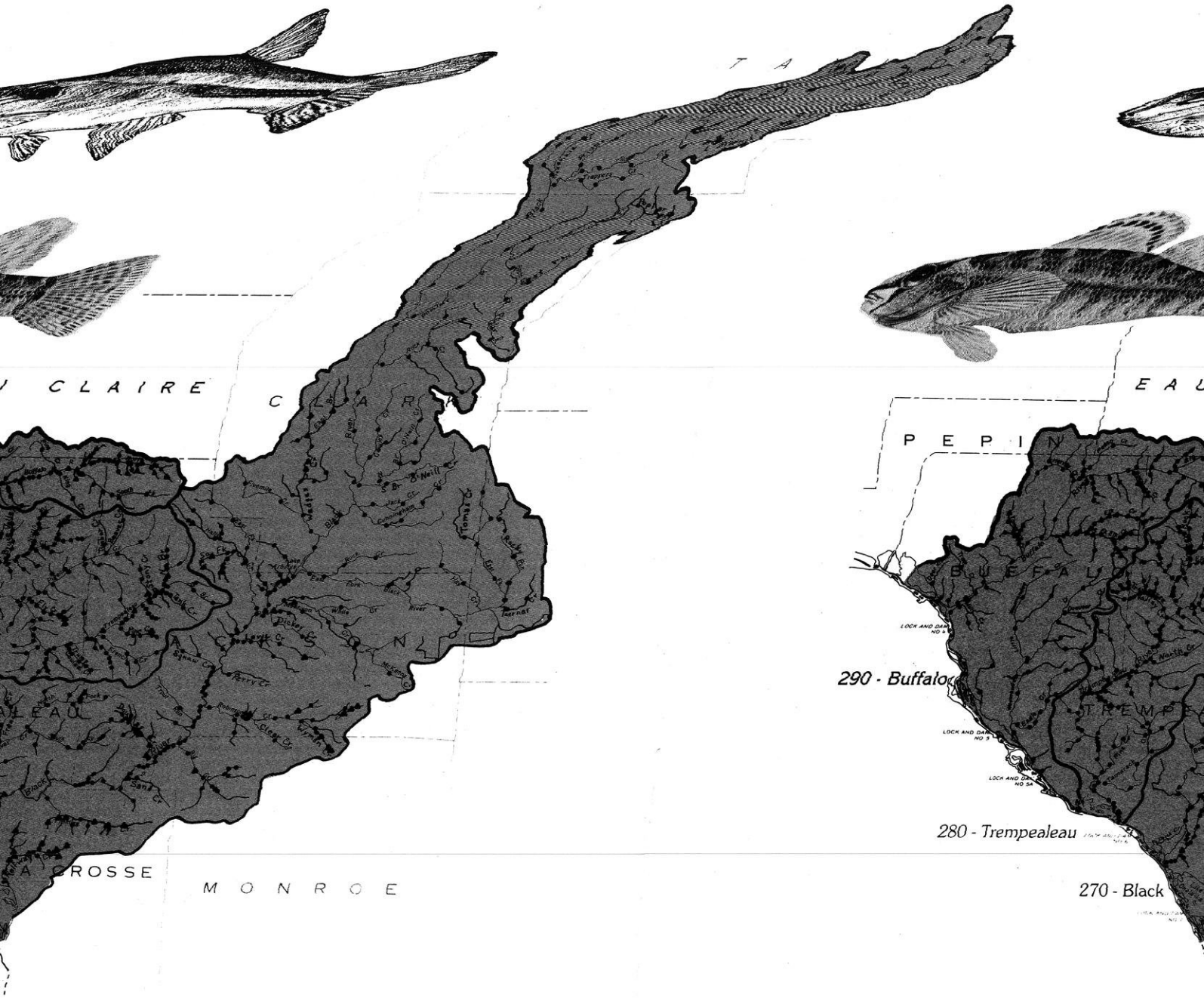
Distribution and relative abundance of fishes in Wisconsin: II. Black, Trempealeau, and Buffalo River basins. No. 140 1983

Fago, Don

Madison, Wisconsin: Wisconsin Department of Natural Resources, 1983



RELATIVE
HES IN WISCONSIN
, and Buffalo

DISTRIBUTION AND
ABUNDANCE OF FIS
II. Black, Trempealeau
River Basins

Technical Bulletin No. 140
DEPARTMENT OF NATURAL RESOURCES
Madison, Wisconsin
1983

This series of fish distribution reports is dedicated to the nongame fish whose interrelationships in the aquatic ecosystem are generally not well documented or appreciated.

PREFACE

Little atte
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overlooked. The nongame fish n
ity of fish species in Wisconsin bu
than sport fish species in both to
biomass.

Further attention by either research o
nongame fish species must be preceded by
what we have and where we have it. In 197
Research of the Wisconsin Department of
sources (DNR), with inputs from field fish manag
sonnel, began a statewide assessment of the distrib
relative abundance of fish species, emphasizing bu
ited to nongame species. This assessment was begun
basin approach to delineate location of sampling stat
the over 7,200 lakes (over 350,000 ha) and 11,000 st
(over 68,000 km) within the state. The 3 major basins
sissippi River, Lake Michigan, and Lake Superior) were
ther divided into 30 minor basins.

The last report on the distribution of fish species throu
out the state was made by C. W. Greene (1935) for the 19
31 period. He covered about 1,400 sampling stations. Si
then, other collectors, notably Dr. George Becker (19
1964a, 1964b, 1966, 1983), Professor Marlin Johnson (197
and the students at the University of Wisconsin at Madiso
(including McNaught 1963) and Stevens Point, have adde
appreciably to knowledge of regional distribution of Wiscon-
sin fishes.

The need to update our knowledge of statewide fish distribution is most clearly evident from the dearth of information available on nongame species in most watersheds for preparing environmental impact assessments and reports and Department master plans. In addition, both federal and state law now require the establishment of an endangered and threatened species list. Furthermore, the Wisconsin Department of Natural Resources has been directed to "conduct research on endangered and threatened species of this state and shall implement programs directed at conserving, protecting, managing and propagating endangered and threatened species to the maximum extent practicable." (Chap. 29.415, Wis. Stats.)

Field collecting under the research study initiated in 1974 was essentially terminated in 1980 due to reduced funding with only limited sampling after that time. Of the 30 river basins in the state, sampling has now been completed in 17 and nearly completed in 1. Only scattered samples were taken in the other 12 basins. These samples inventoried about 45% of the state.

The results of the work so far completed on fish distribution are being published in a series of separate bulletins dealing with one or more minor basins. The report on the greater Rock River basin is now available (Fago 1982). The bulk of the data presented refers primarily to collections made during the Bureau of Research study. However, other fishery biologists and managers have made numerous collections over the years, and their published and unpublished records, when available to us, are included. Therefore, data from as early as 1900 are available for some basins, permitting comparisons between historical and current records.

This series of reports, however, constitutes only an overview of a voluminous mass of data now permanently stored in computer files. For the field manager or investigator, the greatest value of this study lies in the availability of fish data on specific waters or on waters in close proximity to those of immediate concern. Data now in computer files (over 16,900 collections) have already, in over 200 cases, proven to be very useful to DNR personnel in several bureaus and to other state and federal agencies, environmental consultants, and students. They have used the data for various purposes: e.g., to make assessments on past as well as potential changes in the aquatic environment, indicate water quality through fish species composition, and determine ranges in Wisconsin for particular fish species.

Sufficient data were collected during the research study to recommend the revision of Wisconsin's endangered and threatened fish species lists in 1979 and again in 1982. The first revision added 15 species to both lists and removed 3 from the endangered list. The second revision added 2 to the endangered list and removed 1 from the endangered and 3 from the threatened list.

The vouchers of the preserved fish collections are curated at
...e Milwaukee Public Museum, further enhancing the value
...significance of this study. There they are used by scien-
...educators interested in taxonomy, systematics and
... They also are serving as a valuable ...
...determine changes in fish community struc-
...
...2 separate basins ...
...Chippewa, and Buffalo river

...This report deals with ...
...Wisconsin — the Black, Tre...
basins.

...tention has been given to nongame fish species
...over 75% of the 152 fish species in Wisconsin
...these species play a major role in main-
...populations so vital to recreational and
...the state. In essentially disregarding
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DISTRIBUTION AND RELATIVE ABUNDANCE OF FISHES IN WISCONSIN

II. Black, Trempealeau, and Buffalo River Basins

By
Don Fago

Technical Bulletin No. 140
DEPARTMENT OF NATURAL RESOURCES
Box 7921, Madison, Wisconsin 53707
1983

ABSTRACT

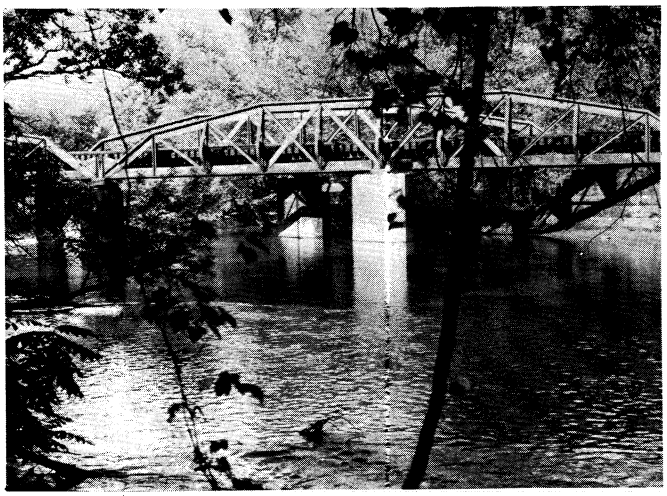
A statewide survey of the inland waters of Wisconsin was initiated in 1974 by the Bureau of Research, Wisconsin Department of Natural Resources, to establish a comprehensive data base on the distribution and relative abundance of all fish species. The Black and Trempealeau river basins were sampled from 1975 through 1979 and the Buffalo River basin from 1975 through 1982 at 638 stations by research personnel and 208 stations by fish management personnel. An additional 151 stations were partially sampled by fish management personnel and other collectors.

A total of 97 species were collected from the Black River basin, 79 from the Trempealeau River basin, and 60 from the Buffalo River basin. Included were the endangered starhead topminnow as well as the threatened speckled chub, blue sucker, and gilt darter. Eight species on the Department's watch list were also collected.

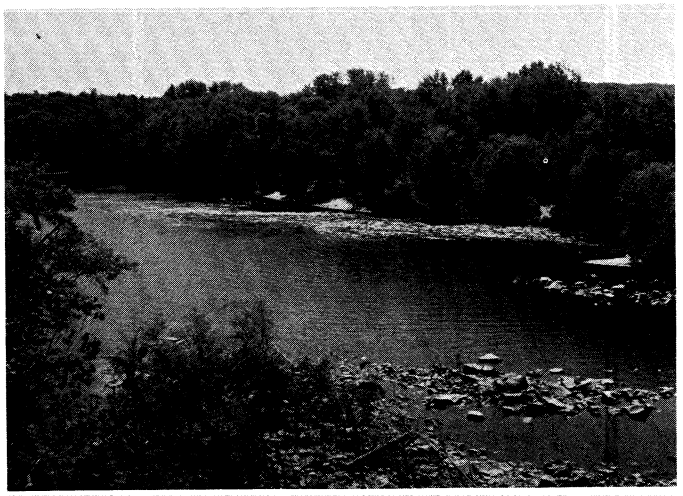
Data from recent collections for the Black, Trempealeau, and Buffalo river basins were compared with data from the 1900-31 and the 1958-74 periods. Twenty-six species were collected which had not been previously reported from the Black River basin, 15 from the Trempealeau River basin, and 13 from the Buffalo River basin. Two species have apparently been extirpated from the Black River basin, 8 from the Trempealeau River basin, and 13 from the Buffalo River basin.

While this report includes numerous tables, distribution maps of the species, and discussion on many aspects of fish distribution in the 3 basins, the continued use of this data base for the preparation of environmental impact assessments, for the development of master plans for the aquatic resource, and for research on nongame species, fish communities, and ecosystems is recommended.

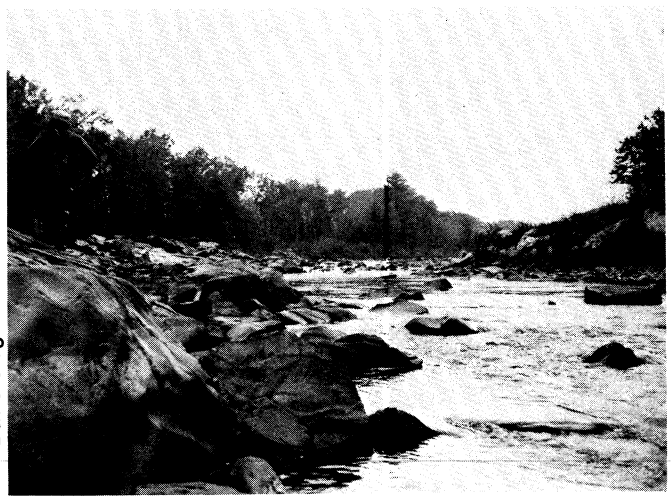
CONTENTS



Trempealeau River north of Dodge.

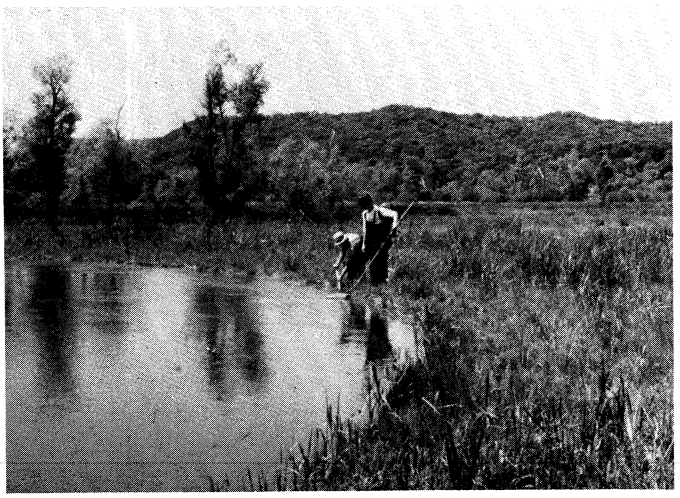


Black River looking downstream from Highway 54 bridge in Black River Falls.



Black River north of Neillsville.

David Siegler



Buffalo River, a few miles from mouth. Shows one method by which mud darters were collected.

STUDY AREA

Black River Basin

The Black River basin (270) is located in the west central portion of Wisconsin (Fig. 1). It is in the Mississippi River basin and encompasses parts of the following counties: Clark, Jackson, La Crosse, Marathon, Monroe, Taylor, Trempealeau, and Wood. This basin includes the Black River, Halfway Creek, Shingle Creek, and Tank Creek, all of which flow directly into the Mississippi River. The watershed contains an area of approximately 6,188 km^2 (Holmstrom 1982). Within this area, we have defined 523 streams with a total length of 3,193 km (Table 1)*. Of these, 351 are unnamed creeks and ditches. There are 167 lakes** in the basin, with a total area of 1,937 ha. However, only 5 lakes are over 80 ha in size. The large number of dams (117) in the basin indicates numerous impoundments which tend to slow down water velocity, create variable discharge patterns, and influence fish migration and species composition.

The average annual precipitation within the Black River basin is 80 cm (76-84 cm) (Wisconsin DNR 1979). The average gradient for the Black River (319 km in length) is 95 cm/km, which ranges from 175 cm/km in the upper portion of the basin to 38 cm/km in the lower portion (Wisconsin DNR 1976). The average discharge at Galesville, which includes 89% of the drainage area, is 48 m^3/sec (U.S. Geological

*These are defined through a water mileage system that divided the state into 3 major and 30 minor basins (Fago 1983).

**Lakes in this report refer to naturally occurring lakes as well as impoundments (bodies of water with dams at their outlets) unless otherwise specified.

Survey 1982). The Black River changes from hard, dark brown water in the upper portion to soft, light brown water in the lower portion. The stream bottom is composed primarily of sand, except for some sections where gravel, rubble, boulder, and bedrock predominate (Wisconsin DNR 1976).

The dominant land uses in the Black River basin are agriculture (dairy and cash crops) and forestry. The population within the basin in 1978 was estimated at 58,912 which is a 17% increase from 1950. However, most of the increase occurred in La Crosse County (Wisconsin DNR 1979).

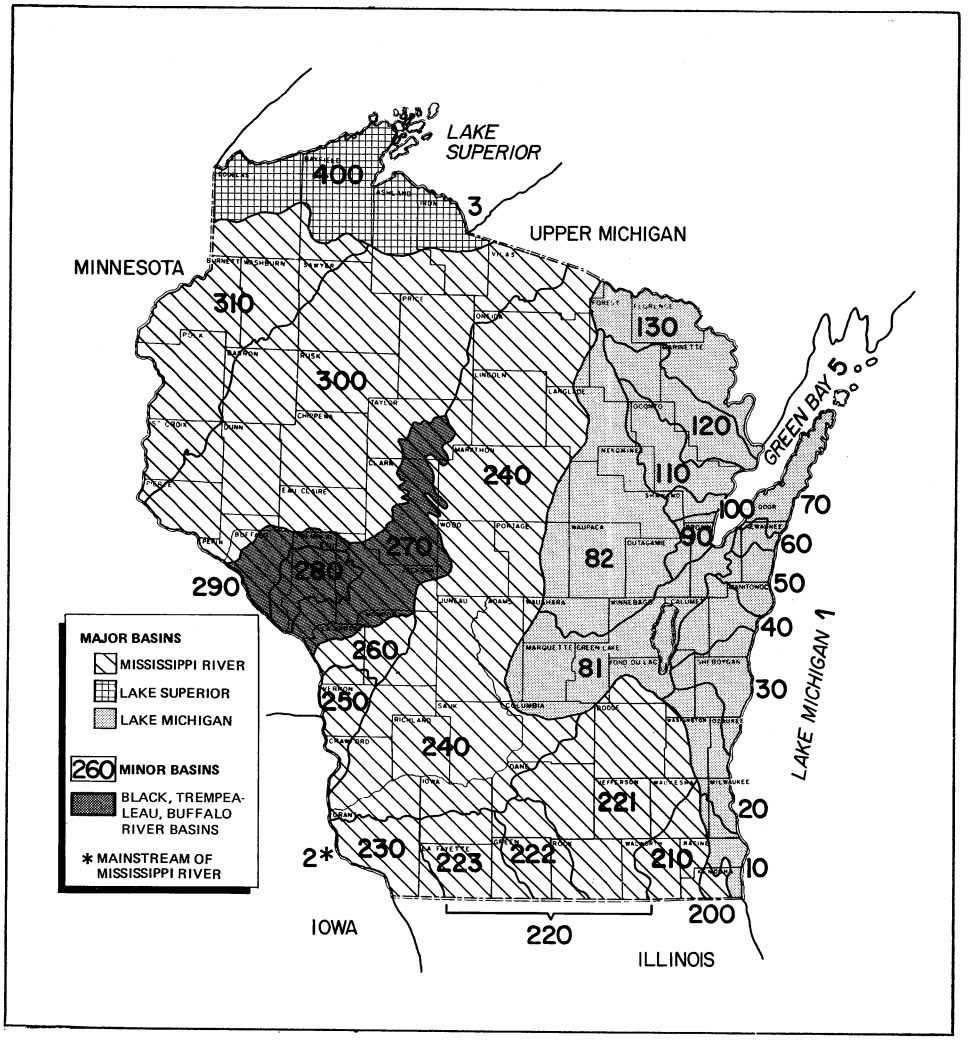


FIGURE 1. *Major and minor river basins in Wisconsin.*

TABLE 1. *Land area, streams, and lakes of the Black, Trempealeau, and Buffalo river basins.*

	Black River Basin	Trempealeau River Basin	Buffalo River Basin
Land area (km^2)	6,188	1,888	1,665
Streams			
Total number	523	326	188
(Unnamed creeks or ditches)	(351)	(272)	(141)
Total length (km)	3,193	1,352	1,117
Lakes/impoundments*			
Total number	167	10	16
Area (ha)	1,937	57	77
No. dams	117	10	9

*Impoundments are bodies of water with dams at their outlets.

Trempealeau River Basin

The Trempealeau River basin (280) is located adjacent to the northern edge of the lower section of the Black River basin (Fig. 1). It encompasses parts of the following Wisconsin counties: Buffalo, Jackson, and Trempealeau. It contains an area of approximately 1,888 km^2 (Holmstrom 1982). Within this area we have defined 326 streams with a total length of 1,352 km (Table 1). Of these, 272 are unnamed creeks or ditches. There are only 10 lakes with a total area of 57 ha, the largest being 18 ha in size.

The average annual precipitation is the same as for the Black River basin. The average gradient for the Trempealeau River (137 km in length) is 65 cm/km. The average discharge at Dodge, which includes 88% of the drainage area, is 12 m^3/sec (U.S. Geological Survey 1982). The Trempealeau River, hard and slightly brown in color, has a stream bottom composed primarily of sand (Wisconsin DNR 1972).

The major land uses are agriculture, which is dominated by dairy farming, and forestry (40% of the woodlands are grazed) (Wisconsin DNR 1978).

Streambank erosion, much of which is caused by livestock, is a major problem throughout the basin. The population within the basin of approximately 23,000 has only shown a 5% increase since 1950.

Buffalo River Basin

The Buffalo River basin (290) is located adjacent to the northern and western edge of the Trempealeau River basin (Fig. 1). It encompasses parts of the following Wisconsin counties: Buffalo, Eau Claire, Jackson, Pepin, and Trempealeau. The basin includes the Buffalo River, Waumandee Creek, and 5 unnamed creeks which flow directly into the Mississippi River. This watershed contains an area of approximately 1,665 km^2 (Holmstrom 1982). Within this area we have defined 188 streams with a total length of 1,117 km (Table 1). Of these, 141 are unnamed creeks or ditches. There are only 16 lakes with a total area of 77 ha, the largest being 22 ha in size.

The average annual precipitation is the same as for the Black River basin. The average gradient for the Buffalo River (113 km in length) is 76 cm/km.

The average discharge (1932-51) of the Buffalo River at Tell is 7 m^3/sec. This measurement encompasses 90% of the Buffalo's watershed (Buffalo River and all its tributaries) and 63% of the entire Buffalo River basin (includes Waumandee Creek and 5 unnamed creeks) (U.S. Geological Survey 1982). The Buffalo River is similar to the Trempealeau River with a slightly brown color and a bottom composed primarily of sand. Land use practices are similar to those in the Trempealeau River basin (Wisconsin DNR 1972). Streambank erosion, due principally to livestock, is also a problem. The population of 13,000 within the basin remained virtually the same since 1950.

METHODS

Data Sources and Time Periods

All collections are divided into 3 time periods: 1900-31, 1958-74, and 1975-79 (1975-82 for the Buffalo River basin). The earlier records provide the basis for assessment of changes over time in distribution of fish species within the basins of the Black, Trempealeau, and Buffalo rivers.

If a location was sampled within a time period more than once, only 1 collection is used in the counts of number of stations sampled and number of stations at which a species was taken.

Stations were classified in one of two ways, except for the 1900-31 period, depending on how the samples were taken: complete (those in which all species collected were recorded and identified), and partial (those in which sampling effort and/or species identification were incomplete and therefore did not yield adequate assessment of total species composition).

1900-31 Period. All collections were made between 1900-31 except for 2 stations in the Black River basin (1 in 1938 and 1 in 1943), with 81% taken between 1927 and 1928. Collections from this time period were made at 38 stations in the Black River basin, 7 in the Trempealeau River basin, and 8 in the Buffalo River basin, by a number of collectors. They included C. W. Greene, L. C. Stuart, E. P. Creases, S. N. Jones, G. Wagner, Schultz, C. Tarzwell, H. R. Rich, N. Enting, R. R. Pope, and W. E. Dickman (names taken from original field notes). Most specimens from these collections were verified by Dr. Carl Hubbs or Dr. Greene and cited by Greene (1935).

The stations sampled were located on 26 streams and 4 lakes in the Black River basin, 4 streams in the Trempealeau River basin, and 3 streams and 2 lakes in the Buffalo River basin (Table 2). Thoroughness of sampling effort was unknown, and therefore calculation of percent occurrence of each species was not attempted (Table 5).

1958-74 Period. Complete collections from this period were made at 28 sampling stations on 10 streams and 1 lake in the Black River basin, 11 stations on 3 streams in the Trempealeau River basin, and 11 stations on 7 streams in the Buffalo River basin (Table 2). An additional 249 partial collections in the Black River basin, 110 in the Trempealeau River basin, and 102 in the Buffalo River basin increased the number of streams sampled by 51, 26, and 26 and lakes by 10, 1, and 1 in the Black, Trempealeau, and Buffalo river basins, respectively. The data from these partial samples were kept separate in Table 2 and not included in the percentages of total stations sampled presented in Table 5. These additional 461 stations came from written records provided by fish management.

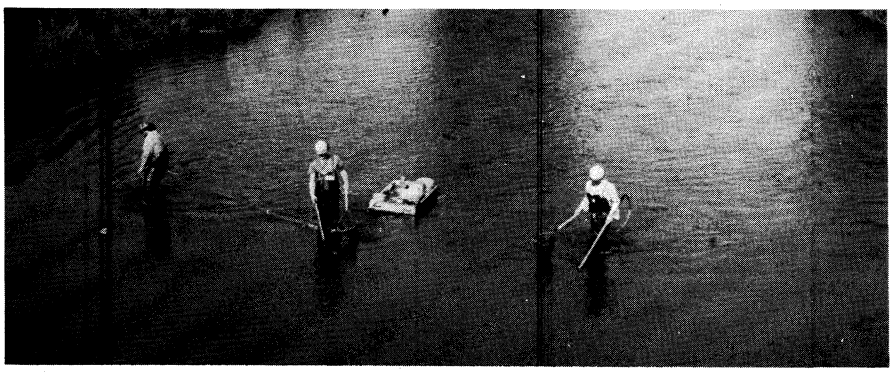
The complete samples (60% collected between 1964-70) from the Black, Trempealeau, and Buffalo river basins were collected by the following: Dr. George Becker and his students (unpubl. data) — 27 stations:

TABLE 2. *Summary of stream and lake sampling efforts in the Black (1900-79), Trempealeau (1900-79), and Buffalo (1900-82) river basins.*

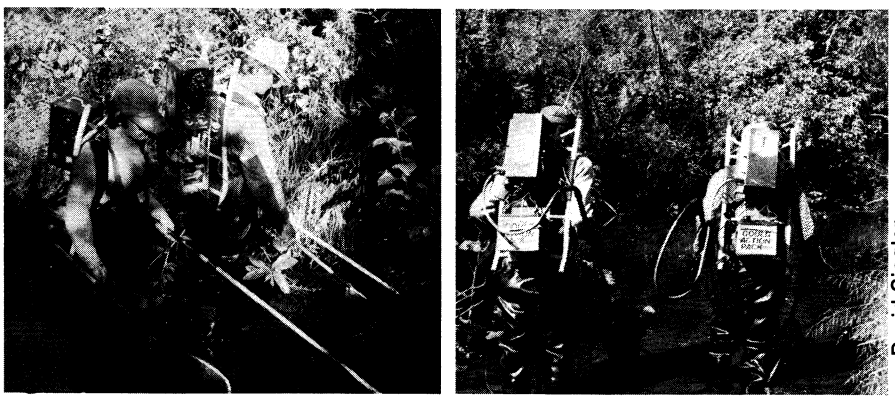
	Black (270)			Trempealeau			Buffalo		
	1900-31	1958-74	1975-79	1900-31	1958-74	1975-79	1900-31	1958-74	1975-82
Streams									
No. sampled	26	10*(51)**	138(6)	4	3(26)	119(2)	3	7(26)	81(2)
No. stations	34	27(238)	341(58)	7	11(109)	334(40)	6	11(101)	163(40)
Lakes/ impoundments									
No. sampled	4	1(10)	6(5)	0	0(1)	1(2)	2	0(1)	0(4)
No. stations	4	1(11)	7(7)	0	0(1)	1(2)	2	0(1)	0(4)
Total no. stations	38	28(249)	348(65)	7	11(110)	335(42)	8	11(102)	163(44)

*Complete samples.
**Partial samples.

Boom shocker near the mouth of the Buffalo River.



Stream shocker with 3-man crew on the Buffalo River near Modena.



David Siegler

Backpack shockers using a 12-volt deep cycle battery.

Minishocker consisting of a 16-foot flatbottom aluminum boat, 5 hp. T&J generator, and pulser control box.

Prof. Marlin Johnson (unpubl. data) — 20 stations: Wisconsin DNR Bureau of Research — 2 stations: and Upper Mississippi River Conservation Commission (Smith and Lopinot 1967) — 1 station.

Total occurrences are defined as the sum of the number of species taken at each station. For example, if a collector took 10 species at one station, 20 at another, and 30 at another, his total species occurrences would be 60. This information has been calculated for each collector since 1958 and reveals the volume of data from both complete and partial samples used (Table 3). For the earliest period, only a grand total of occurrences was calculated (Table 5). Total occurrences increased from 261 for the 1900-31 period to 1,580 for the 1958-74 period for the Black, Trempealeau, and Buffalo river basins. During 1958-74, 71% of the grand total of occurrences for the Black, Trempealeau, and Buffalo river basins were accounted for by fish management personnel. However, collections by Becker and Johnson and their students provided 58 species not taken by fish management in these 3 watersheds (Table 3 and Append. A Table 18).

1975-79 Period*. Complete collections from this period were made at 348 sampling stations (86% collected in 1977-78) on 138 streams and 6 lakes in the Black River basin, 335 stations (79% in 1979), on 119 streams and 1 lake in the Trempealeau River basin, and 163 stations (45% in 1980 and 18% in 1982) on 81 streams in the Buffalo River basin. There were an additional 65 partial collections in the Black River basin, 42 in the Trempealeau River basin, and 44 in the Buffalo River basin which increased the number of streams by 6, 2, and 2 and lakes by 5, 2, and 4 in the Black, Trempealeau and Buffalo river basins, respectively.

For the Black, Trempealeau, and Buffalo river basins, the number of complete samples increased an average of more than 1,800% over the 1958-74 period with 846 stations sampled (Table 2). DNR research personnel sampled 638 (75%) of the complete samples, and fish management personnel sampled 208 (25%). The 151 partial samples were collected by fish management personnel, sport and commercial fishermen.

Total occurrences increased from 1,580 for the 1958-74 period to 7,967 for the Black, Trempealeau, and Buffalo river basins: 75% of these were recorded by research personnel (Table 3). We also collected all of the 99 species found in the Black, Trempealeau, and Buffalo river basins (for list of species taken by all other collectors see Append. A Table 18).

TABLE 3. *List of collectors with number of species taken and total occurrences for samples from the Black, Trempealeau, and Buffalo river basins.*

	Black (270)				Trempealeau (280)				Buffalo (290)			
	1958-74		1975-79		1958-74		1975-79		1958-74		1975-82	
Source of Data*	No. Species	Total Occurrences	No. Species	Total Occurrences	No. Species	Total Occurrences	No. Species	Total Occurrences	No. Species	Total Occurrences	No. Species	Total Occurrences
Research 0	9	15(2)**	96	3,814(86)	—	—	77	1,530(67)	—	—	57	648(52)
Fish Mgt. 1	17	620(77)	57	597(14)	16	268(63)	36	767(33)	14	237(66)	34	609(48)
Becker 2	37	126(16)	—	—	21	34(8)	—	—	28	52(15)	—	—
Johnson 3	26	40(5)	—	—	49	100(24)	—	—	36	69(19)	—	—
Comm. fish. 7	—	—	1	1(t)	—	—	—	—	—	—	—	—
Sport fish. 8	—	—	1	1(t)	—	—	—	—	—	—	—	—
UMRCC 9	—	—	—	—	19	19(5)	—	—	—	—	—	—
Grand total of occurrences		801		4,413		421		2,297		358		1,257

*Collectors identified in Appendix A Table 18.
**Total occurrences are defined as the sum of the number of species collected at each station; percent of total occurrences in parentheses.
t = less than 0.5%.

Collection Methods and Gear**

We used five types of electrofishing gear, depending on the size of the body of water. The types of gear and percentage of stations where each was used were: boom shocker (6%), minishocker (3%), stream shocker (29%), battery-powered backpack (36%), and longline shocker (17%). Small mesh seines were used at 9% of the stations, primarily in lakes and large rivers.

All generators produced direct current, with the boom shocker and minishocker permitting a choice of several pulse rates and frequencies. The boom shocker also produced alternating current and it was used occasionally when the DC unit was inoperative. For more information concerning the boom and stream shocking equipment, see Novotny and Priegel (1971, 1974).

The minishocker consisted of a 5-m flat bottom boat with one boom in the bow and used the same 5 hp T&J gasoline-powered generator as the stream shocker. It required only 1 person sitting on a chair in the bow to collect the fish, in contrast to 2 people standing in the boat using the boom shocker. The battery-powered backpack used a 12-volt deep cycle battery and pulsed the DC at several frequency and pulse rates. The development and production of this unit, like all the electric fishing gear used, was a joint project between the Wisconsin DNR and the Instrumentation Systems Center, UW-Madison. The seines were 1.2-m and 9.1-m bag seines with 4.8-mm delta mesh.

Sampling Effort

We established sampling locations based on habitat diversity, the distance between stations, and accessibility. The length of a sampling station was approximately 100 m for all electrofishing gear except for the boom and minishockers. Boom shocker and minishocker stations averaged 2.7 km. Areas seined averaged 307 m^2. Distance between stations on the main stems of the Black, Trempealeau, and Buffalo rivers averaged 3.7 km. There was an average of 1 station/5 km of the total length of all sampled streams with 1 or more complete stations. On sampled lakes in the Black River basin, there was an average of 1 station/66 ha of water.

Complete collections were made on 26% of the streams and 4% of the lakes in the Black River basin, 37% of the streams and 9% of the lakes in the Trempealeau River basin, and 43% of the streams and none of the lakes in the Buffalo River basin (Tables 1 and 2). While these percentages are relatively low, the streams that were sampled comprise 68%, 74%, and 72% of the total length of all streams in the Black, Trempealeau, and Buffalo river basins, respectively. The sampled lakes comprised only 24%, 31%, and 0%, respectively, of the total surface area for all lakes in each basin. This was due to the fact that most lakes were small, averaging only 12, 5, and 5 ha respectively.

Figure 2 shows the locations of 782 of the 846 complete and 109 of the 151 partial stations sampled in 1975-82. Only one dot per lake was shown and dots were eliminated that would overlap another dot.

*1975-82 for the Buffalo River basin.
**Only the methods and gear employed by DNR research personnel are described; fish management personnel used similar equipment.

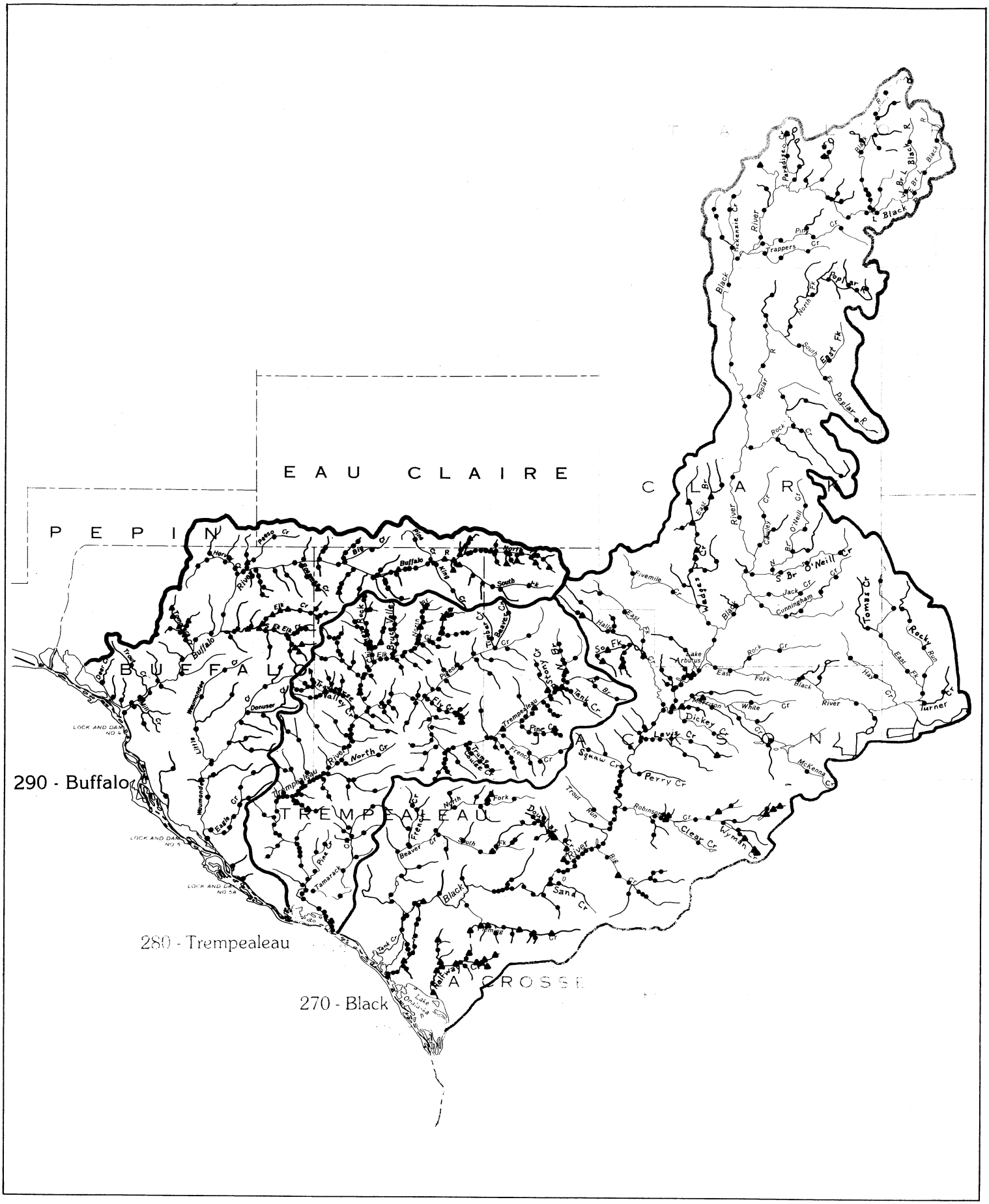


FIGURE 2. *Location of 891 sampling stations in the Black, Trempealeau, and Buffalo River basins. There were 782 complete and 109 partial stations. (Due to lack of space, 64 complete and 42 partial stations are not shown.)*

Data collected at the sampling stations were recorded in pencil on Form 8100-46 (Append. A Fig. 5), and include station and species information, and ecological data. This form is made of polyethylene paper, is virtually unaffected by salt and fresh water, and is resistant to tearing, discoloration, and rotting.

In order to handle the data on over 1,700 collections from the Black, Trempealeau, and Buffalo river basins, dating from 1900, Cobol and Mark IV computer programs were developed through a cooperative effort with the DNR's Bureau of Information Management to organize, store, and retrieve the data. Some programs are used to update the Fish Master File which contains all data on the stations in the 3 basins as well as on 15,200 additional stations throughout the state.

Other programs are used to help in the analysis of the data. One analysis uses a Cobol program to organize the data by species, and lists all stations for each species. This listing, based on a water mileage system developed for this study, was organized in 2 ways (Fig. 3a and 3b):

(1) All stations on a river are listed until a tributary of the river is reached (Fig. 3a). All stations on that tributary are then listed before going back to the confluence of the tributary with the original river. This procedure is followed for all tributaries in the basin of the 1st tributary before going back to the original river.

(2) All stations on a river are listed before going back to the 1st tributary of the original river and listing all stations on the tributary (Fig. 3b). This procedure is followed for all tributaries in the basin of the 1st tributary before going to the 2nd tributary of the original river.

The program for both of these methods can be restricted to one or more of the following criteria: particular minor basins, a sub-basin or part of a sub-basin, individual collectors, dates, township and range (by entire township or contiguous townships), counties, water types, and selected species. At each station, the stream name along with water type, number of fish taken, collector, gear, effort, date, township description, and county are listed. An example of the Cobol listing for one species is shown in Appendix A Figure 6. At the end of each species listing, the total number of stations, total number of specimens, average number of fish/station, and number of stations for each collector are computed. At the end of the printout, a summary table is given that lists each species, the number of stations at which it was taken, the percent of the total stations possible, grand total of species occurrences, totals for each collector, and totals for number of species and hybrids (Append. A Fig. 7).

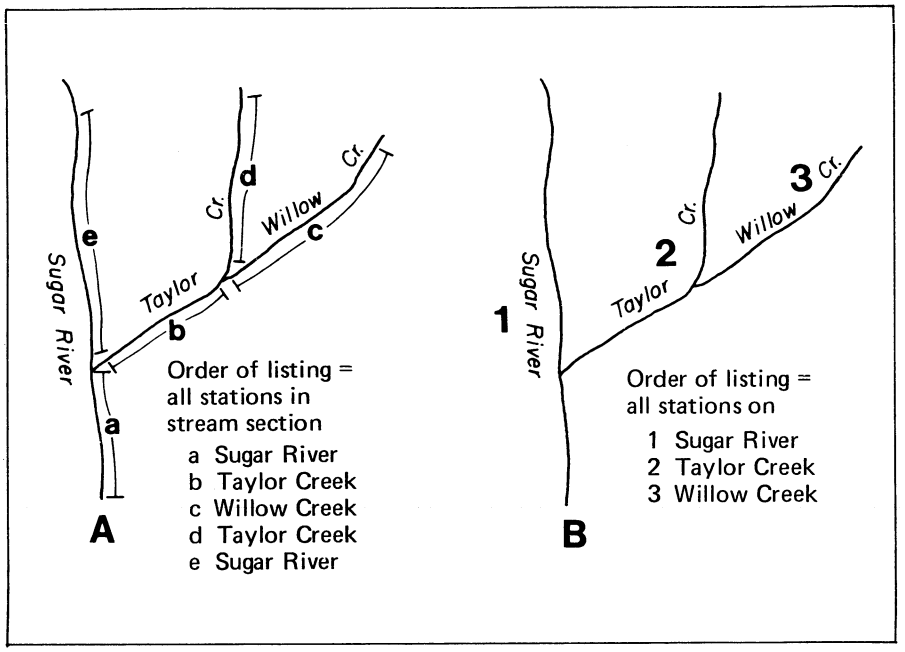


FIGURE 3. *Two methods of organizing stations on computer printouts.*

Another type of analysis uses a Mark IV program to organize the data by stations, and lists for each station all information (number of specimens of each species, and the total number of species, hybrids, and unspecified categories). The program can be restricted to the same criteria cited above for the Cobol program, and the listing can be organized the same 2 ways (Fig. 3). However, only the Mark IV listing can be restricted to gear, or any of the 10 ecological variables. This program can be organized in still different ways, including: (1) by county and then alphabetically by name of stream or lake, (2) by county and then by basin, or (3) by township, range, and section. An example of the Mark IV listing is shown in Appendix A Figure 8.

A water mileage system was devised to permit computer analysis of the data and still allow easy recognition of the location by persons wishing to use the data. This was accomplished by using the town, range, section, quarter section, and county along with basin numbers, a series of mileages, and the name of the body of water. A Master Stream and Lake File containing this information has been generated by this study for most streams and lakes in Wisconsin. Mark IV computer programs are available to obtain a variety of listings — such as streams and/or lakes in each basin listed alphabetically.

An example of a page of the water mileage system from a computer printout of the Master Stream and Lake File is shown in Appendix A Figure 9. An example of a page of the Master Fish File which uses the water mileage system to organize the biological and environmental data is included in Appendix A Figure 8. A detailed explanation of the data storage system as exemplified in these figures is presented in Fago (1983).

Fish Identification and Enumeration

In order to reduce the volume of specimens taken back to the laboratory, larger fish were identified to species in the field and were usually returned to the water. Generally all others were preserved in 10% Formalin for later identification in the laboratory (using the unpublished keys of Dr. G. Becker).

At least a few stonerollers at each station were keyed to species. The remainder were left as stonerollers (*Campostoma* spp.). Research personnel identified all fish for the 1975-82 period except for some specimens of 23 species (indicated by an asterisk in Append. A Table 18) collected by fish management personnel, and American eels caught by sport and commercial fishermen. For the 1958-74 period, species records are based upon the collectors' identification except for the mud darters collected by fish management and identified by research personnel.

