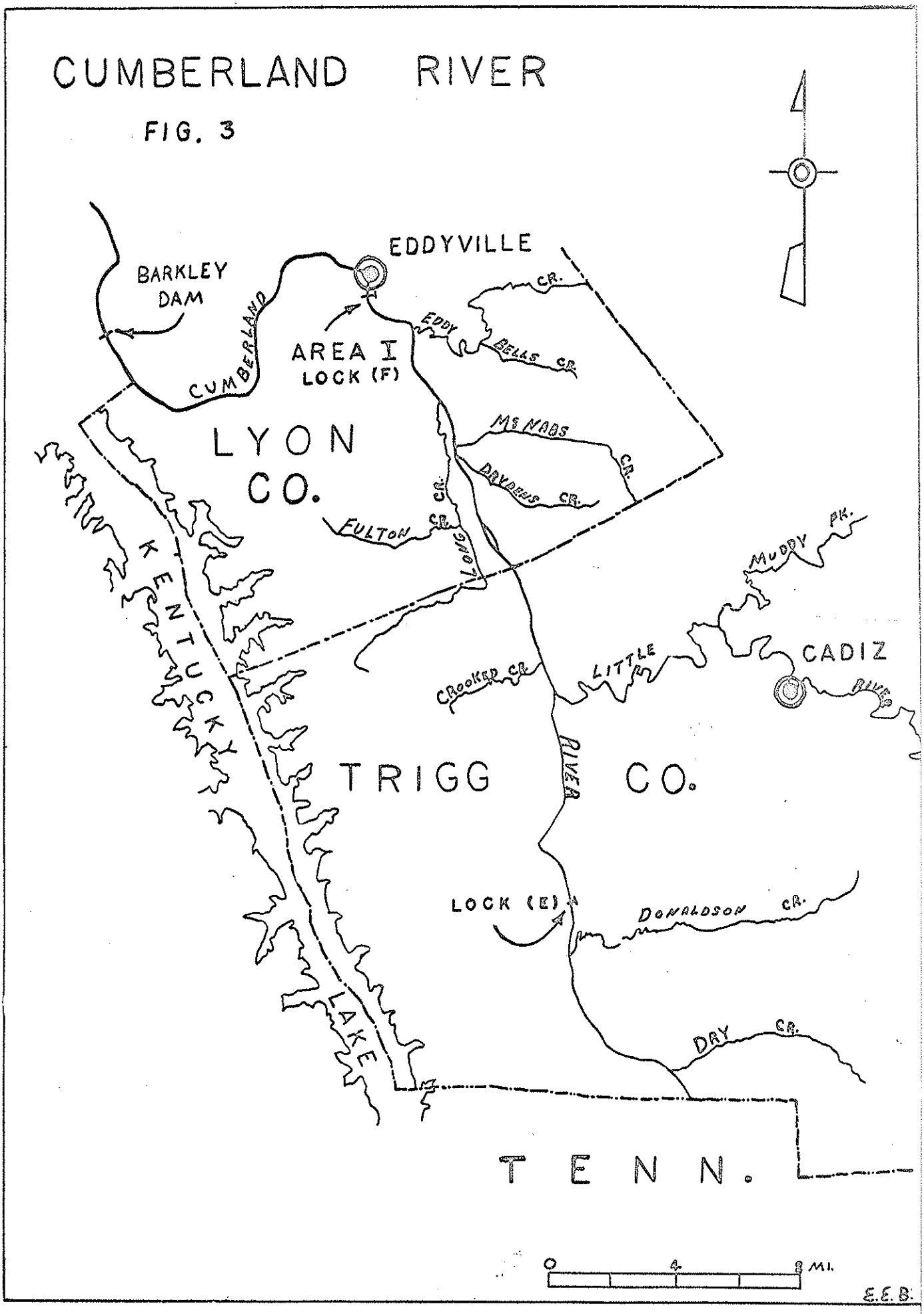
The largemouth bass was not taken in any of the population samples from Middle Fork. This species should be stocked in the reservoir soon after impoundment since it is a favorite among Kentucky fishermen.

The muskellunge, Esox masquinongy, is a native species to Middle Fork as has been shown by past creel census records. There is much speculation as to whether or not the "muskie" will become established in Buckhorn Reservoir. If this species will move into the headwaters and spawn it is likely that a muskie fishery will be established. Although some of the local fishermen are inclined to regard the "pike" as an undesirable glutton, its value as a predator and the undaunted efforts of a large and select group of muskie fishermen cannot be denied. Such a fishery would be unique and would be a major fishing attraction in Kentucky. There is also some hope that a muskie fishery will become established in Barren #2 Reservoir.

Cumberland River

The Cumberland River rises in the mountains of Eastern Kentucky in Letcher and Harlan Counties. The stream flows in a general westerly course, dips into Tennessee and re-enters Kentucky to empty into the Ohio River at Smithland in Livingston County. A multiple-purpose dam, for flood control, power, and navigation, is now under construction and is scheduled to be completed in 1963. The dam site is located in Livingston and Lyon Counties at a point 30.5 miles above the mouth of the Cumberland River. The dam will impound waters that will parallel Kentucky Lake for some 118 miles in Kentucky and Tennessee. The reservoir will have a summer pool of 62,000 surface acres and will extend upstream to Cheatham Lock and Dam, now under construction, near Ashland City, Tennessee.

The fish population of the Cumberland River was sampled during 1958 by making lock-chamber studies on 2 different occasions. Lock "F" at


CUMBERLAND RIVER
FIG. 3
EDDYVILLE
BARKLEY DAM
CUMBERLAND
AREA I
LOCK (F)
EDDY
CR.
BELLS CR.
McNABS CR.
DRYDENS CR.
LYON CO.
FULTON CR.
LONG CR.
KENTUCKY
MUDDY PK.
CADIZ
CROOKER CR.
LITTLE R.
TRIGG CO.
RIVER
LOCK (E)
DONALDSON CR.
LAKE
DRY CR.
TENN.
0 4 8 MI.
E.E.B.

Eddyville was sampled on 8 July and 4 September by rotenone. The lock chamber has a surface area of 0.36 acre and is located about 13 stream miles above the dam site, Figure 3. The 2 samples disclosed a total of 27 species of fish, Table V.

A total of 0.72 surface acre was sampled on the Cumberland River during 1958. The results of the 2 population studies are compiled both separately and combined in Table VI.

A total of 2,513 fish which weighed 417.4 pounds was taken during the studies. Only 2 species of game fish were collected in the samples, white bass and white crappie, and they made up only 0.1 percent of the total number and 0.5 percent of the total weight. Panfish recovery was also very low in the samples; 2 species which were represented by 2 fish made up 0.1 percent of the total number and 0.1 percent of the total weight. Edible rough fish constituted 38.3 percent of the total number and 40.6 percent of the total weight of the samples. Numerically the freshwater drum was the dominant species in this category but the bulk of the weight was composed of carp. Non-edible rough fish were foremost in both numbers and weight, and constituted 46.7 percent of the former and 55.3 percent of the latter. The gizzard shad was by far the most abundant fish and also more than one-half (51.0 percent) of the total weight of the samples was composed of this species. Forage fish made up 14.8 percent of the total number and 3.5 percent of the total weight of the samples.

In general, the lock-chamber studies have indicated an extremely low population of game fish and panfish as compared to the samples collected from the other streams by various methods. Charles (1958) reported a low sport-fish population in the Ohio River as revealed by a large series of lock-chamber studies. It is possible that lock-chamber studies may be less reliable than open-stream rotenone studies as a method of determining

Table V. List of fishes collected from Lock "F" in the Cumberland River on 8 July and 4 September 1958.