TABLE 4. *List of common and scientific names of all fish species cited in this report.*

Computer No.	Common Name	Scientific Name
	Lampreys	Petromyzontidae
A02	Chestnut lamprey	*Ichthyomyzon castaneus*
A03	Northern brook lamprey	*Ichthyomyzon fossor*
A04	Silver lamprey	*Ichthyomyzon unicuspis*
A05	American brook lamprey	*Lampetra appendix*
	Gars	Lepisosteidae
D01	Longnose gar	*Lepisosteus osseus*
D02	Shortnose gar	*Lepisosteus platostomus*
	Bowfins	Amiidae
E01	Bowfin	*Amia calva*
	Freshwater eels	Anguillidae
F01	American eel	*Anguilla rostrata*
	Herrings	Clupeidae
G02	Gizzard shad	*Dorosoma cepedianum*
	Mooneyes	Hiodontidae
H02	Mooneye	*Hiodon tergisus*
	Trouts	Salmonidae
I19	Rainbow trout	*Salmo gairdneri*
I21	Brown trout	*Salmo trutta*
I22	Brook trout	*Salvelinus fontinalis*
	Mudminnows	Umbridae
K01	Central mudminnow	*Umbra limi*
	Pikes	Esocidae
L02	Northern pike	*Esox lucius*
L03	Muskellunge	*Esox masquinongy*
	Minnows and carps	Cyprinidae
M06	Central stoneroller	*Campostoma anomalum*
M07	Largescale stoneroller	*Campostoma oligolepis*
M09	Redside dace	*Clinostomus elongatus*
M12	Common carp	*Cyprinus carpio*
M14	Brassy minnow	*Hybognathus hankinsoni*
M15	Silvery minnow	*Hybognathus nuchalis*
M16	Speckled chub	*Hybopsis aestivalis*
M19	Hornyhead chub	*Nocomis biguttatus*
M20	Golden shiner	*Notemigonus chrysoleucas*
M21	Pallid shiner	*Notropis amnis*
M23	Emerald shiner	*Notropis atherinoides*
M24	River shiner	*Notropis blennius*
M28	Common shiner	*Notropis cornutus*
M29	Bigmouth shiner	*Notropis dorsalis*
M30	Pugnose minnow	*Notropis emiliae*
M32	Blacknose shiner	*Notropis heterolepis*
M33	Spottail shiner	*Notropis hudsonius*
M35	Rosyface shiner	*Notropis rubellus*
M36	Spotfin shiner	*Notropis spilopterus*
M37	Sand shiner	*Notropis stramineus*
M38	Weed shiner	*Notropis texanus*
M39	Redfin shiner	*Notropis umbratilis*
M40	Mimic shiner	*Notropis volucellus*
M41	Suckermouth minnow	*Phenacobius mirabilis*
M42	Northern redbelly dace	*Phoxinus eos*
M43	Southern redbelly dace	*Phoxinus erythrogaster*
M44	Finescale dace	*Phoxinus neogaeus*
M45	Bluntnose minnow	*Pimephales notatus*
M46	Fathead minnow	*Pimephales promelas*
M47	Bullhead minnow	*Pimephales vigilax*
M48	Blacknose dace	*Rhinichthys atratulus*
M49	Longnose dace	*Rhinichthys cataractae*
M50	Creek chub	*Semotilus atromaculatus*
M51	Pearl dace	*Semotilus margarita*
	Suckers	Catostomidae
N05	River carpsucker	*Carpiodes carpio*
N06	Quillback	*Carpiodes cyprinus*
N07	Highfin carpsucker	*Carpiodes velifer*
N09	White sucker	*Catostomus commersoni*
N10	Blue sucker	*Cycleptus elongatus*
N13	Northern hog sucker	*Hypentelium nigricans*
N14	Smallmouth buffalo	*Ictiobus bubalus*
N15	Bigmouth buffalo	*Ictiobus cyprinellus*
N17	Spotted sucker	*Minytrema melanops*
N18	Silver redhorse	*Moxostoma anisurum*
N19	River redhorse	*Moxostoma carinatum*
N21	Golden redhorse	*Moxostoma erythrurum*
N22	Shorthead redhorse	*Moxostoma macrolepidotum*
	Bullhead catfishes	Ictaluridae
O05	Black bullhead	*Ictalurus melas*
O06	Yellow bullhead	*Ictalurus natalis*
O07	Brown bullhead	*Ictalurus nebulosus*
O08	Channel catfish	*Ictalurus punctatus*
O10	Stonecat	*Noturus flavus*
O11	Tadpole madtom	*Noturus gyrinus*
O12	Flathead catfish	*Pylodictis olivaris*
	Pirate perches	Aphredoderidae
P01	Pirate perch	*Aphredoderus sayanus*
	Trout-perches	Percopsidae
Q01	Trout-perch	*Percopsis omiscomaycus*
	Codfishes	Gadidae
R01	Burbot	*Lota lota*
	Killifishes	Cyprinodontidae
S03	Starhead topminnow	*Fundulus notti*
	Silversides	Atherinidae
T01	Brook silverside	*Labidesthes sicculus*
	Sticklebacks	Gasterosteidae
U01	Brook stickleback	*Culaea inconstans*
	Temperate basses	Percichthyidae
V01	White bass	*Morone chrysops*
	Sunfishes	Centrarchidae
W04	Rock bass	*Ambloplites rupestris*
W05	Green sunfish	*Lepomis cyanellus*
W06	Pumpkinseed	*Lepomis gibbosus*
W07	Warmouth	*Lepomis gulosis*
W08	Orangespotted sunfish	*Lepomis humilis*
W09	Bluegill	*Lepomis macrochirus*
W11	Smallmouth bass	*Micropterus dolomieui*
W12	Largemouth bass	*Micropterus salmoides*
W13	White crappie	*Pomoxis annularis*
W14	Black crappie	*Pomoxis nigromaculatus*
	Perches	Percidae
X03	Crystal darter	*Ammocrypta asprella*
X04	Western sand darter	*Ammocrypta clara*
X05	Mud darter	*Etheostoma asprigene*
X07	Rainbow darter	*Etheostoma caeruleum*
X09	Iowa darter	*Etheostoma exile*
X10	Fantail darter	*Etheostoma*
X11	Least darter	*Etheostoma microperca*
X12	Johnny darter	*Etheostoma nigrum*
X14	Banded darter	*Etheostoma zonale*
X15	Yellow perch	*Perca flavescens*
X16	Logperch	*Percina caprodes*
X17	Gilt darter	*Percina evides*
X18	Blackside darter	*Percina maculata*
X19	Slenderhead darter	*Percina phoxocephala*
X20	River darter	*Percina shumardi*
X21	Sauger	*Stizostedion canadense*
X22	Walleye	*Stizostedion vitreum vitreum*
	Drums	Sciaenidae
Y01	Freshwater drum	*Aplodinotus grunniens*

The common and scientific names of fish species cited in this report (Table 4) follow names established by the American Fisheries Society's Committee on Names of Fishes (Robins 1980). All hybrids and specimens not keyed to species, except stonerollers, were not dealt with in this report.

At each station, the number of specimens for each species was counted to 98 and recorded on Form 8100-46 (Append. A Fig. 5). However, at many stations there were more than 98 specimens taken for certain species. They were recorded as 99. Therefore, the number of specimens recorded in Tables 6, 11, and 12 for some species is substantially lower than the number actually captured. Furthermore, there were up to 6 stations for certain species at which the number taken was unknown, further underestimating the total number of specimens.

Questionable specimens were sent to Dr. George Becker at the University of Wisconsin-Stevens Point for verification.

Endangered, Threatened, and Watch Species

The State of Wisconsin currently has 8 species on its endangered list*, 6 species on its threatened list*, and 18 species on its unofficial watch list. These 3 categories are defined as follows:

Endangered: Any species or subspecies in danger of becoming extirpated. Its continued existence as part of the state's wildlife resources is in jeopardy.

Threatened: Any species or subspecies which appears likely, within the foreseeable future, to become endangered.

Watch: Species or subspecies that may or may not be holding their own at the present time. They will be under special observation to identify conditions that could cause further decline, or any factors that could help to ensure their survival in the state.

*Chap. NR 27, Wis. Admin. Code.

RESULTS AND DISCUSSION

Findings are presented individually for the Black, Trempealeau, and Buffalo river basins. This is followed by a discussion of differences between the basins for selected species, including those on the Wisconsin DNR endangered, threatened, or watch lists. Unless otherwise indicated, findings refer only to the 1975-79 period (1975-82 for Buffalo).

BLACK RIVER BASIN (270)

Species Found

Over 111,000 specimens representing 97 species were identified in samples from the Black River basin (Tables 5 and 6). This includes the endangered starhead topminnow, 3 threatened species (speckled chub, blue sucker, and gilt darter), and 8 watch species. Distribution maps for all species are presented in Appendix B: each map shows the location of stations where the species was collected. An index to the maps is contained in Table 5 and in the front of Appendix B.

Muskellunge taken from the lower Black River.

Reproducing Populations

In the Black River basin 94 species are believed to have reproducing populations. The presence of reproducing populations of 2 other species is questionable: (1) rainbow trout — all collections can be attributed to stocking (J. Talley, pers. comm.), and (2) brown bullhead — only 1 young-of-year was taken. Another species captured, the American eel, does not spawn in fresh water.

Common and Rare Species

The 5 most common species (caught at the highest percentage of complete stations) were white sucker (63%), Johnny darter (64%), creek chub (52%), central mudminnow (50%), and brook stickleback (41%) (Table

TABLE 5. *Number of stations and percent of total stations at which each species was collected and percent change in occurrence in the Black, Trempealeau, and Buffalo river basins, 1900-82.*

Map No.	Species	Black (270)						Trempealeau (280)						Buffalo (290)					
		1900-31	1958-74		1975-79		Percent	1900-31	1958-74		1975-79		Percent	1900-31	1958-74		1975-82		Percent
		No. Stn.	No. Stn.	Percent Total	No. Stn.	Percent Total	Change In Occur.[2]	No. Stn.	No. Stn.	Percent Total	No. Stn.	Percent Total	Change In Occur.	No. Stn.	No. Stn.	Percent Total	No. Stn.	Percent Total	Change In Occur.
1	Chestnut lamprey	0	0	-	11	3	-	0	0	-	2	1	-	0	0	-	0	-	-
1	North. brook lamprey	0	0	-	8(2)*	2	-	0	0	-	0	-	-	0	0	-	1	1	-
2	Silver lamprey	0	0	-	3	1	-	0	0	-	0	-	-	0	0	-	1	1	-
2	Am. brook lamprey	2	0	-	34(5)	10	1,900	0	0	-	78(7)	23	-	0	0	-	40(14)	25	-
3	Longnose gar	0	0	-	10	3	-	0	1	8	1	t	0	1	0	-	0	-	-100
3	Shortnose gar	0	0	-	13	4	-	0	0	-	1	t	-	0	0	-	0	-	-
4	Bowfin	0	0	-	1	t**	-	0	0	-	3(2)	1	-	0	0(1)	-	0	-	-100
4	American eel (W)[1]	0	0(1)	-	0(3)	0	200	0	0	-	1	t	-	0	0	-	0	-	-
5	Gizzard shad	1	0	-	1	t	0	0	2	17	13	4	550	0	1	9	1	1	0
5	Mooneye	0	0	-	14	4	-	0	0	-	6	2	-	0	0	-	0	-	-
6	Rainbow trout	0	0(7)	-	4	1	-43	0	0(2)	-	4(2)	1	200	0	0(1)	-	4(7)	2	1,000
7	Brown trout	2	0(89)	-	29(11)	8	-55	0	0(32)	-	51(18)	15	120	0	0(35)	-	29(15)	18	26
8	Brook trout	4	2(138)	7	57(26)	16	-41	0	0(68)	-	51(14)	15	-4	0	0(46)	-	53(23)	33	65
9	Central mudminnow	14	3(65)	11	173(37)	50	210	1	0(7)	-	45(13)	13	730	1	0(27)	-	53(6)	33	120
10	Northern pike	2	1(11)	4	56(13)	16	480	1	2(10)	17	35(8)	10	260	1	1(3)	9	15(1)	9	300
11	Muskellunge	0	0(3)	-	19(8)	5	800	0	0	-	0	-	-	0	0	-	0	-	-
12	Central stoneroller	0	0	-	0	-	-	0	0	-	3	1	-	0	0	-	2	1	-
13	Largescale stoneroller	7	5	18	89(1)	26	1,700	1	0	-	0	-	-100	0	0	-	0	-	-
14	Redside dace (W)	5	0	-	36(1)	10	640	0	0	-	0	-	-	0	0	-	0	-	-
15	Common carp	2	0(5)	-	31(9)	9	700	1	3(7)	25	26(2)	8	180	2	1(12)	9	10(1)	6	-15
16	Brassy minnow	4	1	4	82(1)	24	8,200	0	0	-	40	12	-	0	6	55	10(3)	6	120
17	Silvery minnow	4	2	7	7	2	250	0	2	17	1	t	-50	2	2	18	0	-	-100
17	Speckled chub (T)	0	0	-	1	t	-	0	0	-	0	-	-	0	0	-	0	-	-
18	Hornyhead chub	5	2	7	60	17	2,900	1	1	8	6	2	500	0	1	9	0	-	-100
19	Golden shiner	15	0	-	61(5)	18	340	2	2	17	10(2)	3	500	4	5	45	7(1)	4	60
-	Pallid shiner (E)	1	0	-	0	-	-100	1	0	-	0	-	-100	0	0	-	0	-	-
20	Emerald shiner	4	2	7	5(1)	1	200	0	8	67	24	7	200	3	4	36	4	2	0
21	River shiner	2	0	-	11	3	450	0	1	8	4	1	300	1	1	9	0	-	-100
22	Common shiner	17	13	46	130(3)	37	920	1	1	8	11	3	1,000	0	1	9	0	-	-100
23	Bigmouth shiner	5	5	18	61(1)	18	1,100	0	3	25	76	23	2,400	2	3	27	24(5)	15	870
24	Pugnose minnow (W)	1	2	7	7	2	250	0	4	33	3	1	-25	1	0	-	0	-	-100
25	Blacknose shiner	9	5	18	51(1)	15	940	1	0	-	2	1	100	0	0	-	0	-	-
26	Spottail shiner	0	1	4	2	1	100	0	2	17	2	1	0	1	2	18	1	1	-50
27	Rosyface shiner	5	5	18	54	16	980	0	0	-	0	-	-	0	0	-	0	-	-
28	Spotfin shiner	6	5	18	64(1)	18	1,200	1	8	67	73	22	810	4	6	55	10(2)	6	100
29	Sand shiner	3	3	11	50	14	1,600	0	1	8	2	1	100	1	0	-	0	-	-100
26	Weed shiner (W)	2	0	-	4	1	100	0	0	-	0	-	-	1	5	45	9	6	80
-	Redfin shiner (W)	2	0	-	0	-	-100	2	0	-	0	-	-100	0	0	-	0	-	-
30	Mimic shiner	2	1	4	34	10	3,300	1	1	8	2	1	100	0	0	-	0	-	-
31	Suckermouth minnow	0	1	4	1	t	0	0	2	17	5	1	150	0	2	18	4	2	100
32	North. redbelly dace	5	1	4	56	16	5,500	0	0	-	0	-	-	0	0	-	0	-	-
31	South. redbelly dace	0	0	-	4	1	-	0	0	-	0	-	-	0	1	9	0	-	-100
33	Finescale dace	0	0	-	8(1)	2	-	0	0	-	0	-	-	0	0	-	0	-	-
34	Bluntnose minnow	7	8	29	135(4)	39	1,600	4	6	50	81(1)	24	1,300	4	8	73	29(3)	18	300
35	Fathead minnow	11	5	18	98(7)	28	2,000	3	3	25	123(5)	37	4,200	4	7	64	51(9)	31	760
36	Bullhead minnow	3	2	7	34	10	1,600	0	5	42	9	3	80	1	2	18	2	1	0
37	Blacknose dace	13	0	-	105(6)	30	750	0	1	8	137(12)	41	14,800	1	3	27	86(21)	53	3,500
38	Longnose dace	5	1	4	76(3)	22	7,800	0	1	8	50	15	4,900	2	3	27	43(4)	26	1,500
39	Creek chub	19	5	18	181(9)	52	3,700	1	3	25	159(10)	47	5,500	3	4	36	87(11)	53	2,400
40	Pearl dace	6	0	-	52(2)	15	800	0	0	-	18(1)	5	-	0	0	-	1(1)	1	-
41	River carpsucker	0	0	-	2	1	-	0	1	8	2	1	100	0	0	-	0	-	-
42	Quillback	0	1	4	24	7	2,300	0	2	17	15	4	650	0	0	-	0	-	-
41	Highfin carpsucker	0	0	-	15	4	-	0	0	-	10	3	-	0	0	-	0	-	-
43	White sucker	29	8(141)	29	224(38)	64	76	4	2(90)	17	186(34)	56	140	4	6(70)	55	111(36)	68	93
44	Blue sucker (T)	0	0	-	1	t	-	0	0	-	0	-	-	0	0	-	0	-	-
45	Northern hog sucker	13	6(20)	21	83(7)	24	250	0	1(5)	8	1	t	-83	0	2(3)	18	7(1)	4	60
44	Smallmouth buffalo	0	0	-	0	-	-	0	1	8	5	1	400	0	0	-	0	-	-
46	Bigmouth buffalo	0	0	-	13	4	-	0	0	-	6	2	-	0	0	-	2	1	-
47	Spotted sucker	1	0	-	25(1)	7	2,500	1	2	17	7	2	250	0	3	27	1	1	-67
48	Silver redhorse	3	4	14	45(3)	13	1,100	0	1	8	11	3	1,000	2	0	-	3	2	50
49	River redhorse (W)	0	0	-	11	3	-	0	0	-	0	-	-	0	0	-	0	-	-
50	Golden redhorse	3	5	18	65(2)	19	1,200	1	0	-	0	-	-100	0	0	-	0	-	-

TABLE 5. *Continued.*

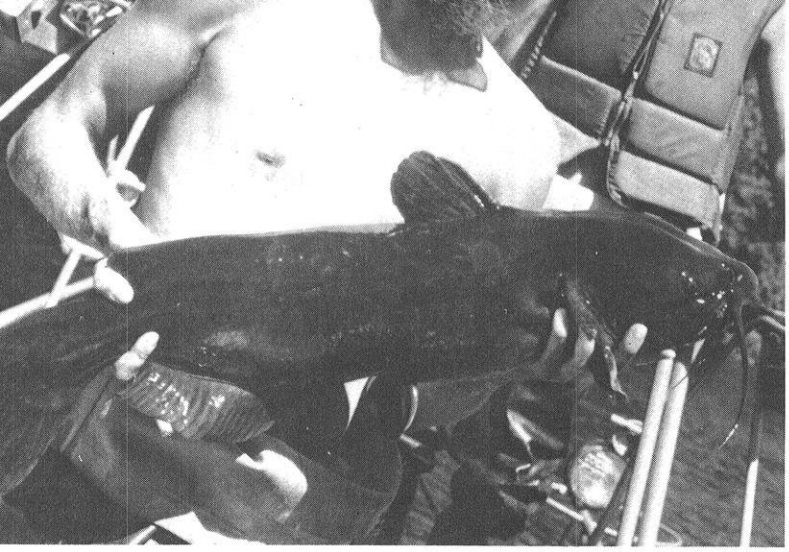
Map No.	Species	Black (270) 1900-31 No. Stn.	Black (270) 1958-74 No. Stn.	Black (270) 1958-74 Percent Total	Black (270) 1975-79 No. Stn.	Black (270) 1975-79 Percent Total	Black (270) Percent Change In Occur.[2]	Trempealeau (280) 1900-31 No. Stn.	Trempealeau (280) 1958-74 No. Stn.	Trempealeau (280) 1958-74 Percent Total	Trempealeau (280) 1975-79 No. Stn.	Trempealeau (280) 1975-79 Percent Total	Trempealeau (280) Percent Change In Occur.	Buffalo (290) 1900-31 No. Stn.	Buffalo (290) 1958-74 No. Stn.	Buffalo (290) 1958-74 Percent Total	Buffalo (290) 1975-82 No. Stn.	Buffalo (290) 1975-82 Percent Total	Buffalo (290) Percent Change In Occur.
51	Shorthead redhorse	1	4	14	59(3)	17	1,500	0	2	17	29	9	1,400	3	1	9	7(1)	4	700
52	Black bullhead	8	0	-	56(1)	16	610	2	2	17	17(2)	5	850	2	0	-	3	2	50
53	Yellow bullhead	1	0	-	15	4	1,400	0	1	8	3	1	200	0	0	-	2(1)	1	-
54	Brown bullhead	1	0	-	1	t	0	0	0	-	1	t	-	0	0	-	0	-	-
55	Channel catfish	2	1(2)	4	24(5)	7	870	1	5(2)	42	20	6	190	0	2(2)	18	1	1	-75
56	Stonecat	1	2	7	28	8	1,300	0	0	-	2	1	-	0	0	-	1(1)	1	-
57	Tadpole madtom	1	0	-	44(1)	13	4,400	0	5	42	4	1	-20	0	2	18	3	2	50
54	Flathead catfish	0	0	-	1(2)	t	-	0	0(2)	-	1	t	-50	0	0(1)	-	2	1	100
58	Pirate perch (W)	0	0	-	2	1	-	0	0	-	0(1)	0	-	0	0	-	1	1	-
-	Trout-perch	0	0	-	0	-	-	0	2	17	0	-	-100	0	0	-	0	-	-
59	Burbot	4	0(34)	-	53(8)	15	79	0	0	-	0	-	-	0	0	-	2	1	-
60	Starhead topminnow (E)	0	0	-	1	t	-	0	0	-	0	-	-	0	0	-	0	-	-
60	Brook silverside	1	2	7	9	3	350	0	2	17	2(1)	1	50	0	2	18	0	-	-100
61	Brook stickleback	11	3(50)	11	148(23)	43	220	1	1(32)	8	170(31)	51	510	0	5(30)	45	91(34)	56	260
62	White bass	0	0	-	2	1	-	0	3	25	6	2	100	0	1	9	2	1	100
63	Rock bass	2	3	11	71(1)	20	2,300	1	2	17	3	1	50	1	0	-	5	3	400
64	Green sunfish	0	0	-	15(1)	4	-	2	1	8	32(5)	10	3,600	0	2	18	13(4)	8	750
65	Pumpkinseed	7	3	11	84(2)	24	2,800	2	3	25	19(1)	6	570	0	0	-	7	4	-
-	Warmouth	0	0	-	0	-	-	1	1	8	0	-	-100	0	1	9	0	-	-100
-	Orangespotted sunfish	0	0	-	0	-	-	0	3	25	0	-	-100	0	1	9	0	-	-100
66	Bluegill	3	5	18	37(1)	11	660	1	4	33	14	4	250	3	2	18	7(1)	4	300
67	Smallmouth bass	9	9(9)	32	90(10)	26	460	0	1(2)	8	2	1	-33	1	0	-	1	1	0
68	Largemouth bass	3	4(12)	14	41(13)	12	240	3	4(2)	33	13(2)	4	150	3	1(3)	9	6(5)	4	175
69	White crappie	4	0	-	13(1)	4	250	2	4	33	3	1	-25	4	1	9	0	-	-100
70	Black crappie	5	4	14	35(2)	10	830	1	3	25	7	2	130	4	3	27	5	3	67
-	Crystal darter (E)	0	0	-	0	-	-	0	1	8	0	-	-100	0	0	-	0	-	-
71	Western sand darter	2	0	-	15	4	650	0	1	8	1	t	0	0	0	-	0	-	-
72	Mud darter (W)	0	0	-	8	2	-	1	3	25	6	2	100	2	1	9	7	4	600
73	Rainbow darter	4	3	11	80(1)	23	2,600	0	0	-	0	-	-	0	0	-	0	-	-
74	Iowa darter	0	0	-	29	8	-	0	2	17	4	1	100	2	1	9	0(2)	-	100
75	Fantail darter	7	1	4	66	19	6,500	2	0	-	16	5	700	0	3	27	21(3)	13	700
76	Least darter (W)	0	0	-	2	1	-	0	0	-	0	-	-	0	0	-	0	-	-
77	Johnny darter	26	15	54	224(12)	64	1,500	5	8	67	214(19)	64	2,800	3	9	82	105(18)	64	1,300
78	Banded darter	3	5	18	51(1)	15	940	0	0	-	13	4	-	0	0	-	4(1)	2	-
79	Yellow perch	6	2(24)	7	28(9)	8	42	0	5	42	2(2)	1	-20	1	0	-	1	1	0
80	Logperch	2	2	7	39(2)	11	2,000	0	3	25	1	t	-70	1	2	18	2	1	0
76	Gilt darter (T)	1	0	-	6	2	500	0	0	-	0	-	-	0	0	-	0	-	-
81	Blackside darter	16	6	21	125(3)	36	2,000	1	1	8	60(5)	18	6,400	1	1	9	15(1)	9	1,500
82	Slenderhead darter	1	1	4	12(1)	3	1,200	0	0	-	0	-	-	0	0	-	0	-	-
83	River darter	0	0	-	6	2	-	0	1	8	1	t	0	0	0	-	0	-	-
84	Sauger	0	0	-	2	1	-	0	2	17	9	3	350	0	0	-	1	1	-
85	Walleye	4	1(9)	4	29(8)	8	270	0	1(3)	8	12	4	200	1	0	-	2	1	100
86	Freshwater drum	0	0	-	7(1)	2	-	0	4(3)	33	9	3	29	1	0(3)	-	3	2	0
No. of Species		67	55		97			33	66		79			38	51		60		
Total no. of occurrences (Sum of number of species taken at each station)		127	801		4,413			55	421		2,297			79	358		1,257		

* Number in parentheses indicates partial stations. They were kept separate since not all of the fish from the station were adequately keyed to species.

** t = less than 0.5%

[1] E = Endangered, T = Threatened, W = Watch.

[2] Percent change over next most recent period in which species was collected (partial stations included in calculations).



This dark specimen of a channel catfish was taken from the lower Trempealeau River with a boom shocker.

The sauger (on left) and smallmouth bass (on right) were taken in the lower Treampealeau River with a boom shocker.

5). The 5 most numerous species (most specimens caught) were white sucker (9,700), creek chub (8,200), common shiner (7,600), Johnny darter (6,000), and bluntnose minnow (5,400) (Table 6). The central mudminnow and brook stickleback were the 7th and 8th most numerous species.

Of the 19 rarest species (those caught at 5 or fewer of all the stations, Table 7), all but 3 (southern redbelly dace, pirate perch, and least darter) were also represented by the smallest total number of specimens (Table 6).

Differences Between Time Periods

Twenty-six species of fish collected during the 1975-79 period have not been previously reported for this basin (Table 8).

The pallid shiner and redfin shiner are apparently no longer present in the Black River basin, for they were last taken before 1931 (Table 9). However, they may have been very rare even in the early 1900's for they were reported from only 1 and 2 stations, respectively.

Thirteen species that we collected had not been reported between 1932 and 1975 from this basin (Table 10).

One of the most important results of this study was the documentation of changes in the known distribution of species within the Black River basin in 1975-79 as compared to previous periods (Table 5). These changes have ranged from decreases in the number of stations for 5 species to increases for 65 species, and no change for 3 others. The decreases ranged from 100% for 2 species to 41% for the brook trout. The increases ranged from 42% for the yellow perch to 8,200% for the brassy minnow (average = 1,500%), and were due primarily but perhaps not entirely to increased sampling effort in 1975-79. There were 128 more streams and 5 more lakes with at least 1 complete station compared to 1958-74 and 113 more streams and 3 more lakes compared to 1900-31 (Table 2). When the total number of complete stations sampled in the 1975-79 period was compared with the 1958-74 and 1900-31 periods, there were increases of 1,100% and 870% respectively.

Species Diversity

Fifty-nine stations (19%) sampled by research personnel in the Black River basin had 20 or more species and 13 stations had more than 25 species (Fig. 4). The average number of species taken per station was 12.

TREMPEALEAU RIVER BASIN (280)

Species Found

Over 35,000 specimens representing 79 species were identified in samples from the Trempealeau River basin (Tables 5 and 11). This included 4 species (American eel, pugnose minnow, pirate perch, and mud darter) on the watch list. Distribution maps for all species are presented in Appendix B.

Reproducing Populations

In the Trempealeau River basin 76 species are believed to have reproducing populations. The presence of reproducing populations of 2 other species is questionable: (1) rainbow trout — all accounts can be attributed to stocking (J. Talley, pers. comm.), and (2) brown bullhead — only 1 specimen taken at mouth of Trempealeau River. Another species captured was the American eel which does not spawn in fresh water.

Common and Rare Species

The 5 most common species (caught at the highest percentage of complete stations) were Johnny darter (65%), white sucker (58%), brook stickleback (53%), creek chub (47%), and blacknose dace (42%) (Table 5). The 5 most numerous species (most specimens caught) were white sucker (4,800), Johnny darter (4,700), brook stickleback (2,900), spotfin shiner (2,800), and creek chub (2,800) (Table 11).

Of the 32 rarest species (those caught at 5 or fewer of all the stations, Table 7), all but 5 (bowfin, central stoneroller, pugnose minnow, spotted shiner, and yellow perch) were also represented by the smallest number of specimens (Table 11).

Differences Between Time Periods

Fifteen species of fish that we collected have not been previously reported for this basin (Table 8).

Eight species are apparently no longer present in the Trempealeau River basin (Table 9). The largescale stoneroller, pallid shiner, redfin shiner, and golden redhorse were taken only before 1932, and the trout-perch, warmouth, orangespotted sunfish, and crystal darter were most recently reported in the 1958-74 time period.

TABLE 6. *Number of specimens and number of stations for each species collected in the Black River basin, 1975-79.*

Common Name	No. Specimens*	No. Stations** <99	>98	"Unknown"
White sucker	9,700	212	44	6
Creek chub	8,300	153	37	
Common shiner	7,700	70	63	
Johnny darter	6,000	214	20	2
Bluntnose minnow	5,400	102	36	1
Largescale stoneroller[1]	5,200	60	30	
Central mudminnow	4,600	192	11	7
Brook stickleback	4,000	152	16	3
Blacknose dace	3,600	95	16	
Brassy minnow	3,300	61	21	1
Blackside darter	3,300	117	10	1
Spotfin shiner	3,200	44	21	
Fathead minnow	3,100	88	17	
Brook trout	2,800	72	11	
Rainbow darter	2,700	65	14	2
Sand shiner	2,600	33	17	
Northern redbelly dace	2,500	38	18	
Bigmouth shiner	2,200	49	13	
Hornyhead chub	1,800	50	10	
Rock bass	1,700	68	3	1
Northern hog sucker	1,700	86	2	2
Smallmouth bass	1,600	95	4	1
Longnose dace	1,500	71	8	
Mimic shiner	1,400	23	10	1
Bullhead minnow	1,400	24	10	
Blacknose shiner	1,200	46	6	
Golden redhorse	1,200	64	2	1
Shorthead redhorse	1,200	60	2	
Fantail darter	1,200	64	1	1
Rosyface shiner	1,200	53	1	
Redside dace	960	33	4	
Bluegill	940	31	6	1
Black bullhead	850	53	4	
Pearl dace	810	51	3	
Pumpkinseed	790	86		
Common carp	780	35	1	4
Golden shiner	720	66		
Tadpole madtom	690	45		
Banded darter	680	52		
Silver redhorse	670	47	1	
Spotted sucker	620	25	1	
Logperch	530	38	2	1
Brown trout	490	37	3	
Walleye	350	35	2	
Northern pike	340	68	1	
American brook lamprey	320	39		
Southern redbelly dace	300	3	1	
Burbot	300	56		5
Largemouth bass	280	53		1
Black crappie	280	36		1
Quillback	250	24		
Yellow perch	220	33	1	3
Iowa darter	160	29		
Silvery minnow	150	6	1	
Longnose gar	150	10		
Muskellunge	120	27		
Bigmouth buffalo	110	13		
Channel catfish	110	29		
Stonecat	110	28		
Least darter	100	1	1	
Slenderhead darter	95	13		
Highfin carpsucker	84	15		
Gilt darter	79	6		
Finescale dace	76	9		
Green sunfish	73	16		
Emerald shiner	70	6		
Brook silverside	70	9		
Shortnose gar	66	13		
Western sand darter	52	15		
Yellow bullhead	44	15		
River shiner	43	11		
Northern brook lamprey	39	10		
Mud darter	36	8		
Mooneye	33	14		
White crappie	23	13		1
River redhorse	22	11		
Chestnut lamprey	20	11		
Pirate perch	20	2		
Pugnose minnow	18	7		
River darter	17	6		
Spottail shiner	13	2		
Freshwater drum	11	7		1
Weed shiner	11	4		
Flathead catfish	11	3		
Rainbow trout	4	4		
Silver lamprey	3	3		
American eel	3	3		
White bass	3	2		
River carpsucker	2	2		
Sauger	2	2		
Bowfin	1	1		
Gizzard shad	1	1		
Speckled chub	1	1		
Suckermouth minnow	1	1		
Blue sucker	1	1		
Brown bullhead	1	1		
Starhead topminnow	1	1	—	—
Total[1]	111,530	3,859	506	48

*Rounded to 2 significant figures for each species.
**<99 = 98 or fewer specimens taken/station.
>98 = 99 or more specimens taken/station.
Unknown = counts of specimens were not made.
[1]4,200 stonerollers were not keyed to species.

These species had been reported from an average of only 1.5 stations, and were considered rare in those years.

The blacknose shiner and fantail darter were not taken between 1931 and 1974 from this basin (Table 10).

As in the Black River basin, one of the most important results of this study was documentation of changes in the known distribution of species within the Trempealeau River basin in 1975-80 as compared to previous periods (Table 5). These changes ranged from decreases in the number of stations for 18 species to increases for 49 species, and no change for 5 others. The decreases ranged from 100% for 8 species to 4% for the brook trout. The increases ranged from 50% for the brook silverside and rock bass to 14,800% for the blacknose dace (average = 1,200%). The reasons for the increases are the same as for the Black River basin. In 1975-79 there were 116 more streams and 1 more lake with at least 1 complete station compared to 1958-74 and 115 more streams and 1 more lake

TABLE 7. *List of species collected at 5 or fewer stations from the Black (1975-79), Trempealeau (1975-79), and Buffalo (1975-82) river basins.*

Black (270)	Trempealeau (280)	Buffalo (290)
Silver lamprey	Chestnut lamprey	Northern brook lamprey
Bowfin	Longnose gar	Silver lamprey
American eel	Shortnose gar	Gizzard shad
Gizzard shad	Bowfin	Central stoneroller
Rainbow trout*	American eel	Emerald shiner
Speckled chub	Central stoneroller	Spottail shiner
Spottail shiner	Silvery minnow	Suckermouth minnow
Weed shiner	River shiner	Bullhead minnow
Suckermouth minnow	Pugnose minnow	Pearl dace
Southern redbelly dace	Blacknose shiner	Bigmouth buffalo
River carpsucker	Spottail shiner	Spotted sucker
Blue sucker	Sand shiner	Silver redhorse
Brown bullhead*	Mimic shiner	Black bullhead
Flathead catfish	Suckermouth minnow	Yellow bullhead
Pirate perch	River carpsucker	Channel catfish
Starhead topminnow	Northern hog sucker	Stonecat
White bass	Small mouth buffalo	Tadpole madtom
Least darter	Yellow bullhead	Flathead catfish
Sauger	Brown bullhead*	Pirate perch
	Stonecat	Burbot
	Tadpole madtom	White bass
	Flathead catfish	Rock bass
	Pirate perch	Smallmouth bass
	Brook silverside	Black crappie
	Rock bass	Iowa darter
	Smallmouth bass	Banded darter
	White crappie	Yellow perch
	Western sand darter	Logperch
	Iowa darter	Sauger
	Yellow perch	Walleye
	Logperch	Freshwater drum
	River darter	

*Naturally reproducing population questionable.

TABLE 8. *Fish species collected for the first time during the 1975-79* period from the Black, Trempealeau, and Buffalo river basins.*

Black (270)	Trempealeau (280)	Buffalo (290)
Chestnut lamprey	Chestnut lamprey	North. brook lamprey
North. brook lamprey	Am. brook lamprey	Silver lamprey
Silver lamprey	Shortnose gar	Am. brook lamprey
Longnose gar	Bowfin	Central stoneroller
Shortnose gar	American eel**	Pearl dace
Bowfin	Mooneye	Bigmouth buffalo
Mooneye	Central stoneroller	Yellow bullhead
Speckled chub	Brassy minnow	Stonecat
South. redbelly dace	Pearl dace	Pirate perch
Finescale dace	Highfin carpsucker	Burbot
River carpsucker	Bigmouth buffalo	Pumpkinseed
Highfin carpsucker	Brown bullhead	Banded darter
Blue sucker	Stonecat	Sauger
Bigmouth buffalo	Pirate perch	
River redhorse	Banded darter	
Flathead catfish		
Pirate perch		
White bass		
Starhead topminnow		
Green sunfish		
Mud darter		
Iowa darter		
Least darter		
River darter		
Sauger		
Freshwater drum		

*1975-82 for Buffalo River basin.
**Natural reproduction does not occur in this basin.

compared to 1900-31 (Table 2). When the total number of complete stations sampled in the 1975-79 period was compared with the 1958-74 and 1900-31 periods, there were increases of 2,900% and 5,500%, respectively.

Species Diversity

There were only 2 stations (1%) sampled by research personnel that had 20 or more species, 1 of which had 27 species (Fig. 4). The average number of species taken per station was 7.

BUFFALO RIVER BASIN (290)

Species Found

Over 22,000 specimens representing 60 species were identified in samples from the Buffalo River basin (Tables 5 and 12). This included 3 species (weed shiner, pirate perch, and mud darter) on the watch list. Distribution maps for all species are presented in Appendix B.

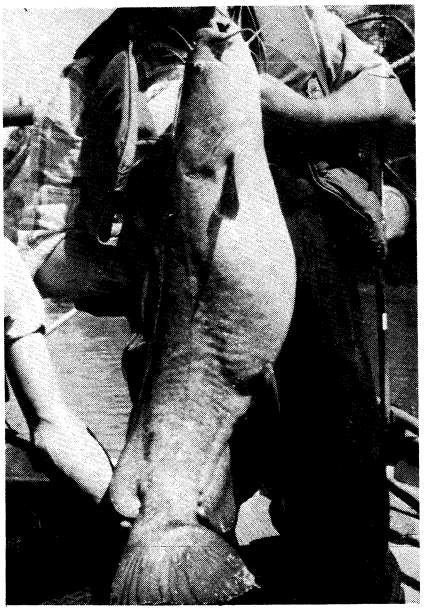
Reproducing Populations

In the Buffalo River basin 59 species are believed to have reproducing populations. The presence of reproducing populations of the rainbow trout is questionable since all records can be attributed to stocking (J. Talley, pers. comm.).

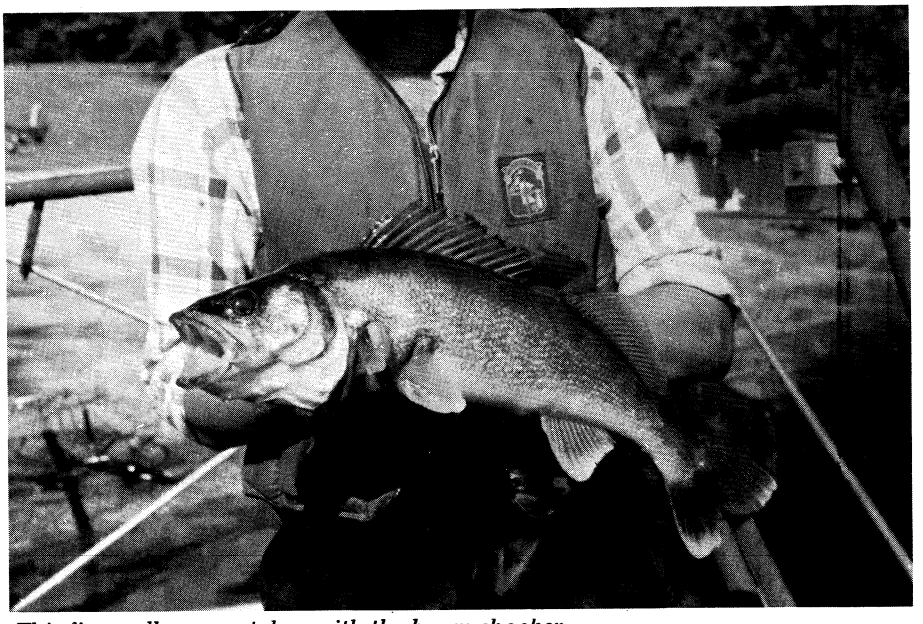
Common and Rare Species

The 5 most common species (caught at the highest percentage of complete stations) were white sucker (68%), Johnny darter (64%), brook stickleback (56%), blacknose dace (53%), and creek chub (53%) (Table 5). The 5 most numerous species (most specimens caught) were white sucker (5,200), Johnny darter (2,800), blacknose dace (2,700), creek chub (2,100), and brook trout (1,800) (Table 12). The brook stickleback was the 6th most numerous species.

Of the 31 rarest species (those caught at 5 or fewer of all the stations, Table 7), all but 4 (emerald shiner, spotted sucker, silver redhorse, and freshwater drum) were also represented by the smallest total number of specimens (Table 12).



This large flathead catfish was taken from the lower Buffalo River with the boom shocker.



This fine walleye was taken with the boom shocker in the lower Buffalo River.

Differences Between Time Periods

Thirteen species of fish that we collected have not been previously reported for this basin (Table 8).

Thirteen species are apparently no longer present in the Buffalo River basin (Table 9). The longnose gar, pugnose minnow, and sand shiner were taken only before 1932, and the bowfin, silvery minnow, hornyhead chub, river shiner, common shiner, southern redbelly dace, brook silverside, warmouth, orangespotted sunfish, and white crappie were most recently taken in the 1958-74 time period. These species were apparently rare in earlier years, for they had been reported at only 1 or 2 stations.

The silver redhorse, black bullhead, rock bass, smallmouth bass, yellow perch, and walleye were not taken between 1931 and 1974 from this basin (Table 10).

Again, one of the most important results of this study was documentation of changes in the known distribution of species within the Buffalo River basin in 1975-82 as compared to previous periods (Table 5). These changes ranged from decreases in the number of stations for 17 species to increases for 36 species, and no change for 7 others. The decreases ranged from 100% for 13 species to 15% for the common carp. The increases ranged from 26% for the brown trout to 3,500% for the blacknose dace (average = 520%). The reasons for the increases are the same as for the other 2 basins. In 1975-82 there were 74 more streams with at least 1 complete station compared to 1958-74

TABLE 9. *Fish species apparently no longer present in the Black, Trempealeau, and Buffalo river basins.*

Last Period Recorded	Black (270)	Trempealeau (280)	Buffalo (290)
1900-31	Pallid shiner Redfin shiner	Largescale stoneroller Pallid shiner Redfin shiner Golden redhorse	Longnose gar Pugnose minnow Sand shiner
1958-74		Trout-perch Warmouth Orangespotted sunfish Crystal darter	Bowfin Silvery minnow Hornyhead chub River shiner Common shiner Southern redbelly dace Brook silverside Warmouth Orangespotted sunfish White crappie

TABLE 10. *Fish species reported prior to 1932 but not collected again until 1975-79.**

Black (270)	Trempealeau (280)	Buffalo (290)
American brook lamprey	Blacknose shiner	Silver redhorse
Gizzard shad	Fantail darter	Black bullhead
Redside dace		Rock bass
Golden shiner		Smallmouth bass
Weed shiner		Yellow perch
Blacknose dace		Walleye
Pearl dace		
Black bullhead		
Yellow bullhead		
Brown bullhead		
Tadpole madtom		
Western sand darter		
Gilt darter		

*1975-82 for Buffalo River basin.

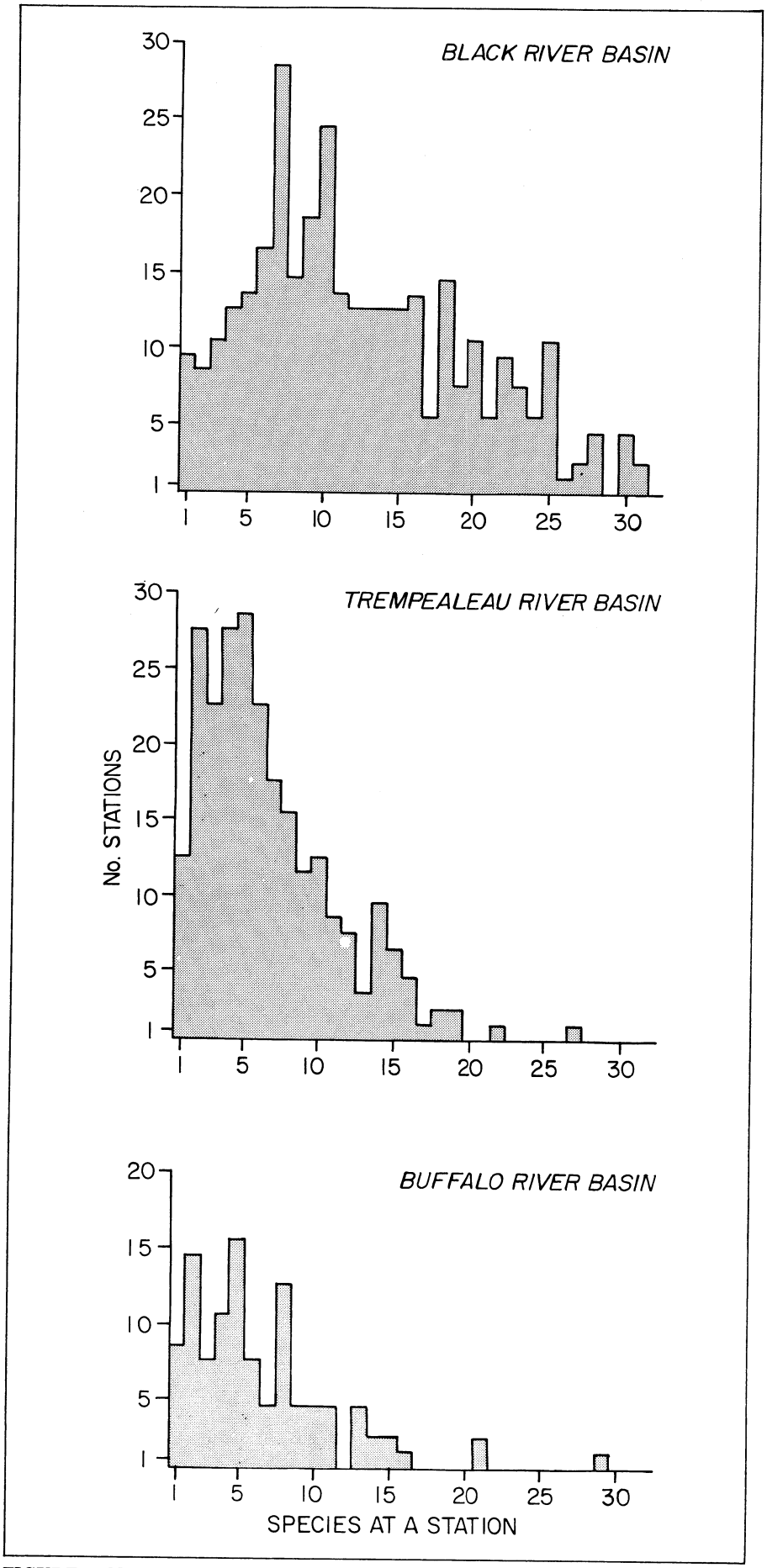


FIGURE 4. *Number of stations at which varying numbers of species were taken in the Black, Trempealeau, and Buffalo river basins.*

and 78 more streams compared to 1900-31 (Table 2). When the total number of complete stations sampled in the 1975-82 period was compared with the 1958-74 and 1900-31 periods, there were increases of 1,400% and 1,900%, respectively.

Species Diversity

There were only 3 stations (1%) sampled by research personnel that had more than 20 species, 1 of which had 29 species (Fig. 4). The average number of species taken per station was 6.

DIFFERENCES BETWEEN BASINS (270, 280, 290)

Of the 97 species found in the Black River basin, 15 were not found in the Trempealeau or Buffalo river basins (Table 13). Of the 79 species found in the Trempealeau River basin, only the smallmouth buffalo was not captured in the other 2. There were no species found in the Buffalo River basin that were not taken in the Black or Trempealeau river basins.

The Black River basin has a more diverse aquatic habitat, 2 1/2 times larger watershed, and over 4 times larger flow rate of its mainstem than the Trempealeau or Buffalo river basins. These are important factors which may help to explain the larger number of species (97 as compared to 79 and 60) and larger average number of species per station (12 as compared to 7 and 6).

ENDANGERED SPECIES

Only 1 species on the state's endangered species list was found in the Black River basin (none in the 2 other basins). One specimen of the **starhead topminnow** was taken at a station near the mouth of the Black River (Table 14) (Append. B Map 60). This species had not been reported previously from any location in the state farther north than T8N.

THREATENED SPECIES

Three threatened species were found in the Black River and none in the 2 other basins (Table 15). One specimen of the **speckled chub** was taken near the mouth of the Black River (Append. B Map 17). One specimen of the **blue sucker** (Append. B Map 44) was taken at 1 station and 79 **gilt darters** (Ap-

TABLE 11. *Number of specimens and number of stations for each species collected in the Trempealeau River basin, 1975-79.*

Common Name	No. Specimens*	No. Stations** <99	>98	"Unknown"
White sucker	4,800	210	9	1
Johnny darter	4,700	222	10	1
Brook stickleback	2,900	193	8	
Creek chub	2,800	163	6	
Spotfin shiner	2,700	61	12	
Blacknose dace	2,300	146	3	
Bigmouth shiner	2,100	69	7	
Bluntnose minnow	1,600	76	6	
Brook trout	1,500	60	5	
Longnose dace	1,400	44	6	
Fathead minnow	1,400	125	3	
Emerald shiner	890	17	7	
Brown trout	650	69		
American brook lamprey	600	85		
Common carp	550	26	2	
Brassy minnow	420	40		
Blackside darter	410	65		
Gizzard shad	380	10	3	
Central mudminnow	330	58		
Shorthead redhorse	320	29		
Green sunfish	220	37		
Northern pike	190	43		
Bluegill	160	13	1	
Common shiner	150	10	1	
Black bullhead	150	18	1	
Bowfin	150	5		
Channel catfish	150	20		
Pearl dace	140	19		
Bullhead minnow	130	9		
Fantail darter	120	16		
Yellow perch	83	4		
Largemouth bass	65	15		
Quillback	64	15		
Spotted sucker	56	7		
Hornyhead chub	55	6		
Pumpkinseed	48	20		
Highfin carpsucker	42	10		
Central stoneroller[1]	35	3		
Pugnose minnow	35	3		
Sauger	35	9		
Black crappie	34	7		
Walleye	34	12		
Spottail shiner	33	2		
Golden shiner	31	12		
Freshwater drum	28	9		
Banded darter	27	13		
White bass	23	6		
Suckermouth minnow	20	5		
White crappie	20	3		
Mooneye	19	6		
Rainbow trout	19	6		
Bigmouth buffalo	18	6		
Silver redhorse	17	11		
Sand shiner	12	2		
Rock bass	11	3		
Mud darter	11	6		
Tadpole madtom	7	4		
Iowa darter	7	4		
Mimic shiner	6	2		
River shiner	5	4		
Smallmouth buffalo	5	5		
Brook silverside	4	2		1
Silvery minnow	3	1		
Yellow bullhead	3	3		
Stonecat	3	2		
Chestnut lamprey	2	2		
Blacknose shiner	2	2		
River carpsucker	2	2		
Smallmouth bass	2	2		
Longnose gar	1	1		
Shortnose gar	1	1		
American eel	1	1		
Northern hog sucker	1	1		
Brown bullhead	1	1		
Flathead catfish	1	1		
Western sand darter	1	1		
Logperch	1	1		
River darter	1	1		
Pirate perch				1
Total	35,245	2,203	90	4

*Rounded to 2 significant figures for each species.
**<99 = 98 or fewer specimens taken/station.
>98 = 99 or more specimens taken/station.
Unknown = counts of specimens were not made.
[1]22 Stonerollers were not keyed to species.

pend. B Map 76) at 6 stations farther up the Black River. Previous to this study, these species had not been reported from these 3 basins.

The gilt darter was found in the shallow riffle area of the mainstem of the Black River where the turbidity was clear to slightly turbid. Habitat characteristics for this darter and 5 watch species are shown in Table 16.

WATCH SPECIES

In the 3 basins, 8 watch species were collected (Table 17). Three **American eels** were taken from the Black River, Soper Creek (270), and the Trempealeau River (Append. B Map 4). From these 3 basins this species previously had been reported from only 1 stream in the Black River basin. These fish (only females found in fresh water) migrate back to the Sargasso Sea to spawn. The **redside dace** was captured at 37 stations in 27 streams in the Black River basin (Append. B Map 14). Previously there were records from only 4 streams in this basin. The **pugnose minnow** occurred at 10 stations in 2 rivers (the Black and Trempealeau) (Append. B Map 24). Previously, this species had been reported in 4 streams from these 3 basins. We sampled the same streams but collected pugnose minnows in only 2 of them — none in the Buffalo River basin.

The **weed shiner** was taken at 13 stations in 5 streams in 2 basins (Append. B Map 26). This species was previously reported from 4 streams in the 2 basins: we sampled the same streams but collected weed shiners in only 3 of them. The **river redhorse** was found at 11 stations in the Black River (Append. B Map 49) and the **pirate perch** was captured at 4 stations in 3 streams (one in each basin) (Append. B Map 58). There were no previous records of either species in any of the 3 basins. The **mud darter** was taken at 21 stations in 7 streams in all basins (Append. B Map 72). Previously, this species was reported from only 3 streams in the Trempealeau and Buffalo river basins. The **least darter** was taken at 2 stations in 2 creeks in the Black River basin (Append. B Map 76). Previously, this species had not been reported from these 3 basins.

Habitat characteristics of 5 of the watch species are shown in Table 16.

TABLE 12. *Number of specimens and number of stations for each species collected in the Buffalo River basin, 1975-82.*

Common Name	No. Specimens*	No. Stations** <99	>98	"Unknown"
White sucker	5,200	119	28	
Johnny darter	2,800	115	8	
Blacknose dace	2,700	100	7	
Creek chub	2,100	96	2	
Brook trout	1,800	70	6	
Brook stickleback	1,400	120	4	1
Longnose dace	1,100	45	2	
Am. brook lamprey	850	54		
Bluntnose minnow	610	29	3	
Bigmouth shiner	550	27	2	
Fathead minnow	490	60		
Brown trout	440	44		
Central mudminnow	290	59		
Fantail darter	240	24		
Shorthead redhorse	150	7	1	
Blackside darter	140	16		
Emerald shiner	110	3	1	
Silver redhorse	100	2	1	
Spotted sucker	99		1	
Spotfin shiner	69	12		
Common carp	67	11		
Largemouth bass	66	11		
Freshwater drum	64	3		
Mud darter	61	7		
Brassy minnow	55	13		
Weed shiner	54	9		
Northern hog sucker	48	8		
Northern pike	45	16		
Bluegill	35	8		
Rainbow trout	34	11		
Golden shiner	34	8		
Green sunfish	30	17		
Central stoneroller	28	2		
Banded darter	27	5		
Black crappie	17	5		
Tadpole madtom	15	3		
Pumpkinseed	15	7		
Rock bass	14	5		
Black bullhead	11	3		
Suckermouth minnow	7	4		
Iowa darter	6	2		
Bullhead minnow	5	2		
Logperch	5	2		
Yellow bullhead	4	3		
Pearl dace	3	2		
Bigmouth buffalo	3	2		
Burbot	3	2		
Walleye	3	2		
Channel catfish	2	1		
Stonecat	2	2		
Flathead catfish	2	2		
Pirate perch	2	1		
White bass	2	2		
Smallmouth bass	2	1		
Yellow perch	2	1		
Sauger	2	1		
North. brook lamprey	1	1		
Silver lamprey	1	1		
Gizzard shad	1	1		
Spottail shiner	1	1		
Total	22,017	1,190	66	1

*Rounded to 2 significant figures for each species.
**<99 = 98 or fewer specimens taken/station.
>98 = 99 or more specimens taken/station.
Unknown = counts of specimens were not made.

TABLE 13. *Fish species found in only one of the three basins, 1975-79*.*

Black (270)	Trempealeau (280)	Buffalo (290)
Muskellunge	Smallmouth buffalo	None
Largescale stoneroller		
Redside dace		
Speckled chub		
Rosyface shiner		
Northern redbelly dace		
Southern redbelly dace		
Finescale dace		
Blue sucker		
River redhorse		
Golden redhorse		
Starhead topminnow		
Least darter		
Gilt darter		
Slenderhead darter		

*1975-82 for the Buffalo River basin.

TABLE 14. *Endangered species collected in the Black River basin during 1975-79 and records from stations in other Wisconsin basins since 1974.*

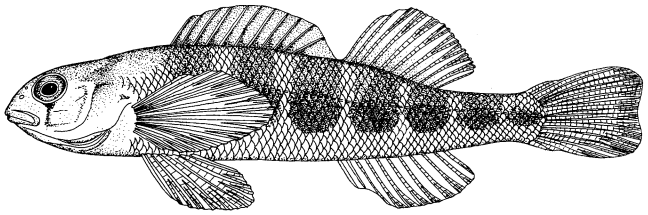
Species	Basin	Body of Water	County	No. Stations	No. Fish	Avg. No. Fish/Station	No. Records From Other Basins*
Starhead topminnow	270	Black R.	La Crosse	1	1	1	8 (210,222)

*Basin numbers shown in parentheses (see Fig. 1).

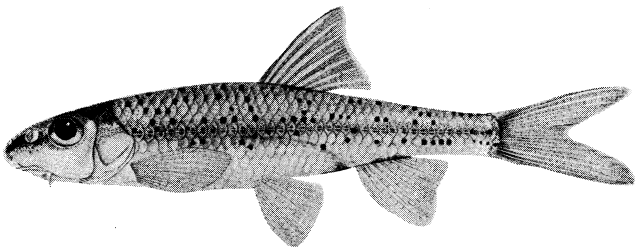
TABLE 15. *Threatened species collected in the Black River basin during 1975-79 and records from stations in other Wisconsin basins since 1974.*

Species	Basin	Body of water	County	No. Stations	No. Fish	Avg. No. Fish/Station	No. Records From Other Basins*
Speckled chub	270	Black R.	Trempealeau	1	1		28 (2,240,310)
			Total	1	1	1	
Blue sucker	270	Black R.	Jackson	1	1		53 (2,240,300,
			Total	1	1	1	310)
Gilt darter	270	Black R.	Jackson	5	75		41 (2,300,310)
		Black R.	Monroe	1	4		
			Total	6	79	13	

*Basin numbers shown in parentheses (see Fig. 1).



Gilt darter, a species currently on the threatened list, inhabits riffles in larger rivers. When this study began it had previously only been taken at a total of 4 stations.

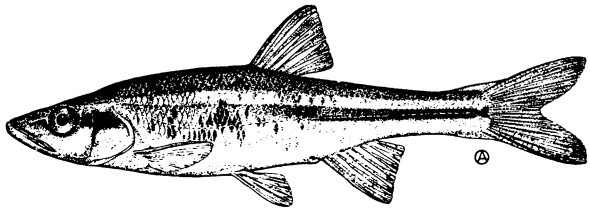


Speckled chub, presently on the threatened list, inhabits sand and gravel riffles of larger rivers.

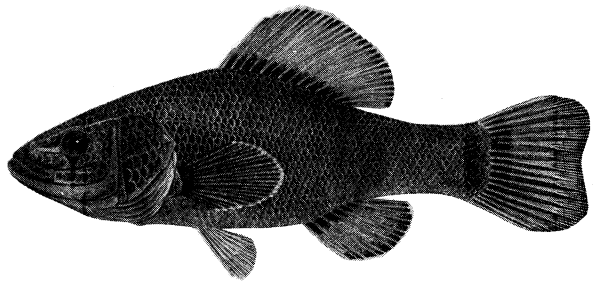
TABLE 16. *Characteristics of stream habitat for selected species* collected in the Black and Trempealeau (1975-79) and Buffalo (1975-82) river basins.*

Species	Stream Width (m)	Stream Depth (m)	Velocity**	Turbidity**	Cond. (µmhos)	Temp. Temp. (F)
THREATENED						
Gilt darter	27-76	0.1-0.3	moderate	clear to slightly turbid	50-100	54-57
WATCH						
Pugnose minnow	6-69	0.3-0.7	sluggish to moderate	moderately turbid	125-275	53-62
Weed shiner	3-69	0.3-0.9	sluggish to moderate	moderately turbid	125-500	53-70
River redhorse	23-64	0.6-1.0	moderate	slightly turbid	50-100	53-74
Pirate perch	8-15	0.7-0.9	sluggish to moderate	moderately turbid to turbid	125-500	54-60
Mud darter	1-30	0.2-1.1	sluggish to moderate	moderately turbid to turbid	125-550	53-71

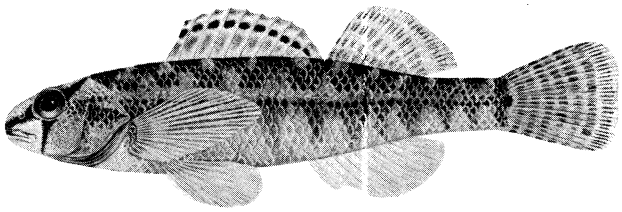
*Endangered, threatened, or watch species for which we have collected data from 3 or more stations.
**Terms are defined in Fago (1983).



Redside dace, a species presently on the watch list, prefers clear pools in small to medium size streams.



Pirate perch, a species currently on the watch list, previously not reported from the Black, Trempealeau or Buffalo River basins.



Mud darter, presently on the watch list, prefers slow moving weedy areas adjacent to streams.

River redhorse, presently on the watch list, prefers fast moving areas of larger rivers. This specimen was taken from the lower Black River.

RECOMMENDATIONS

CONTINUING USE OF FISH DISTRIBUTION DATA

The data in both the Master Fish and Master Stream and Lake files* are available and should be used by interested persons when preparing environmental impact assessments, forming master plans, and planning future research studies.

*See section on Data Handling in this report and Fago (1983) for explanation of these files.

FUTURE RESEARCH STUDIES

This series of reports on fish distribution does not deal generally with the ecological data collected since 1974. Analysis of these data should be the subject of another study. The species composition of fish communities and their relationship to the ecological data collected are two other subjects for study.

The potential integration of the data compiled by the study with data collected by other researchers, on, for example, water quality, open up further areas for study and analysis.

PROTECTION OF ENDANGERED AND THREATENED SPECIES AND THEIR HABITATS

Starhead Topminnow. Any proposed manipulation of the aquatic environment near the mouth of the Black River where the endangered starhead topminnow was captured (Append. B Map 60) should recognize the presence of this population.

TABLE 17. *Watch species collected in the Black, Trempealeau, and Buffalo river basins and records from stations in other Wisconsin basins since 1974.*

Species	Basin	Body of Water	County	No. Stations	No. Fish	Avg. No. Fish/Station	No. Records From From Other Basins*
American eel	270	Black R.	Jackson	1	1		36 (5,81,2,221,222,
		Black R.	La Crosse	1	1		240,300)
		Soper Cr.	Monroe	1	1		
	280	Trempealeau R.	Trempealeau	1	1		
			Total	4	4	1	
Redside dace	270	Black R.	Taylor	2	22		81 (50,90,222,223,
		E. Fork Halls Cr.	Jackson	1	1		240,300)
		S. Fork Halls Cr.	Jackson	2	20		
		Cisna Cr.	Jackson	1	12		
		Un. Cr.	Jackson	1	1		
		Wedges Cr.	Clark	1	46		
		Crooked Cr.	Clark	1	1		
		Meadows Cr.	Clark	2	126		
		Pony Cr.	Clark	1	1		
		E. Br. Wedges Cr.	Clark	1	47		
		Jack Cr.	Clark	2	24		
		S. Br. O'Neill Cr.	Clark	3	140		
		N. Br. O'Neill Cr.	Clark	2	105		
		Middle Br. O'Neill Cr.	Clark	1	99		
		Cawley Cr.	Clark	2	7		
		Panther Cr.	Clark	1	99		
		Nelson Cr.	Clark	1	40		
		Un. Cr. (17-15)	Clark	1	79		
		Poplar R.	Clark	1	1		
		S. Fork Poplar R.	Clark	1	20		
		Un. Cr.	Clark	1	2		
		McKenzie Cr.	Taylor	1	1		
		Trappers Cr.	Taylor	1	2		
		Pine Cr.	Taylor	1	24		
		Paradise Cr.	Taylor	1	19		
		Maurer Cr.	Taylor	1	2		
		Un. creeks	Taylor	3	18		
			Total	37	959	26	
Pugnose minnow	270	Black R.	La Crosse	5	14		114 (81,82,2,210,221,
		Black R.	Jackson	2	4		240,300,310)
	280	Trempealeau R.	Trempealeau	3	35		
			Total	10	53	5	
Weed shiner	270	Black R.	La Crosse	3	6		59 (82,120,210,221,
		Black R.	Trempealeau	1	5		222,240,250,260,
	290	Waumandee Cr.	Buffalo	1	5		300,310)
		Buffalo R.	Buffalo	6	36		
		Peeso Cr.	Buffalo	1	4		
		Big Cr.	Trempealeau	1	9		
			Total	13	65	5	
River redhorse	270	Black R.	Jackson	5	10		60 (82,2,210,221,
		Black R.	La Crosse	2	2		222,240,300,310)
		Black R.	Monroe	4	10		
			Total	11	22	2	
Pirate perch	270	Black R.	La Crosse	2	20		21 (200,240,250)
	280	Trempealeau R.-Bay	Trempealeau	1	-		
	290	Waumandee Cr.	Buffalo	1	2		
			Total	4	22	6	
Mud darter	270	Black R.	La Crosse	5	28		57 (2,230,240,250)
		Black R.	Trempealeau	1	1		
		Fleming Cr.	La Crosse	1	1		
		Sand Cr.	Jackson	1	6		
	280	Trempealeau R.	Trempealeau	6	11		
	290	Waumandee Cr.	Buffalo	1	44		
		Buffalo R.	Buffalo	5	11		
		Deer Cr.	Buffalo	1	6		
			Total	21	108	5	
Least darter	270	Nelson Cr.	Clark	1	99		88 (20,82,200,210
		Un. Cr. (17-15)	Clark	1	1		221,222,300,310,
							400)
			Total	2	100	50	

*Basin numbers shown in parentheses (see Fig. 1); refers only to those basins sampled to date (approximately 45% of the geographic area of the state).
**1975-82 for Buffalo River basin.
-Unknown number collected.

Speckled Chub. This threatened species was also found near the mouth of the Black River (Append. B Map 17). This should reinforce our concern for the future of this habitat.

Blue Sucker. This threatened species was taken at 1 station in the lower Black River (Append. B Map 44). Management of the lower Black River should take cognizance of this valuable species.

Gilt Darter. This threatened species was taken at 6 stations from the Black River, all except 1 below the City of Black River Falls (Append. B Map 76). The maintenance of good water quality in the mainstem of the Black River is needed for the protection of this beautiful darter.

UPDATING PRESENT RECORDS

District fish management personnel should in the course of routine surveys preserve at least 1 specimen of each endangered, threatened, and watch species they observe (except paddlefish, lake sturgeon, and American eel) and notify the Bureau of Research. Such collections will permit continuing reassessment of the endangered and threatened species lists as required by law and of the watch list as well.

COMPLETION OF THIS SURVEY

Completion of the statewide survey has not been achieved due to funding reduction: only 45% of the state has been covered. When additional funds become available for investigations of endangered, threatened, and/or nongame species, high priority should be accorded to completion of the surveys in compliance with the legislative mandate.

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APPENDIX A. Supplementary Data

TABLE 18. *List of species reported from the Black, Trempealeau, and Buffalo river basins by collectors other than DNR research personnel.*

Species	Black (270)		Trempealeau (280)		Buffalo (290)	
	1958-74	1975-79	1958-74	1975-79	1958-74	1975-82
Chestnut lamprey	-	-	-	1	-	-
Northern brook lamprey	-	1	-	-	-	1
American brook lamprey	-	1	-	1	-	1
Longnose gar	-	-	9	-	-	-
Bowfin*	-	-	-	1	1	-
American eel*	1	1,7,8	-	-	-	-
Gizzard shad	-	-	3,9	-	2	-
Rainbow trout*	1	-	1	1	1	1
Brown trout*	1	1	1	1	1	1
Brook trout*	1,3	1	1	1	1	1
Central mudminnow*	1,2	1	1	1	1	1
Northern pike*	1,2	1	1,2,9	1	1,2	1
Muskellunge*	1	1	-	-	-	-
Central stoneroller	-	-	-	1	-	1
Largescale stoneroller	2	1	-	-	-	-
Redside dace	-	1	-	-	-	-
Common carp*	1	1	1,2,3,9	1	1,2	1
Brassy minnow	3	1	-	1	2,3	1
Silvery minnow	3	-	3	-	2,3	-
Hornyhead chub	2	-	2	-	3	-
Golden shiner	-	1	2,3	1	2,3	1
Emerald shiner	3	1	2,3,9	1	2,3	-
River shiner	-	-	2	-	3	-
Common shiner	2	1	2	-	3	-
Bigmouth shiner	2,3	1	2,3	1	3	1
Pugnose minnow	3	-	3	-	-	-
Blacknose shiner	2	1	-	1	-	-
Spottail shiner	3	-	3	-	2,3	-
Rosyface shiner	2	-	-	-	-	-
Spotfin shiner	3	1	2,3	1	2,3	1
Sand shiner	3	-	3	-	-	-
Weed shiner	-	-	-	-	2,3	-
Mimic shiner	2	1	2	-	-	-
Suckermouth minnow	3	-	3	-	3	-
Northern redbelly dace	2	-	-	-	-	-
Southern redbelly dace	-	-	-	-	3	-
Finescale dace	-	1	-	-	-	-
Bluntnose minnow	2,3	1	2,3	1	2,3	1
Fathead minnow	2,3	1	2,3	1	2,3	1
Bullhead minnow	3	-	3,9	-	2,3	-
Blacknose dace	-	1	2	1	3	1
Longnose dace	2	1	2	1	3	1
Creek chub	2,3	1	2,3	1	3	1
Pearl dace	-	1	-	1	-	1
River carpsucker	-	-	3	-	-	-
Quillback	3	-	3	-	-	-
White sucker*	1,2,3	1	1,2	1	1,2,3	1
Northern hog sucker*	1,2,3	1	1,3	-	1,2,3	1
Smallmouth buffalo	-	-	9	-	-	-
Spotted sucker	-	1	3,9	-	2	-
Silver redhorse	2,3	1	3	-	-	-
Golden redhorse	2	1	-	-	-	-
Shorthead redhorse	2	1	3,9	-	3	1
Black bullhead	-	1	3	1	-	1
Yellow bullhead	-	1	3	-	-	1
Channel catfish*	1	1	1,2,3,9	-	1,2,3	-
Stonecat	2	-	-	-	-	1
Tadpole madtom	-	1	2,3	-	3	-
Flathead catfish*	-	1	1	-	1	-
Pirate perch*	-	-	-	1	-	-
Trout-perch*	-	-	3	-	-	-
Burbot*	1	1	-	-	-	-
Brook silverside*	2,3	-	3	1	2,3	-
Brook stickleback*	1,2,3	1	1,3	1	1,2,3	1
White bass	-	-	3,9	-	2	-
Rock bass	2	1	3,9	-	-	-
Green sunfish	-	1	3	1	2,3	1
Pumpkinseed	2,3	1	2,3	1	-	-

TABLE 18 (Cont.)

Species	Black (270)		Trempealeau (280)		Buffalo (290)	
	1958-74	1975-79	1958-74	1975-79	1958-74	1975-82
Warmouth	-	-	3	-	3	-
Orangespotted sunfish	-	-	3	-	3	-
Bluegill	2,3	1	3,9	1	2,3	1
Smallmouth bass*	1,2,3	1	1,9	-	-	-
Largemouth bass*	1,2,3	1	1,3,9	1	1,2	1
White crappie	-	1	3,9	-	2	-
Black crappie	2,3	1	3	-	2,3	-
Crystal darter	-	-	2	-	-	-
Western sand darter	-	-	3	-	-	-
Mud darter	-	-	1,3	-	3	-
Rainbow darter	2	1	-	-	-	-
Iowa darter	-	-	3	1	3	1
Fantail darter	2	1	-	1	3	1
Johnny darter	2,3	1	2,3	1	2,3	1
Banded darter	2	1	-	-	-	1
Yellow perch*	1,2	1	3,9	1	-	-
Logperch	2	1	3	-	2,3	-
Blackside darter	2	1	3	1	2	1
Slenderhead darter	2	1	-	-	-	-
River darter	-	-	3	-	-	-
Sauger	-	-	3,9	-	-	-
Walleye*	1,2	1	1,3	-	-	-
Freshwater drum*	-	1	1,3,9	-	1	-

*Records of this species collected by Fish Management, students, and sport and commercial fishermen are based upon their identification.

KEY TO COLLECTOR'S CODE

1 = All Fish Management collections
2 = Dr. George Becker and his students
3 = Professor Marlin Johnson and his students
[4 = Dr. George Seeburger and his students]
[5 = Milwaukee Public Museum]
[6 = UW-Madison students]
7 = Commercial fishermen
8 = Sport fishermen
9 = Upper Mississippi River Conservation Commission (UMRCC)

[ ] = Collector not used in this report

DEPARTMENT OF NATURAL RESOURCES — FISH OR STREAM DATA INPUT — FORM 8100-58 REV. 4-81

1 ADD
2 CHANGE
3 DELETE

☐ SEQUENCE __ __ __ __ __ __ __ ☐ F OR S

MAJOR BASIN __ MINOR BASIN __ __ __

CC1 MB MILES __ __ __ __ . __ __

ORDER MILEAGES 1) __ __ __ __ . __ __ 2) __ __ __ __ . __ __ 3) __ __ __ __ . __ __

4) __ __ __ __ . __ __ 5) __ __ __ __ . __ __ 6) __ __ __ __ . __ __

7) __ __ __ __ . __ __ 8) __ __ __ __ . __ __ 9) __ __ __ __ . __ __

10) __ __ __ __ . __ __ 11) __ __ __ __ . __ __

STATION MILEAGE __ __ __ __ . __ __ REPORT LOCATION ☐

NAME __

DAM OR JAR CODE __ WATERTYPE __ LANDLOCKED SEQUENCE NUMBER __ __

STREAM OR LAKE LOCATION __ __ __ TOWNSHIP __ __ __ RANGE __ __ SEC. __ __ 1/16 __ __ 1/4 __ __ COUNTY

STATION LOCATION __ __ __ TOWNSHIP __ __ __ RANGE __ __ SEC. __ __ 1/16 __ __ 1/4 __ __ COUNTY

SOURCE OF DATA __ __ GEAR __ EFFORT __ __ DATE __ __ / __ __ / __ __ (MO / DAY / YR) HOUR __ __

WIDTH __ __ __ L __ __ __ M __ __ __ U DEPTH __ __ __ L __ __ __ M __ __ __ U

VELOCITY __ TEMPERATURE __ __ CONDUCTIVITY __ __ __ __ TURBIDITY __

BOTTOM TYPES __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

AQUATIC VEG. __ __ __ __ __ __ __ __

STRM. BANK VEG. __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

FISH SPECIES

1) __ __ __ __ __ 2) __ __ __ __ __ 3) __ __ __ __ __ 4) __ __ __ __ __

5) __ __ __ __ __ 6) __ __ __ __ __ 7) __ __ __ __ __ 8) __ __ __ __ __

9) __ __ __ __ __ 10) __ __ __ __ __ 11) __ __ __ __ __ 12) __ __ __ __ __

13) __ __ __ __ __ 14) __ __ __ __ __ 15) __ __ __ __ __ 16) __ __ __ __ __

MORE DATA ON BACK: ☐ YES

17) __ __ __ __ __ 18) __ __ __ __ __ 19) __ __ __ __ __ 20) __ __ __ __ __

21) __ __ __ __ __ 22) __ __ __ __ __ 23) __ __ __ __ __ 24) __ __ __ __ __

25) __ __ __ __ __ 26) __ __ __ __ __ 27) __ __ __ __ __ 28) __ __ __ __ __

29) __ __ __ __ __ 30) __ __ __ __ __ 31) __ __ __ __ __ 32) __ __ __ __ __

33) __ __ __ __ __ 34) __ __ __ __ __ 35) __ __ __ __ __ 36) __ __ __ __ __

37) __ __ __ __ __ 38) __ __ __ __ __ 39) __ __ __ __ __ 40) __ __ __ __ __

41) __ __ __ __ __ 42) __ __ __ __ __ 43) __ __ __ __ __ 44) __ __ __ __ __

FISH ONLY

FIGURE 5. *Example of field collection form (8100-46).*

```
MINOR=223SELECTION=223                                    SOURCE=NOT 40 81 94 95 99        MILE ON                    PAGE  43
MIN. MONTH =     MAX. MONTH =      MIN. YEAR = 1950  MAX. YEAR = 1973   COUNTY = OR < 72

X12   JOHNNY DARTER                                    ETHEOSTOMA NIGRUM                                  DATE RUN 11/09/83

                ----------O R D E R  M I L E A G E S----------                                                          N86006A
BASIN   MBM       1       2/7      3/8      4/9      5/10     6/11    MILE  LAKE OR STREAM NAME          WT NO SD GEF --DATE--TWRRNGSECQTQTCO

2 223 1434.8R  156.9L                                                 139.1  PECATONICA R                  2  2 46 5    6/27/60  2N 3E12SESE33
2 223 1434.8R  156.9L                                                 182.4  PECATONICA R -MIFFLIN         2 11 46 5    8/15/62  5N 1E27SESE25
2 223 1434.8R  156.9L    72.8R                                         30.5  RICHLAND CR                   2    61 5   11/28/65  1N 8E 7SENE23
2 223 1434.8R  156.9L    72.8R    27.OR                                 1.8E TWIN GROVE BR                 2    61 5   10/20/64  1N 8E29NWNE23
2 223 1434.8R  156.9L   102.8R    13.8Y                                 1.3  BUCKSKIN SCHOOL CR            2    61 5    7/ 5/65  2N 7E 5SWSW23
2 223 1434.8R  156.9L   105.8R                                         30.2  E BR PECATONICA R             2 44 46 5    6/30/60  4N 5E26SESE33
2 223 1434.8R  156.9L   105.8R                                         40.3  E BR PECATONICA R             2 27 46      6/30/60  4N 5E 4SENE25
2 223 1434.8R  156.9L   105.8R                                         53.4  E BR PECATONICA R             2    61 5   10/15/64  5N 5E 4NWNW25
2 223 1434.8R  156.9L   105.8R                                         58.3  E BR PECATONICA R             2  3 61 5    8/ 1/69  6N 5E22  SE25
2 223 1434.8R  156.9L   105.8R   10.9L                                  .5  WHITESIDE CR                  2  3 46      6/30/60  2N 5E 3SESW33
2 223 1434.8R  156.9L   105.8R   10.9L    1.6R                          1.9  APPLE BR                      2    61 5   10/ 7/65  3N 5E32  NE33
2 223 1434.8R  156.9L   105.8R   10.9L    1.6R                          3.3E APPLE BR                      2 19 46      6/29/60  3N 5E30SESE33
2 223 1434.8R  156.9L   105.8R   15.OR                                  5.3  DOUGHERTY CR                  2    61 5   10/ 6/64  3N 6E19NWSE23
2 223 1434.8R  156.9L   105.8R   19.2L                                  .3  MUD BR                        2 24 46      6/29/60  3N 5E22  SW33
2 223 1434.8R  156.9L   105.8R   19.2L                                 3.7  MUD BR                        2    61 5   10/ 1/64  3N 5E20NWNW33
2 223 1434.8R  156.9L   105.8R   19.2L                                 9.6  MUD BR                        2 24 46      6/29/60  3N 4E15NENW33
2 223 1434.8R  156.9L   105.8R   19.7L                                 6.1E YELLOWSTONE R                 2  5 46      6/29/60  3N 5E 8SENE33
2 223 1434.8R  156.9L   105.8R   19.7L                                17.0  YELLOWSTONE R                 2  9 46      6/28/60  4N 4E23SESE33
2 223 1434.8R  156.9L   105.8R   25.4R                                 1.3  SAWMILL CR                    2    61 5   10/ 7/64  3N 5E 2NESE33
2 223 1434.8R  156.9L   105.8R   25.4R                                 6.5E SAWMILL CR                    2    61 5   10/ 6/64  4N 6E20SESW23
2 223 1434.8R  156.9L   105.8R   27.5L                                 1.0  UN CR                         2 27 46      6/28/60  4N 5E27NWSE33
2 223 1434.8R  156.9L   105.8R   33.5R                                  .9  GORDON CR                     2    61 5   10/ 1/64  4N 5E13NWSW25
2 223 1434.8R  156.9L   105.8R   44.2L    6.1R                          6.3  CONLEY LEWIS CR               2  1 61 5    8/ 1/69  6N 4E34SWNE25
2 223 1434.8R  156.9L   139.5L                                         1.2  AMES BR                       2  3 46      6/27/60  2N 3E11SESE33
2 223 1434.8R  156.9L   141.OR                                          .4  OTTER CR                      2  2 46      6/27/60  2N 4E 6SENW33
2 223 1434.8R  156.9L   153.4L                                         5.1  BONNER BR                     2  7 46      8/15/62  3N 2E11SENW33
2 223 1434.8R  156.9L   159.OR                                         9.9  MINERAL POINT BR              2  3 46 5    8/15/62  4N 2E10  NE25
2 223 1434.8R  156.9L   159.OR                                        13.7  MINERAL POINT BR              2  1 46      8/ 9/62  5N 2E36SWNE25
2 223 1434.8R  156.9L   159.OR    8.8L                                 8.3  SUDAN BR                      2  4 46      8/14/62  5N 2E29SWSE25
2 223 1434.8R  156.9L   159.OR    8.8L   10.6R                          .4  PEDLER CR                     2  2 46      8/14/62  5N 2E21SWNE25
2 223 1434.8R  156.9L   172.9L                                         1.5  JONES BR                      2    45      7/11/62  4N 1E23SWSE33


NUMBER OF STATIONS WITH FISH =   31     NUMBER OF STATIONS WITH 1-98 FISH =   20   NUMBER OF STATIONS WITH 99 OR MORE FISH =   0
TOTAL NUMBER OF FISH =    221          AVERAGE NUMBER OF FISH = 11.1  (ESTIMATE)
PERCENT OF TOTAL NUMBER OF STATIONS = 79.49                    NUMBER OF STATIONS WITH A " " = 11
# STATIONS/SD:  SD-11=   0     SD-14,16=  0  SD-15,17,19=  0  SD-23-33=  0     SD-40=  0  SD-45,46= 19     SD-50=  0  SD-55,56=  0
                 SD-61= 12       SD-66=  0       SD-72=  0     SD-75=  0     SD-76=  0     SD-77=  0     SD-78=  0     SD-80=  0
                 SD-83=  0       SD-86=  0       SD-88=  0     SD-89=  0     SD-94=  0     SD-98=  0     SD-99=  0     SD-36=  0

                      TOTAL NUMBER OF SPECIES OCCURRENCES    31
```

FIGURE 6. *Sample listing for a species using the Cobol program (listing method B, Figure 3, used here).*

MINOR=223SELECTION=223 SOURCE=NOT 40 81 94 95 99 MILE ON

A86006

		NUMBER OF STATIONS	PERCENT OF TOTAL STATIONS
I21	BROWN TROUT	1	2.56
KO1	CENTRAL MUDMINNOW	4	10.26
MO5	STONEROLLERS	13	33.33
MO6	CENTRAL STONEROLLER	19	48.72
MO7	LARGESCALE STONEROLLER	4	10.26
M12	COMMON CARP	5	12.82
M14	BRASSY MINNOW	5	12.82
M19	HORNYHEAD CHUB	21	53.85
M23	EMERALD SHINER	1	2.56
M28	COMMON SHINER	28	71.79
M29	BIGMOUTH SHINER	5	12.82
M35	ROSYFACE SHINER	17	43.59
M36	SPOTFIN SHINER	16	41.03
M37	SAND SHINER	14	35.90
M41	SUCKERMOUTH MINNOW	8	20.51
M43	SOUTHERN REDBELLY DACE	18	46.15
M45	BLUNTNOSE MINNOW	29	74.36
M46	FATHEAD MINNOW	6	15.38
M48	BLACKNOSE DACE	2	5.13
M50	CREEK CHUB	27	69.23
M76	COMMON SHINER X ROSYFACE SHINER	1	2.56
NO2	SUCKERS	1	2.56
NO4	REDHORSES	1	2.56
NO6	QUILLBACK	1	2.56
NO9	WHITE SUCKER	29	74.36
N13	NORTHERN HOG SUCKER	10	25.64
N15	BIGMOUTH BUFFALO	3	7.69
N18	SILVER REDHORSE	9	23.08
N21	GOLDEN REDHORSE	8	20.51
N22	SHORTHEAD REDHORSE	13	33.33
O08	CHANNEL CATFISH	1	2.56
O10	STONECAT	5	12.82
SO2	BLACKSTRIPE TOPMINNOW	1	2.56
UO1	BROOK STICKLEBACK	12	30.77
WO4	ROCK BASS	5	12.82
WO5	GREEN SUNFISH	6	15.38
WO8	ORANGESPOTTED SUNFISH	5	12.82
WO9	BLUEGILL	10	25.64
W11	SMALLMOUTH BASS	14	35.90
W12	LARGEMOUTH BASS	6	15.38
XO7	RAINBOW DARTER	2	5.13
X10	FANTAIL DARTER	13	33.33
X12	JOHNNY DARTER	31	79.49
X14	BANDED DARTER	5	12.82
X15	YELLOW PERCH	3	7.69
X18	BLACKSIDE DARTER	7	17.95
X19	SLENDERHEAD DARTER	4	10.26
X22	WALLEYE	1	2.56
ZO1	MOTTLED SCULPIN	7	17.95

TOTAL NUMBER OF SPECIES OCCURRENCES 441

STATIONS/SD: SD-11= 0 SD-14,16= 0 SD-15,17,19= 0 SD-23-33= 0 SD-40= 0 SD-45,46= 283 SD-50= 0 SD-55,56= 0
SD-61= 158 SD-66= 0 SD-72= 0 SD-75= 0 SD-76= 0 SD-77= 0 SD-78= 0 SD-80= 0
SD-83= 0 SD-86= 0 SD-88= 0 SD-89= 0 SD-94= 0 SD-98= 0 SD-99= 0 SD-36= 0

TOTAL NUMBER OF SPECIES OCCURRENCES 441

TOTAL NUMBER OF STATIONS
(WITH MILE RULE) 39
(WITHOUT MILE RULE) 42
TOTAL NUMBER OF SPECIES 45
TOTAL NUMBER OF HYBRIDS 1

FIGURE 7. *Sample summary report for species listing shown in Figure 6.*

```
NOV 23, 1983             FISH MASTER FILE                                                       MILE OFF          PAGE 1
  SEQ. JAR WT   -----------O R D E R   M I L E A G E S---------                                                 STATION LOCATION
BASIN     MBM        1        2/7      3/8      4/9      5/10    6/11      MILE  ----STREAM OR LAKE NAME----   SD G EF --DATE-- TWNRNGSECQTQTCO


2 222               1N       1OE       27      SW 54                          +  SUGAR R -OXBOW                46 5      8/ 0/63    1N1OE27NWSW54

         SP=O4 HY=OO UNSP=OO  FISH  M2O  +  OO5  +  SO2  +  WO8  +

2 222  1434.8R  156.9L      .7R     6.9R                               2.3   E FORK RACCOON CR             61 5     12/12/65    1N12E31NWSE54

         SP=13 HY=OO UNSP=O2  FISH  MO4  +  MO5  +  M14  +  M28  +  M29  +  M41  +  M43  +  M45  +  M5O  +
                                    NO9  +  UO1  +  X1O  +  X12  +  X14  +  X18  +

2 222  1434.8R  156.9L      .7R     6.9R                               2.4   E FORK RACCOON CR             11 2 O6   5/15/74    1N12E31SWNE54

         SP=15 HY=O1 UNSP=O1  FISH  AO5  4  I21 1O  LO2  6  LO7  1  MO5  6  M12  1  M28  1  M29  1  M45 13
                                    M5O  2  NO9 28  WO5  3  WO9  1  X1O 11  X12 25  X14  2  ZO1  6

2 222  1434.8R  156.9L      .7R     6.9R    2.7R                       1.5   UN CR (CHAMBERLIN SPRINGS)    71 5     1O/ 5/77    1N12E29SWNW54

         SP=O8 HY=OO UNSP=OO  FISH  MO6  1  M29 27  M43 1O  M48 29  M5O 99  NO9  3  UO1  5  X12 11

2 222  1434.8R  156.9L      .7R     6.9R    2.7R                       3.8   UN CR                         11 3 O6   5/15/74    1N12E21NWNW54

         SP=O7 HY=OO UNSP=O1  FISH  MO5 99  M43 19  M46  4  M48 75  M5O 53  NO9 3O  UO1  8  X12  2

2 222  1434.8R  156.9L      .7R     6.9R                               3.2   E FORK RACCOON CR             11 2 O5  11/ 5/75    1N12E31NENW54

         SP=17 HY=OO UNSP=O1  FISH  AO5  2  KO1  6  LO1  2  MO5 33  M28  2  M45 11  M46  3  M48 2O  M5O 16  (OO6     O3O   O      4O)
                                    NO9 47  WO5 1O  WO9  6  XO7  1  X1O 3O  X12 25  X14  2  X18 1O  ZO1 27  (1 49          3  OOO1    )
                                                                                                            (ET F1 G2 H5 I2           )
                                                                                                            (D3 FT K4 M2 O1           )

2 222  1434.8R  156.9L      .7R     6.9R                               3.3   E FORK RACCOON CR             61 5      6/1O/65    1N12E31NENW54

         SP=O7 HY=OO UNSP=O1  FISH  MO5  +  M28  +  M39  +  M43  +  M45  +  M5O  +  NO9  +  X1O  +

2 222  1434.8R  156.9L      .7R     6.9R                               7.8   E FORK RACCOON CR             11 2 O6   5/15/74    1N11E12SESW54

         SP=16 HY=OO UNSP=O1  FISH  I21  2  KO1  2  MO5 99  MO9  1  M43 99  M45 99  M46  5  M48 79  M5O 99
                                    NO9 99  UO1 99  WO5  5  WO8  1  X1O 99  X11 46  X12 61  ZO1  2

2 222  1434.8R  156.9L      .7R                                       1O.7   RACCOON CR                    11 2 O6   7/ O/74    1N11E35SENW54

         SP=19 HY=OO UNSP=O1  FISH  LO2  8  MO5 15  M12  7  M19  6  M28 32  M36 27  M45 54  M46  6  M5O  3
                                    NO9 11  OO5  1  OO6 13  O1O  2  UO1  2  WO4  2  WO5  2  WO6  1  X12  3
                                    X14  4  X18  4

2 222  1434.8R  156.9L      .7R                                       1O.7   RACCOON CR                    61 5      6/1O/65    1N11E35SENW54

         SP=12 HY=OO UNSP=OO  FISH  KO1  +  LO2  1  M39  +  M45  +  NO9  +  OO5  +  OO6  +  SO2  +  UO1  +
                                    WO5  +  X12  +  X18  +
```

FIGURE 8. *Sample page from the Master Fish File using a Mark IV program (listing method A, Figure 3, used here).*