POLYODONTIDAE	
Polyodon spathula (Walbaum)	Spoonbill
LEPISOSTEIDAE	
Lepisosteus platostomus Rafinesque	Shortnose gar
CLUPEIDAE	
Alosa chrysochloris Rafinesque	Skipjack herring
Dorosoma cepedianum (Le Sueur)	Gizzard shad
HIODONTIDAE	
Hiodon alosoides (Rafinesque)	Goldeye
CATOSTOMIDAE	
Carpiodes velifer (Rafinesque)	Highfin carpsucker
Ictiobus bubalus (Rafinesque)	Smallmouth buffalofish
Ictiobus cyprinellus (Valenciennes)	Bigmouth buffalofish
Ictiobus niger (Rafinesque)	Black buffalofish
CYPRINIDAE	
Cyprinus carpio Linnaeus	Carp
Hybopsis storeriana (Kirtland)	Silver chub
Notropis atherinoides Rafinesque	Emerald shiner
Notropis blennius (Girard)	River shiner
Notropis rubellus (Agassiz)	Rosyface shiner
Notropis whipplei (Girard)	Steelcolor shiner
Pimephales vigilax (Baird and Girard)	Bullhead minnow
ICTALURIDAE	
Ictalurus furcatus (Le Sueur)	Blue catfish
Ictalurus melas (Rafinesque)	Black bullhead
Ictalurus punctatus (Rafinesque)	Channel catfish
Noturus nocturnus Jordan and Gilbert	Freckled madtom
Pilodictis olivaris (Rafinesque)	Flathead catfish
SERRANIDAE	
Roccus chrysops (Rafinesque)	White bass
CENTRARCHIDAE	
Lepomis macrochirus Rafinesque	Bluegill
Lepomis megalotis (Rafinesque)	Longear sunfish
Pomoxis annularis Rafinesque	White crappie
PERCIDAE	
Percina phoxocephala (Nelson)	Slenderhead darter
SCIAENIDAE	
Aplodinotus grunniens	Freshwater drum

Table VI. Composition of fish population samples collected from Lock "F" in the Cumberland River prior to impoundment-July and September 1958.

Species	Area I (July)		Area I (Sept.)		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.					
White bass	1	1.72			14.9	1	1.72	0.04	0.41
White crappie	1	0.44			10.0	1	0.44	0.04	0.11
GAME FISH	2	2.16				2	2.16	0.08	0.52
Bluegill			1	0.25	7.0	1	0.25	0.04	0.06
Longear sunfish			1	0.16	6.0	1	0.16	0.04	0.04
PANFISH			2	0.41		2	0.41	0.08	0.10
Paddlefish	2	4.02			27.1-28.0	2	4.02	0.08	0.96
Bigmouth buffalo	1	0.62			10.0	1	0.62	0.04	0.15
Black buffalo	2	1.08			10.2	2	1.08	0.08	0.26
Smallmouth buffalo	27	22.94	20	1.72	3.0-15.3	47	24.66	1.87	5.91
Highfin carpsucker	1	0.12			6.1	1	0.12	0.04	0.03
Carp	29	44.98	33	13.74	5.0-23.1	62	58.72	2.47	14.07
Blue catfish	7	3.18			5.1-20.0	7	3.18	0.28	0.76
Channel catfish	183	21.57	126	9.34	3.1-13.0	309	30.91	12.29	7.41
Flathead catfish	1	8.20	4	1.20	3.0-27.0	5	9.40	0.20	2.25
Black bullhead	2	1.14			9.1-11.1	2	1.14	0.08	0.27
Freshwater drum	484	24.70	41	10.78	3.0-15.3	525	35.48	20.89	8.50
EDIBLE ROUGH FISH	739	132.55	224	36.78		963	169.33	38.32	40.57
Shortnose gar	20	13.94			14.0-34.2	20	13.94	0.80	3.34
Goldeye	1	0.13			8.0	1	0.13	0.04	0.03
Skipjack herring	12	3.16	2	0.91	8.1-14.0	14	4.07	0.56	0.98
Gizzard shad	1059	192.79	80	19.96	7.1-15.0	1139	212.75	45.32	50.97
NON-EDIBLE ROUGH FISH	1092	210.02	82	20.87		1174	230.89	46.72	55.32
Gizzard shad	232	13.48	40	0.88	3.0- 6.9	272	14.36	10.82	3.44
Madtoms			1		1.8	1		0.04	
Misc. minnows	94	0.20	4	0.03	1.7- 4.3	98	0.23	3.90	0.05
Misc. darters			1	0.01	1.8	1	0.01	0.04	
FORAGE FISH	326	13.68	46	0.92		372	14.60	14.80	3.49
TOTALS	2159	358.41	354	58.98		2513	417.39	100.00	100.00

the fish population of a stream and should be supplemented by other types of sampling. Fish samples collected from some of the tributary streams would probably be of some benefit in this case, and would depict more clearly the population expected to occur in the reservoir.

Rough River

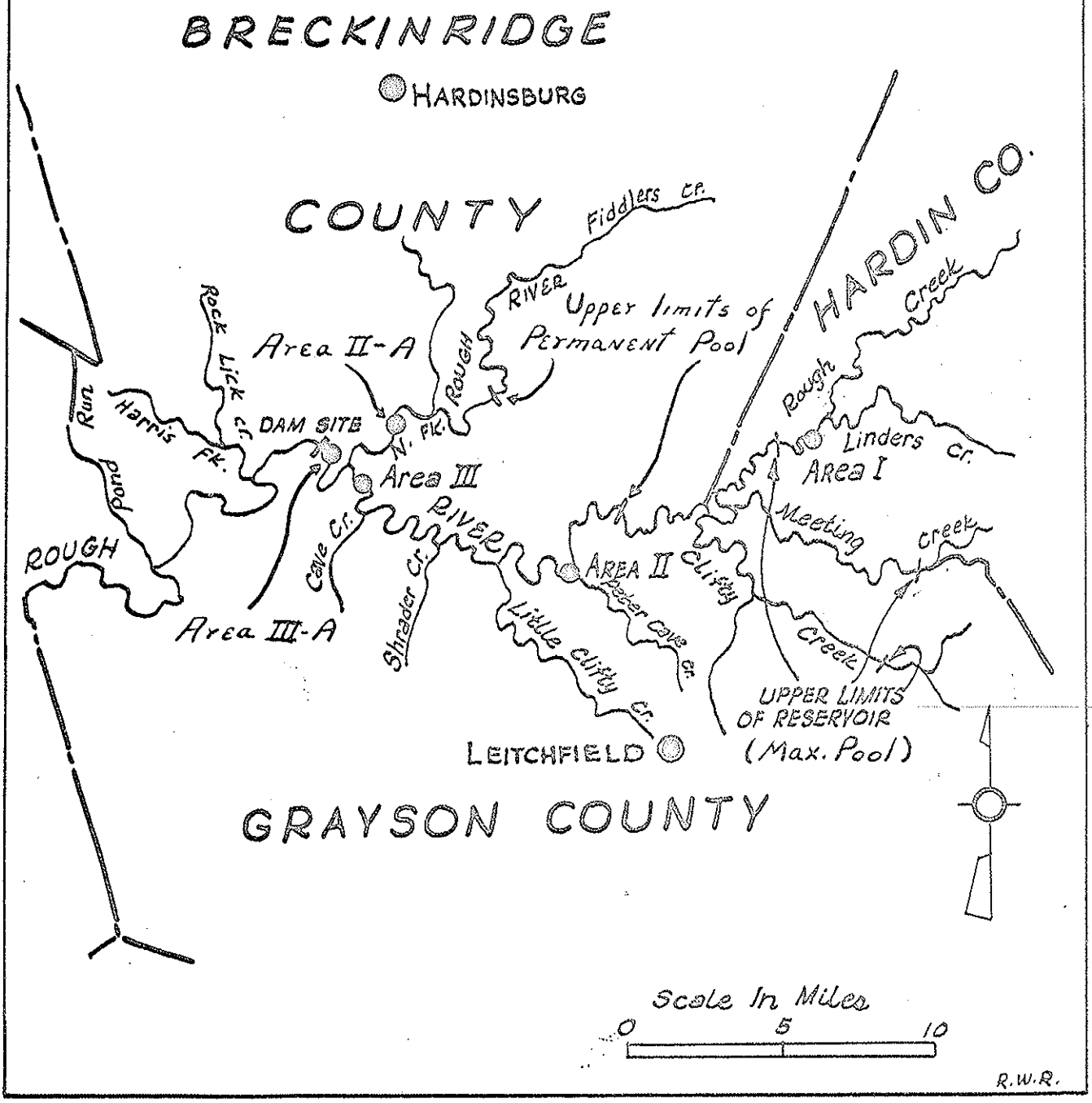
The Rough River rises in Hardin County in Western Kentucky and flows westward to form the Breckinridge-Grayson County boundary, then through Ohio County and empties into the Green River at Livermore in McLean County. The Rough River Dam in Breckinridge and Grayson Counties is located 89.3 miles above the mouth of the stream and is scheduled to be completed during the fall of 1959. The dam is 124 feet high and will impound a permanent pool of 1,600 surface acres, and a summer conservation pool of approximately 3,000 surface acres.