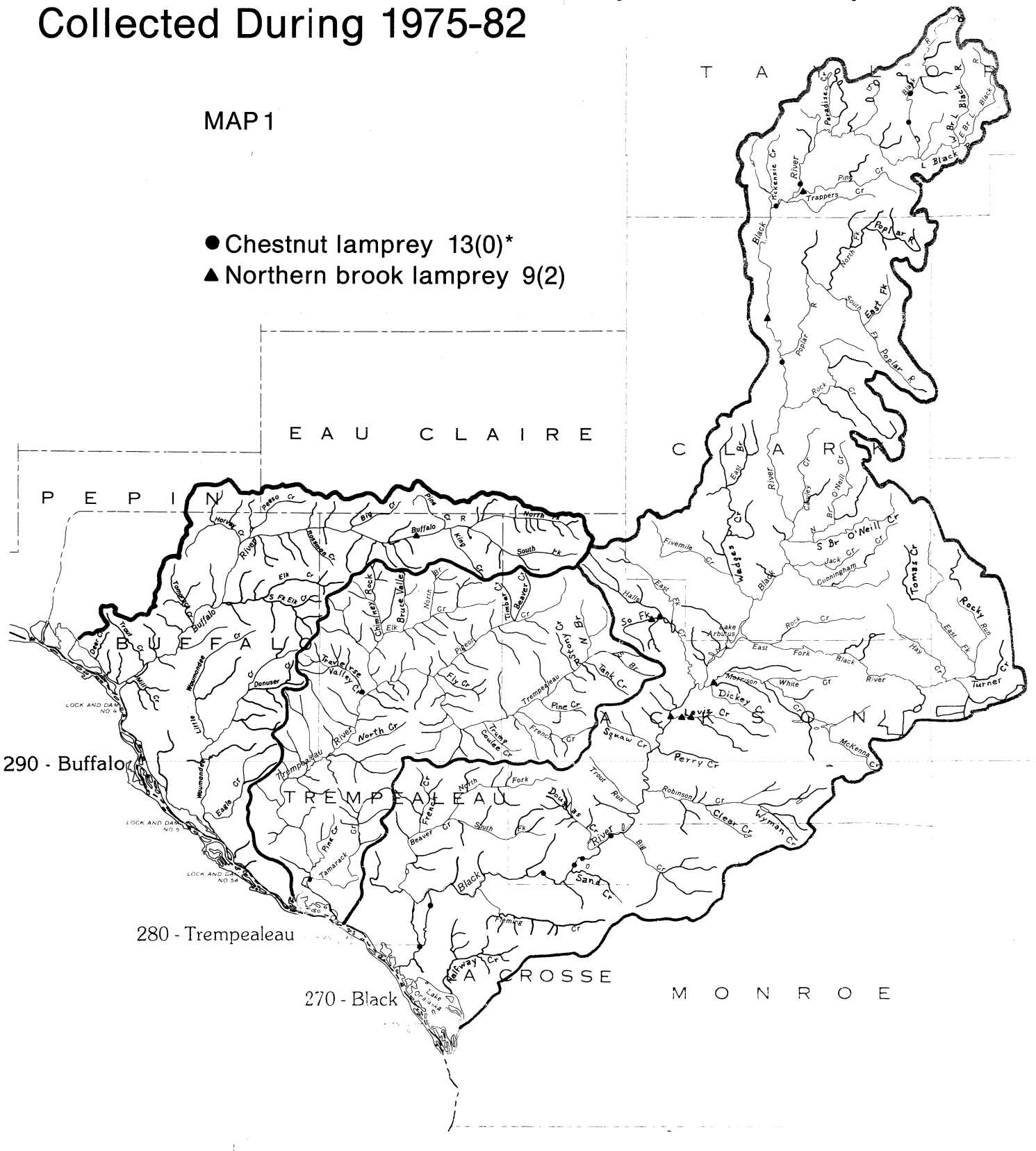
NOV 29, 1983 STREAM & LAKE FILE - MASTER PAGE 1

BASINS MAJ	MIN	MB. MI.	ORDER MILEAGES 1	2	3	4/8	5/9	6/10	7/11	MI OR ACRES	STREAM OR LAKE NAME	D C	WL TSTWN	RNGSEC	LOCATION QTQT64CO
2	222 62640									17	GOOSE POND	0	6N	8E 13	NENE 13
2	222 62650									33	L HARRIETT	0	5N	9E 9	NWNW 13
2	222 62660									10	MORSE POND	0	6N	8E 3	SESW 13
2	222 62670									12	MORTENSON POND	0	5N	9E 26	NWSE 13
2	222 62680										SUGAR R -OXBOW	0	1N	10E 27	NWSW 54
2	222 62690									8	VERONA GRAVEL PIT #12 (EAST	0	6N	8E 22	SENW 13
2	222 62700	1434.8R	156.9L	.7R						11	RACCOON CR	2	46N	1E 22	80
2	222 62710	1434.8R	156.9L	.7R	6.9R					7	E FORK RACCOON CR	2	46N	1E 8	80
2	222 62720	1434.8R	156.9L	.7R	6.9R	1.4					E FORK RACCOON CR WI-IL BD	6	1N	12E 31	SESW 54
2	222 62730	1434.8R	156.9L	.7R	6.9R	2.7R				4	UN CR (31-3,CHAMBERLIN SPR.	2	1N	12E 31	SWNE 54
2	222 62740	1434.8R	156.9L	.7R	9.5						RACCOON CR WIS-ILL BD	6	1N	11E 35	SESE 54
2	222 62750	1434.8R	156.9L	.7R	11.4						DAM-RACCOON CR-MILLPOND		1N	11E 34	NENE 54
2	222 62760	1434.8R	156.9L	.7R	11.7R					3	UN CR	2	1N	11E 27	SWSE 54
2	222 62770	1434.8R	156.9L	.7R	11.7R	.3R				3	UN CR	2	1N	11E 27	NWSE 54
2	222 62780	1434.8R	156.9L	9.2R						76	SUGAR R	2	28N	11E 11	80
2	222 62790	1434.8R	156.9L	9.2R	10.7						SUGAR R WIS-ILL BD	6	1N	10E 36	SESW 54
2	222 62800	1434.8R	156.9L	9.2R	10.8L					9	GREEN DRAINAGE SYSTEM	2	1N	10E 36	SESW 54
2	222 62810	1434.8R	156.9L	9.2R	10.8L	6.4R				1	UN CR	2	1N	9E 25	SENE 54
2	222 62820	1434.8R	156.9L	9.2R	11.2R					3	UN DITCH	2	1N	10E 36	NWSW 54
2	222 62830	1434.8R	156.9L	9.2R	11.2R	.7R				1	UN DITCH	2	1N	10E 36	NENW 54
2	222 62840	1434.8R	156.9L	9.2R	11.7R					2	UN DITCH	2	1N	10E 35	SENE 54
2	222 62850	1434.8R	156.9L	9.2R	16.0L					6	UN DITCH	2	1N	10E 28	NESW 54
2	222 62860	1434.8R	156.9L	9.2R	18.8L						SUGAR R -W CHANNEL	2	1N	10E 20	SWNE 54
2	222 62870	1434.8R	156.9L	9.2R	18.8L	.5L				1	UN DITCH	2	1N	10E 20	SWNW 54
2	222 62880	1434.8R	156.9L	9.2R	19.8R					13	TAYLOR CR	2	1N	10E 18	SESE 54
2	222 62890	1434.8R	156.9L	9.2R	19.8R	1.8R				10	WILLOW CR (NORTH)	2	1N	10E 7	NESW 54
2	222 62900	1434.8R	156.9L	9.2R	19.8R	1.8R	6.7R			4	UN CR	2	1N	10E 11	SWNE 54

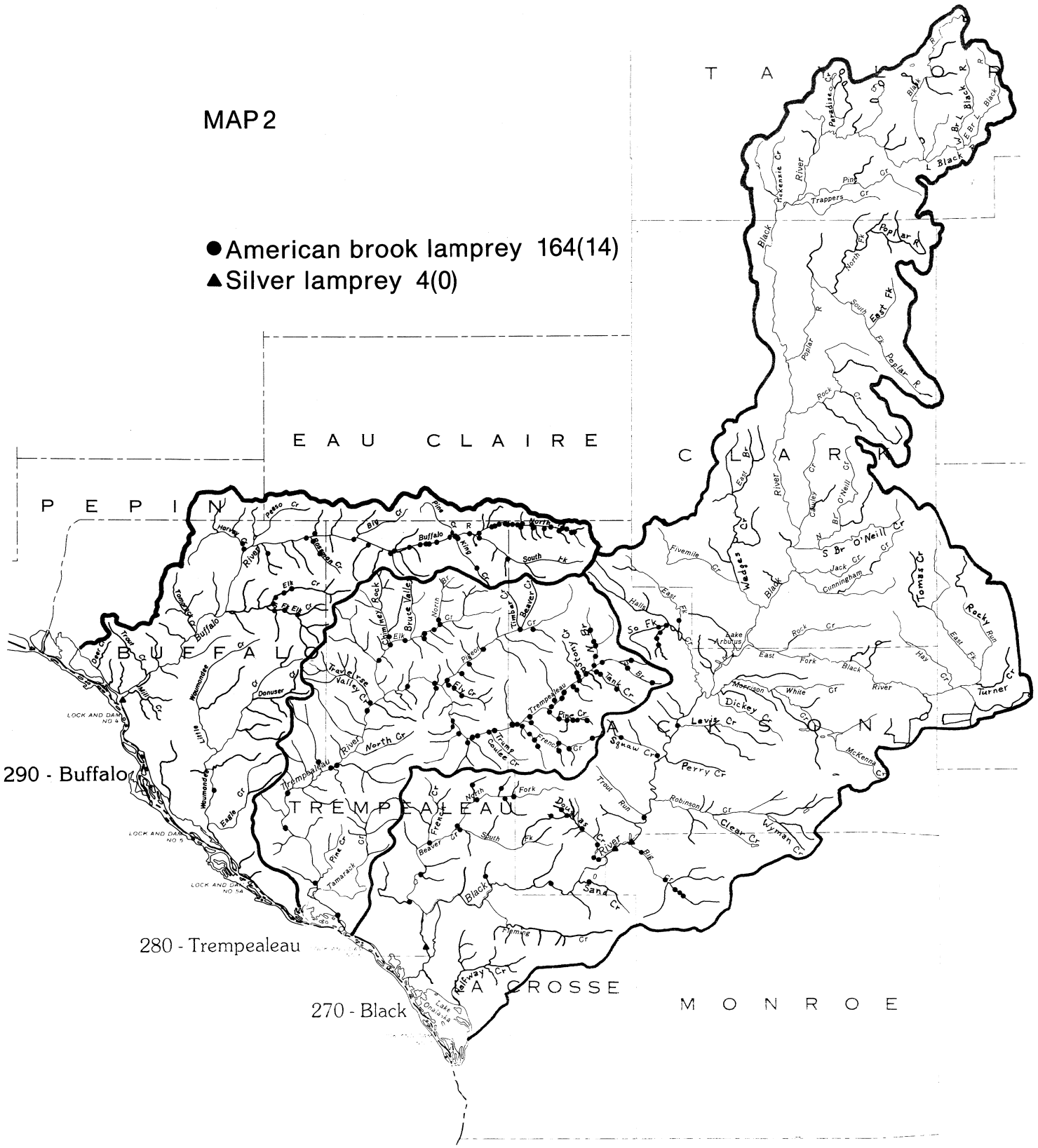
FIGURE 9. *Sample page from the Master Stream and Lake File.*

APPENDIX B. Distribution Maps For All Species Collected During 1975-82

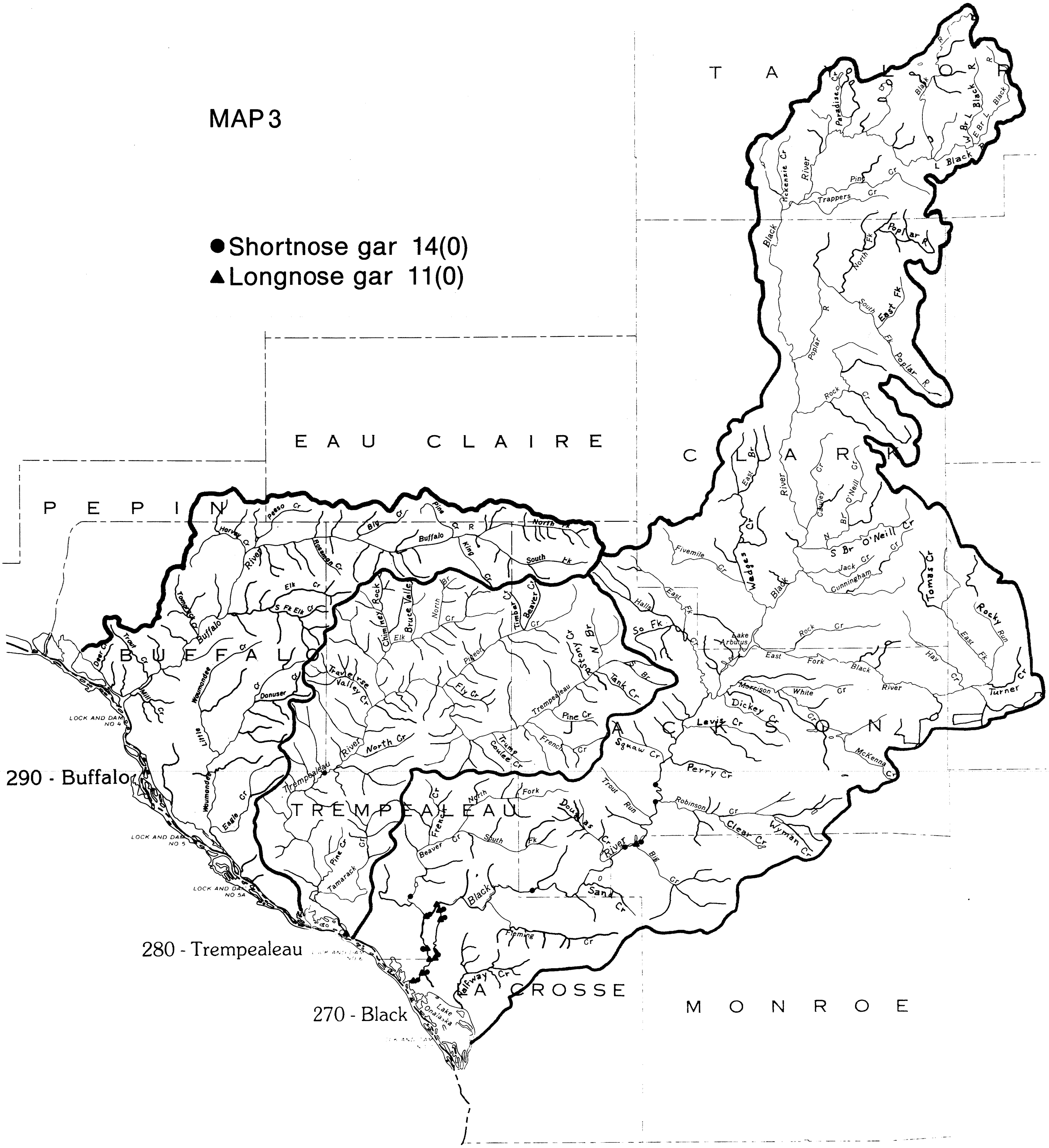
MAP 1

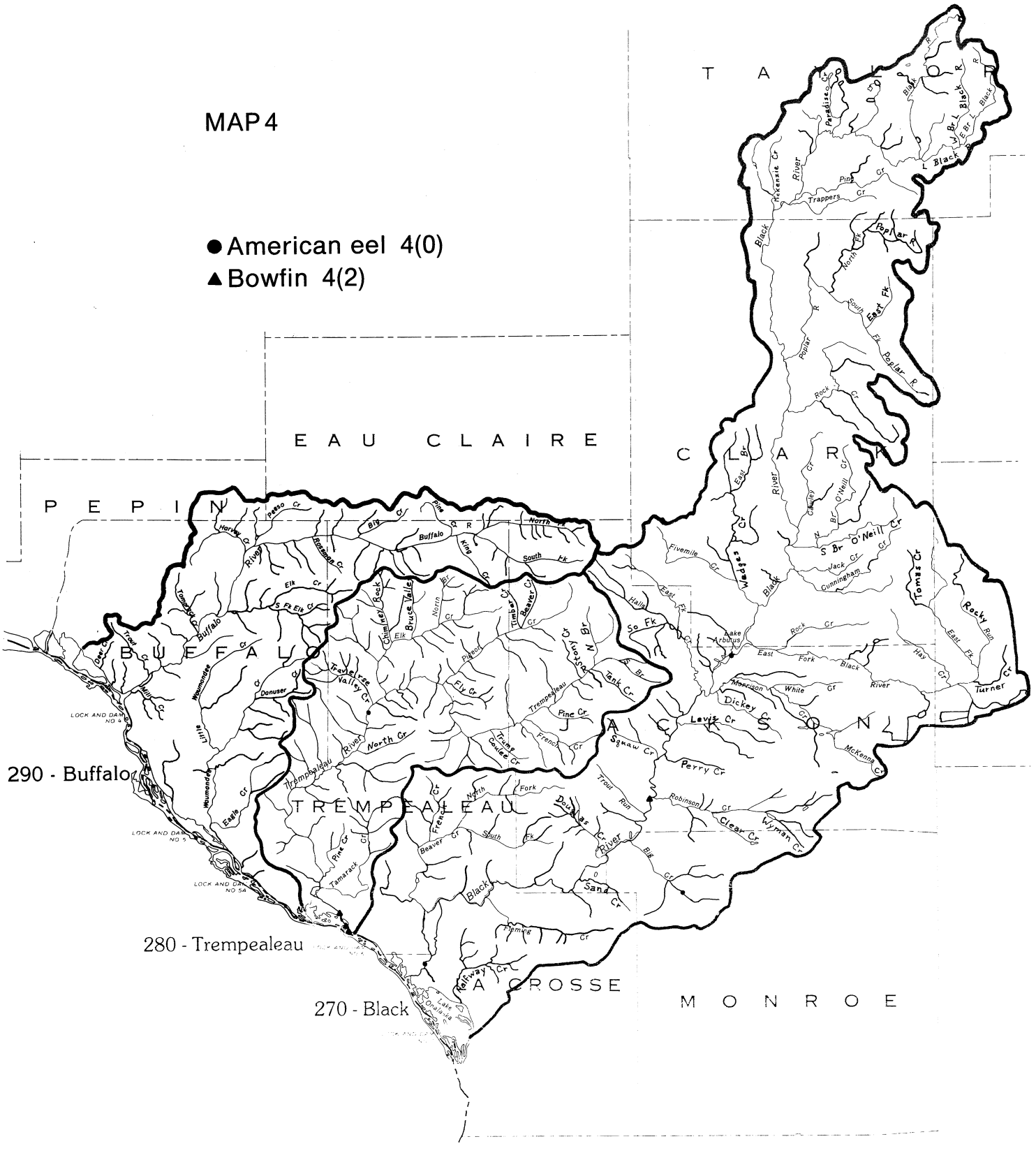


* Number in parentheses is the number of locations not shown due to lack of space.


MAP 2
● American brook lamprey 164(14)
▲ Silver lamprey 4(0)
290 - Buffalo
280 - Trempealeau
270 - Black
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
LA CROSSE
MONROE
JACKSON
CLARK
TAYLOR

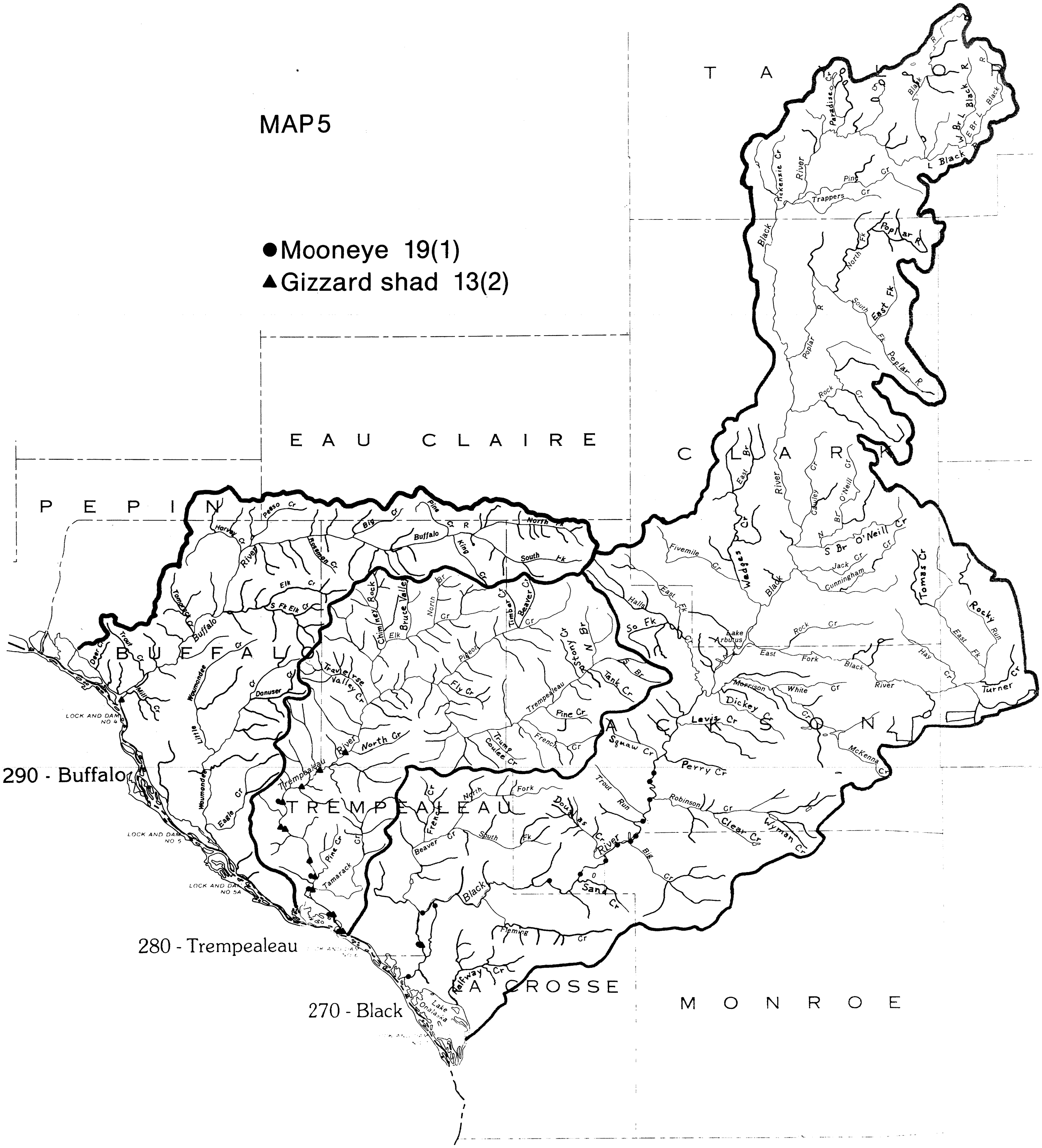
MAP 3

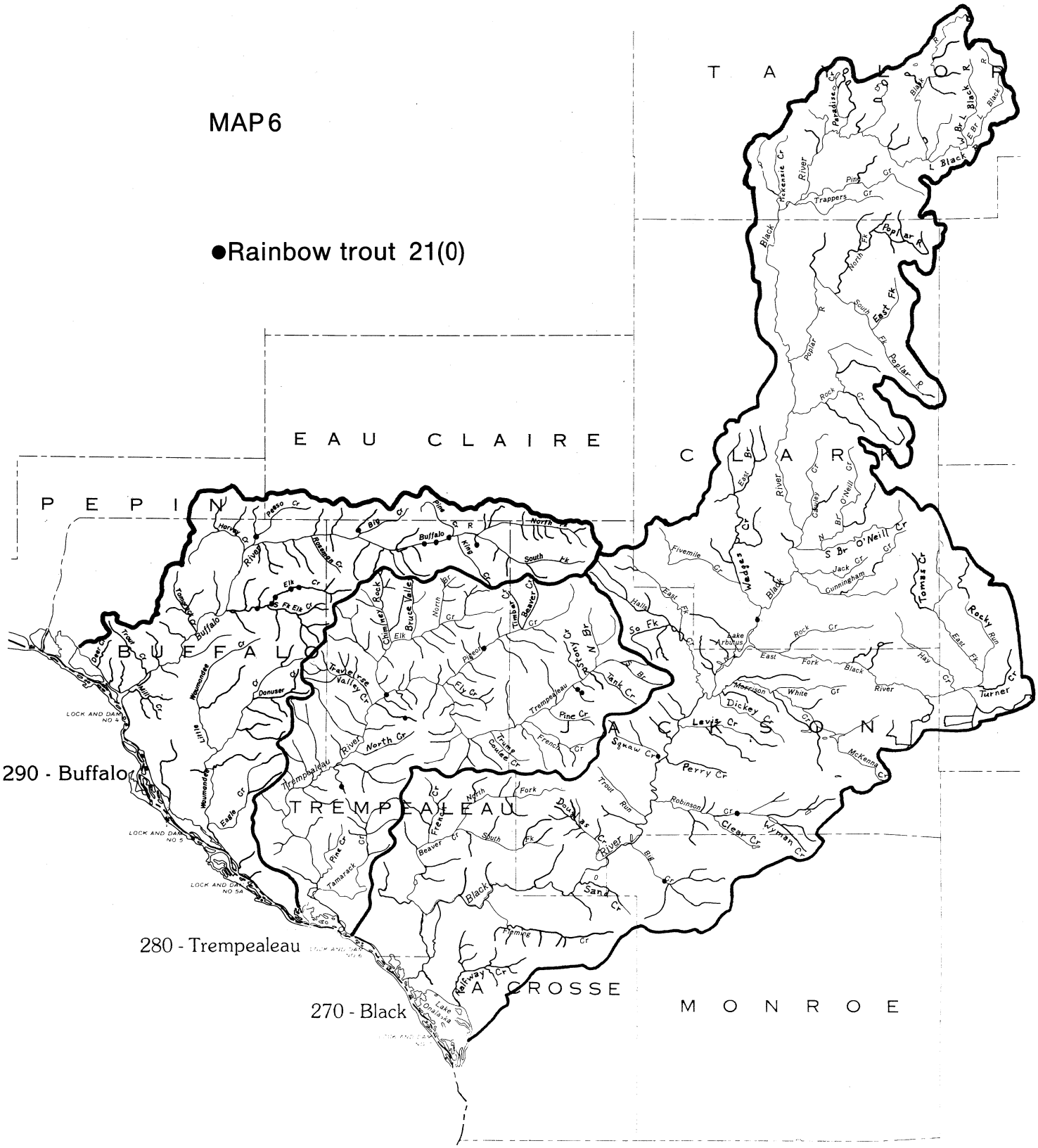

●Shortnose gar 14(0)
▲Longnose gar 11(0)
TAYLOR
CLARK
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Lake Onalaska
Lake Arbutus


MAP 4
● American eel 4(0)
▲ Bowfin 4(2)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Lake Arbutus
Lake Onalaska

MAP5

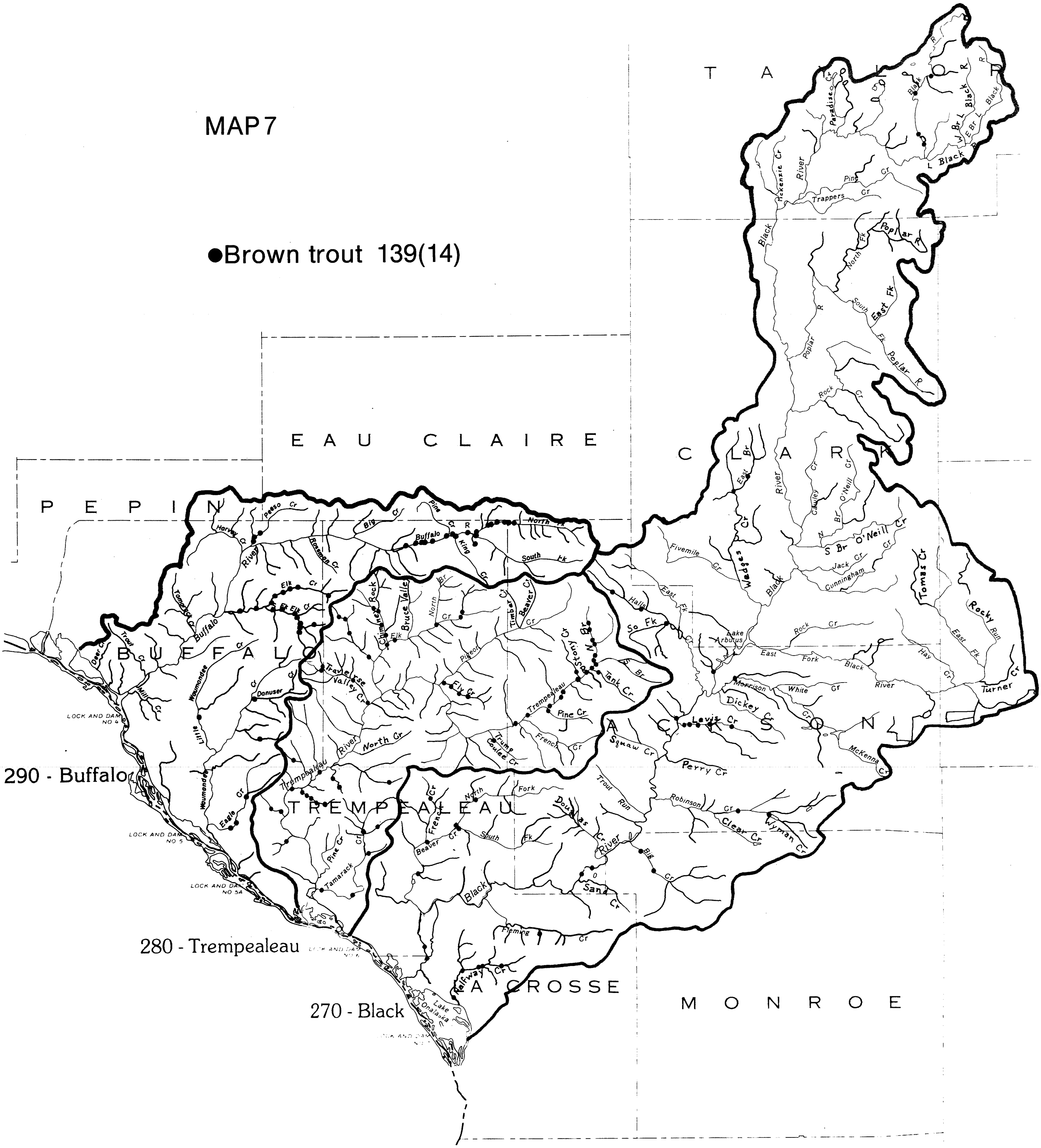
●Mooneye 19(1)
▲Gizzard shad 13(2)

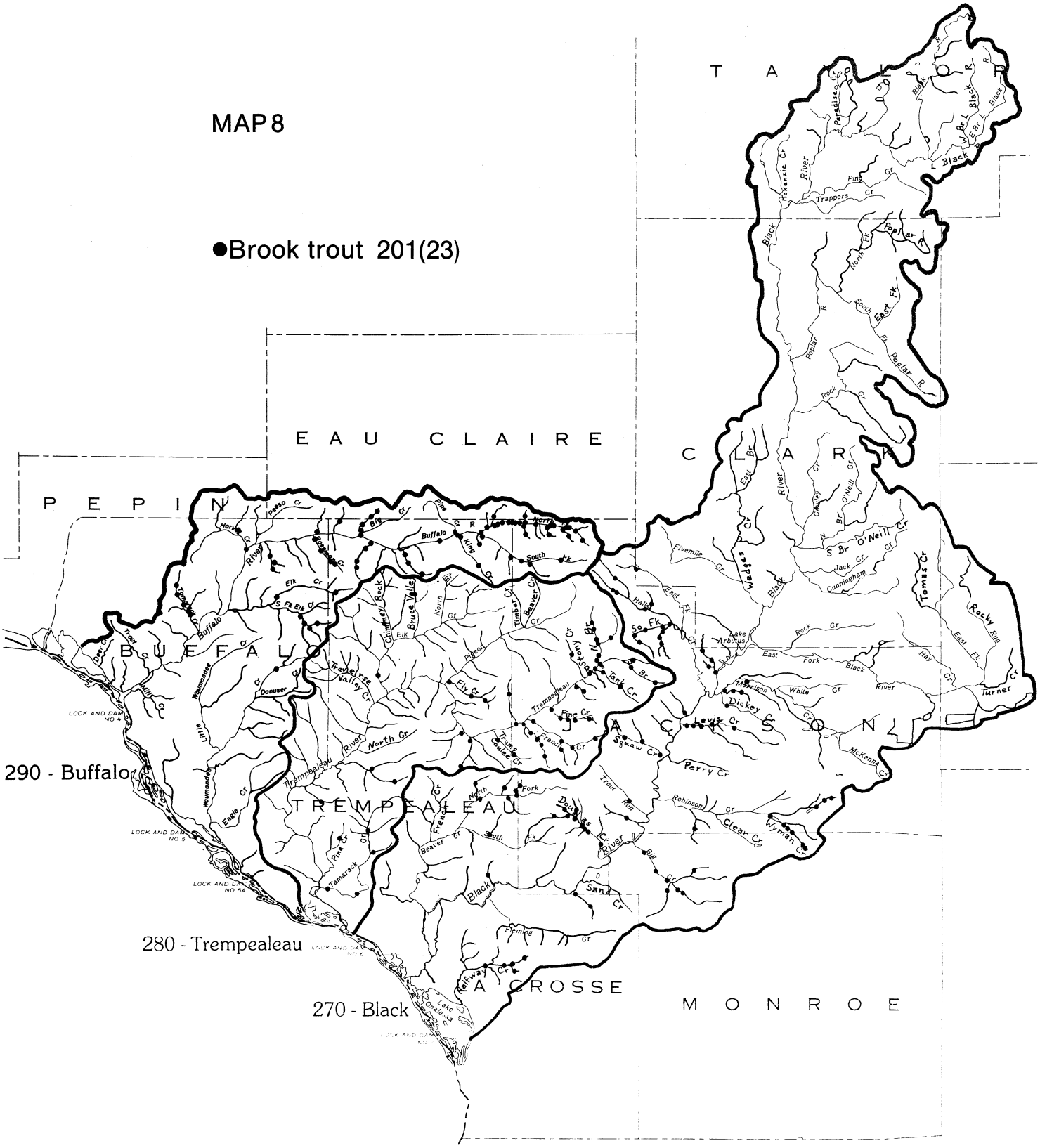


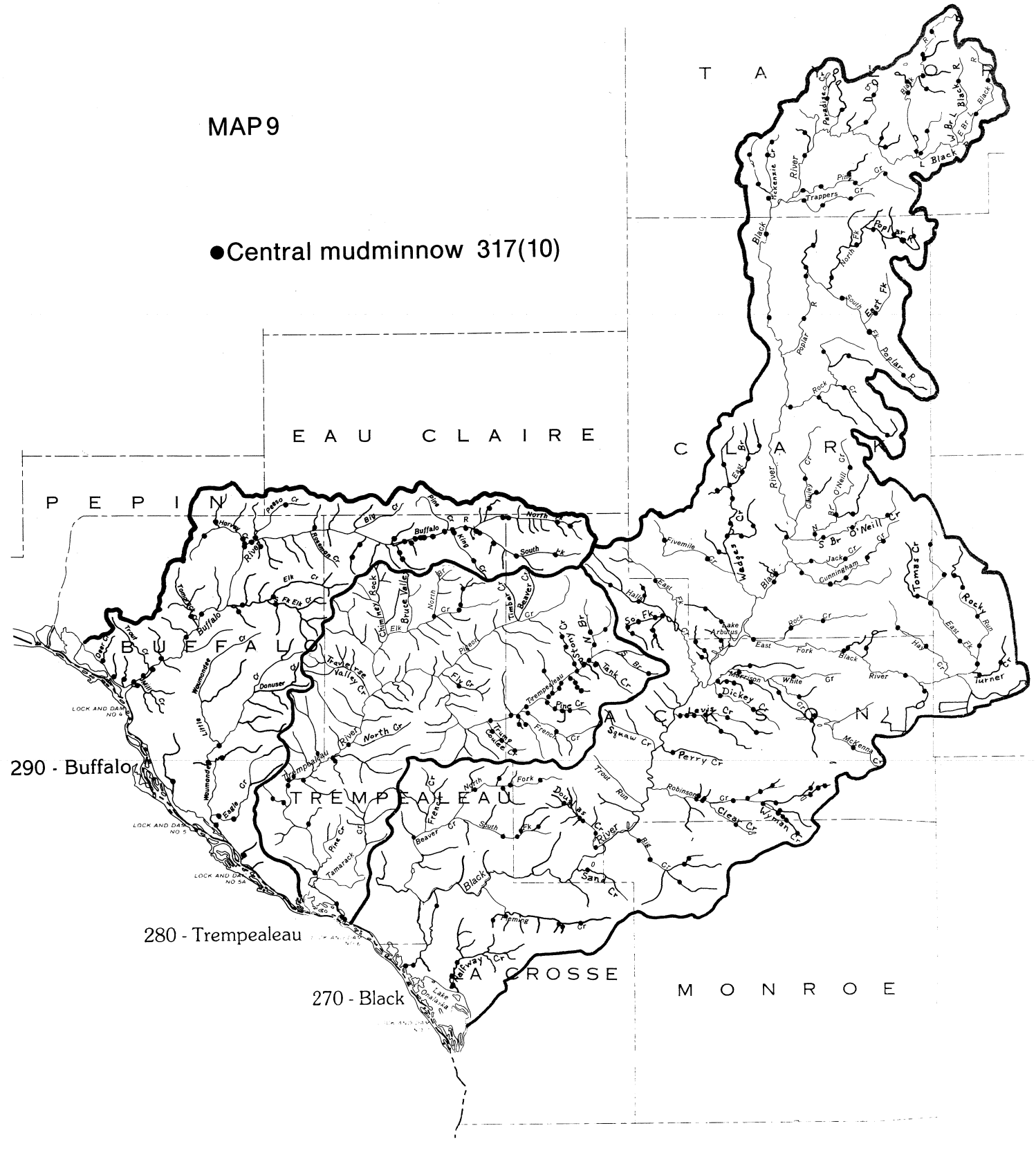

MAP 6
●Rainbow trout 21(0)
290 - Buffalo
280 - Trempealeau
270 - Black
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
LA CROSSE
MONROE
JACKSON
CLARK
TAYLOR
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A

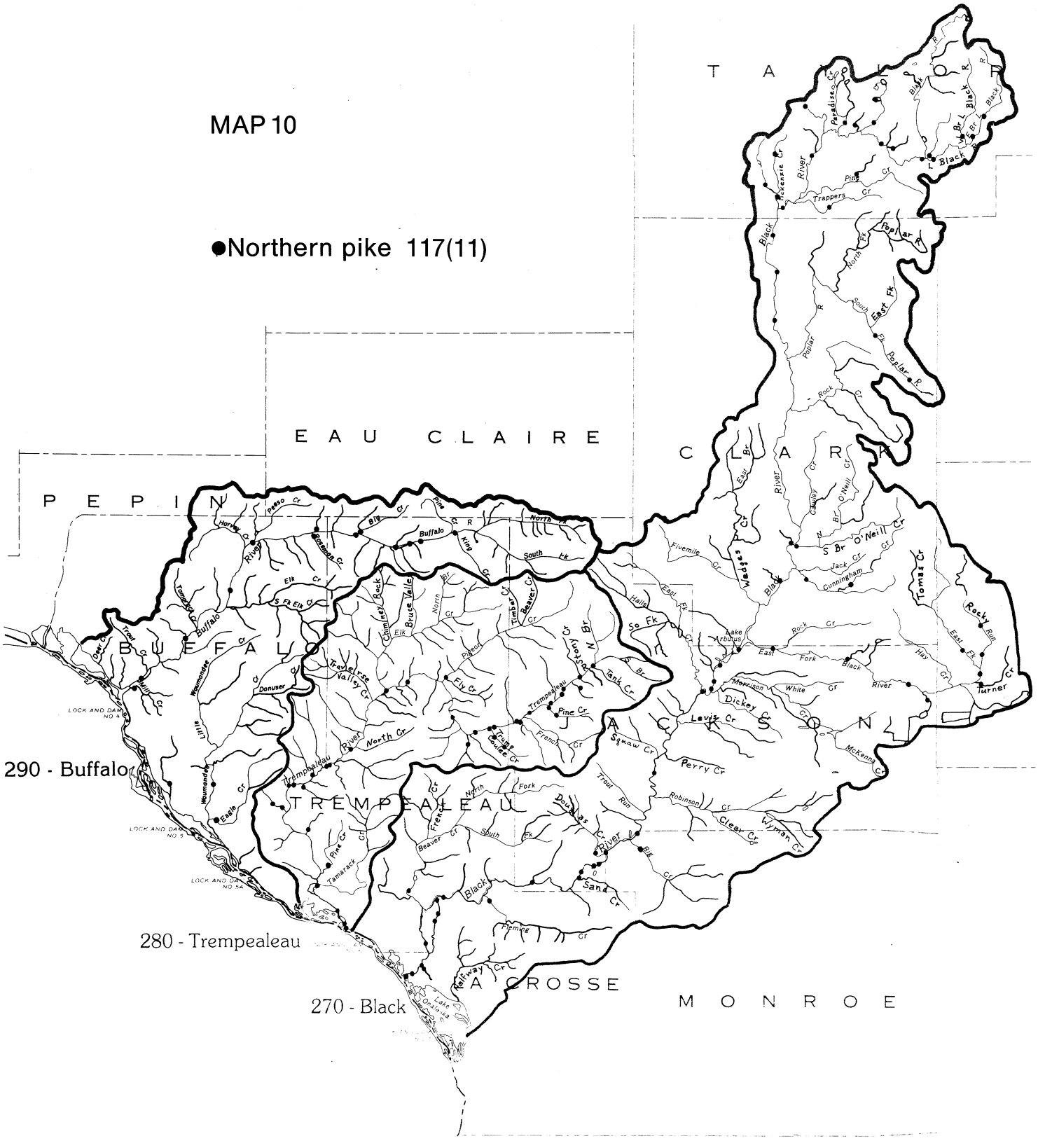
MAP 7

●Brown trout 139(14)



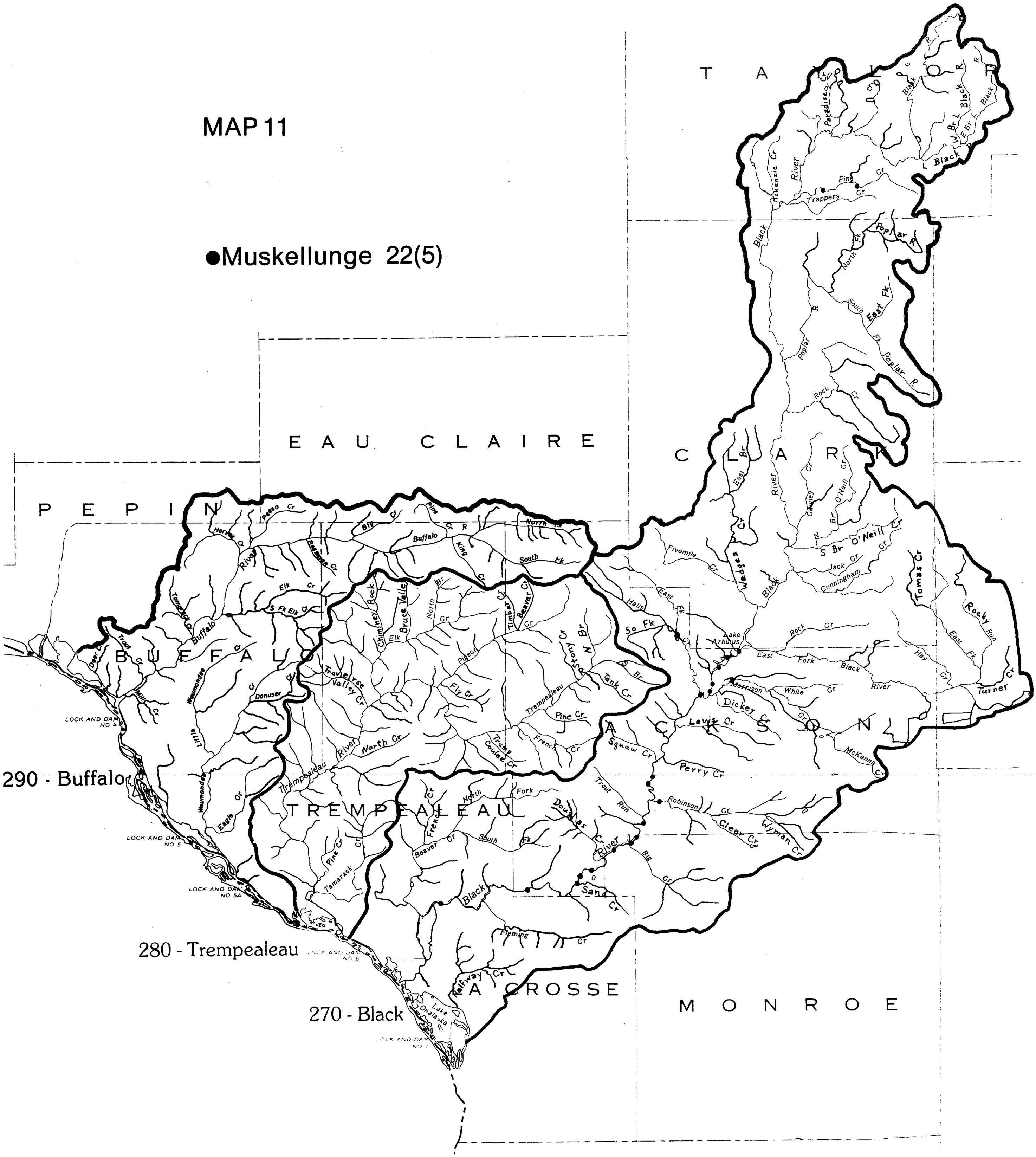

MAP 8
●Brook trout 201(23)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E


MAP 9
●Central mudminnow 317(10)
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LA CROSSE
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Lake Onalaska
Lake Arbutus
Black R
Trappers Cr
Poplar R
Rock Cr
Fivemile Cr
Jack Cr
Gunningham
Tomaz Cr
Rocky Run
Turner
Dickey Cr
Lewis Cr
McKenna Cr
Perry Cr
Sqkaw Cr
Trout Run
Robinson Cr
Clear Cr
Wyman Cr
Douglas Cr
Sand Cr
Tank Cr
Stony Cr
Timber Cr
Beaver Cr
Pine Cr
French Cr
Tamarack Cr
Eagle Cr
Waumandee Cr
Donuser Cr
Trempealeau River
North Cr
Fly Cr
Elk Cr
Pk Elk Cr
Buffalo River
Big Cr
King Cr
Esseenay Cr
Horner Cr
Pesso Cr
Railway Cr
Flaming Cr


MAP 10
●Northern pike 117(11)
290 - Buffalo
280 - Trempealeau
270 - Black
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
LA CROSSE
MONROE
JACKSON
CLARK
TAYLOR
Pepin
Harvey Cr
Pesto Cr
Big Cr
Buffalo R
North Fk
South Fk
King Cr
Elk Cr
S Fk Elk Cr
Tamarack Cr
Buffalo R
Trout Cr
Deer Cr
Mill Cr
Waumandee Cr
Danuser Cr
Lime Chimney Rock
Elk
Bruce Valley
North Br
Timber Cr
Beaver Cr
Traverse Valley Cr
Ely Cr
Trempealeau R
North Cr
Trempealeau
Eagle Cr
Waumandee
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Pine Cr
Tamarack
French Cr
Beaver Cr
North Fork
South Fk
Black R
Douglas Cr
Sand Cr
Fleming Cr
Railway Cr
Lake Onalaska
Trempealeau
Pine Cr
Tank Cr
S Br Robinson Cr
Sgnaw Cr
French Cr
Trout Run
Perry Cr
Robinson Cr
Clear Cr
Wyman Cr
Levis Cr
Dickey Cr
McKenna Cr
Morrison
White R
Black River
Hay Cr
Turner Cr
Rocky Run
East Fk
Lake Arbutus
Pine Cr
Halls Cr
East Fk
So Fk
Fivemile Cr
Wedges Cr
Black R
Cunningham
Jack Cr
S Br O'Neill Cr
N Br O'Neill Cr
O'Neill Cr
Crowley Cr
East Fk
Rock Cr
Tomas Cr
Poplar R
South Fk
North Fk
East Fk
Poplar R
Rock Cr
Black R
Trappers Cr
Pine Cr
Mckenzie Cr
Paradise Cr
Black R
Br
L Black R
Br
Black R

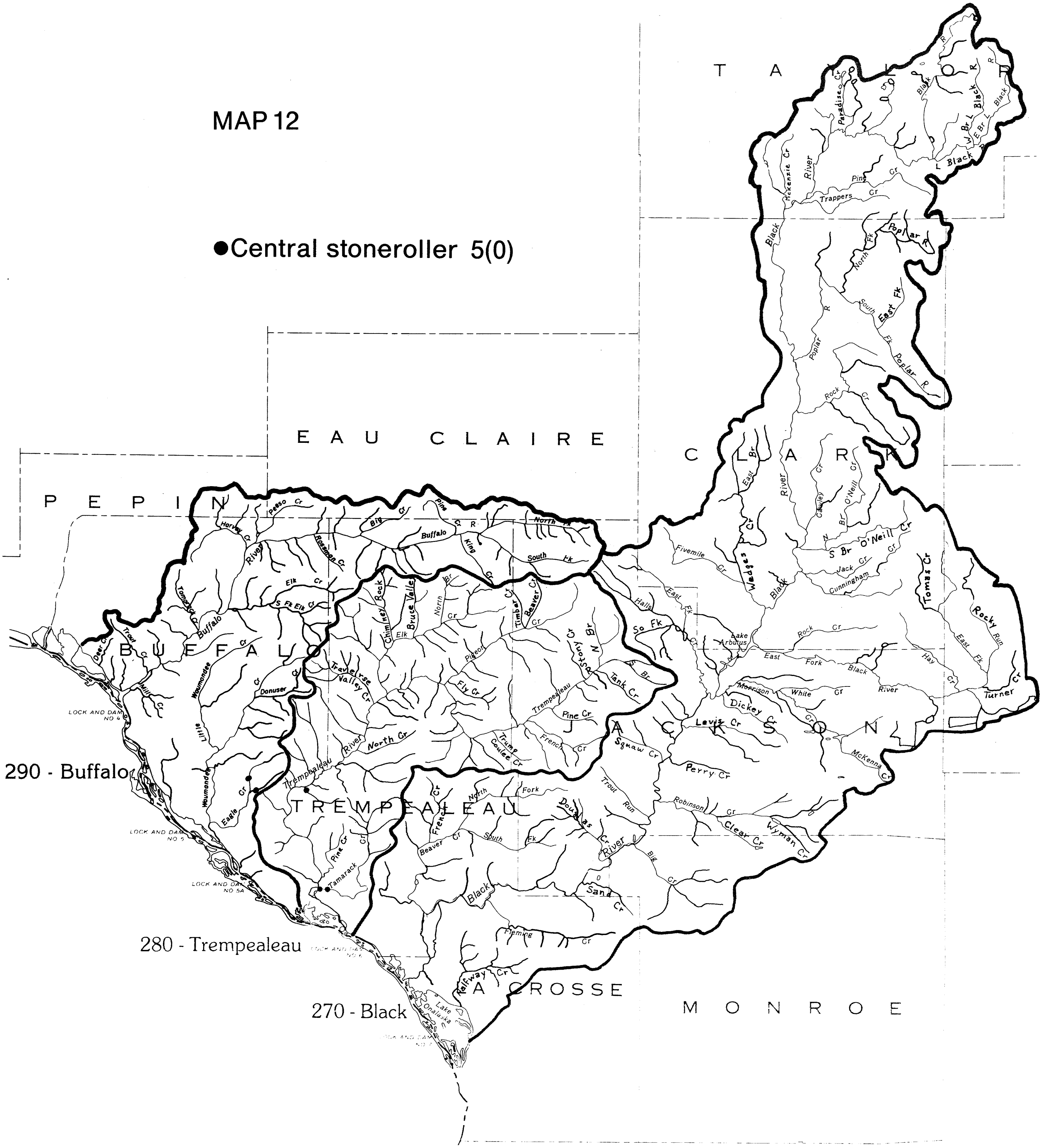
MAP 11

●Muskellunge 22(5)



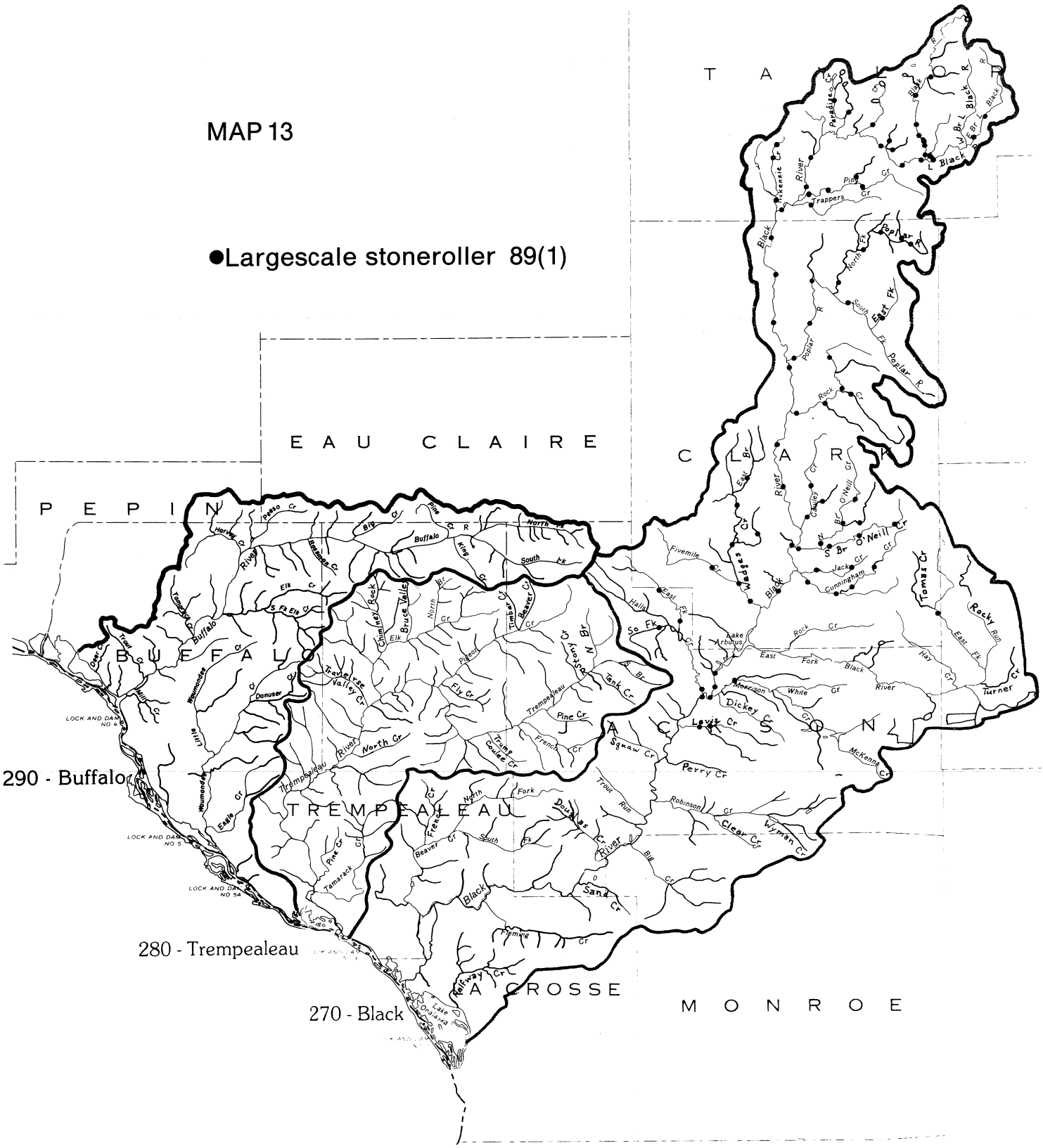
MAP 12

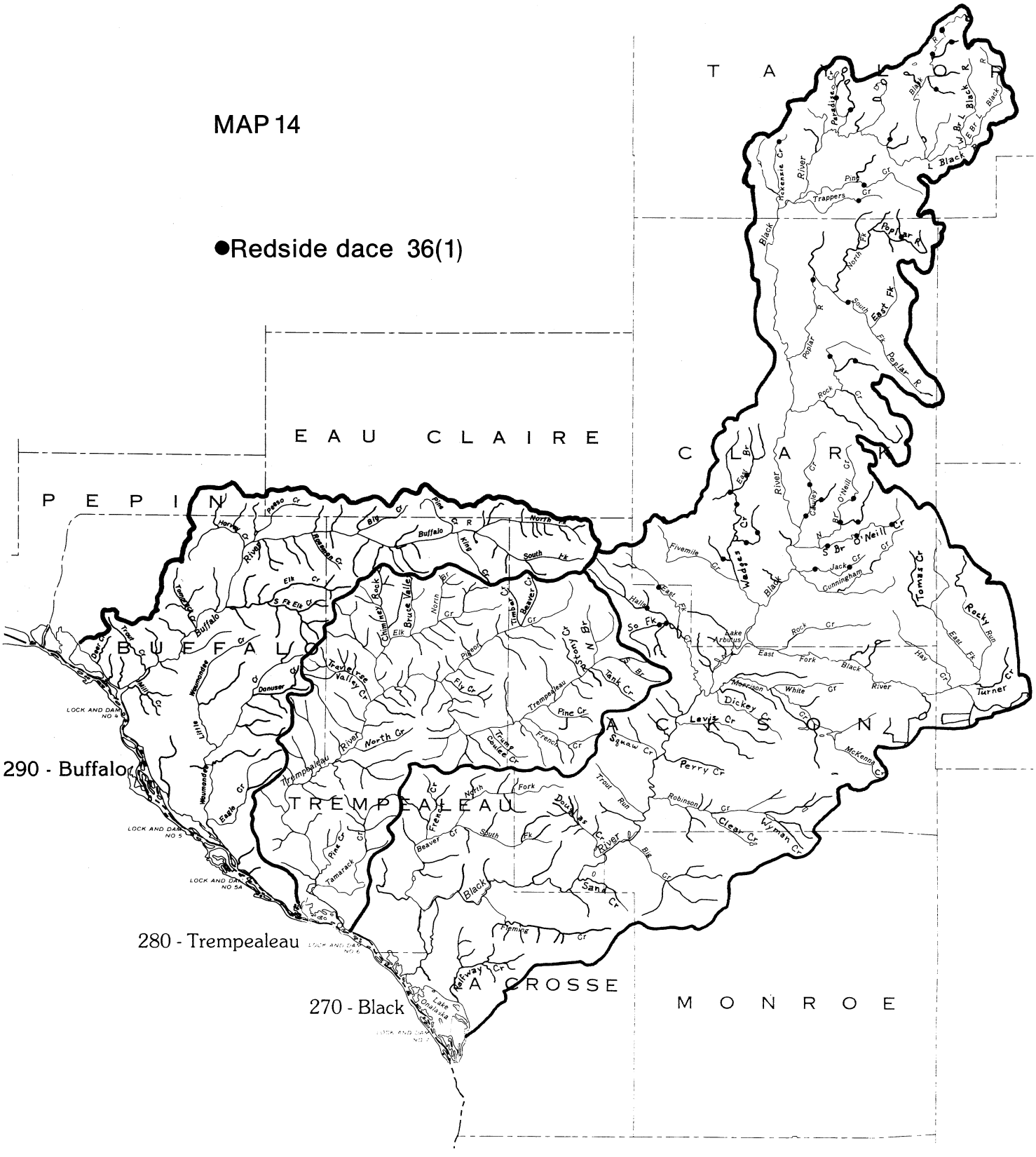
●Central stoneroller 5(0)

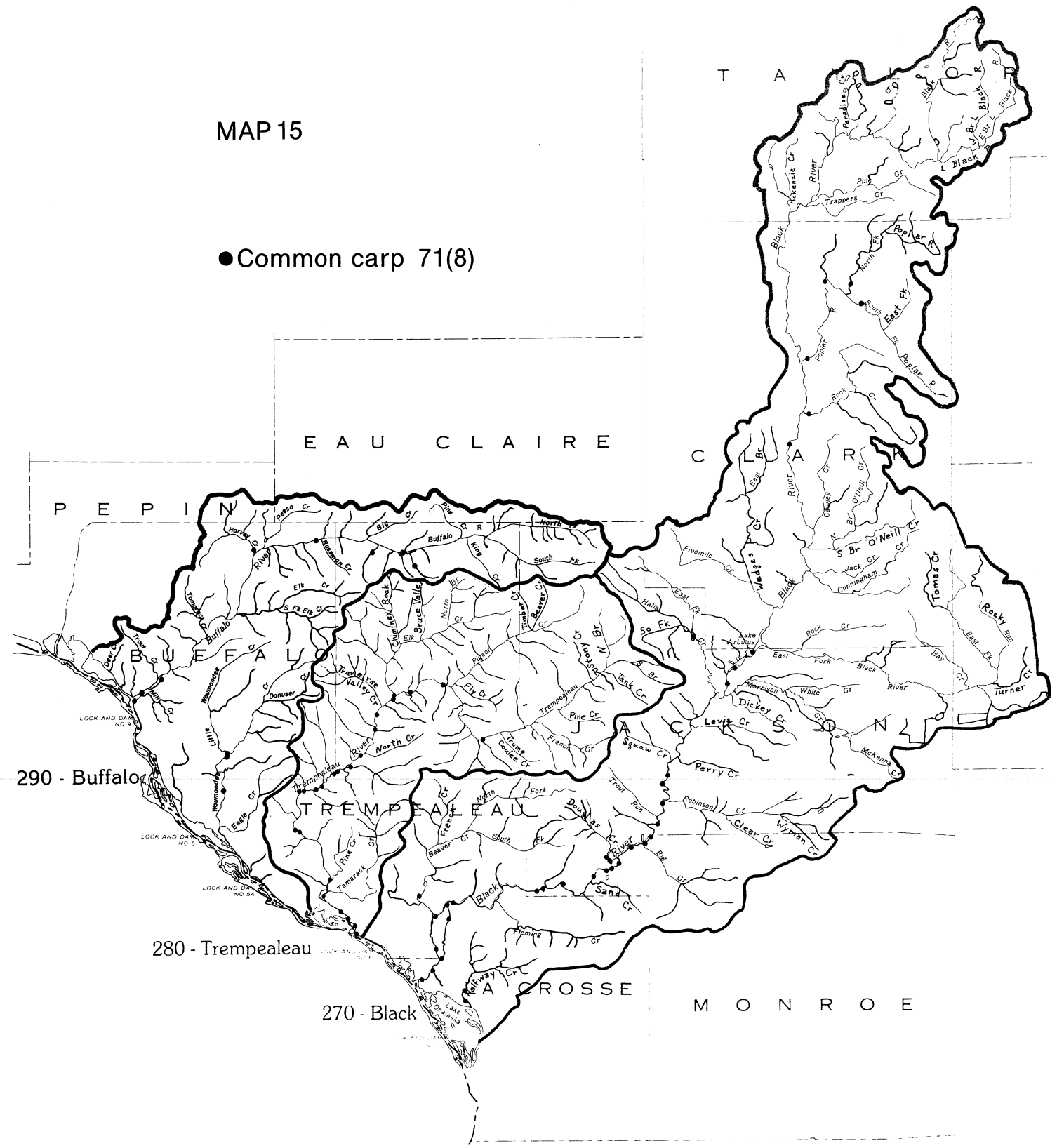


MAP 13

●Largescale stoneroller 89(1)

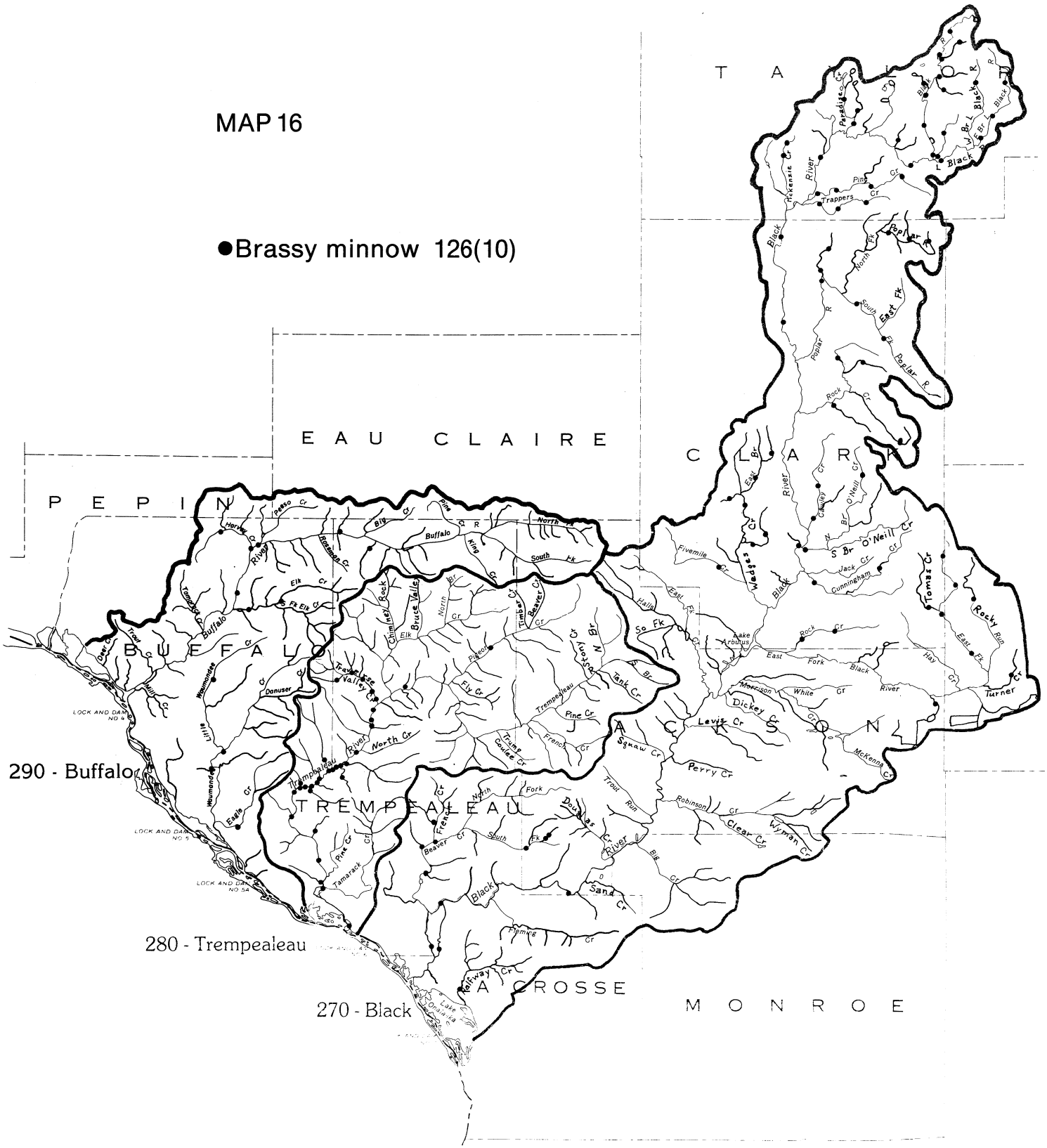


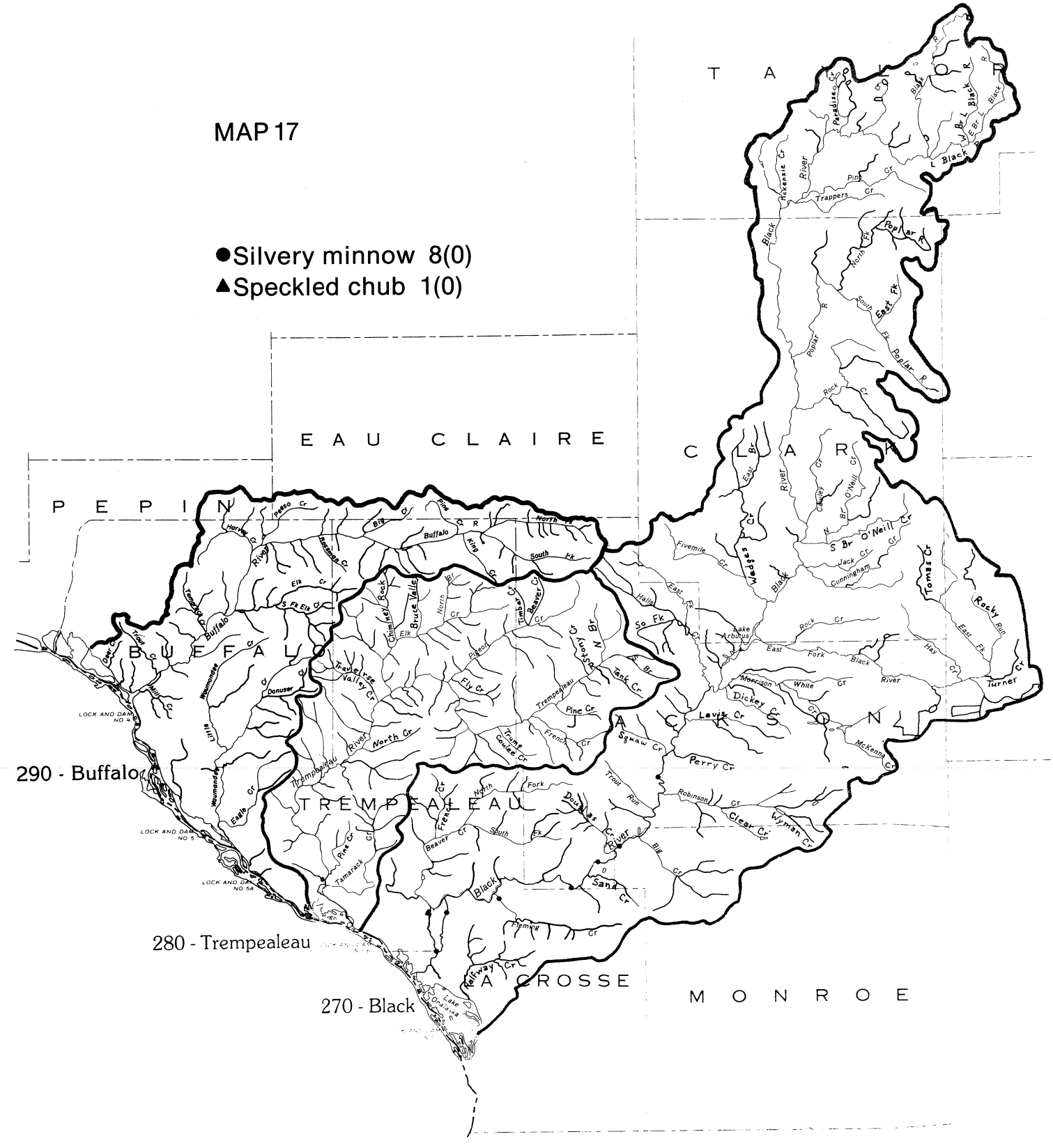

MAP 14
●Redside dace 36(1)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E


MAP 15
● Common carp 71(8)
T A Y L O R
C L A R K
E A U C L A I R E
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
A C R O S S E
290 - Buffalo
280 - Trempealeau
270 - Black

MAP 16

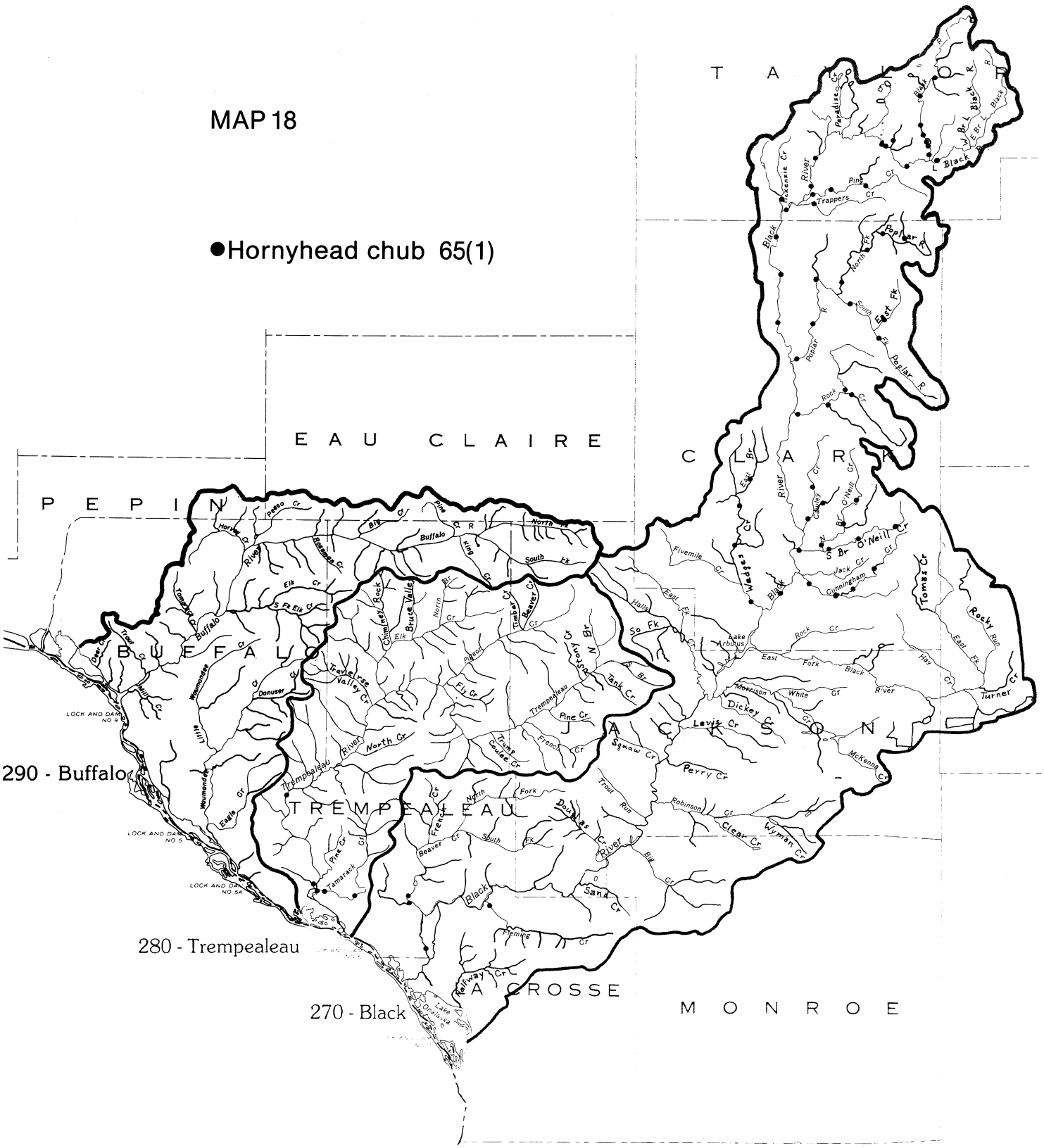
●Brassy minnow 126(10)




MAP 17
●Silvery minnow 8(0)
▲Speckled chub 1(0)
T A
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
TREMPEALEAU
JACKSON
M O N R O E
LA CROSSE
290 - Buffalo
280 - Trempealeau
270 - Black

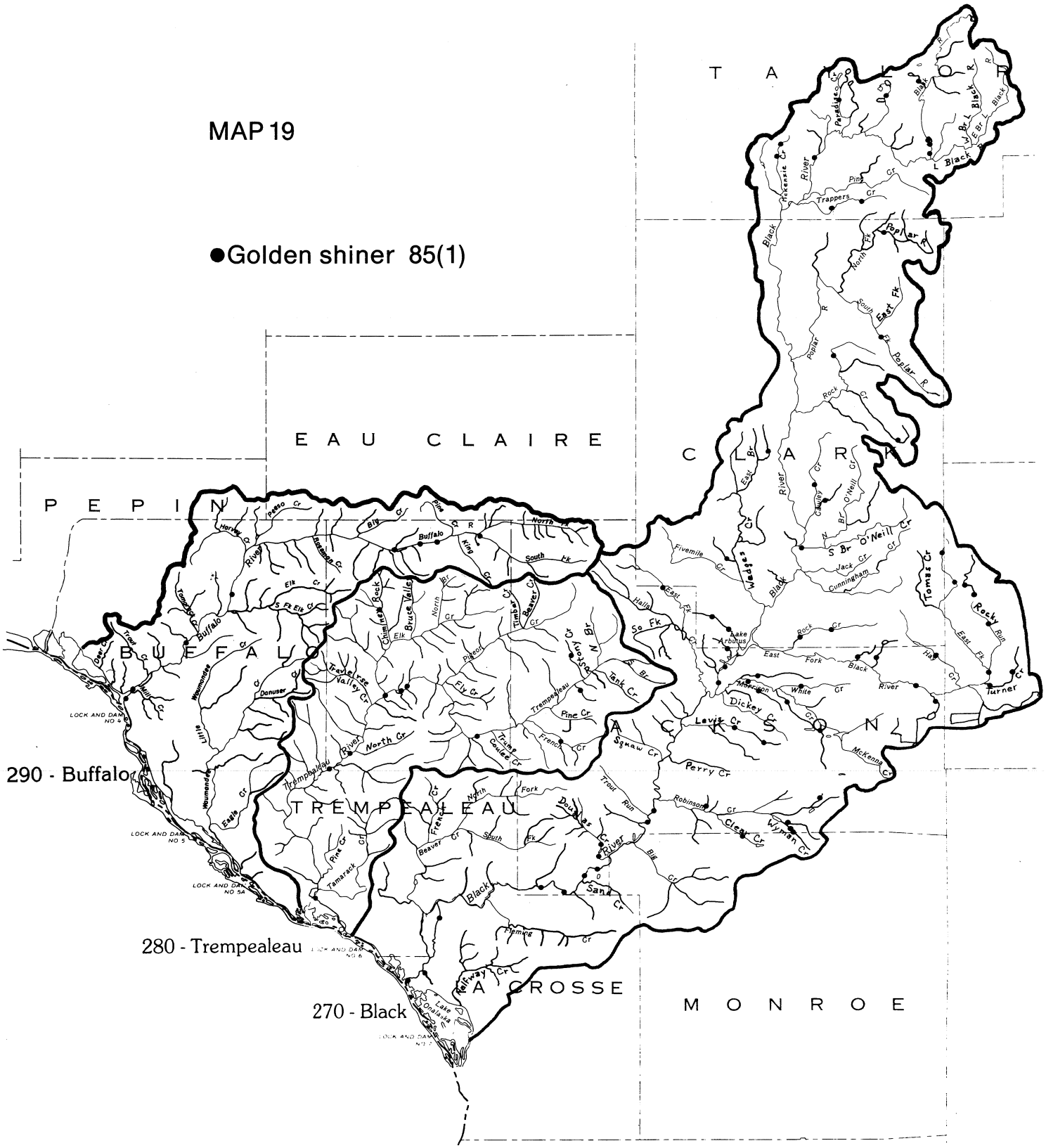
MAP 18

●Hornyhead chub 65(1)



MAP 19

●Golden shiner 85(1)



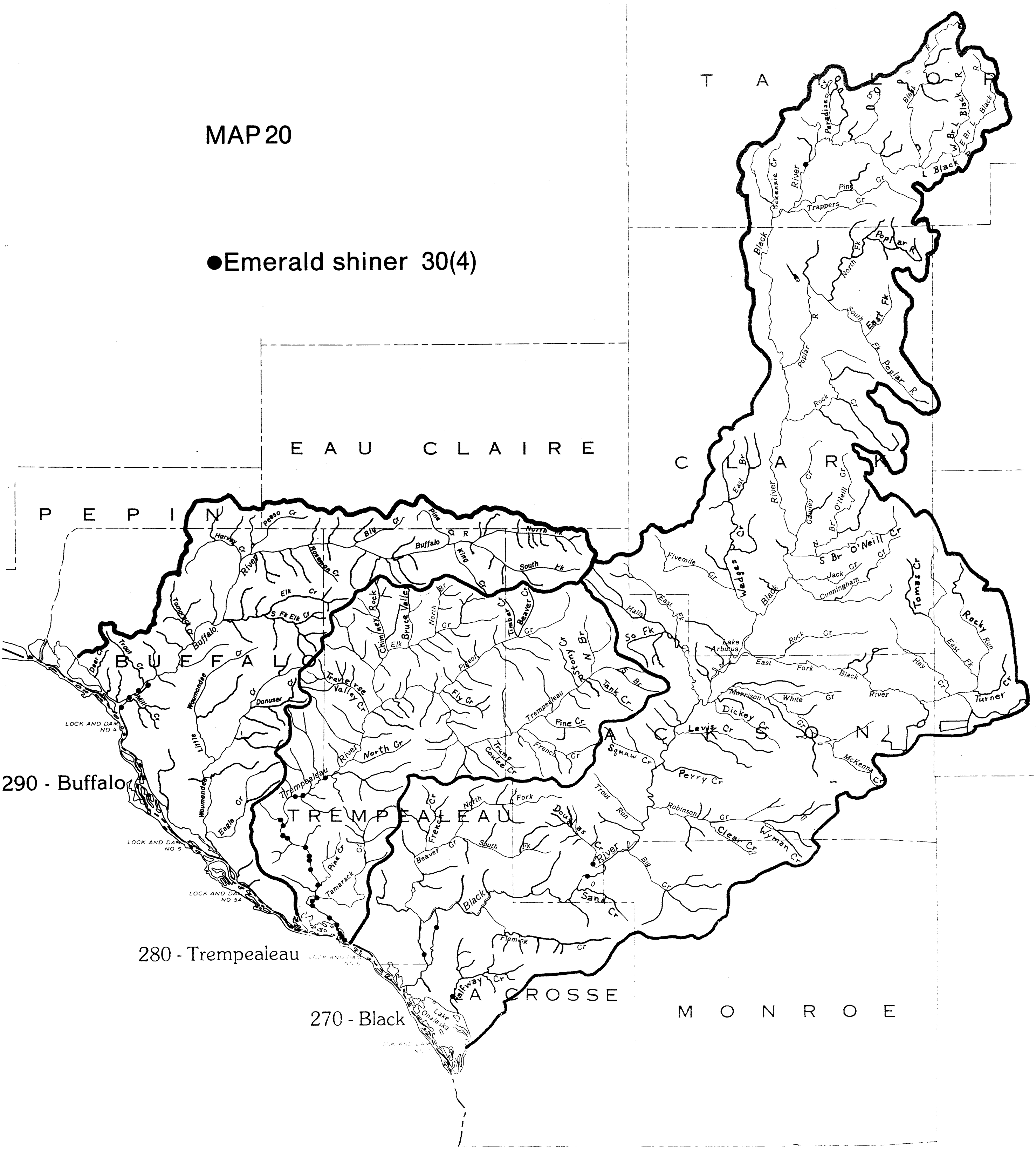
290 - Buffalo

280 - Trempealeau

270 - Black

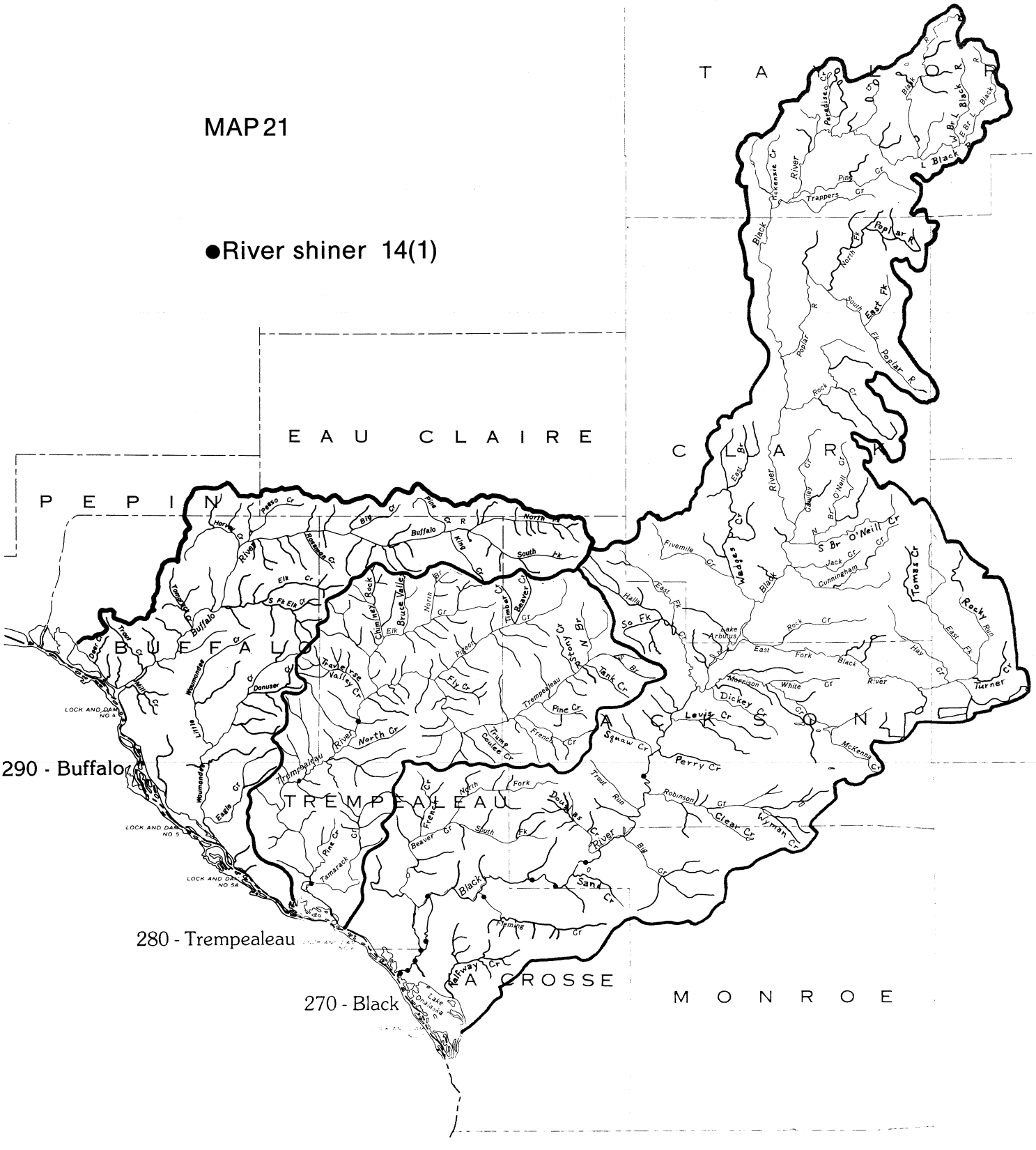
MAP 20

●Emerald shiner 30(4)



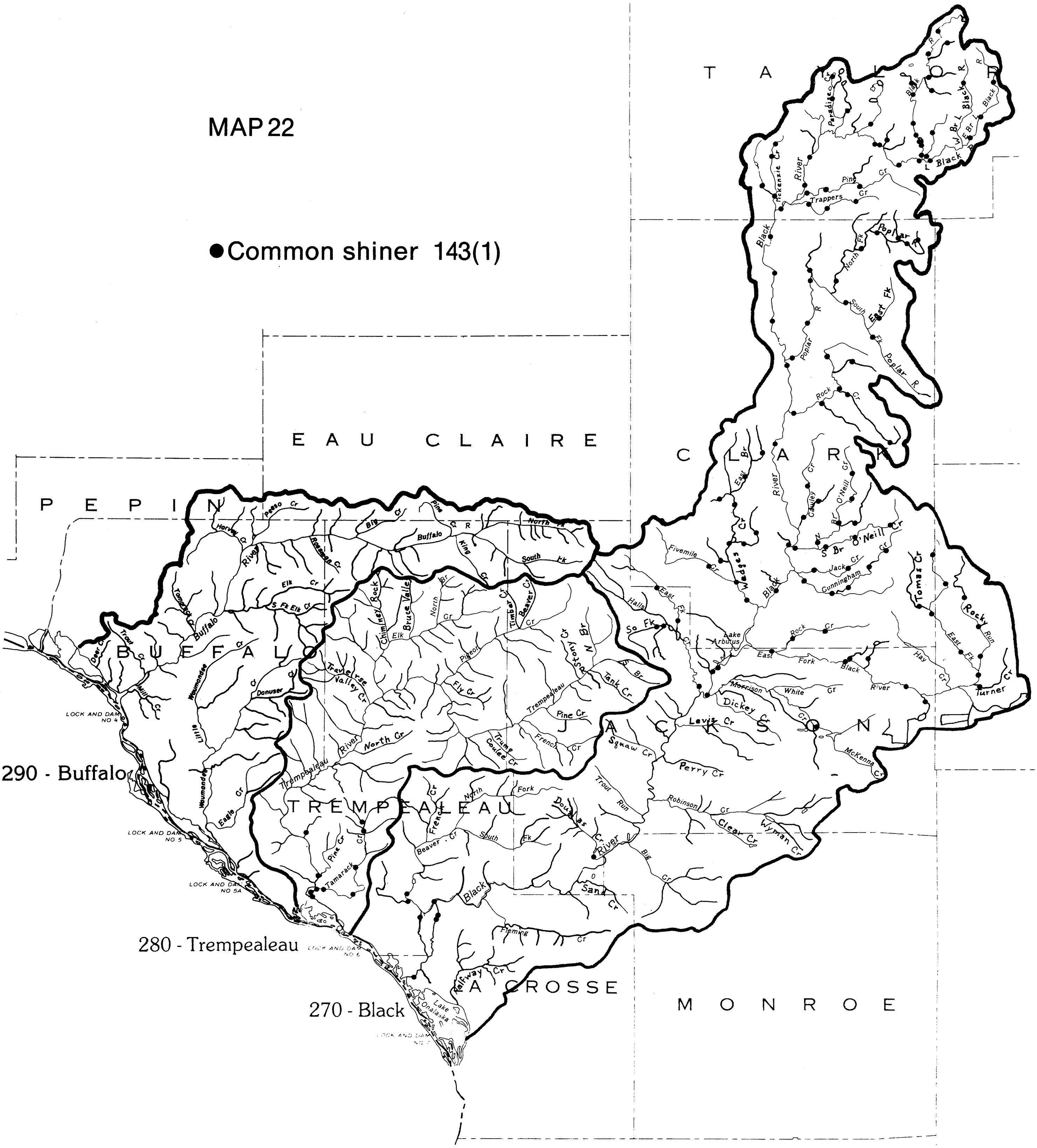
MAP 21

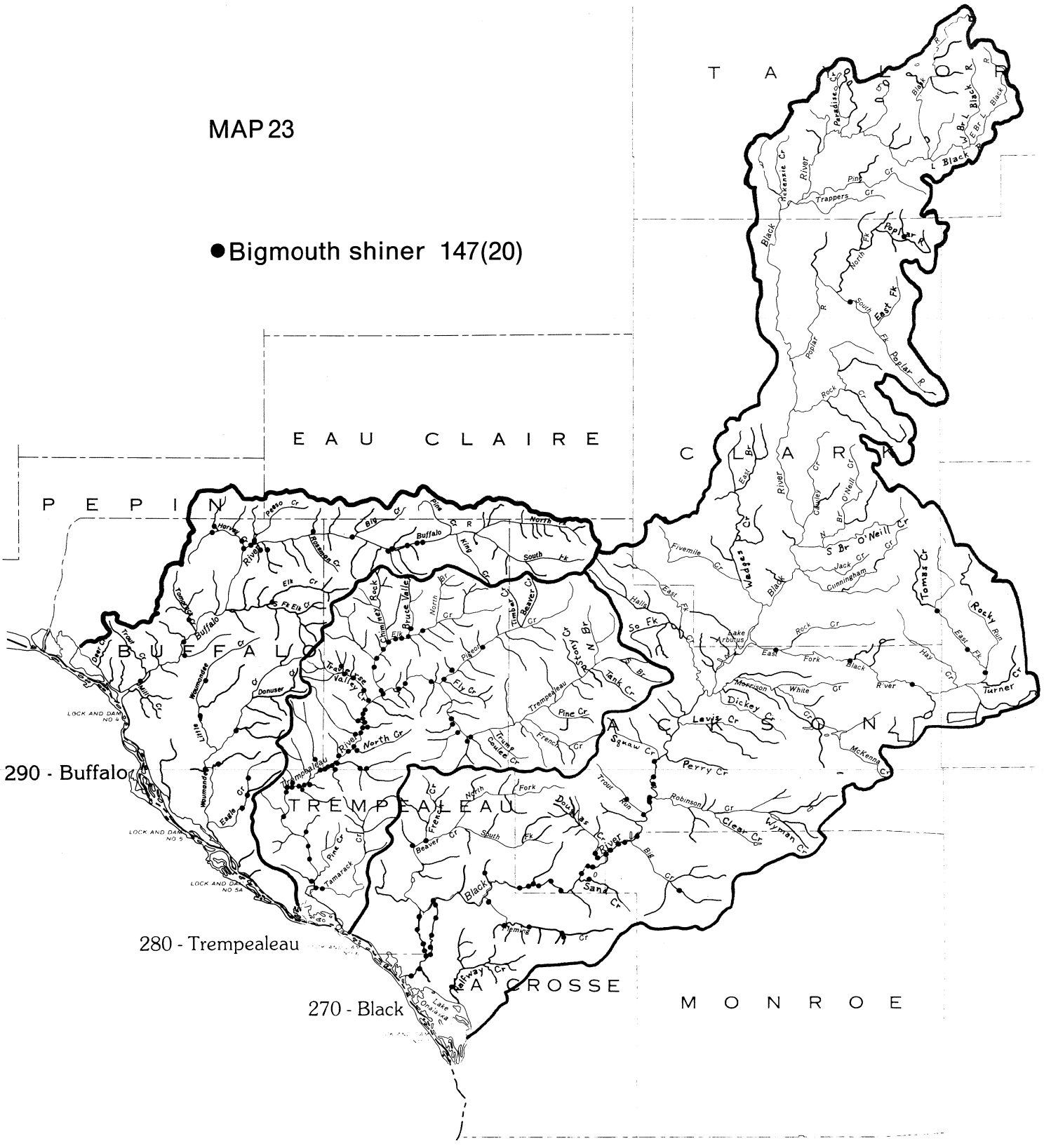
●River shiner 14(1)