The fish population of the Rough River was sampled at 3 different areas, 2 within and 1 above the proposed limits of the impoundment, during 1957. Two alternate sampling areas, both within the limits of the future reservoir, were substituted for Areas II and III during 1958, Figure 4. A description of the sampling areas follows.

Area I is located on Rough Creek a short distance below the mouth of Linder's Creek in Hardin County, and is above the proposed limits of the flood storage pool. The watershed is hilly and slightly karsted and in the area adjacent to the stream it is densely wooded. The slope of the stream bed is rather steep in this area and has an average gradient of about 32 feet per mile. The stream bottom is composed of sand and silt in the pools and rubble and boulders on the riffles. The maximum depth of the pool that was sampled was 4.2 feet and the average depth 2.3 feet. Available fish shelter consists mainly of submerged logs and roots and

ROUGH RIVER

FIG. 4



occasional boulders. In 1957, 0.1 surface acre was sampled in this area by a minnow seine. In 1958, 0.4 surface acre was sampled by rotenone.

Area II is located at the mouth of Peter Cave Creek and is within the limits of the proposed reservoir. The immediate banks are very steep and are moderately wooded. Steep limestone bluffs arise a short distance from the banks and beyond are hills which are densely timbered with oak, Quercus sp., hickory, Carya sp., beech, F. grandifolia, and their hardwood associates. The maximum depth of the pool that was sampled was 10.6 feet and the average depth 5.1 feet. The pools are heavily silted and filled with detritus. The riffles are covered with silt, sand, and gravel and at these points the channel is clogged with brush, logs, and other debris. During the study many fish became lodged beneath this debris and could not be recovered. These same barriers provided an abundance of fish shelter in this area. On 26 September 1957 the surface temperature was 73° F., the pH was 7.7, and the total alkalinity 144 ppm. On this same date, 0.7 surface acre was sampled by rotenone.

Area II-A is located on the North Fork of Rough River, in Breckinridge County, about 2.5 miles above its mouth. This area was selected to replace Area II because it was extremely difficult to recover fish in that area. The watershed of Area II-A is densely wooded and the stream characteristics are essentially as those in Area II, but there are fewer log barriers. On 1 October 1958 the maximum depth in this area was 7.3 feet and the surface temperature was 58° F. A total of 0.5 surface acre was sampled by rotenone in this area.

Area III is located on Rough River proper a short distance above the mouth of North Fork. This area is essentially similar to Area II, and differs mainly in the respect that the channel is somewhat deeper. A total of 0.7 surface acre was sampled by rotenone in this area during 1957.

Table VII. List of fishes collected from Rough River during 1957 and 1958 population studies.

LEPISOSTEIDAE	
Lepisosteus osseus (Linnaeus)	Longnose gar
CLUPEIDAE	
Dorosoma cepedianum (Le Sueur)	Gizzard shad
ESOCIDAE	
Esox americanus Le Sueur	Central redfin pickerel
CATOSTOMIDAE	
Catostomus commersoni (Lacepede)	White sucker
Erimyzon oblongus (Mitchill)	Creek chubsucker
Hypentelium nigricans (Le Sueur)	Hogsucker
Minytrema melanops (Rafinesque)	Spotted sucker
Moxostoma duquesnei (Le Sueur)	Black redhorse
Moxostoma erythrurum (Rafinesque)	Golden redhorse
CYPRINIDAE	
Campostoma anomalum (Rafinesque)	Stoneroller
Hybopsis amblops (Rafinesque)	Bigeye chub
Notropis ardens Jordan	Rosefin shiner
Notropis atherinoides Rafinesque	Emerald shiner
Notropis cornutus Mitchill	Common shiner
Notropis fumeus Evermann	Ribbon shiner
Notropis heterolepis Eigenmann and Eigenmann	Blacknose shiner
Notropis photogenis (Cope)	Silver shiner
Notropis spilopterus (Cope)	Spotfin shiner
Notropis umbratilis (Girard)	Redfin shiner
Phenacobius mirabilis (Girard)	Suckermouth minnow
Pimephales notatus (Rafinesque)	Bluntnose minnow
Pimephales vigilax (Baird and Girard)	Bullhead minnow
Semotilus atromaculatus (Mitchill)	Creek chub
ICTALURIDAE	
Ictalurus natalis (Le Sueur)	Yellow bullhead
Ictalurus punctatus (Rafinesque)	Channel catfish
Noturus miurus Jordan	Brindled madtom
Noturus nocturnus Jordan and Gilbert	Freckled madtom
Pilodictis olivaris (Rafinesque)	Flathead catfish
APHREDODERIDAE	
Aphredoderus sayanus (Gilliams)	Pirate perch
CENTRARCHIDAE	
Ambloplites rupestris (Rafinesque)	Rock bass
Lepomis cyanellus Rafinesque	Green sunfish
Lepomis humilis (Girard)	Orangespotted sunfish
Lepomis macrochirus Rafinesque	Bluegill
Lepomis megalotis (Rafinesque)	Longear sunfish
Micropterus dolomieui Lacepede	Smallmouth bass
Micropterus punctulatus (Rafinesque)	Spotted bass
Pomoxis annularis Rafinesque	White crappie

Table VII. (Cont.)

PERCIDAE	
Etheostoma blennioides Rafinesque	Greenside darter
Etheostoma caeruleum Storer	Rainbow darter
Etheostoma flabellare Rafinesque	Fantail darter
Etheostoma kennicotti Putnam	Stripetail darter
Etheostoma nigrum Rafinesque	Johnny darter
Etheostoma squamiceps Jordan	Spottail darter
Etheostoma stigmaeum (Jordan)	Speckled darter
Percina caprodes (Rafinesque)	Logperch
Percina evides (Jordan and Copeland)	Gilt darter
Percina phoxocephala (Nelson)	Slenderhead darter
Percina sciera (Swain)	Dusky darter
SCIAENIDAE	
Aplodinotus grunniens Rafinesque	Freshwater drum
COTTIDAE	
Cottus carolinae Gill	Banded sculpin

Area III-A was selected and sampled in 1958 to replace Area III. This area is located at the dam site and extends from the dam upstream to the first log jam, a distance of 512 feet. On 2 October 1958 the maximum depth was 12.0 feet, the surface temperature was 49° F., and the total alkalinity 144 ppm. A total of 0.5 surface acre was sampled by rotenone on the above date.

During 1957 a total of 37 species of fish was collected from Rough River. In 1958, 13 additional species were taken which brings the total to 50 species collected during the 2 years, Table VII. Specimens of the dusky darter, *Percina evides*, possess some questionable characters which tend to place this fish in an intermediate position with the blackside darter, *Percina maculata*. At present this darter is listed as *P. evides* until its position is clarified.

A total of 2.9 surface acres was sampled on Rough River during the past 2 years. A total of 2,135 fish which weighed 117.3 pounds were taken in the samples. The results of the studies are compiled both separately

Table VIII. Composition of fish population samples collected from Rough River prior to impoundment - 1957 and 1958 study areas combined.

Species	Area I		Area II		Area III		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.	No.	Wt.					
Grass pickerel			3	0.41	1	0.07	6.3-10.1	4	0.48	0.19	0.41
Smallmouth bass	2	1.11					10.0-11.0	2	1.11	0.09	0.94
Spotted bass	3	0.50	2	1.10	9	8.84	1.0-14.0	14	10.44	0.66	8.90
Rock bass	11	2.13			4	0.01	2.0	15	2.14	0.70	1.82
White crappie					1	0.62	11.0	1	0.62	0.05	0.53
GAME FISH	16	3.74	5	1.51	15	9.54		36	14.79	1.69	12.60
Bluegill			9	0.16	6	0.25	1.6- 6.4	15	0.41	0.70	0.35
Green sunfish	2	0.15	11	0.29	1	0.01	2.1- 5.0	14	0.45	0.66	0.38
Longear sunfish			29	1.70	15	0.19	1.9- 6.0	44	1.89	2.06	1.61
PANFISH	2	0.15	49	2.15	22	0.45		73	2.75	3.42	2.34
Hogsucker	9	0.63					2.0- 9.0	9	0.63	0.42	0.54
Spotted sucker			20	6.37	2	0.03	3.0-14.0	22	6.40	1.03	5.45
White sucker			2	0.18			5.1- 7.3	2	0.18	0.09	0.15
Redhorses	27	13.03	35	14.68	62	10.26	1.8-15.1	124	37.97	5.81	32.36
Yellow bullhead			19	0.27	3	0.02	1.6- 5.2	22	0.29	1.03	0.25
Channel catfish			8	6.05	29	2.80	1.4-23.0	37	8.85	1.73	7.54
Flathead catfish			15	15.25	8	12.04	3.0-21.0	23	27.29	1.08	23.25
Freshwater drum					1	0.78	12.0	1	0.78	0.05	0.67
EDIBLE ROUGH FISH	36	13.66	99	42.80	105	25.93		240	82.39	11.24	70.21
Longnose gar					2	0.10	9.2-10.1	2	0.10	0.09	0.08
Gizzard shad					17	8.61	9.3-13.0	17	8.61	0.80	7.34
NON-EDIBLE ROUGH FISH					19	8.71		19	8.71	0.89	7.42
Madtoms			39	0.07	43	0.05	1.1- 5.0	82	0.12	3.84	0.10
Pirate perch					9	0.08	2.7- 3.3	9	0.08	0.42	0.07
Misc. minnows	132	1.63	275	1.83	669	2.14	1.6- 4.1	1076	5.60	50.40	4.77
Misc. darters	39	0.34	225	1.02	302	1.11	1.3- 6.1	566	2.47	26.51	2.11
Orangespotted sunfish	1	0.04	1	0.01	5	0.02	1.2- 4.5	7	0.07	0.33	0.06
Sculpins	14	0.26	6	0.07	7	0.04	1.7- 5.0	27	0.37	1.26	0.31
FORAGE FISH	186	2.27	546	3.00	1035	3.44		1767	8.71	82.76	7.42
TOTALS	240	19.82	699	49.46	1196	48.07		2135	117.35	100.00	99.99

and combined in Table VIII. The alternate areas sampled during 1958 are compiled with the respective areas sampled during 1957.

Game fish, represented by 5 species, made up 1.7 percent of the total number and 12.6 percent of the total weight of the samples. Three species of panfish made up 3.4 percent of the total number and 2.3 percent of the total weight of the samples. Edible rough fish, of which numerically more than one-half were redhorses, constituted 11.2 percent of the total number and 70.2 percent of the total weight of the samples. Flathead and channel catfishes made up a large portion of this weight, and were second only to redhorses in this respect. Non-edible rough fish, composed of longnose gar and gizzard shad, made up 1.0 percent of the total number and 7.4 percent of the total weight of the samples. A relatively high number of forage fish occurred in the samples, 82.8 percent, and these constituted 7.4 percent of the total weight.

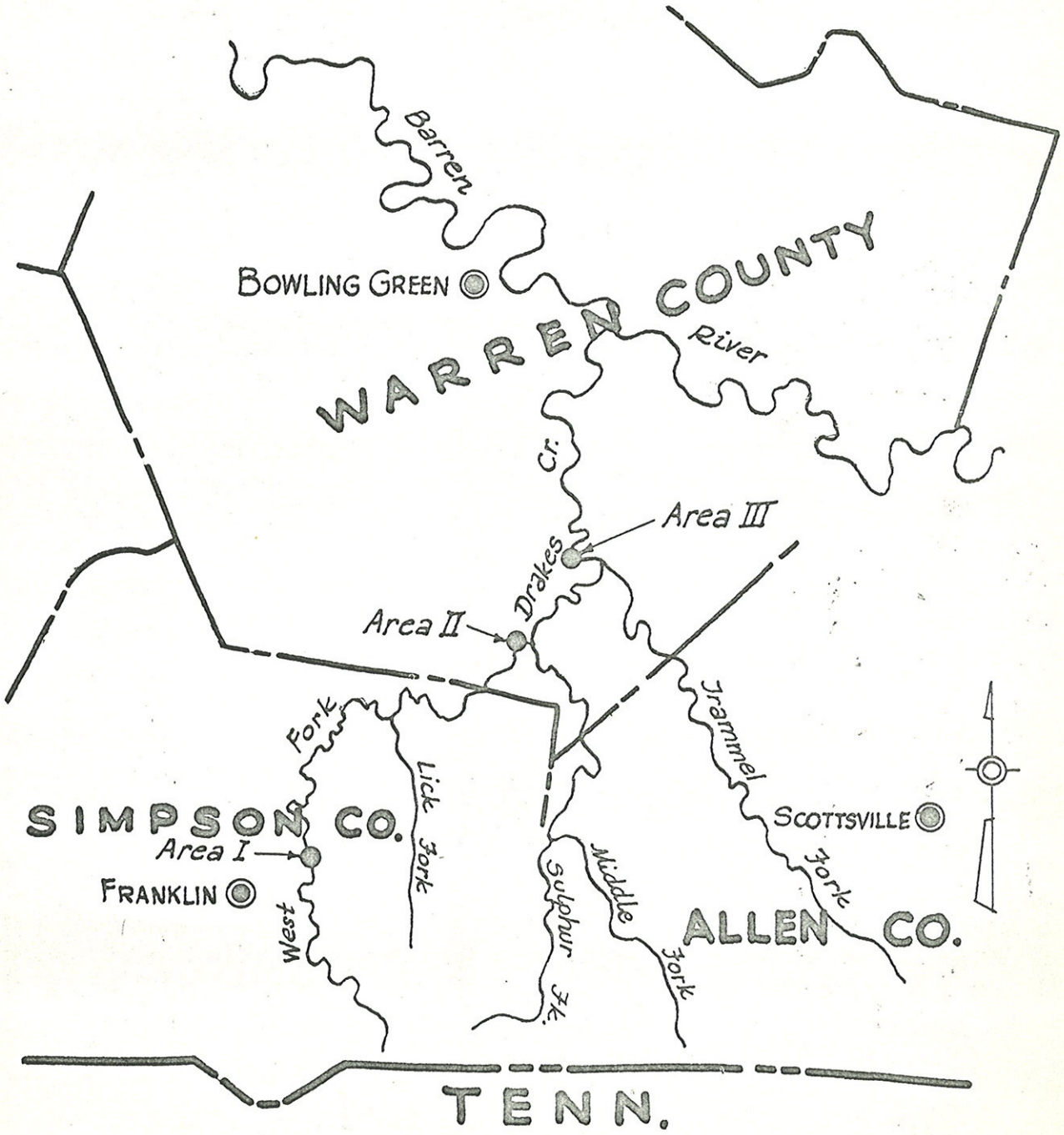
As in the Middle Fork of the Kentucky River, an absence of largemouth bass was also indicated by the samples collected from the Rough River. It is recommended that the extant game fish population of the Rough River be supplemented with largemouth bass as soon as possible after impoundment.