MAP 22

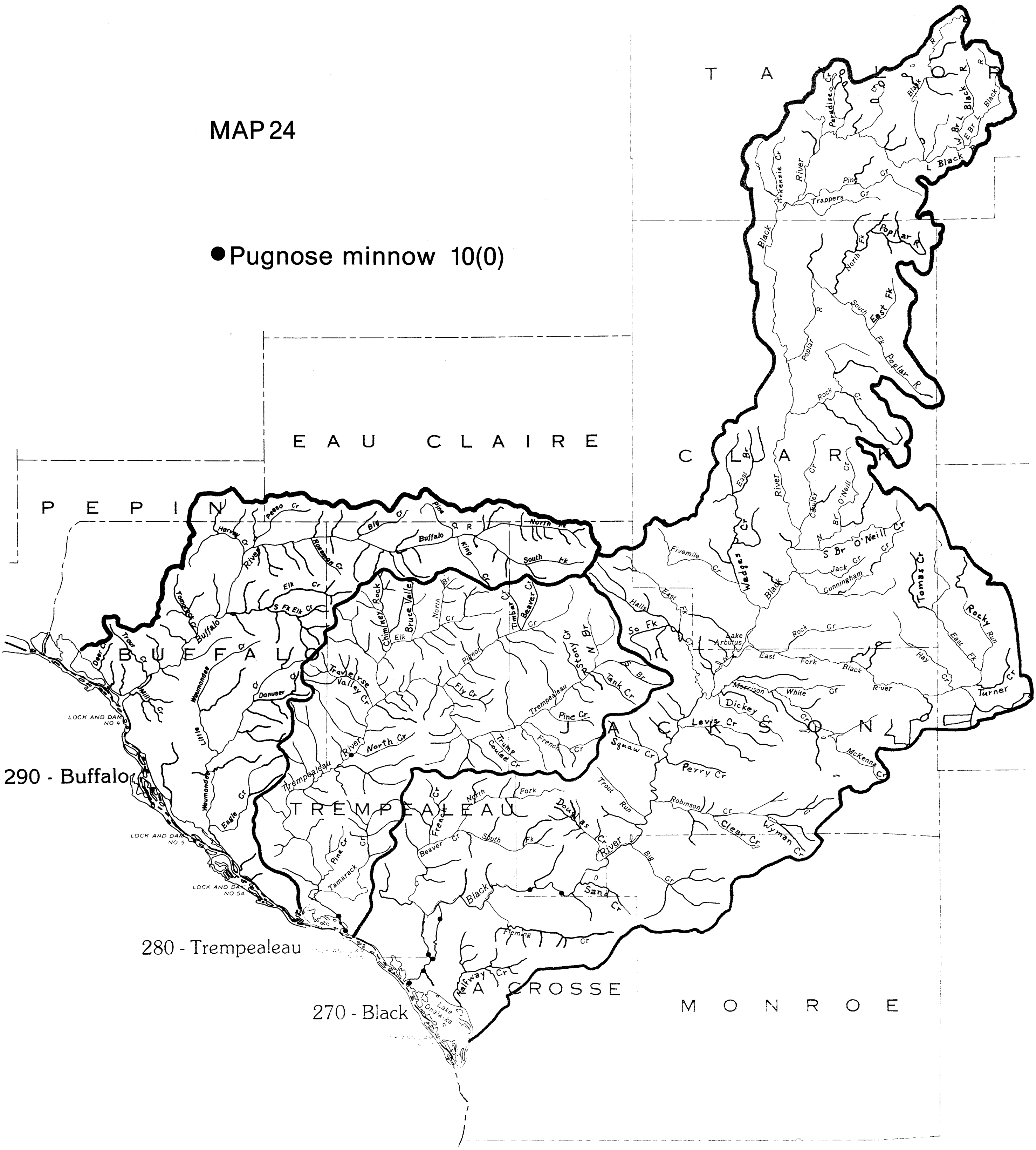
●Common shiner 143(1)




MAP 23
● Bigmouth shiner 147(20)
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

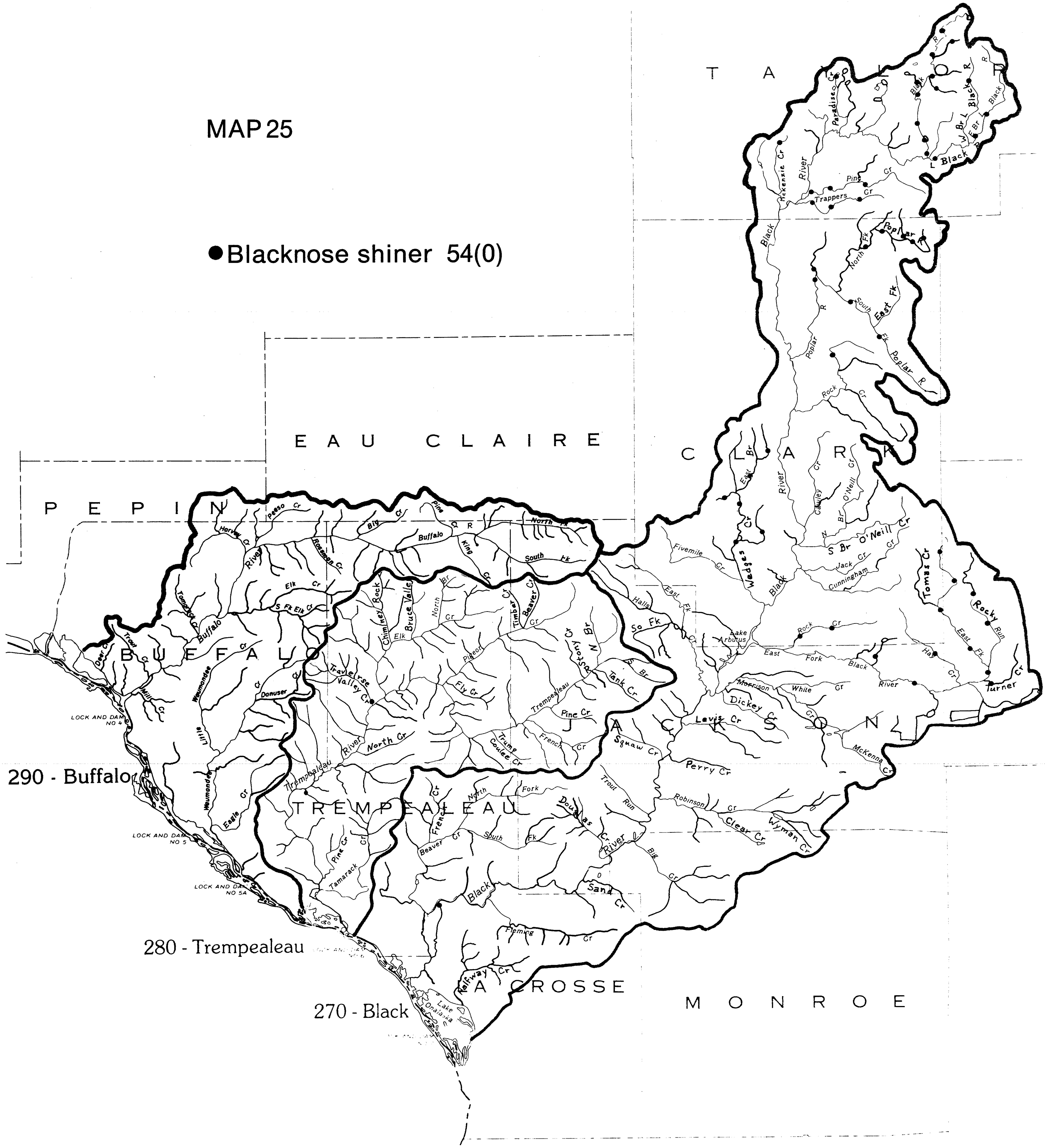
MAP 24

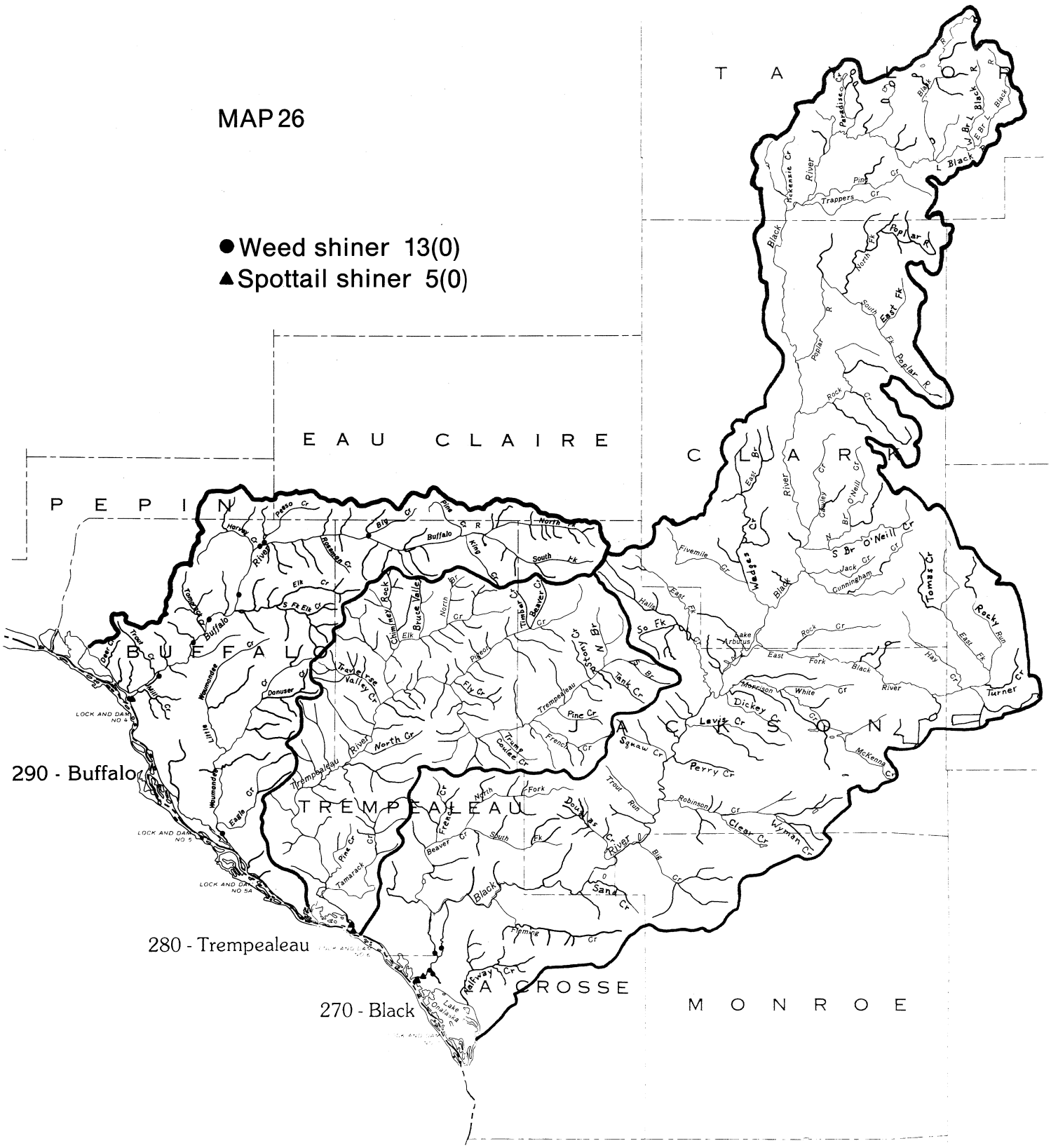
● Pugnose minnow 10(0)

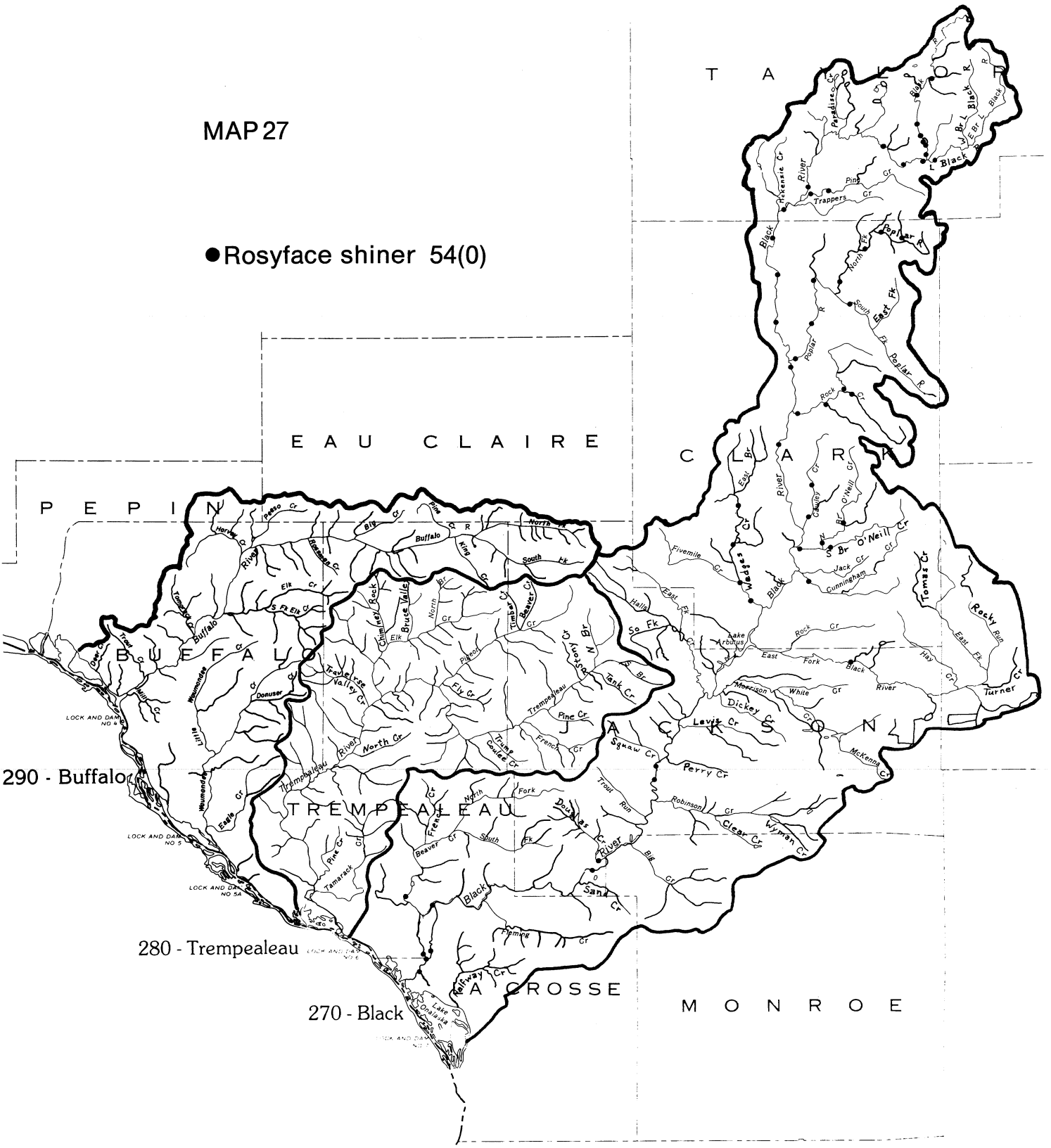


MAP 25

●Blacknose shiner 54(0)

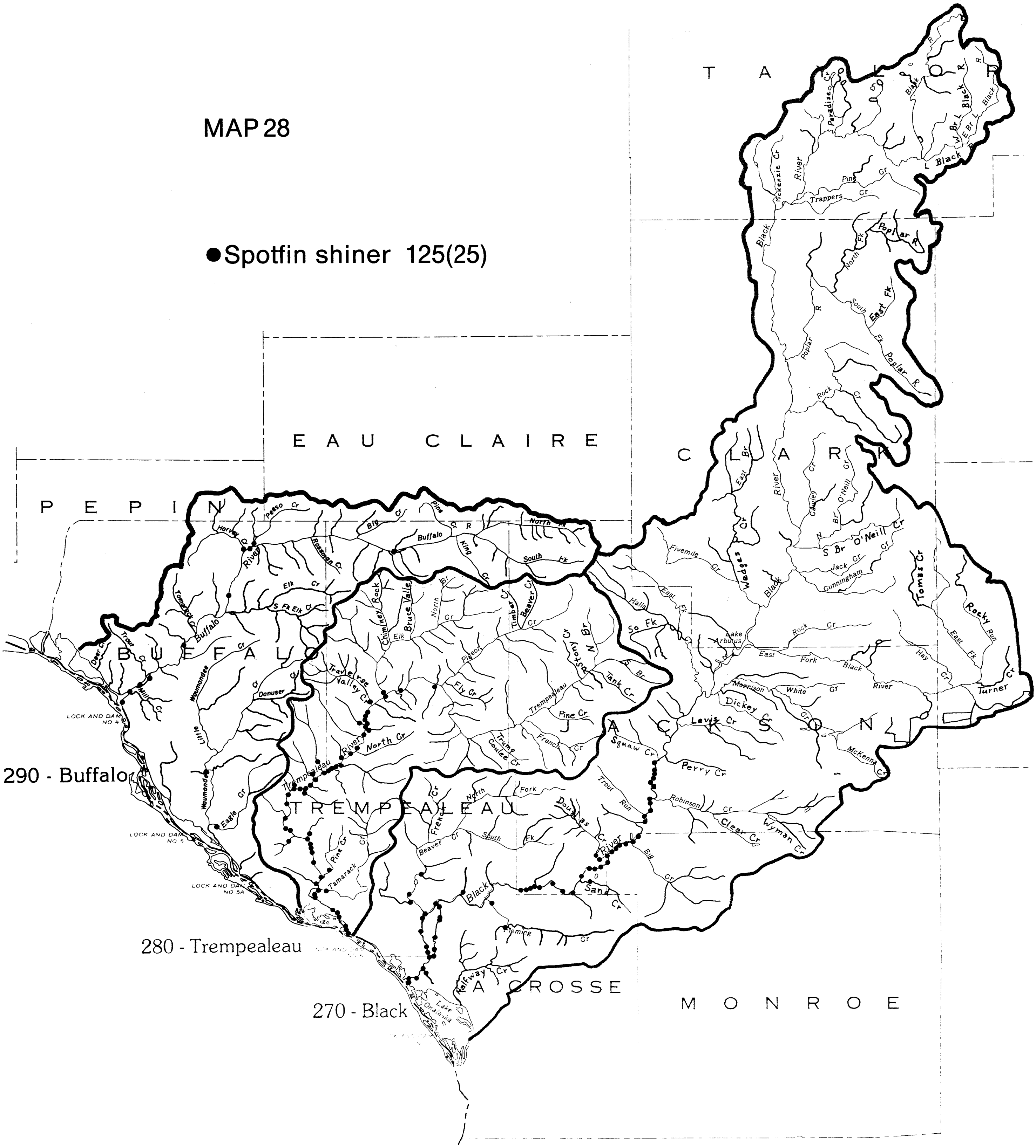



MAP 26
● Weed shiner 13(0)
▲ Spottail shiner 5(0)
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
290 - Buffalo
280 - Trempealeau
270 - Black
LA CROSSE
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Lake Onalaska
Lake Arbutus


MAP 27
● Rosyface shiner 54(0)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A L A C R O S S E
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

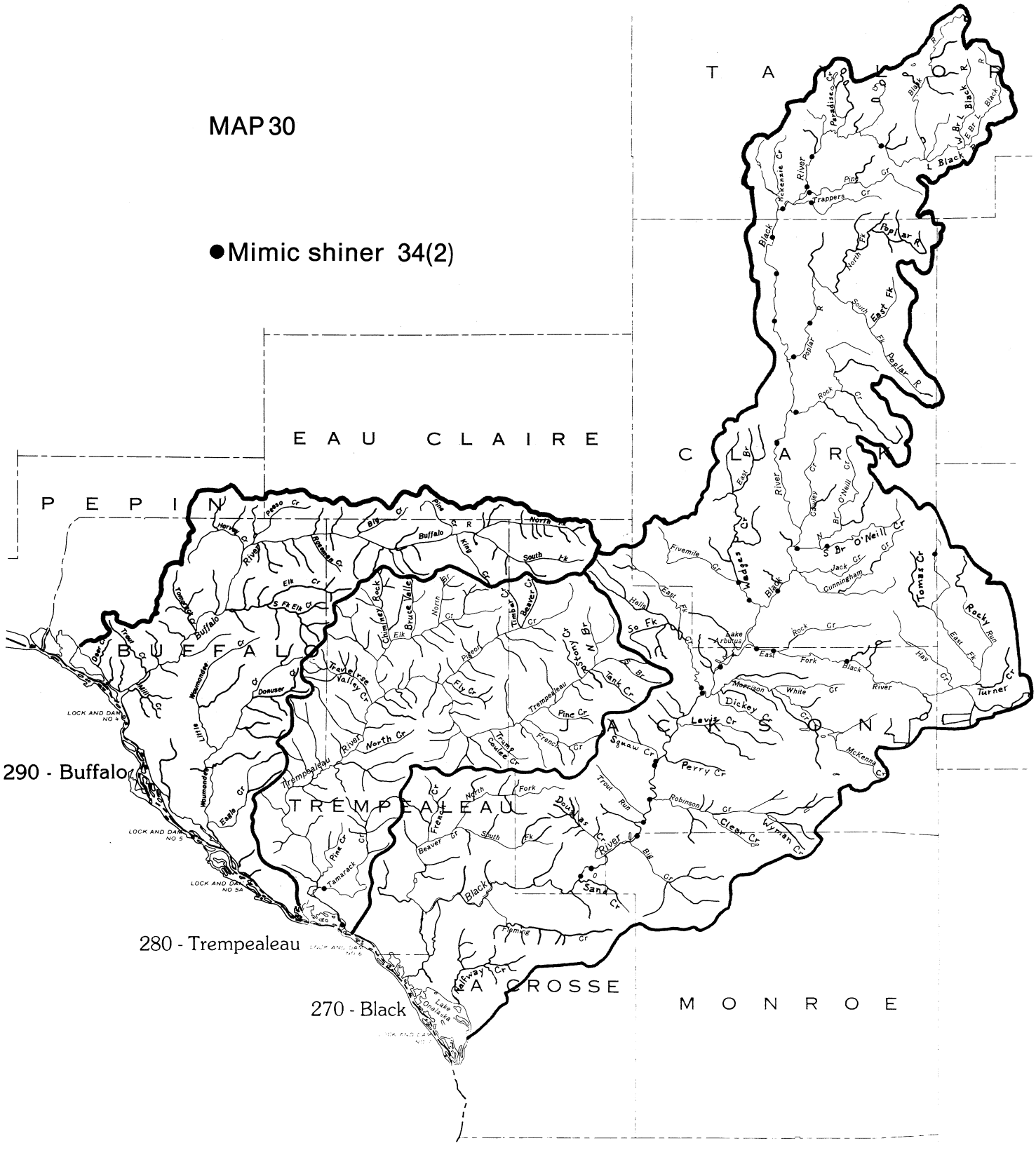
MAP 28

●Spotfin shiner 125(25)



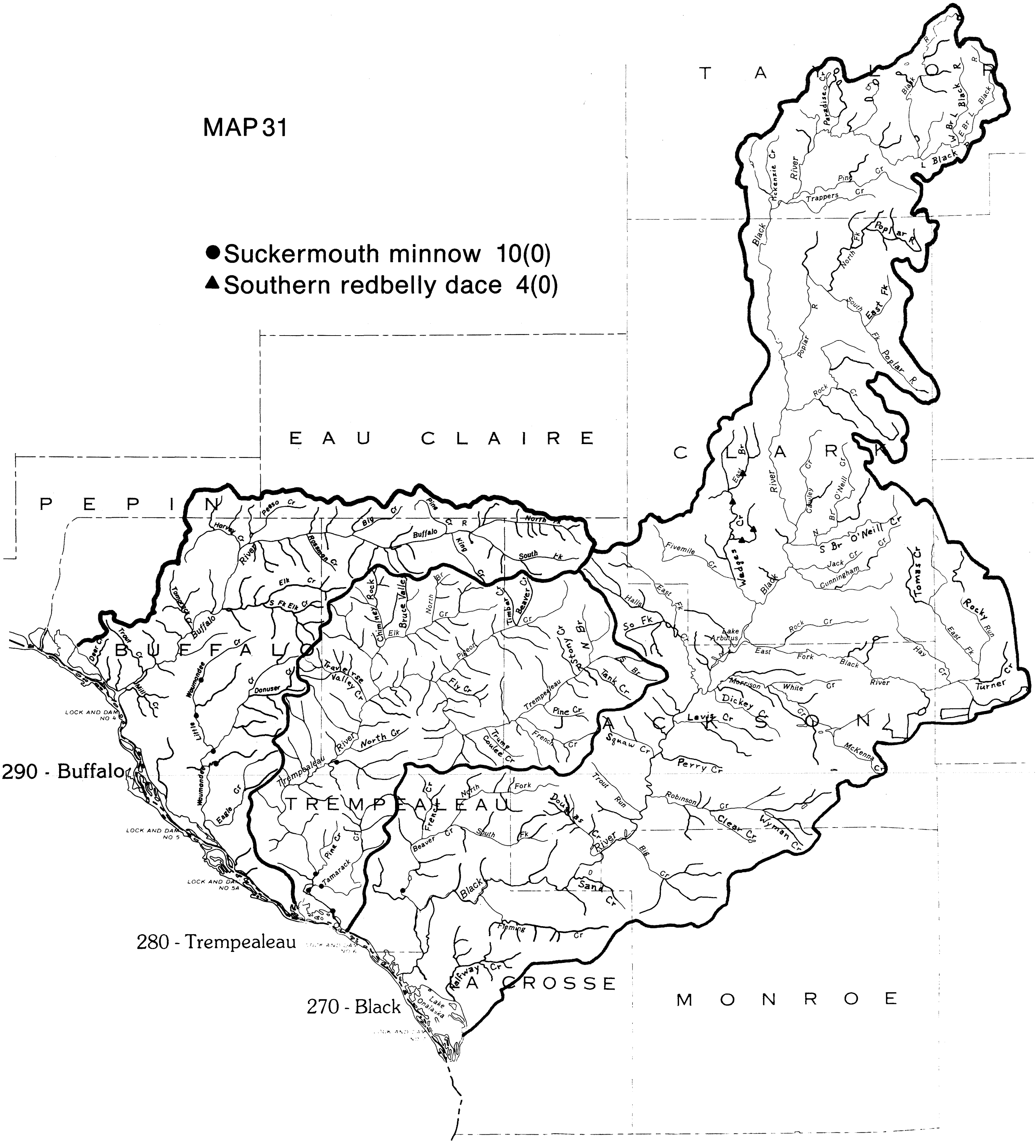
MAP 29

● Sand shiner 46(6)


MAP 30
● Mimic shiner 34(2)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
J A C K S O N
TREMPEALEAU
LA CROSSE
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

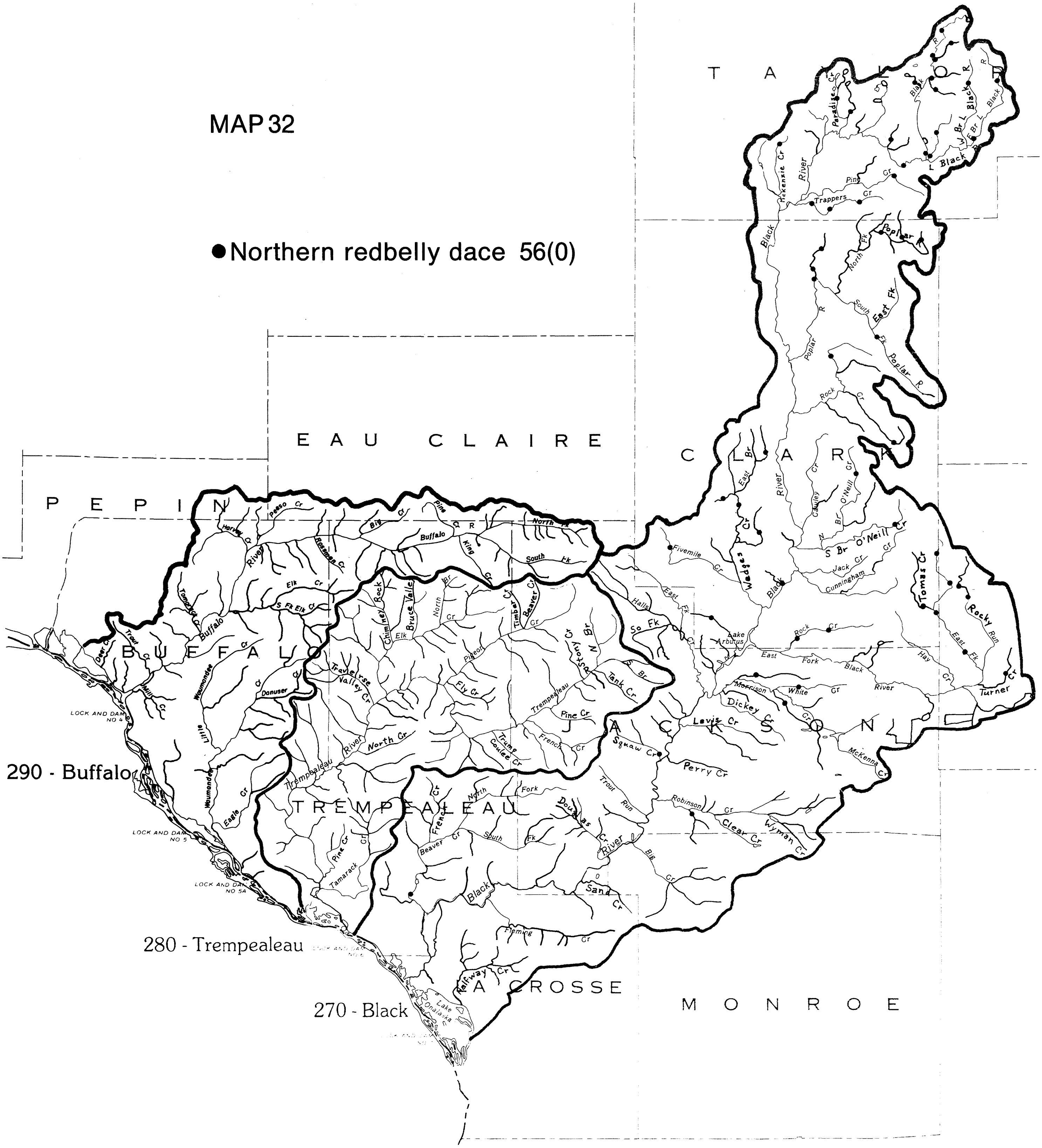
MAP 31

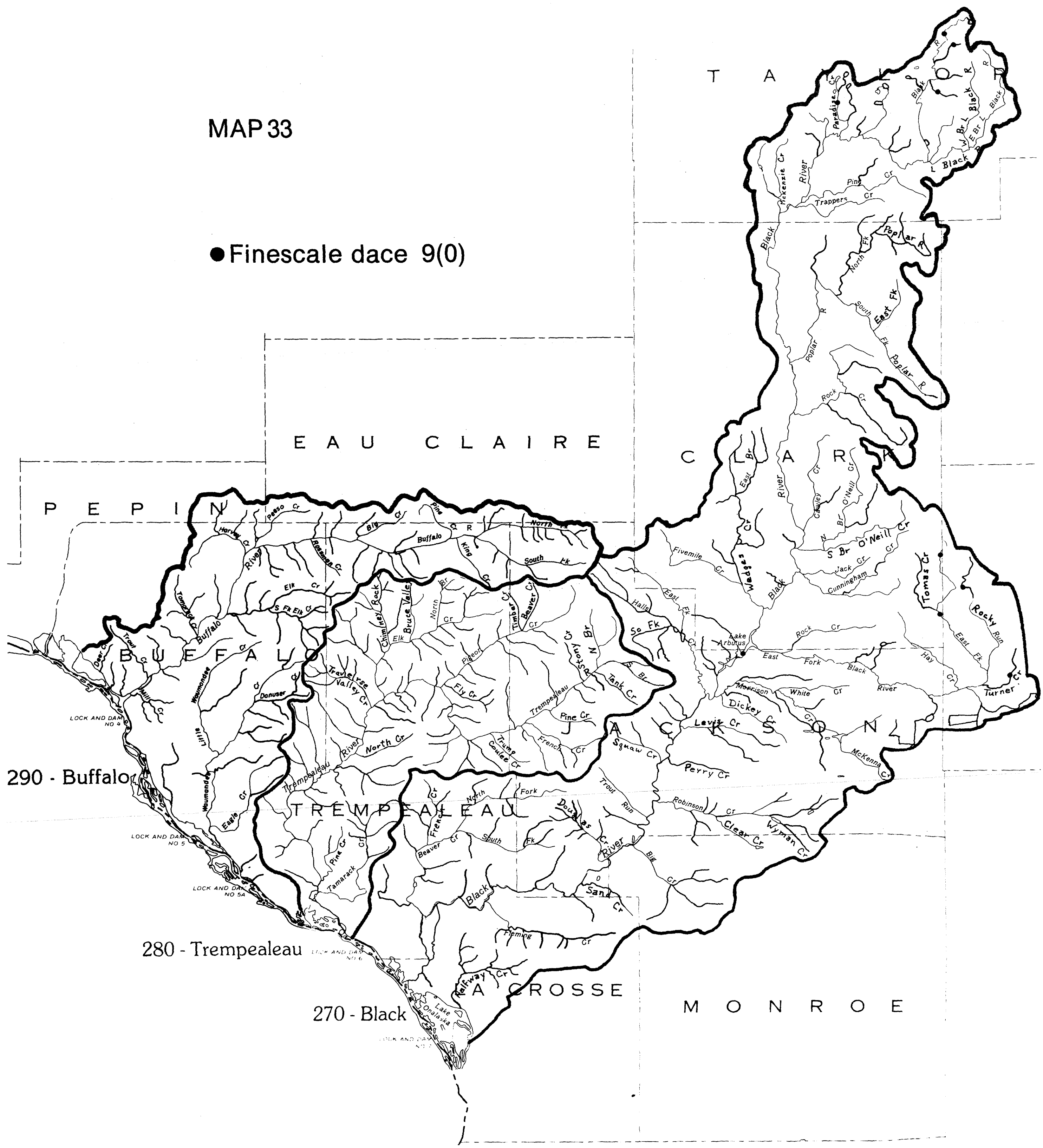
● Suckermouth minnow 10(0)
▲ Southern redbelly dace 4(0)

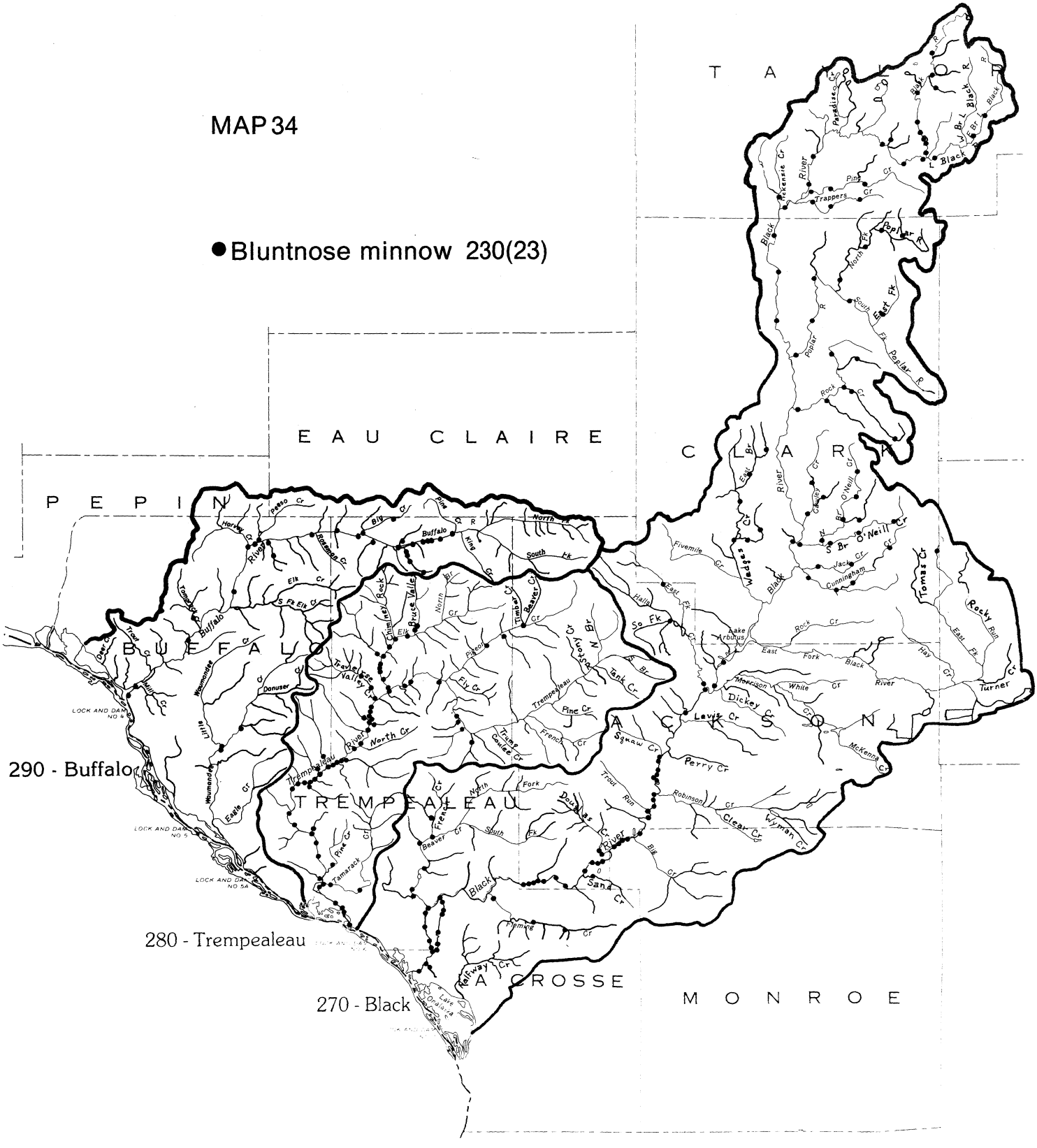


MAP 32

●Northern redbelly dace 56(0)

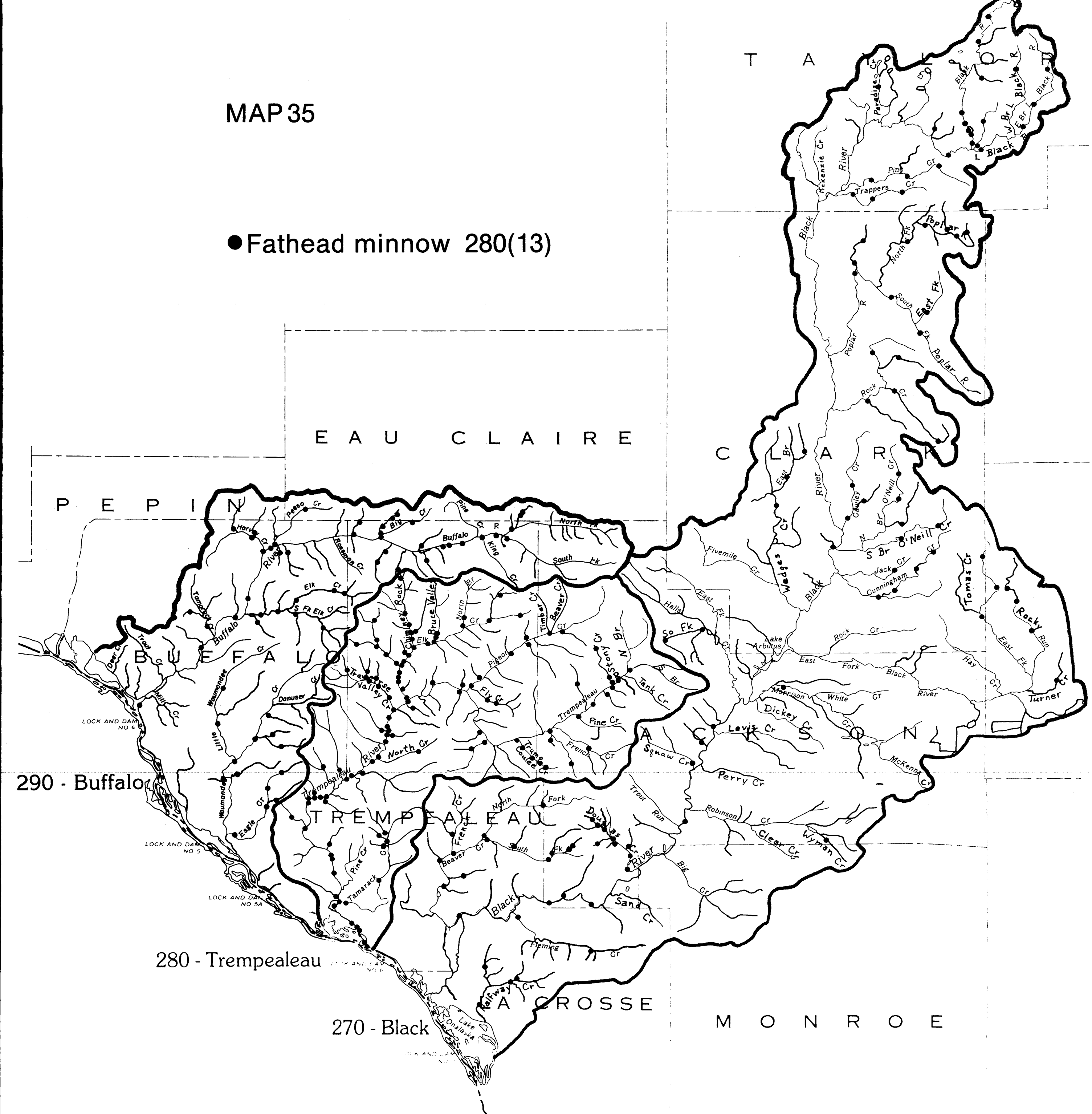



MAP 33
● Finescale dace 9(0)
290 - Buffalo
280 - Trempealeau
270 - Black
PEPIN
EAU CLAIRE
TAYLOR
CLARK
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE


MAP 34
● Bluntnose minnow 230(23)
290 - Buffalo
280 - Trempealeau
270 - Black
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
CLARK
TAYLOR
LA CROSSE
MONROE

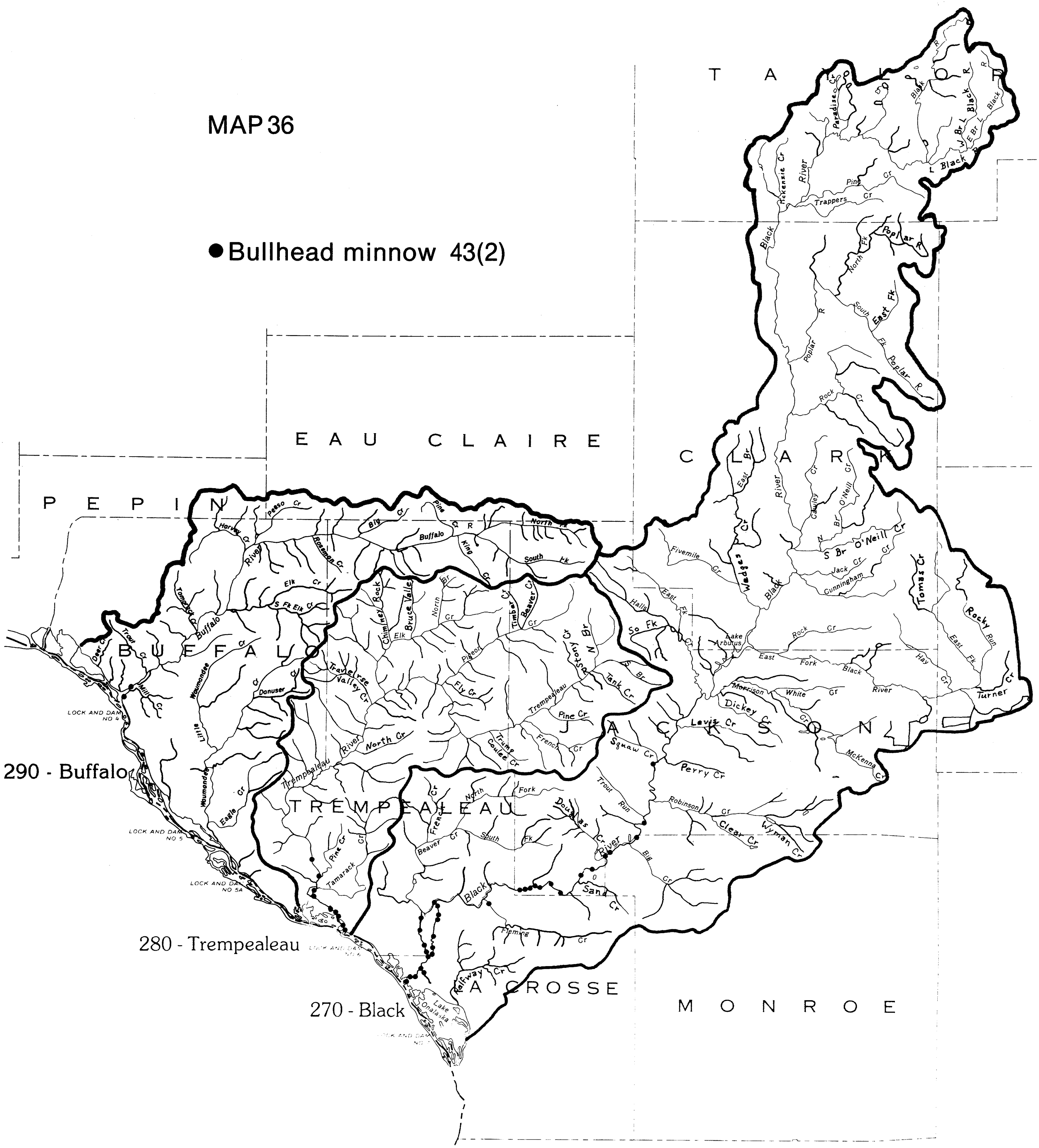
MAP 35

●Fathead minnow 280(13)



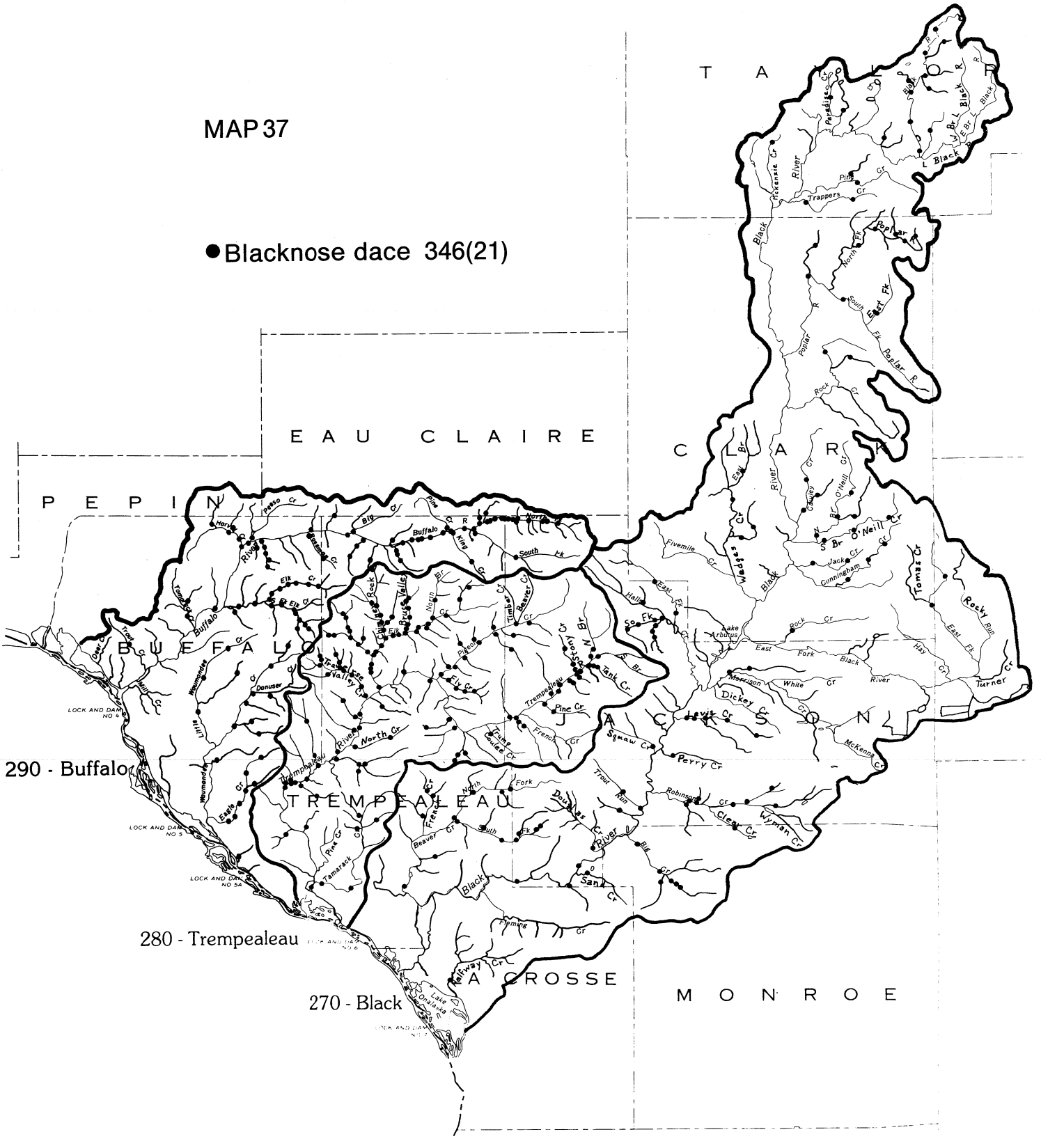
MAP 36

● Bullhead minnow 43(2)



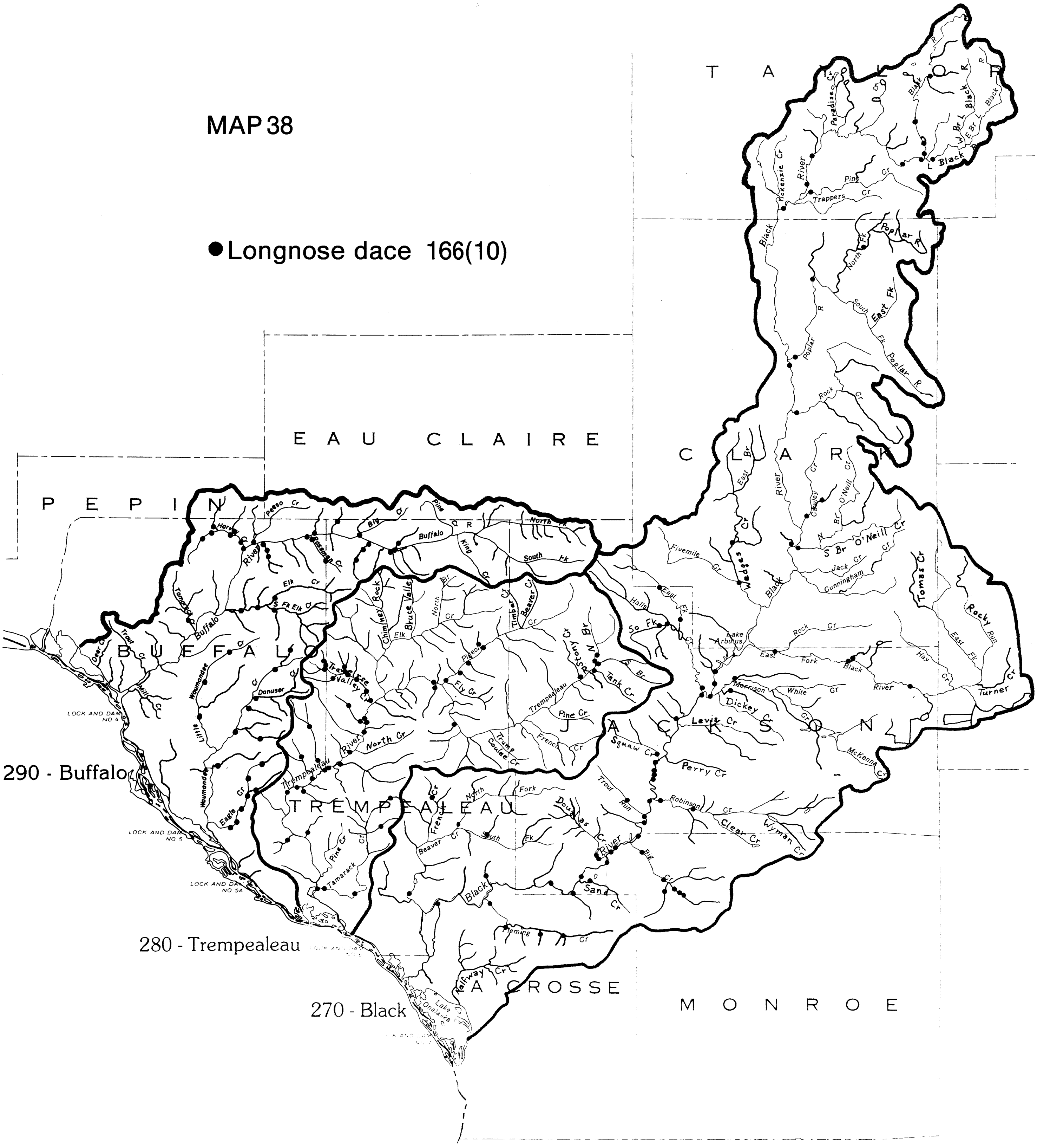
MAP 37

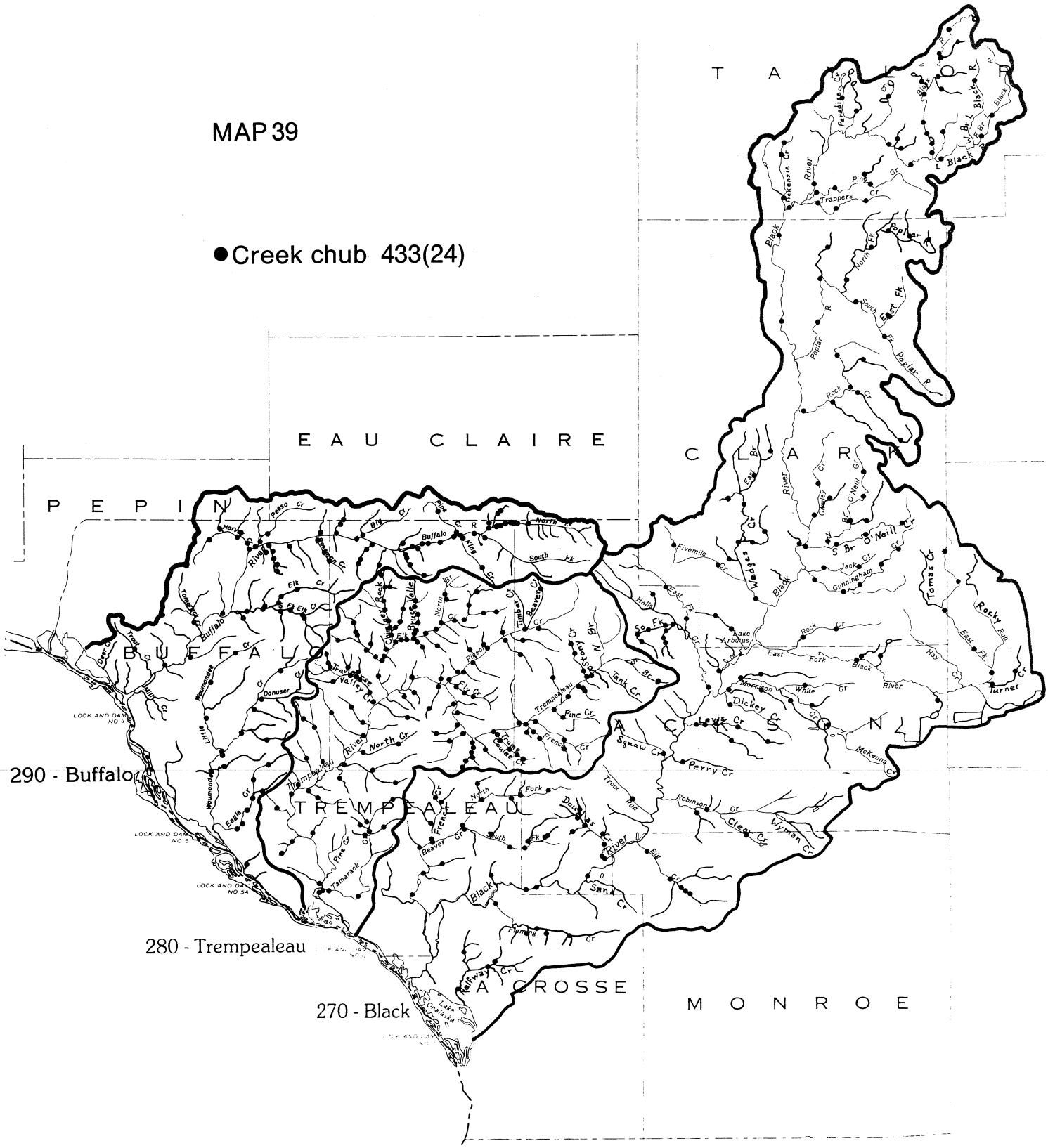
● Blacknose dace 346(21)

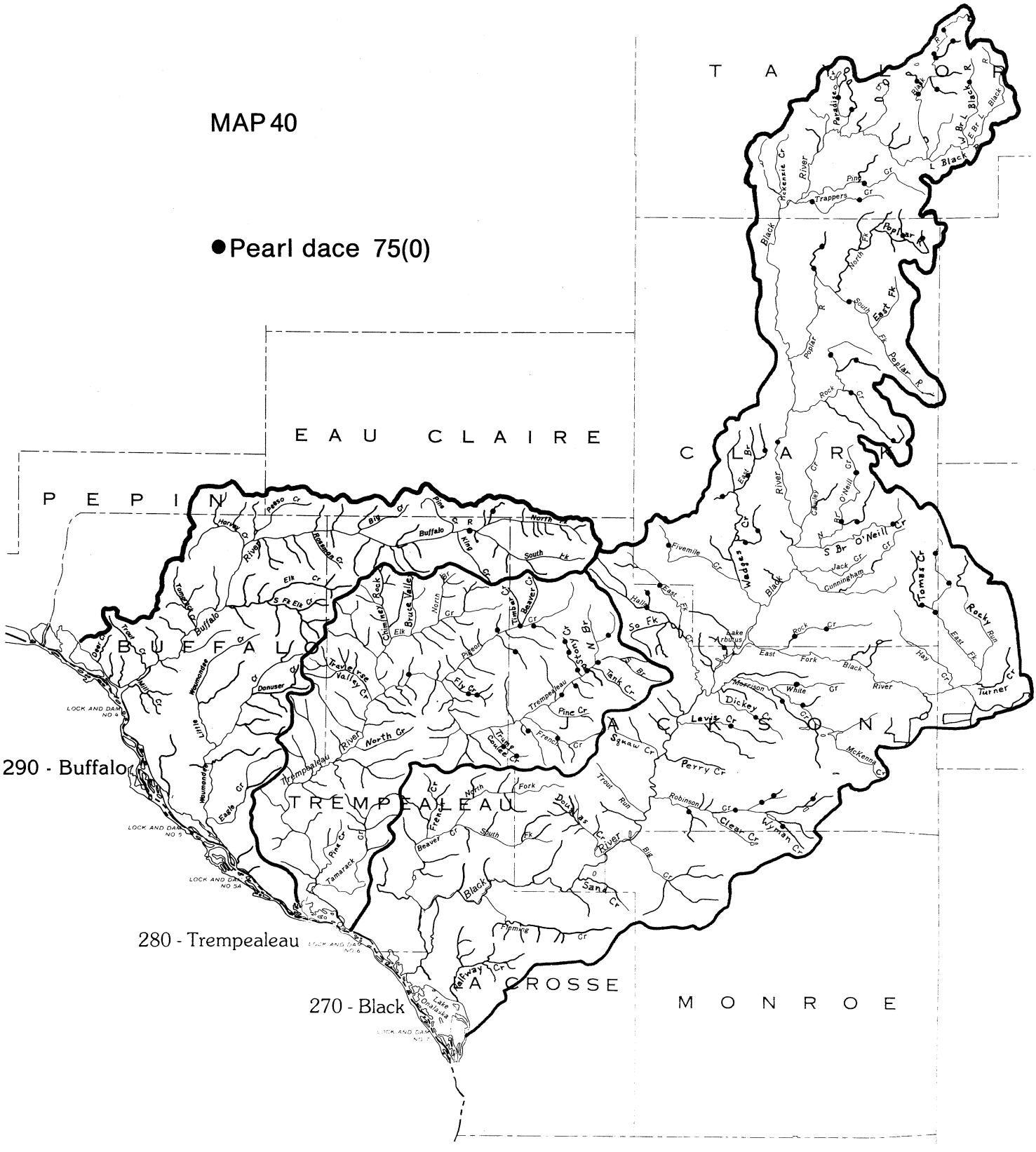


MAP 38

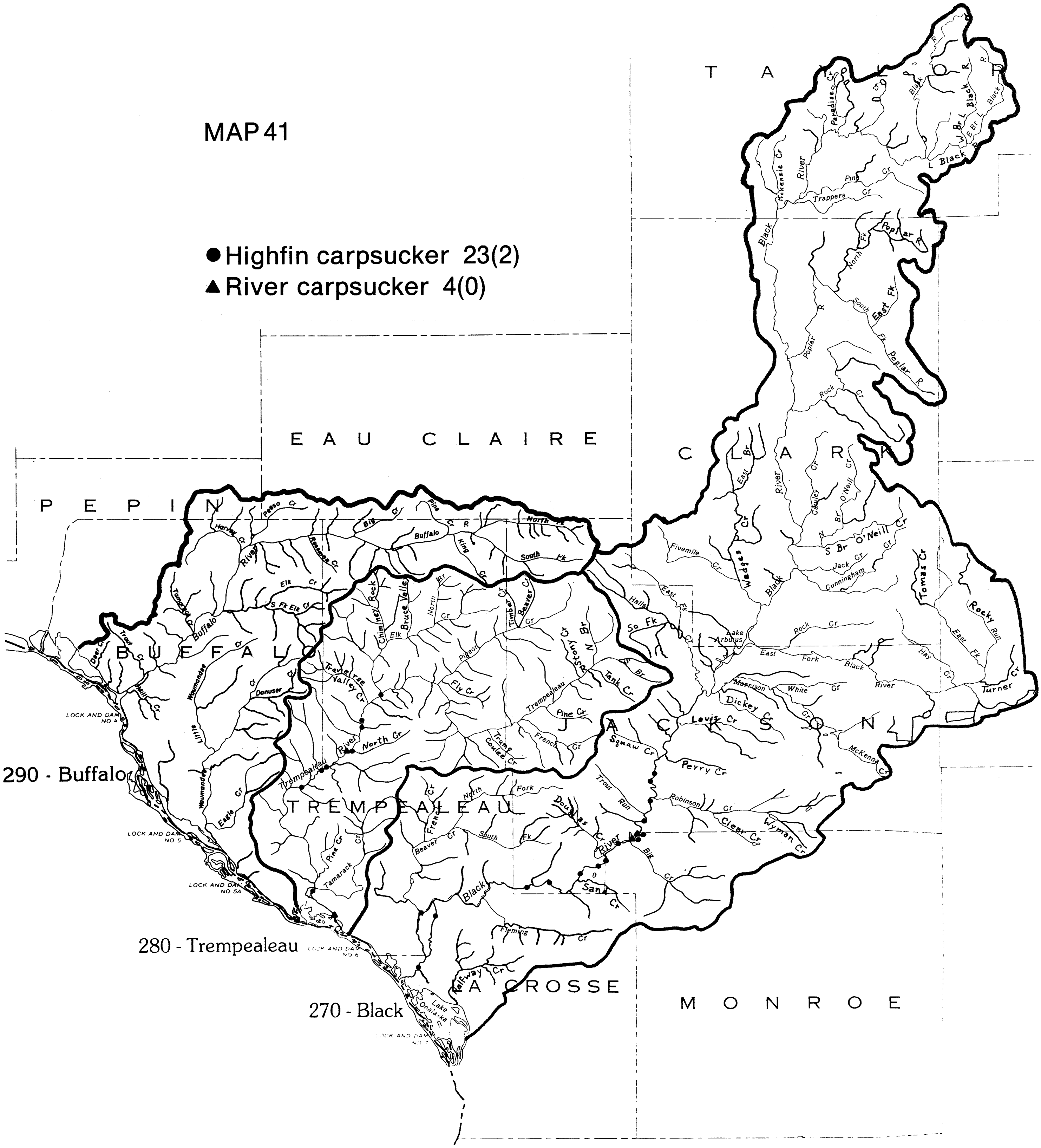
● Longnose dace 166(10)

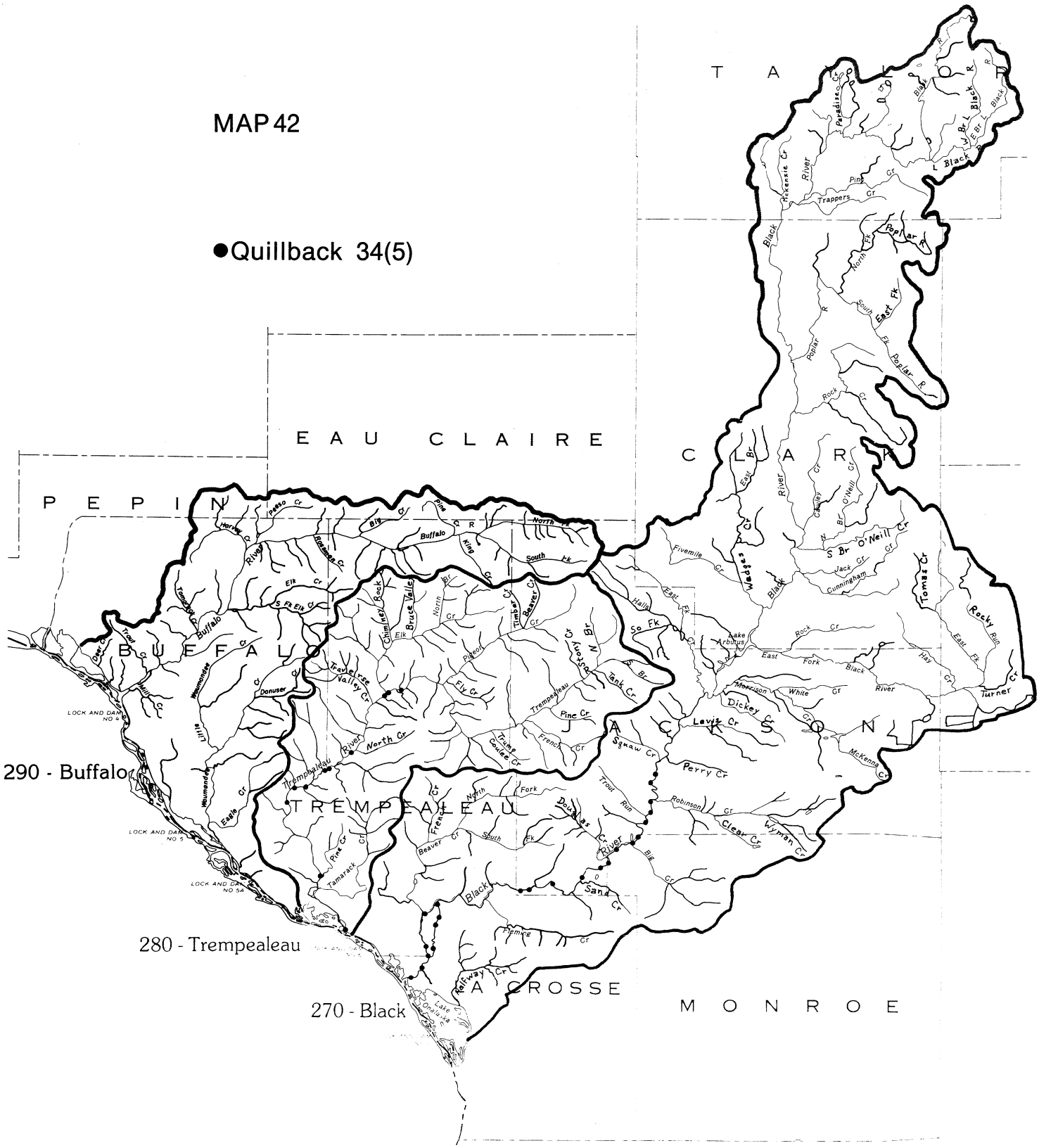



MAP 39
● Creek chub 433(24)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A


MAP 40
● Pearl dace 75(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E

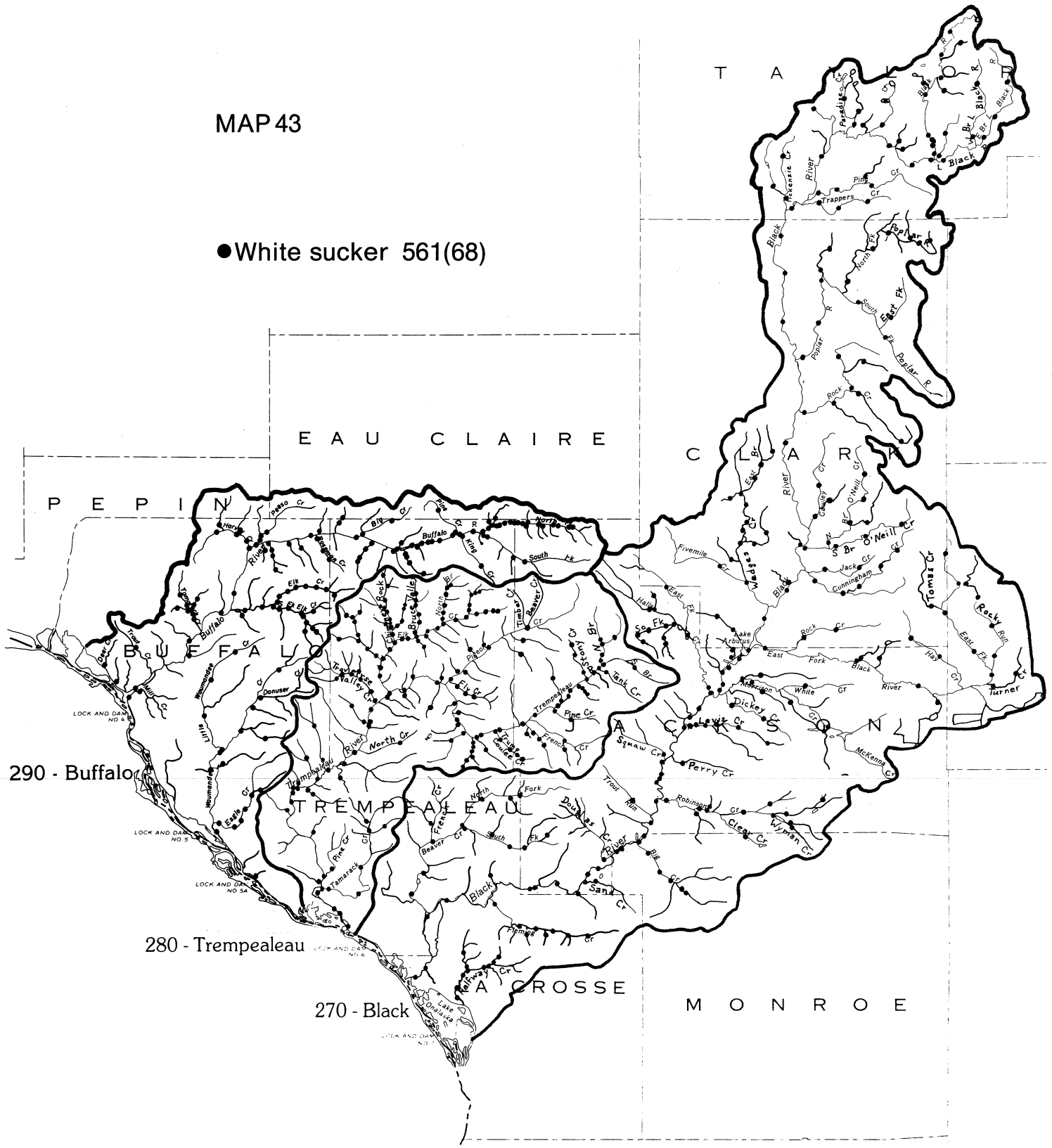
MAP 41


●Highfin carpsucker 23(2)
▲River carpsucker 4(0)
TAYLOR
EAU CLAIRE
CLARK
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
LOCK AND DAM NO 7
Lake Onalaska
Lake Arbutus

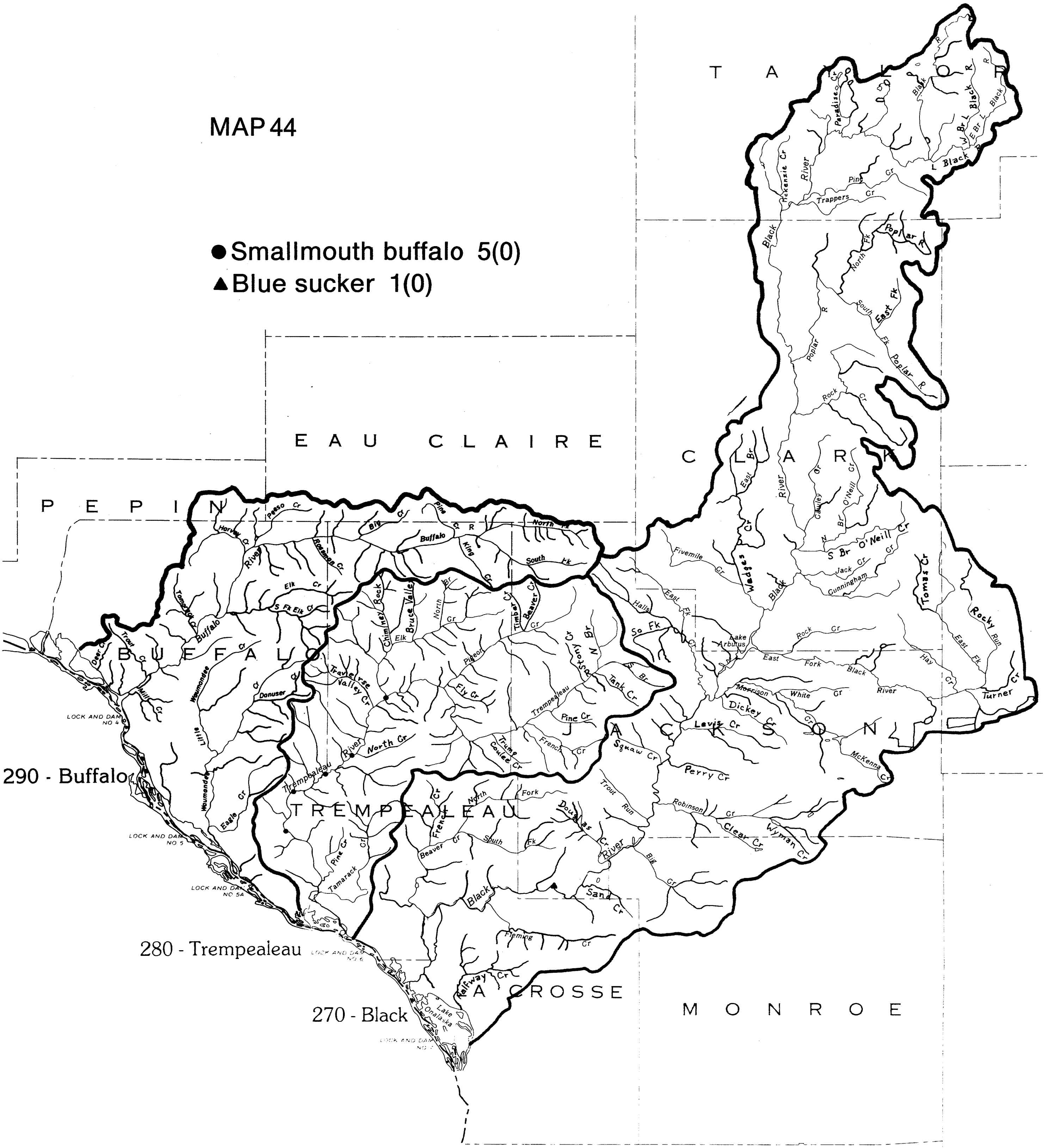

MAP 42
●Quillback 34(5)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A

MAP 43

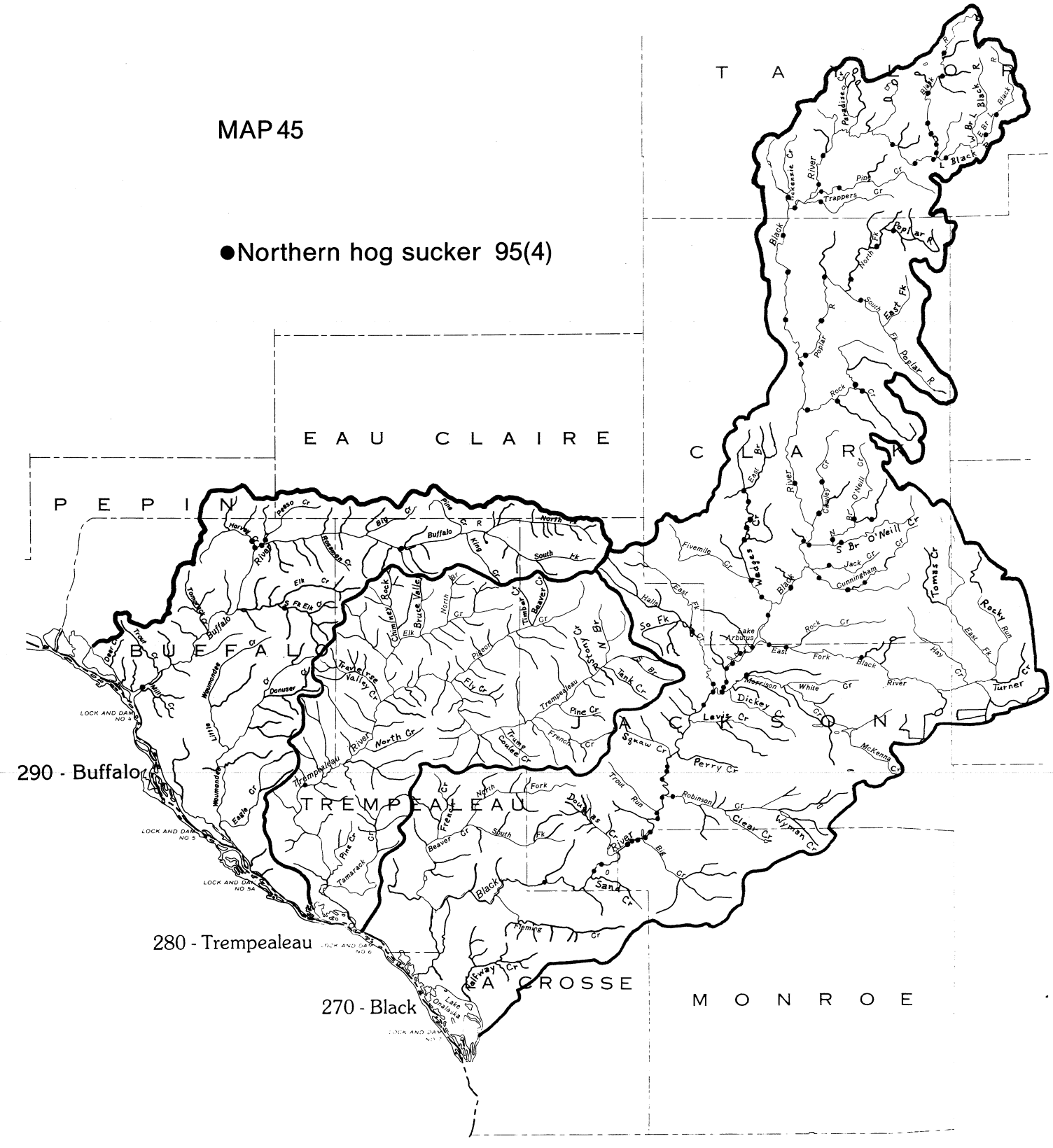
● White sucker 561(68)



MAP 44

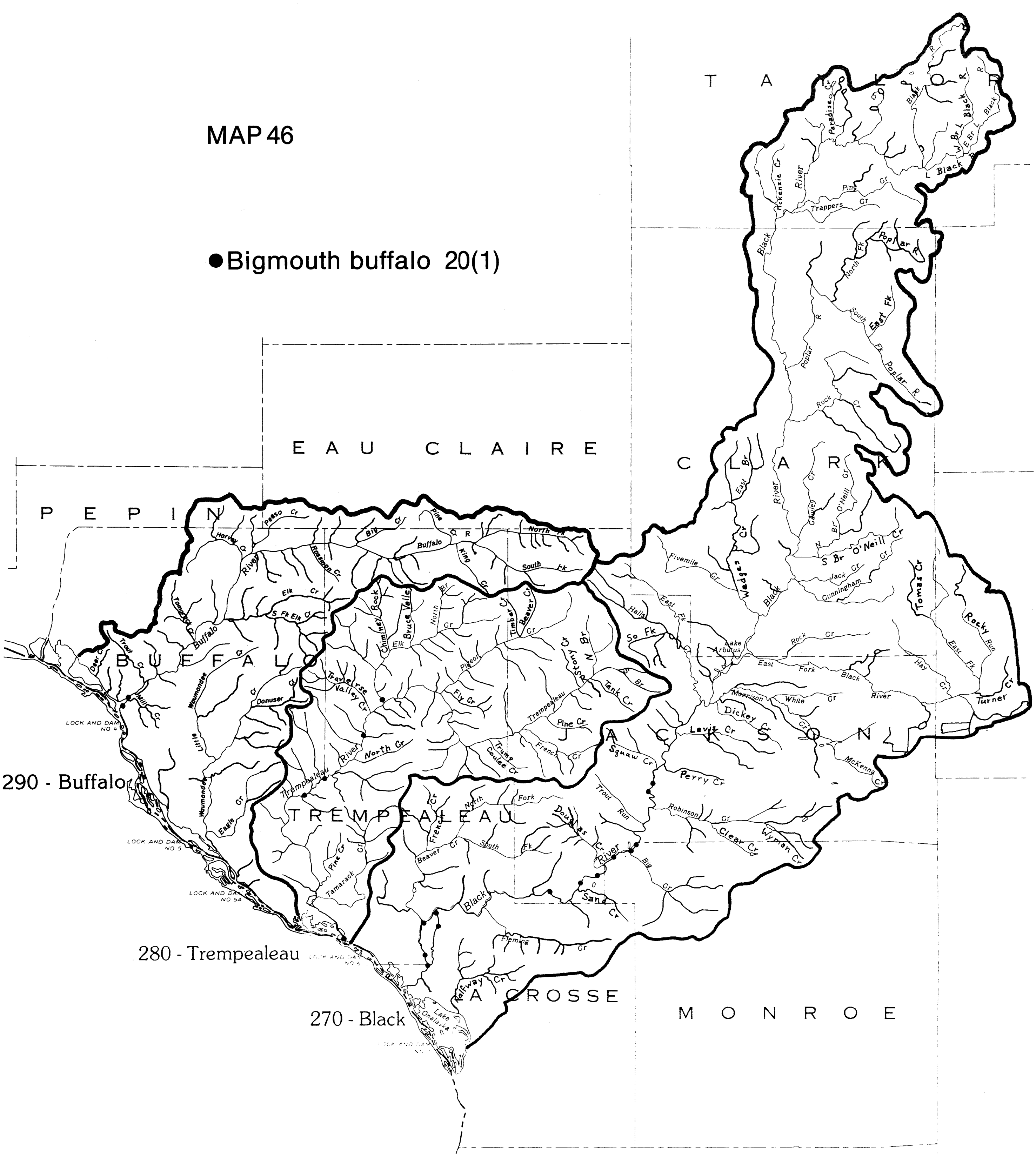


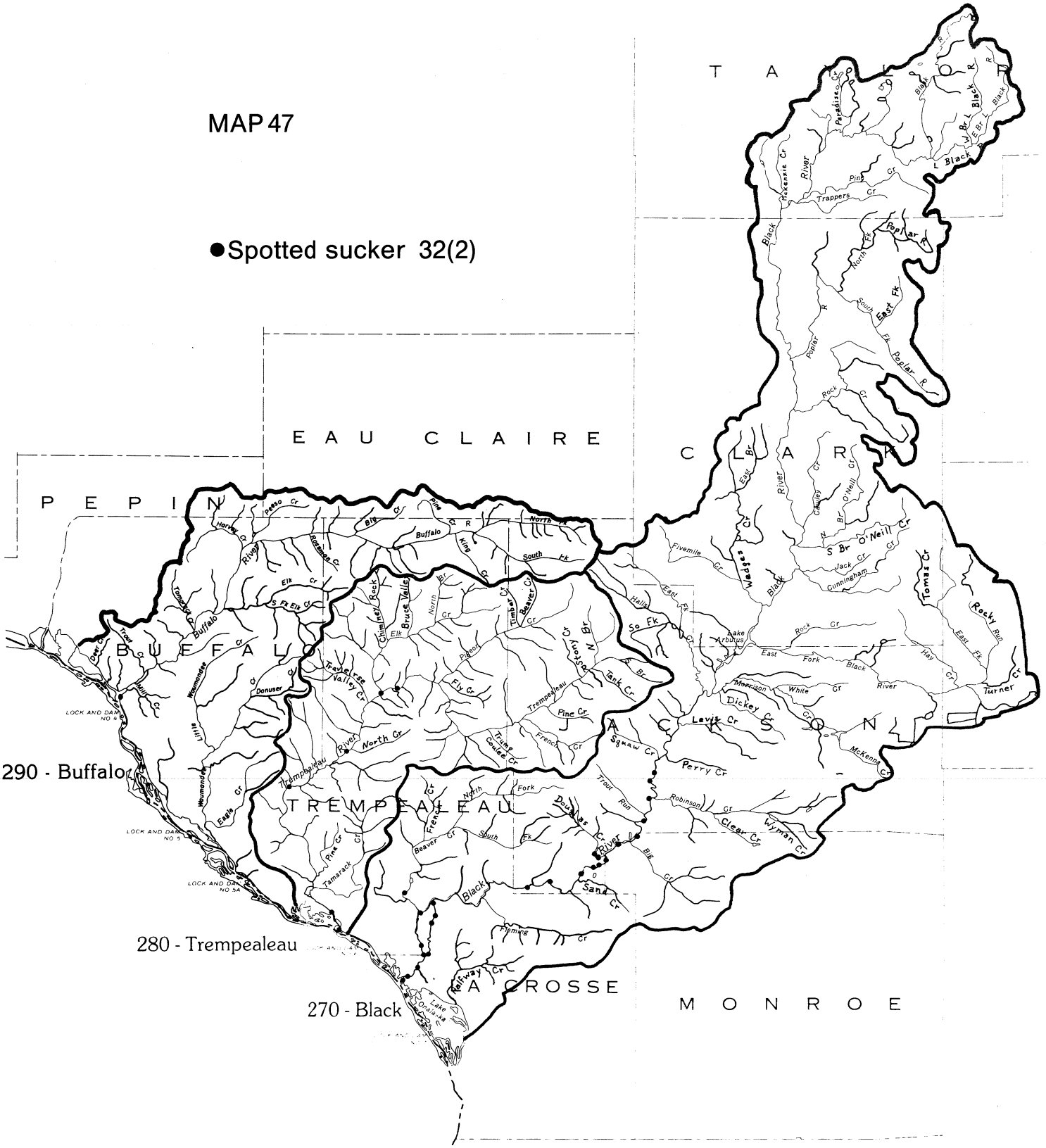
●Smallmouth buffalo 5(0)
▲Blue sucker 1(0)
TAYLOR
CLARK
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
Lake Onalaska
Lake Arbutus