Drake's Creek

Drake's Creek rises in North-central Tennessee, flows north and enters Kentucky in Simpson County. The stream continues north through Simpson County and into Warren County where it empties into the Barren River. This stream is not proposed for impoundment as are the others, but a knowledge of the fish population of Drake's Creek was encouraged by public demand.

Three areas were sampled on Drake's Creek by an electric shocker in 1957 (Figure 5). A brief description of these areas is given below.

DRAKES CREEK
FIG. 5



Scale In Miles
0 5 10

R.W.R.

Area I is located on the West Fork of Drake's Creek in Simpson County directly east of a point 3 miles due north of Franklin, the county seat. In this area the stream has cut its way through low upland hills and has exposed outcroppings of limestone bedrock along the banks. The hills are moderately timbered with beech, oak, and hickory, and beech and sycamore are the principal trees along the stream banks. The stream bed is predominantly composed of rubble with at most a thin layer of silt in the pools. The pool that was sampled had a maximum depth of 4.3 feet and an average depth of 3.0 feet. Aquatic vegetation was sparse in this area and most of the available fish shelter was provided by logs and projecting ledges. A total of 0.5 surface acre was sampled during September.

Area II is located above the mouth of Middle Fork approximately 2 miles north of the Warren-Simpson County boundary. The watershed in this area is moderately cultivated and pastured. The stream banks are narrowly lined with typical flood-plain trees, sycamore and red birch being most abundant. The stream bed is composed of gravel and the pools are somewhat more silted than in Area I. The maximum depth of the pool that was sampled was 7.1 feet and the average depth 3.2 feet. Most of the available fish shelter consisted of submerged logs and occasional large boulders. On 9 September 1957 the water temperature was 72° F., the pH was 7.9, and the total alkalinity 124 ppm. A total of 0.6 surface acre was sampled on the above date.

Area III is located approximately 1 mile below the mouth of Trammel Fork in Warren County. The watershed in this area is to a large extent under cultivation and only a few small scattered woodlots remain intact. The stream bed is composed of rubble and boulders and there is a moderate deposit of silt in the pools. The maximum depth of the pool that was sampled was 7.3 feet and the average depth 3.5 feet. Large boulders were

Table IX. List of fishes collected from Drake's Creek on September 10 and 11, 1957.

LEPISOSTEIDAE	
Lepisosteus osseus (Linnaeus)	Longnose gar
CLUPEIDAE	
Dorosoma cepedianum (Le Sueur)	Gizzard shad
CATOSTOMIDAE	
Hypentelium nigricans (Le Sueur)	Hogsucker
Minytrema melanops (Rafinesque)	Spotted sucker
Moxostoma breviceps (Cope)	Ohio redhorse
Moxostoma duquesnei (Le Sueur)	Black redhorse
Moxostoma erythrurum (Rafinesque)	Golden redhorse
CYPRINIDAE	
Campostoma anomalum (Rafinesque)	Stoneroller
Hybopsis amblops (Rafinesque)	Bigeye chub
Hybopsis insignis Hubbs and Crowe	Blotched chub
Notropis ardens Jordan	Rosefin shiner
Notropis cornutus (Rafinesque)	Common shiner
Notropis photogenis (Cope)	Silver shiner
Notropis rubellus (Agassiz)	Rosyface shiner
Notropis spilopterus (Cope)	Spotfin shiner
Pimephales notatus (Rafinesque)	Bluntnose minnow
Semotilus atromaculatus (Mitchill)	Creek chub
CYPRINODONTIDAE	
Fundulus olivaceous Storer	Blackspotted topminnow
ATHERINIDAE	
Labidesthes sicculus (Cope)	Brook silversides
CENTRARCHIDAE	
Ambloplites rupestris (Rafinesque)	Rock bass
Lepomis cyanellus Rafinesque	Green sunfish
Lepomis humilis (Girard)	Orangespotted sunfish
Lepomis macrochirus Rafinesque	Bluegill
Lepomis megalotis (Rafinesque)	Longear sunfish
Micropterus dolomieui Lacepede	Smallmouth bass
Micropterus puntulatus (Rafinesque)	Spotted bass
Micropterus salmoides (Lacepede)	Largemouth bass
PERCIDAE	
Etheostoma blennioides Rafinesque	Greenside darter
Etheostoma camurum (Cope)	Bluebreast darter
Etheostoma flabellare Rafinesque	Fantail darter
Etheostoma stigmaeum (Jordan)	Speckled darter
Etheostoma zonale (Cope)	Banded darter
Percina caprodes (Rafinesque)	Logperch
Percina phoxocephala (Nelson)	Slenderhead darter
COTTIDAE	
Cottus carolinae Gill	Banded sculpin

Table X. Composition of fish population samples collected from Drake's Creek during September 1957.

Species	Area I		Area II		Area III		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.	No.	Wt.					
Smallmouth bass	4	4.81	6	2.82	2	0.32	2.6-15.6	12	7.95	1.22	5.00
Spotted bass	4	0.86	8	2.56	1	0.24	3.6-12.1	13	3.66	1.32	2.30
Largemouth bass	3	0.99			2	0.08	3.3-12.4	5	1.07	0.51	0.67
Rock bass	5	1.23	2	0.22	3	0.78	4.8- 8.8	10	2.23	1.02	1.40
GAME FISH	16	7.89	16	5.60	8	1.42		40	14.91	4.07	9.37
Green sunfish	1	0.03					4.0	1	0.03	0.10	0.02
Bluegill	1	0.12	1	0.03			3.5- 5.4	2	0.15	0.20	0.09
Longear sunfish	39	3.48	17	1.19	6	0.44	1.0- 5.9	62	5.11	6.31	3.21
PANFISH	41	3.63	18	1.22	6	0.44		65	5.29	6.62	3.32
Hogsucker	14	6.30	30	2.72	6	0.56	2.9-14.7	50	9.58	5.10	6.02
Spotted sucker	3	0.31	4	0.23			3.9- 6.7	7	0.54	0.71	0.34
Redhorses	144	62.37	47	27.43	54	15.14	3.0-19.5	245	104.94	24.94	65.97
EDIBLE ROUGH FISH	161	68.98	81	30.38	60	15.70		302	115.06	30.75	72.34
Longnose gar					1	0.30	17.6	1	0.30	0.10	0.19
Gizzard shad	30	7.90	6	3.91	5	4.98	8.0-14.7	41	16.79	4.17	10.55
NON-EDIBLE ROUGH FISH	30	7.90	6	3.91	6	5.28		42	17.09	4.28	10.74
Misc. minnows	120	0.78	279	4.32	53	0.43	2.0- 6.5	452	5.53	46.03	3.48
Topminnows			2	0.02			1.0- 3.0	2	0.02	0.20	0.01
Brook silversides			1	0.01			2.0	1	0.01	0.10	0.01
Orangespotted sunfish	12	0.20			5	0.13	2.1- 3.9	17	0.33	1.73	0.21
Misc. darters	6	0.08	18	0.32	30	0.35	2.0- 6.0	54	0.75	5.50	0.47
Sculpins			5	0.05	2	0.02	3.0- 3.7	7	0.07	0.71	0.04
FORAGE FISH	138	1.06	305	4.72	90	0.93		533	6.71	54.27	4.22
TOTALS	386	89.46	426	45.83	170	23.77		982	159.06	99.99	99.99

numerous and provided most of the fish shelter in this area. A total of 0.7 surface acre was sampled by an electric shocker.

During the brief study a total of 35 species of fish were collected from Drake's Creek (Table IX).

A total of 1.8 surface acres was sampled on Drake's Creek and the results are summarized both by separate and combined areas in Table X.

A total of 982 fish which weighed 159.1 pounds was recovered from the 3 areas. Four species of game fish were collected and they constituted 4.4 percent of the total number and 9.4 percent of the total weight of the samples. Panfish, represented by 3 species, made up 6.6 percent of the total number and 3.3 percent of the total weight of the samples. Edible rough fish constituted 30.7 percent of the total number and 72.3 percent of the total weight of the samples. Non-edible rough fish comprised 4.3 percent of the total number and 10.7 percent of the total weight of the samples. Forage species made up 54.3 percent of the total number and 4.2 percent of the total weight of the samples.

Stream conditions were excellent for the effective operation of the electric shocker throughout the entire study. The depth and transparancy of the water in all 3 sampling areas were ideal for optimum shocking capacity and good recovery.

Levisa Fork and Russell Fork of the Big Sandy River

The Levisa Fork of the Big Sandy River rises in Virginia and flows northwest into Pike County, Kentucky. The stream winds through Pike and Floyd Counties and then flows north through Johnson County and into Lawrence County. The confluence of the Levisa and Tug Forks at Louisa in Lawrence County forms the Big Sandy River.

A flood-control reservoir has been authorized on Levisa Fork in Pike County near Fishtrap, Kentucky. The proposed height of Fishtrap Dam is 161 feet and would maintain a reservoir of approximately 810 surface acres at conservation pool stage.

The fish population of Levisa Fork was sampled by an electric shocker in 4 different areas during October 1956 (see Kirkwood 1957). The areas that were sampled are outlined in Figure 6 and their description as follows is taken from Kirkwood.

Area I. Levisa Fork 1 mile downstream from Virginia in Pike County.

Width - - - - - 60 feet
Depth - - - - - 1 to 5 feet, average 2.5 feet
Bottom - - - - Boulders, some gravel
Bank - - - - - Hardwood trees and large boulders
Water - - - - - Black from coal washing operations
Temperature - - 64.4° F.

Area II. Confluence of Russell Fork and Levisa Fork in Pike County.

Width - - - - - 70 feet
Depth - - - - - 1 to 6 feet, average 3 feet
Bottom - - - - gravel to boulders
Bank - - - - - Hardwood trees
Water - - - - - Clear
Temperature - - 65.0° F.

Area III. Levisa Fork 5 miles upstream from Allen in Floyd County.

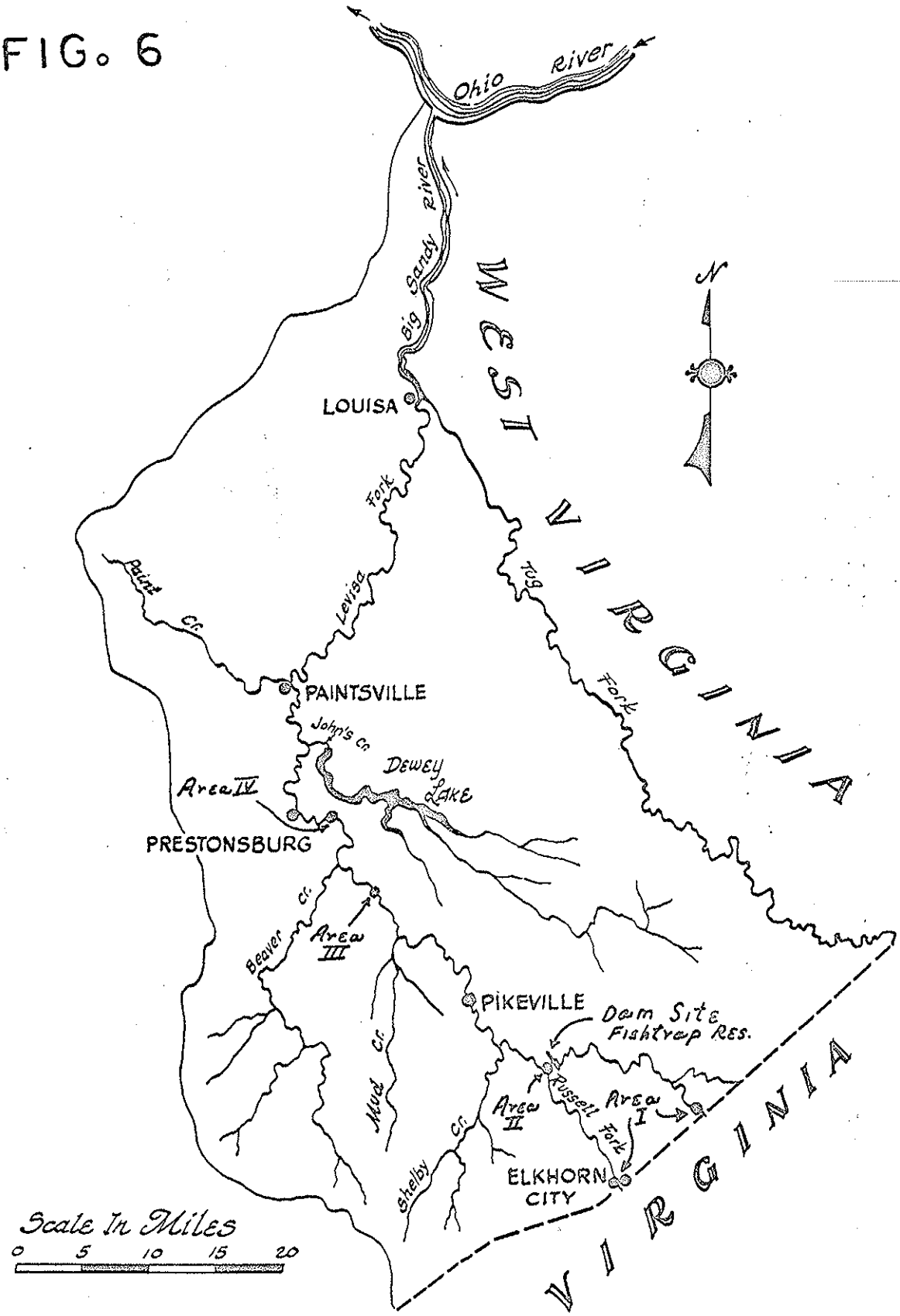
Width - - - - - 90 feet
Depth - - - - - 1 to 3 feet, average 2 feet
Bottom - - - - Sandy, gravel to boulders
Bank - - - - - Hardwood trees, mostly willows
Water - - - - - Surface covered with oil
Temperature - - 65.2° F.

Area IV. Levisa Fork 4 miles upstream from Prestonsburg in Floyd County.

Width - - - - - 100 feet
Depth - - - - - 2 to 8 feet, average 5 feet
Bottom - - - - Silt, sand, gravel and some large boulders
Bank - - - - - Hardwood trees, mostly willows
Water - - - - - Dark color from coal, oil on surface
Temperature - - 65.2° F.

From October 1949 to March 1953, the pH of Levisa Fork at Paintsville ranged from 6.3 to 8.3 (Lamar, Krieger, and Collier, 1955). During the

FIG. 6



BIG SANDY RIVER AND WATERSHED THAT IS IN KENTUCKY

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same period these authors reported that the total hardness ranged from 40 to 155 ppm. and averaged 72 ppm.

Russell Fork also rises in Virginia and flows northwest into Pike County, Kentucky where it empties into Levisa Fork about 1 mile below the dam site of Fishtrap Reservoir. The fish population which occurs in the lower portion of Russell Fork will likely undergo a marked change as a result of the construction of Fishtrap Dam. In addition, the fish population in the upper reaches of Russell Fork will probably be influenced by the construction of the Pound River Dam in Virginia. The dam on the Pound River will be located 1 mile above its confluence with Russell Fork and approximately 7 miles above the Kentucky-Virginia State line.

The fish population of Russell Fork was sampled at 1 area by an electric shocker in October 1956. The location of this area is shown in Figure 6 and the following account is taken from Kirkwood (1957).

Area I is located at Elkhorn City in Pike County. The maximum width of the stream in this area was 70 feet, the maximum depth 10 feet, and the average depth 5 feet. The stream bottom is composed chiefly of boulders. Hardwood trees and large boulders line the banks in this area. When the fish population was sampled in October the water was clear and the stream temperature was 60.5° F.

Both the Levisa and Russell Forks are polluted, especially during rainy seasons, by coal washings from 7 operative mines in Kentucky and an undetermined number in Virginia. A sand dredge operator in Floyd County reported that about one-third of the upper 12 feet of stream bottom was composed of usable sand, one-third of rock and debris, and the remaining one-third of coal. The upper 4 feet of stream bottom was chiefly coal.

A total of 44 species of fish was collected from Levisa and Russell Forks during October 1956 (Table XI). One species of darter, Percina sp., taken from Russell Fork, has not as yet been positively identified.

Extensive fish population samples collected by Clark (1937) from Levisa and Russell Forks disclosed 17 other species that were not taken during these studies.

A total of 524 fish which weighed 53.5 pounds was taken in the 4 population samples from Levisa Fork. The samples are summarized both by separate and combined areas in Table XII.

Game fish, represented by 3 species, made up 3.6 percent of the total number and 12.7 percent of the total weight of the samples. The longear sunfish was the only species of panfish found and represented 0.4 percent of the total number and 0.3 percent of the total weight of the samples. Edible rough fish in Levisa Fork constituted a greater percentage of the fish population both in number and in weight than was encountered in any of the other streams. This group constituted 43.5 percent of the total number and 75.4 percent of the total weight of the samples. Slightly more than one-half of the total sample weight (51.1 percent) was composed of redhorses. Non-edible rough fish, composed entirely of gizzard shad, made up 0.8 percent of the total number and 4.2 percent of the total weight of the samples. Forage fish made up 51.7 percent of the total number and 7.3 percent of the total weight of the samples.

Two of the areas sampled on Levisa Fork are located a considerable distance below the dam site. These sample areas should be re-located in the proximity of the impending reservoir.

A total of 59 fish which weighed 27.3 pounds was taken in the single study from Russell Fork. The results of this study are summarized in Table XIII.

Table XI. List of fishes collected from Levisa Fork and Russell Fork of the Big Sandy River on October 23, 24 and 25, 1956.

PETROMYZONTIDAE	
Ichthyomyzon fossor Reighard and Cummins	Northern brook lamprey
Lampetra lamottei (Le Sueur)	American brook lamprey
LEPISOSTEIDAE	
Lepisosteus osseus (Linnaeus)	Longnose gar
CLUPEIDAE	
Dorosoma cepedianum (Le Sueur)	Gizzard shad
CATOSTOMIDAE	
Carpiodes cyprinus (Le Sueur)	Quillback carpsucker
Catostomus commersoni (Lacepede)	White sucker
Hypentelium nigricans (Le Sueur)	Hogsucker
Moxostoma breviceps (Cope)	Ohio redhorse
Moxostoma duquesnei (Le Sueur)	Black redhorse
Moxostoma erythrurum (Rafinesque)	Golden redhorse
CYPRINIDAE	
Campostoma anomalum (Rafinesque)	Stoneroller
Ericymba buccata Cope	Silverjaw minnow
Hybopsis aestivalis (Girard)	Speckled chub
Hybopsis amblops (Rafinesque)	Bigeye chub
Hybopsis dissimilis (Kirtland)	Spotted chub
Hybopsis micropogon (Cope)	River chub
Notropis atherinoides Rafinesque	Emerald shiner
Notropis cornutus Mitchill	Common shiner
Notropis deliciosus (Girard)	Sand shiner
Notropis photogenis (Cope)	Silver shiner
Notropis rubellus (Agassiz)	Rosyface shiner
Notropis spilopterus (Cope)	Spotfin shiner
Notropis volucellus (Cope)	Mimic shiner
Notropis whipplei (Girard)	Steelcolor shiner
Pimephales notatus (Rafinesque)	Bluntnose minnow
ICTALURIDAE	
Ictalurus punctatus (Rafinesque)	Channel catfish
Noturus eleutherus Jordan	Mountain madtom
ATHERINIDAE	
Labidesthes sicculus (Cope)	Brook silversides
CENTRARCHIDAE	
Ambloplites rupestris (Rafinesque)	Rock bass
Lepomis macrochirus Rafinesque	Bluegill
Lepomis megalotis (Rafinesque)	Longear sunfish
Micropterus dolomieui Lacepede	Smallmouth bass
Micropterus punctulatus (Rafinesque)	Spotted bass
Micropterus salmoides (Lacepede)	Largemouth bass
Pomoxis annularis Rafinesque	White crappie

Table XI. (Cont.)

PERCIDAE	
Ammocrypta pellucida (Baird)	Eastern sand darter
Etheostoma blennioides Rafinesque	Greenside darter
Etheostoma variatum Kirtland	Variegated darter
Etheostoma zonale (Cope)	Banded darter
Percina caprodes (Rafinesque)	Logperch
Percina evides (Jordan and Copeland)	Gilt darter
Percina maculata (Girard)	Blackside darter
Percina sp.	
COTTIDAE	
Cottus carolinae Gill	Banded sculpin

Game fish, represented by 4 species, made up 13.6 percent of the total number and 6.9 percent of the total weight of the sample. Bluegill, the only panfish collected, constituted 1.7 percent of the total number and 0.7 percent of the total weight of the sample. Edible rough fish made up 23.7 percent of the number and 24.4 percent of the total weight of the sample. Non-edible rough fish, represented by gizzard shad only, made up 37.3 percent of the total number and 67.4 percent of the total weight of the sample. Forage fish constituted 23.7 percent of the total number and 0.7 percent of the total weight of the sample.

A second study area located near the mouth of Russell Fork might help to evaluate better the tailwater fishery which will develop after the construction of Fishtrap Dam. If the present sample area were re-located nearer the State line it might also serve better to evaluate the tailwater fishery established by the construction of Pound Dam in Virginia.

Table XII. Composition of fish population samples collected from Levisa Fork of the Big Sandy River prior to impoundment - October 1956.

Species	Area I		Area II		Area III		Area IV		Length limits	Total no.	Total wt.	% of total number	% of total weight
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.					
Smallmouth bass	4	0.61			4	1.01	2	2.16	3.0-15.1	10	3.78	1.91	7.06
Largemouth bass	2	0.12							4.4- 4.6	2	0.12	0.38	0.22
Spotted bass	5	2.02	1	0.20	1	0.68			6.8-12.8	7	2.90	1.34	5.42
GAME FISH	11	2.75	1	0.20	5	1.69	2	2.16		19	6.80	3.63	12.70
Longear sunfish			1	0.08	1	0.09			4.7- 4.8	2	0.17	0.38	0.32
PANFISH			1	0.08	1	0.09				2	0.17	0.38	0.32
Quillback	1	0.12	3	0.97	1	0.37	2	0.53	6.0- 9.4	7	1.99	1.34	3.72
Hogsucker	35	2.95	6	0.75	9	0.68	6	0.41	2.4-10.7	56	4.79	10.69	8.95
Redhorses	28	5.74	22	6.04	73	14.02	15	1.57	3.2-13.8	138	27.37	26.33	51.12
Channel catfish					26	6.16	1	0.08	6.6-14.4	27	6.24	5.15	11.65
EDIBLE ROUGH FISH	64	8.81	31	7.76	109	21.23	24	2.59		228	40.39	43.51	75.44
Gizzard shad			4	2.25					10.2-12.2	4	2.25	0.76	4.20
NON-EDIBLE ROUGH FISH			4	2.25						4	2.25	0.76	4.20
Lampreys			1	0.01	1	0.01			5.6- 6.2	2	0.02	0.38	0.04
Madtoms					1				1.9	1		0.19	
Brook silversides	1		1						3.0- 3.4	2		0.38	
Misc. minnows	63	1.66	49	0.31	107	1.48	18	0.24	2.1- 6.1	237	3.69	45.23	6.89
Misc. darters	1		4	0.02	23	0.19			2.1- 6.0	28	0.21	5.35	0.39
Sculpins					1	0.01			3.7	1	0.01	0.19	0.02
FORAGE FISH	65	1.66	55	0.34	133	1.69	18	0.24		271	3.93	51.72	7.34
TOTALS	140	13.22	92	10.63	248	24.70	44	4.99		524	53.54	100.00	100.00

Table XIII. Composition of a fish population sample collected from Russell Fork during October 1956, prior to the impoundment of Pound River in Virginia.

Species	Area I		Length limits	% of total number	% of total weight
	No.	Wt.			
Smallmouth bass	2	0.21	3.0- 7.5	3.40	0.77
Spotted bass	4	1.04	2.0-11.4	6.78	3.81
Rock bass	1	0.30	7.3	1.69	1.10
White crappie	1	0.32	7.5	1.69	1.17
GAME FISH	8	1.87		13.56	6.85
Bluegill	1	0.18	5.2	1.69	0.66
PANFISH	1	0.18		1.69	0.66
Quillback	2	1.60	11.7-11.8	3.40	5.86
White sucker	5	2.09	6.5-14.8	8.46	7.65
Hogsucker	1	0.01	3.1	1.69	0.04
Redhorses	4	1.61	2.3-12.5	6.78	5.90
Channel catfish	2	1.34	12.5-12.7	3.40	4.91
EDIBLE ROUGH FISH	14	6.65		23.73	24.36
Gizzard shad	22	18.40	10.5-15.6	37.29	67.40
NON-EDIBLE ROUGH FISH	22	18.40		37.29	67.40
Misc. minnows	11	0.18	1.9- 5.2	18.64	0.66
Misc. darters	3	0.02	2.2- 2.9	5.09	0.07
FORAGE FISH	14	0.20		23.73	0.73
TOTALS	59	27.30		100.00	100.00

Discussion and Conclusions

The Corps of Engineers, U. S. Army, and other agencies are constructing dams throughout Kentucky at such a rate that a reservoir per year for the next 4 years will be impounded. In the meantime, other similar projects are being proposed and authorized. Fishermen are already optimistic about the angling potentialities that are being provided for them, but in order to attain top fishing waters a controlled research and management plan is necessary.

An indication of the prospects of some of these potential fisheries has been gained from the population studies reported herein.

The Barren River showed the highest game fish population (by weight) of any of the streams that were sampled. In addition to the 4 species of game fish that were collected from the Barren River, crappie, walleye, and muskellunge are known to occur, and there is some optimism concerning the establishment of a muskie fishery in the proposed reservoir.

Four species of game fish were taken from the Middle Fork of the Kentucky River also, but there were no largemouth bass in any of the samples. Largemouth bass should be stocked in Buckhorn Reservoir as soon as possible after impoundment to implement the establishment of this species. There is also some likelihood that a muskie fishery will become established in Buckhorn Reservoir as this species prevails in Middle Fork.

Lock-chamber population samples from the Cumberland River indicated a very low percentage of game fish and panfish. The low sport-fish representation in these samples is believed to be the result of the suspected selectivity of such studies. Studies should be extended into some of the tributaries of the Cumberland in order to obtain a more representative sample of the fish population that will occur in Barkley Lake.

Population samples from the Rough River also indicated a lack of largemouth bass, and this species should be stocked in the reservoir soon after impoundment. Four species of game fish were found in the samples collected from the Rough River and their percentage of the total population composition compared very favorably with the other streams that were sampled. Especially noteworthy is the spotted bass population which made up 8.9 percent of the total weight of the samples. The catfish population in this stream was unparalleled in any of the other streams that were sampled; 3 species constituting 31.0 percent of the total weight of the samples.

The fish population samples from Drake's Creek contained the highest composition of panfish of any of the streams that were sampled. The composition of the remainder of the fish population compared favorably with the findings in other streams.

Levisa Fork of the Big Sandy River contained the highest population of edible rough fish of any of the streams that were sampled. However, the panfish population was comparatively low as but 2 longear sunfish were taken in the samples.

The 1 sample collected from Russell Fork also indicated a low panfish population. The percentage (by weight) of the population composed of non-edible rough fish was the highest encountered in any of the streams. However, too much reliance should not be placed on a single population sample.

Organized plans have already been made to study the fish population composition of each stream that has been proposed for impoundment. Fish population trends in each stream will be studied before and after impoundment, and it is hoped that management techniques can be developed as various fisheries problems become apparent. An intensive creel census will be initiated on many of the streams so that an evaluation can be made of the benefits that are derived from the impoundments. Most of these plans have

already been initiated and were made possible through Federal Aid in the form of Kentucky D.-J. Project F-16-R, Pre- and Post-Impoundment Surveys.

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Literature Cited

Charles, J. R.
1958. Ohio River fishery investigations. Ky. Dept. of Fish and Wildl. Res., Annual Job Prog. Rep., unpubl., 27 pp.

Clark, M. E.
1937. Biological survey of the Big Sandy, Tygart, and Kinniconick drainage areas. Ky. Div. of Fish and Game, Bull. No. 2, 188 pp.

Kirkwood, J. B.
1957 A brief study of the Levisa Fork and Russell Fork of Big Sandy River. Ky. Dept. of Fish and Wildl. Res., Bull. No. 21, 15 pp.

Lamar, W. L., Krieger, R. A., and Collier, C. R.
1955. Quality of surface waters of Kentucky 1951-1953. Agri. and Ind. Dev. Bd. of Ky., 210 pp.