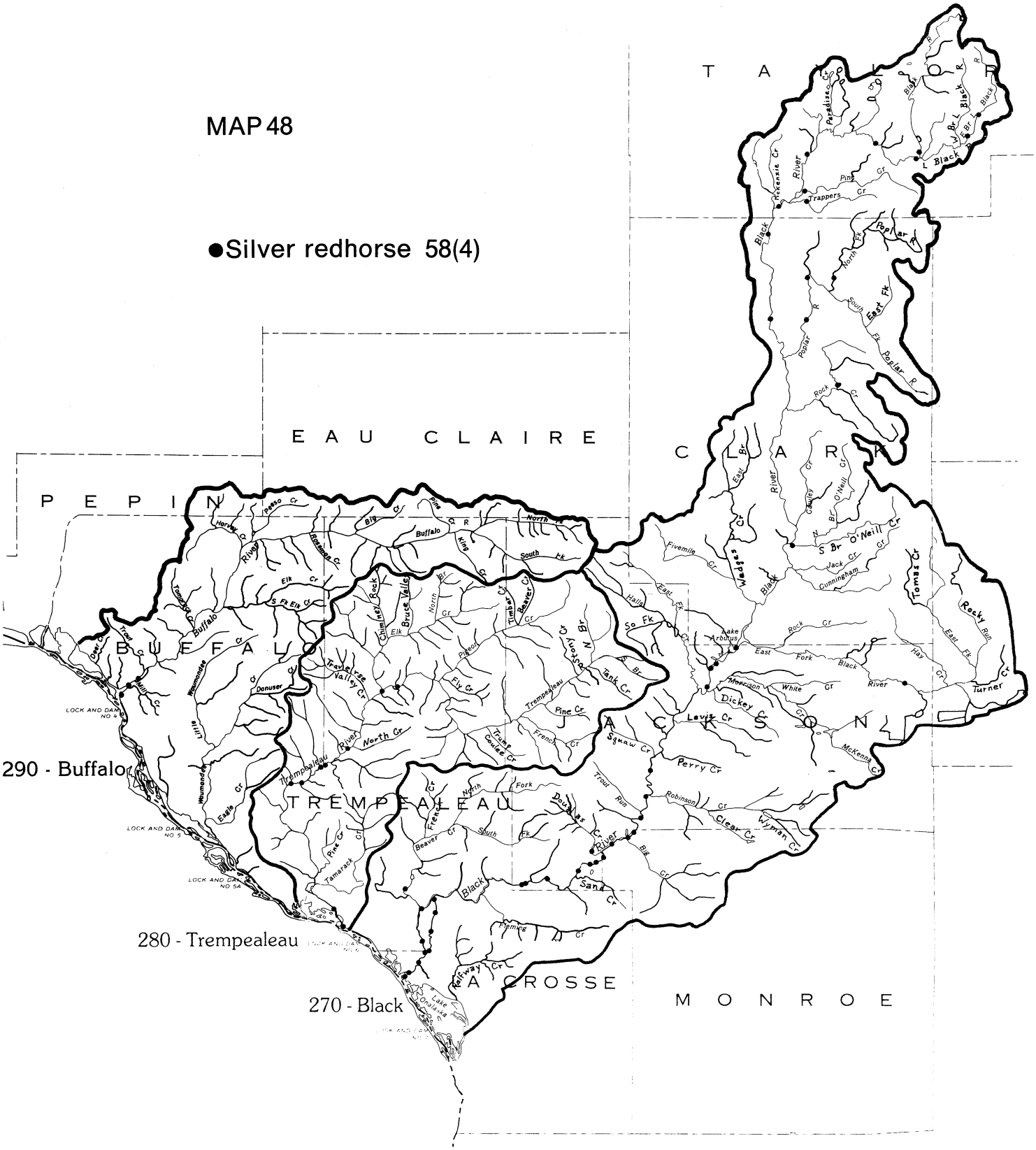

MAP 45
●Northern hog sucker 95(4)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

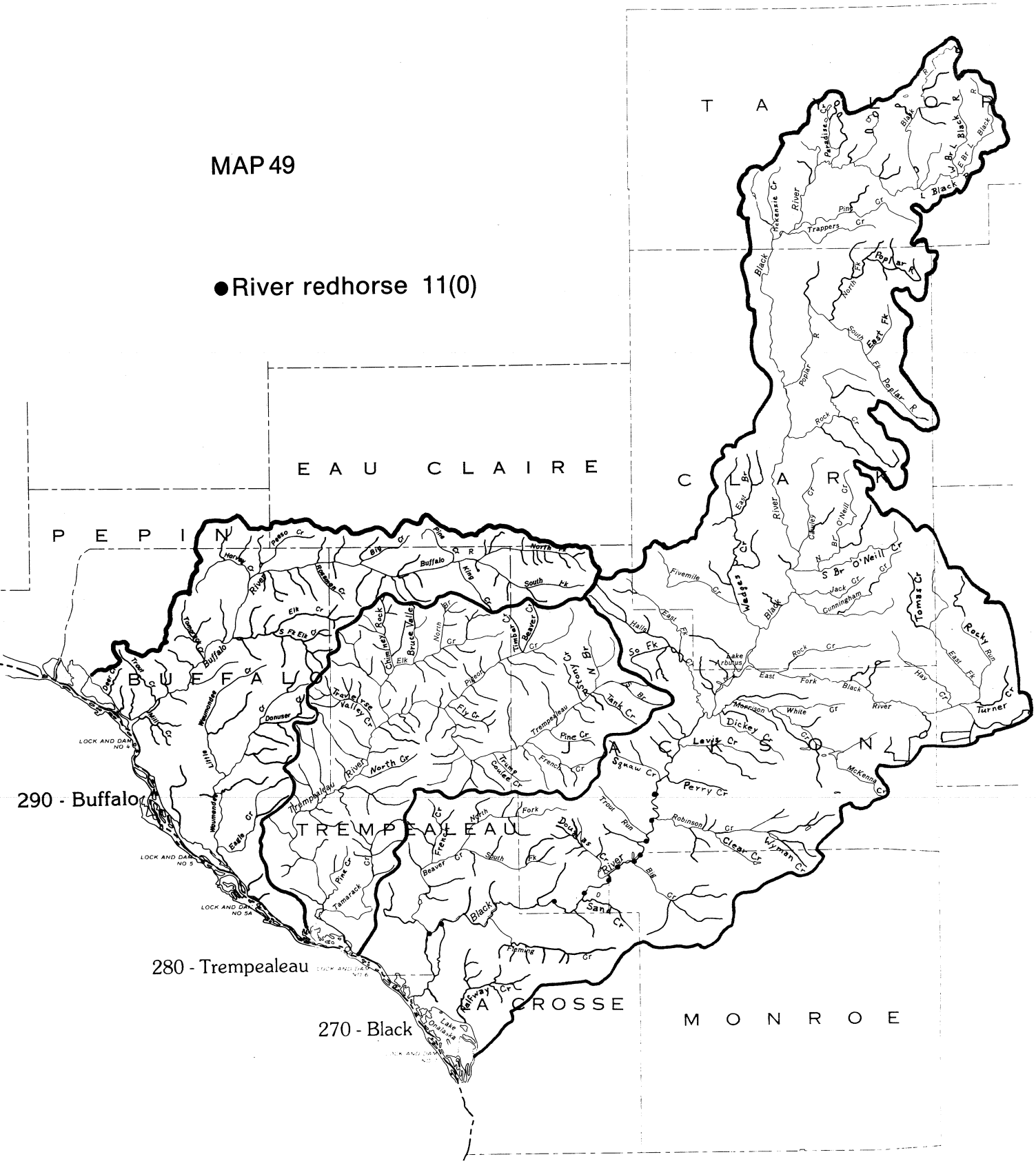
MAP 46

●Bigmouth buffalo 20(1)



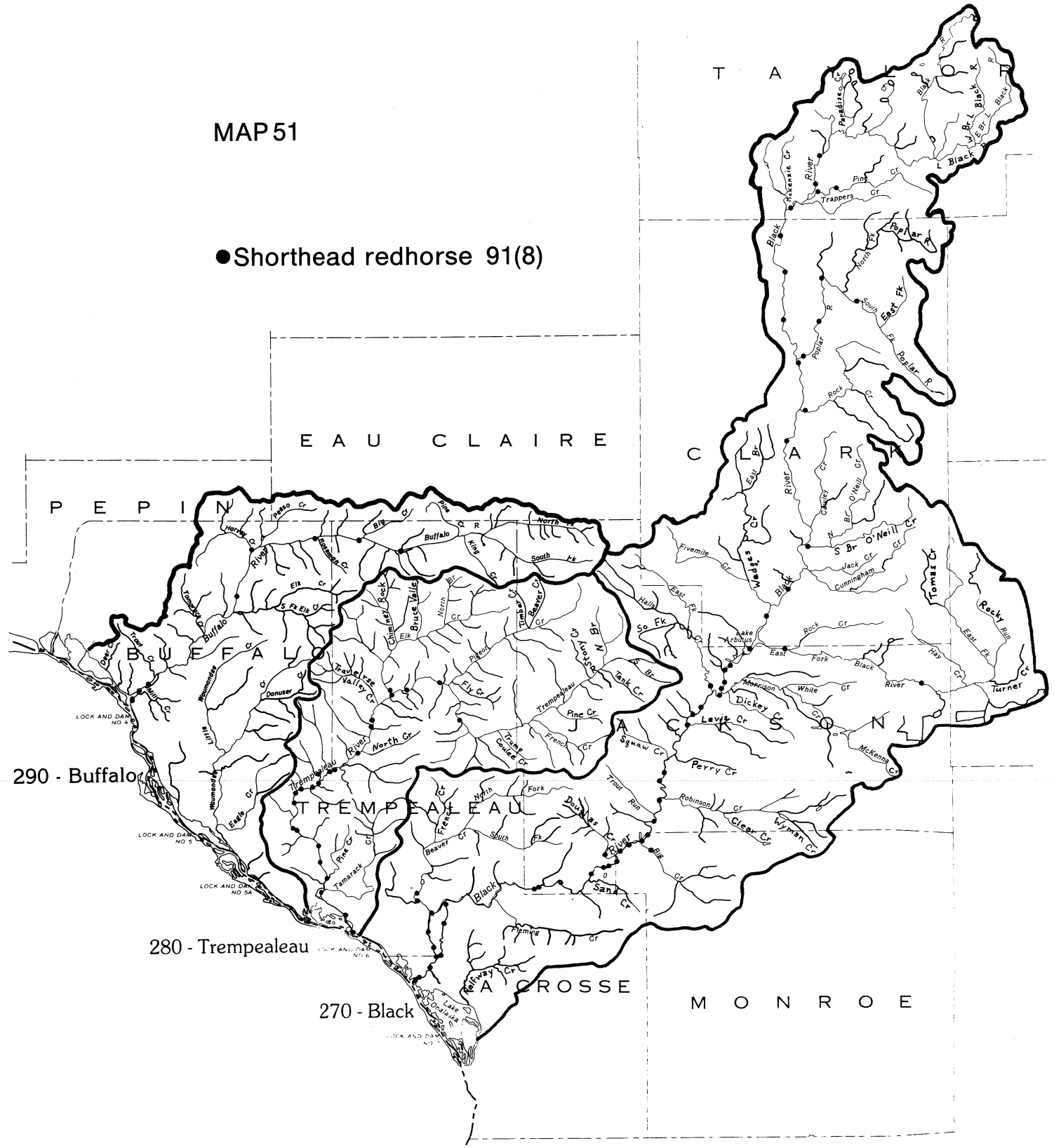

MAP 47
●Spotted sucker 32(2)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A

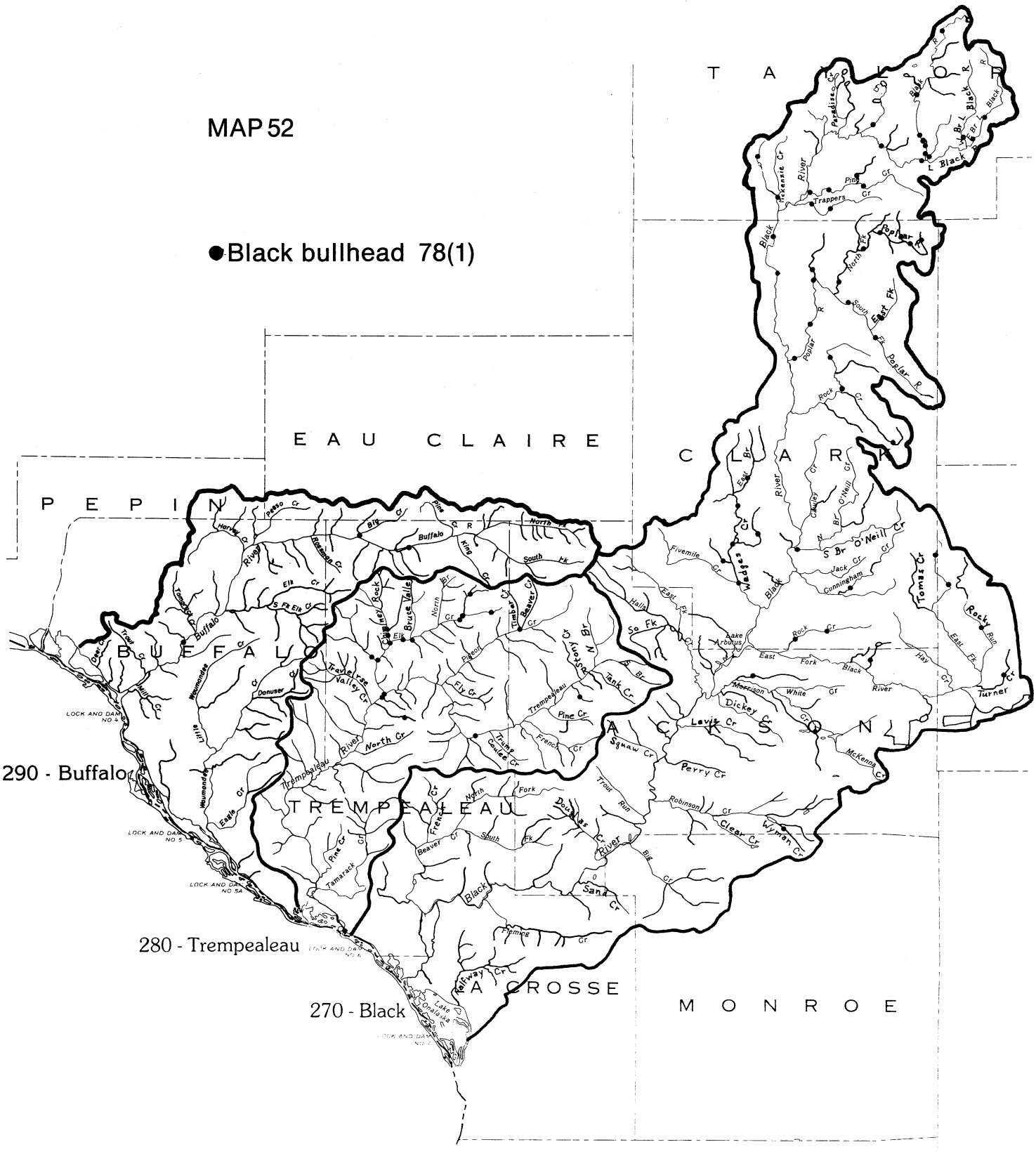

MAP 48
●Silver redhorse 58(4)
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
TREMPEALEAU
J A C K S O N
M O N R O E
A C R O S S E
290 - Buffalo
280 - Trempealeau
270 - Black

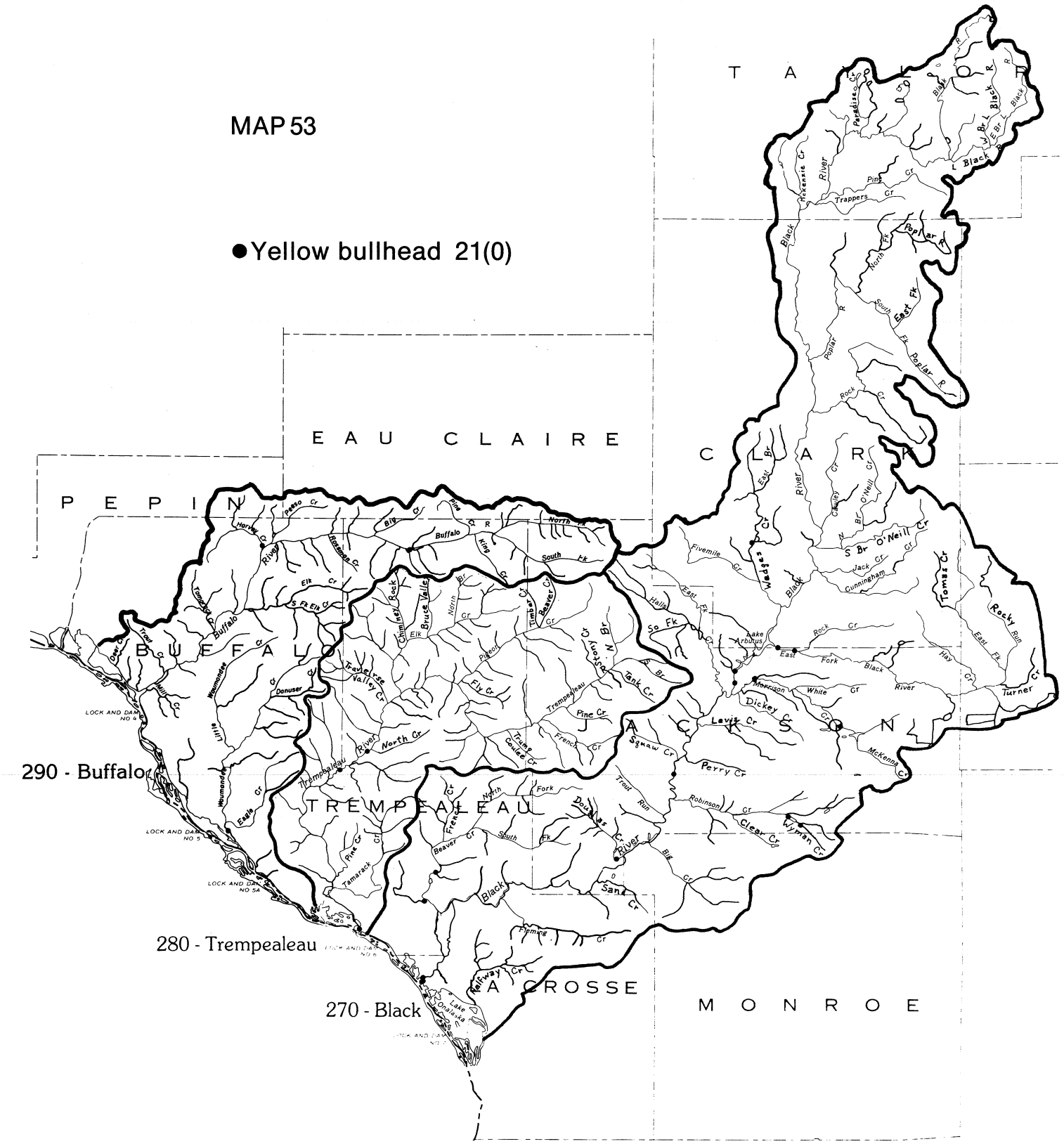

MAP 49
●River redhorse 11(0)
T A
E A U C L A I R E
C L A R
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

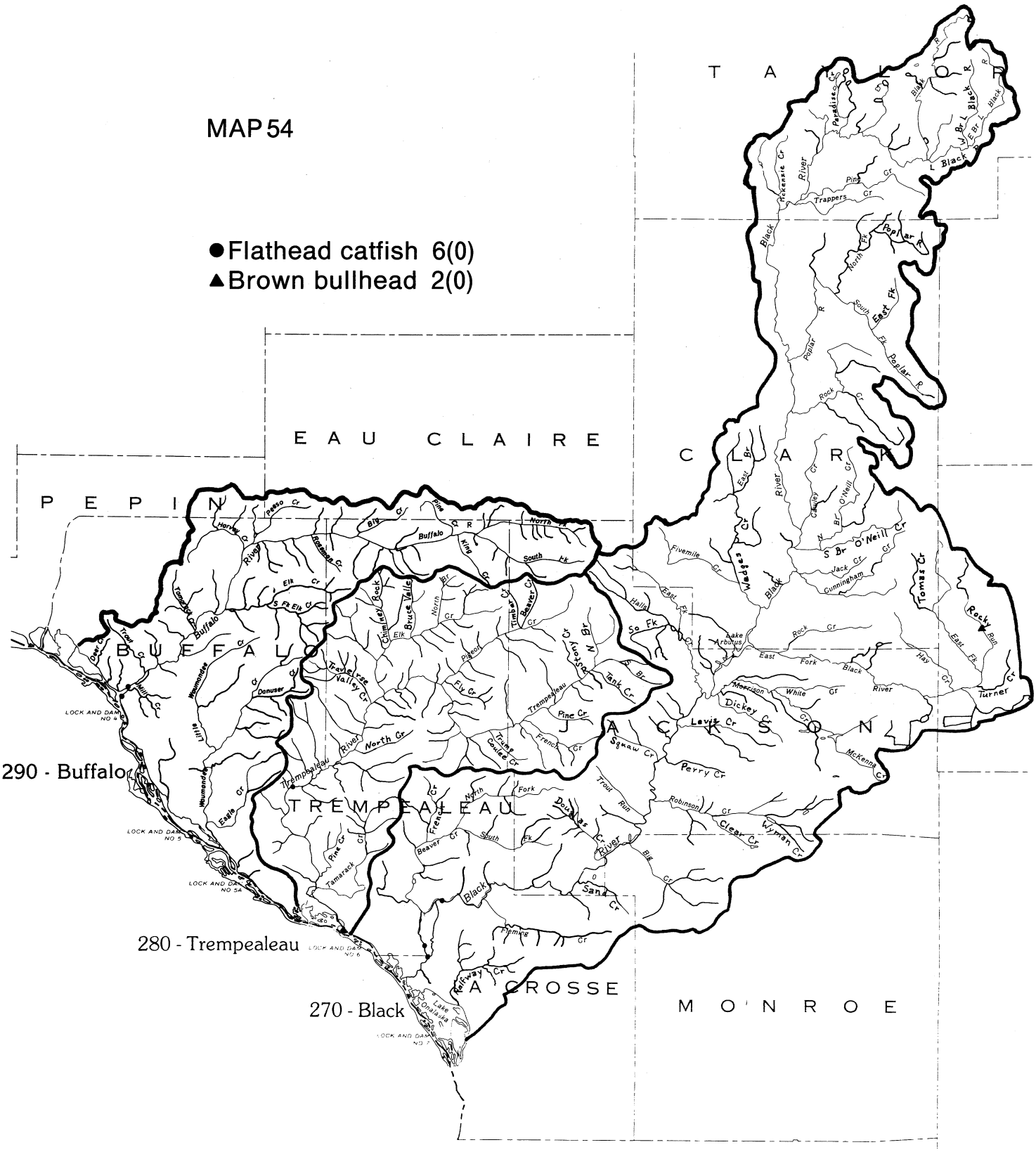
MAP 50

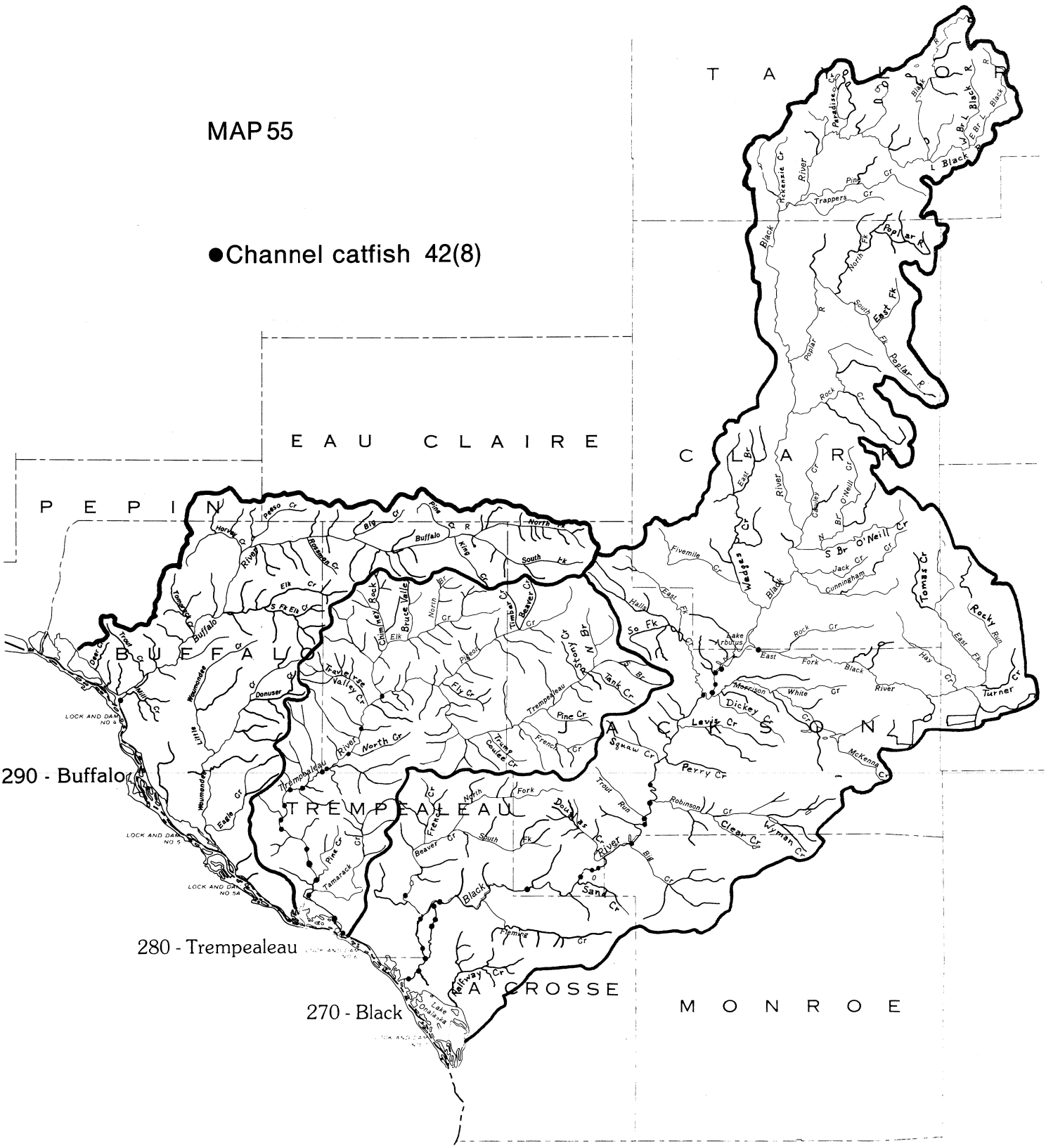
●Golden redhorse 64(3)
TAYLOR
CLARK
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Buffalo River
Trempealeau River
Black River
Poplar R
Rock Cr
Perry Cr
Robinson Cr
Clear Cr
Wyman Cr
Dickey Cr
Levis Cr
Squaw Cr
Trout Run
Douglas Cr
Sand Cr
Fleming Cr
Halls Cr
Morrison Cr
Tank Cr
Pine Cr

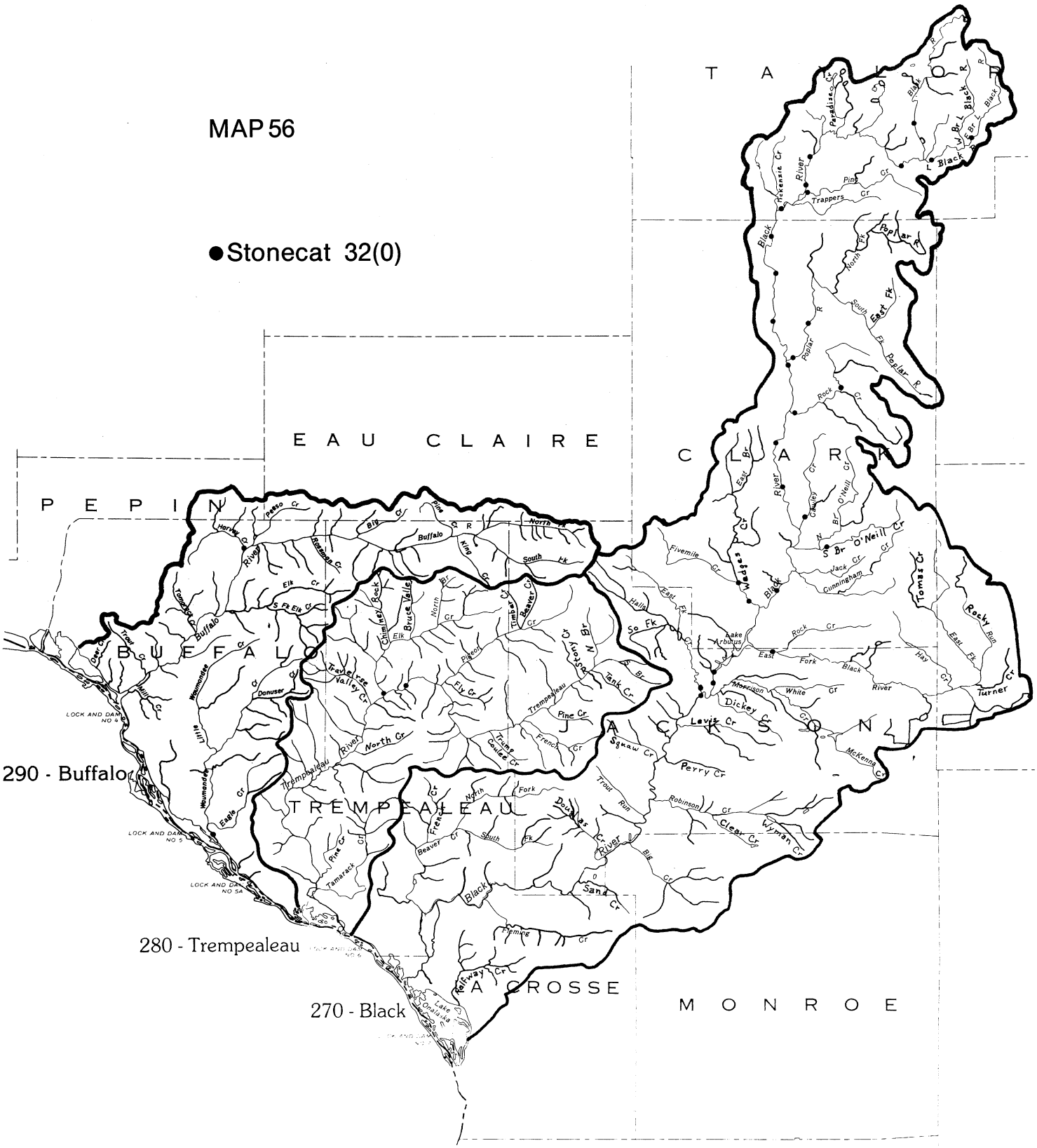

MAP 51
●Shorthead redhorse 91(8)
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
TREMPEALEAU
J A C K S O N
M O N R O E
LA CROSSE
290 - Buffalo
280 - Trempealeau
270 - Black


MAP 52
●Black bullhead 78(1)
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black


MAP 53
●Yellow bullhead 21(0)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
J A C K S O N
T R E M P E A L E A U
L A C R O S S E
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

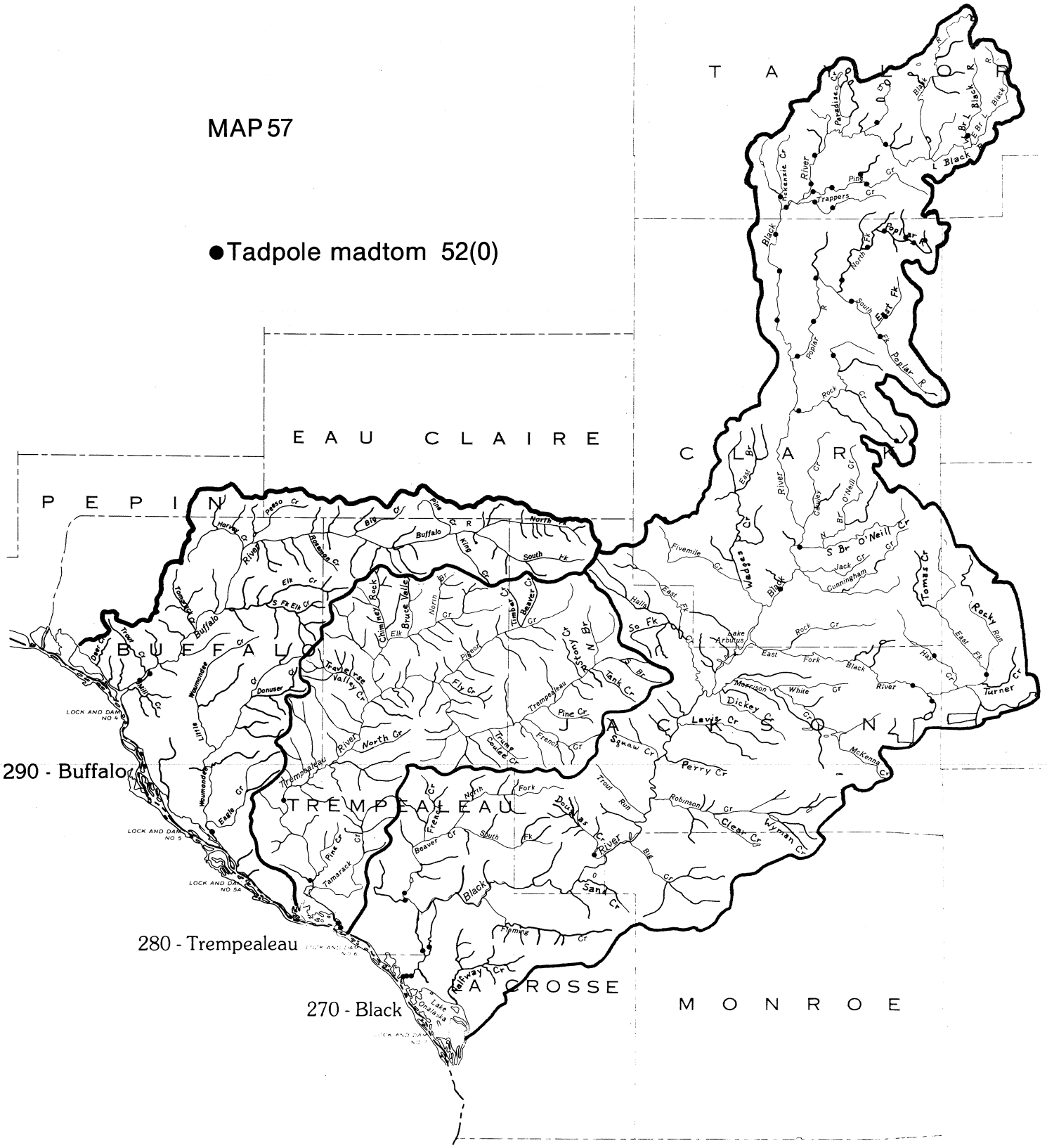

MAP 54
●Flathead catfish 6(0)
▲Brown bullhead 2(0)
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
J A C K S O N
TREMPEALEAU
LA CROSSE
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

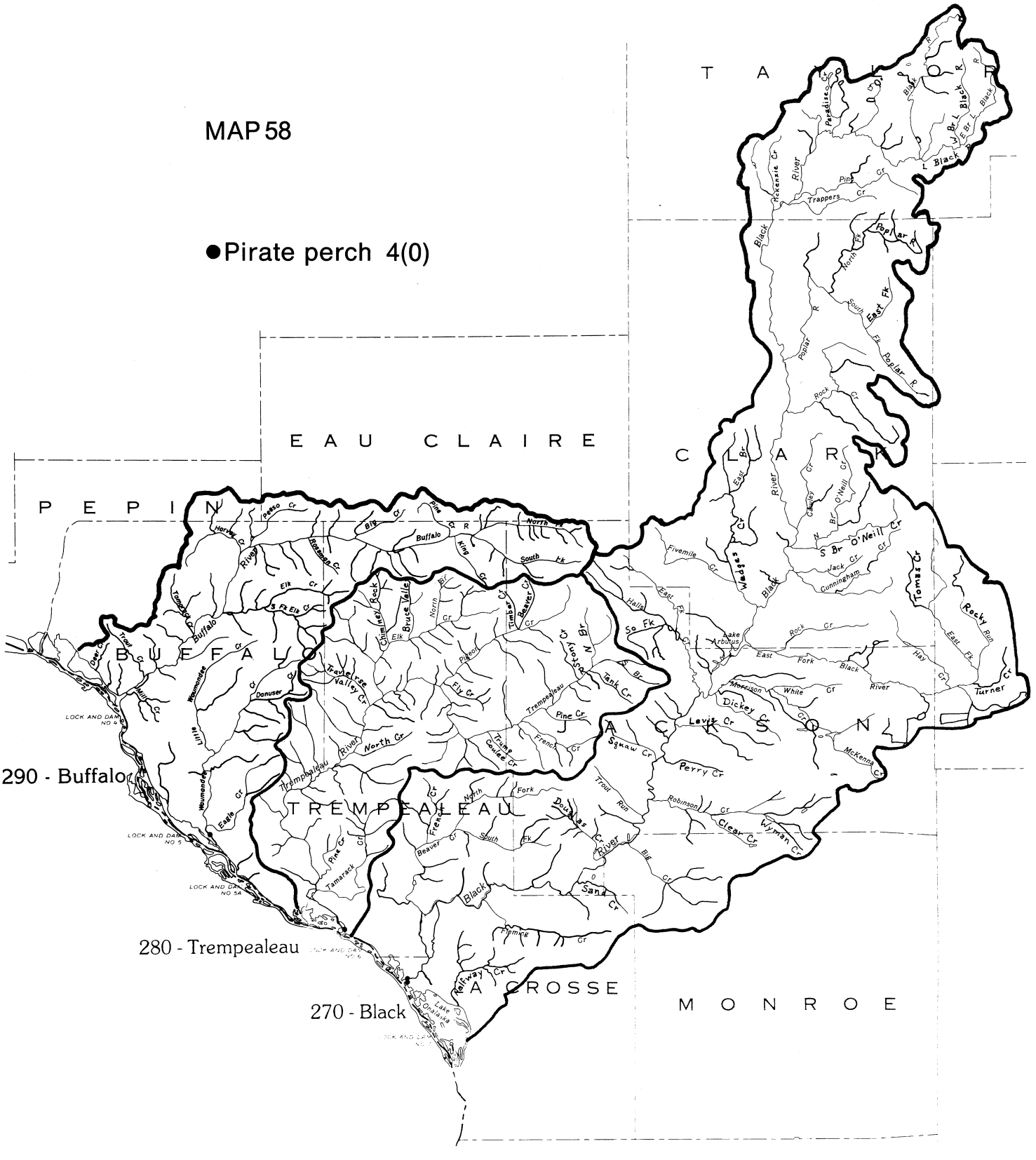

MAP 55
●Channel catfish 42(8)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A


MAP 56
● Stonecat 32(0)
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A D A M S
M O N R O E
L A C R O S S E
290 - Buffalo
280 - Trempealeau
270 - Black

MAP 57

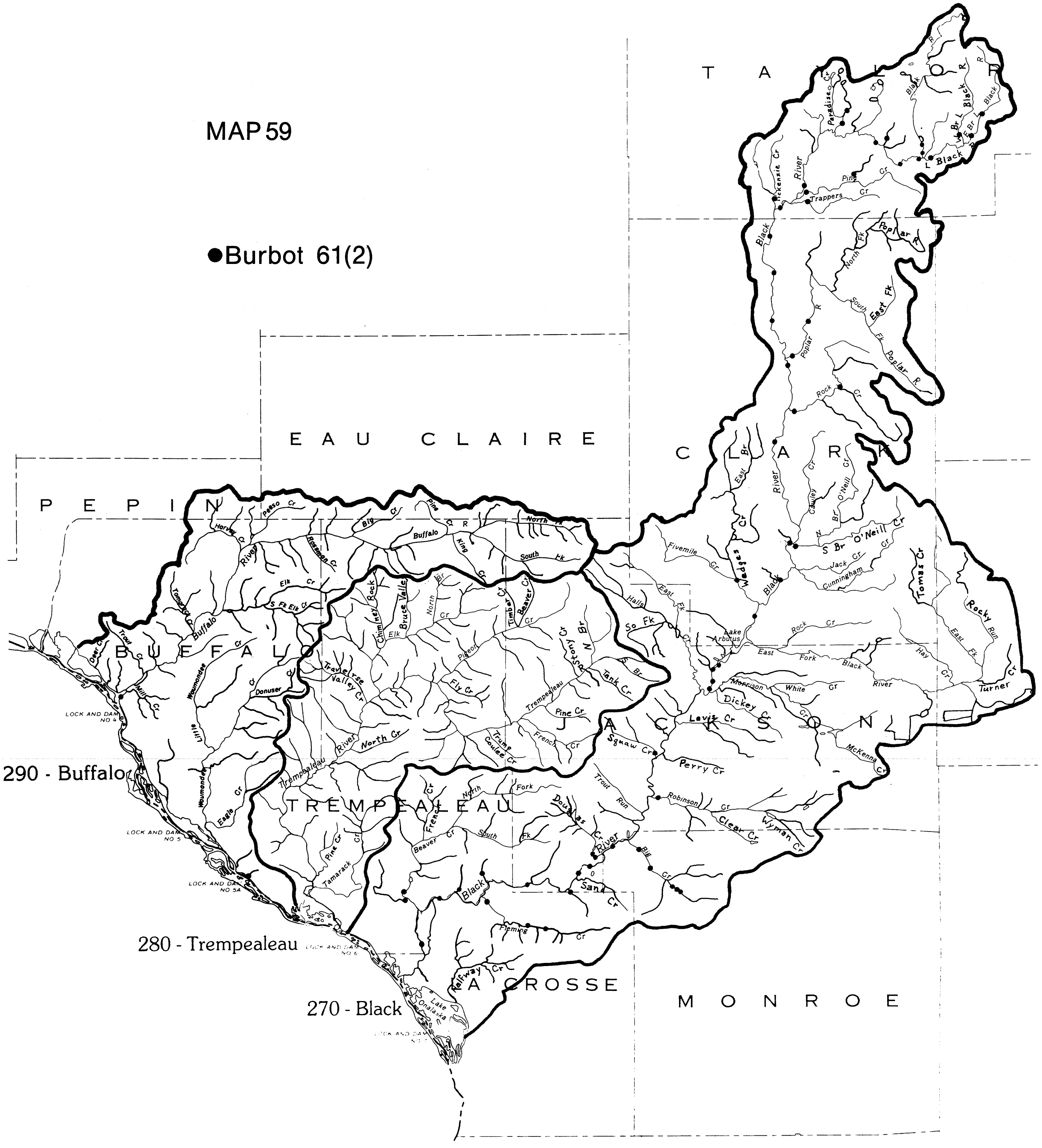
● Tadpole madtom 52(0)

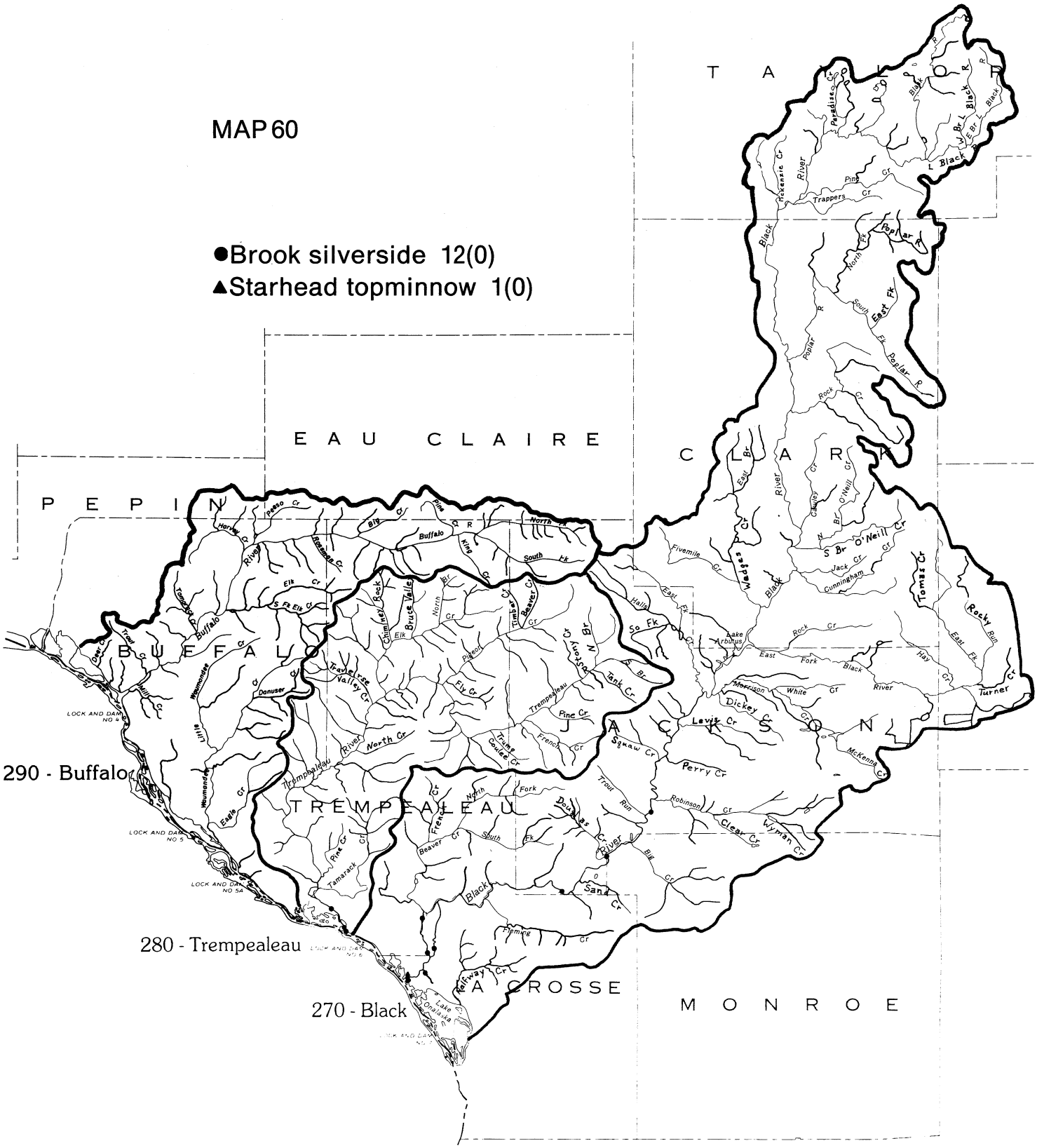


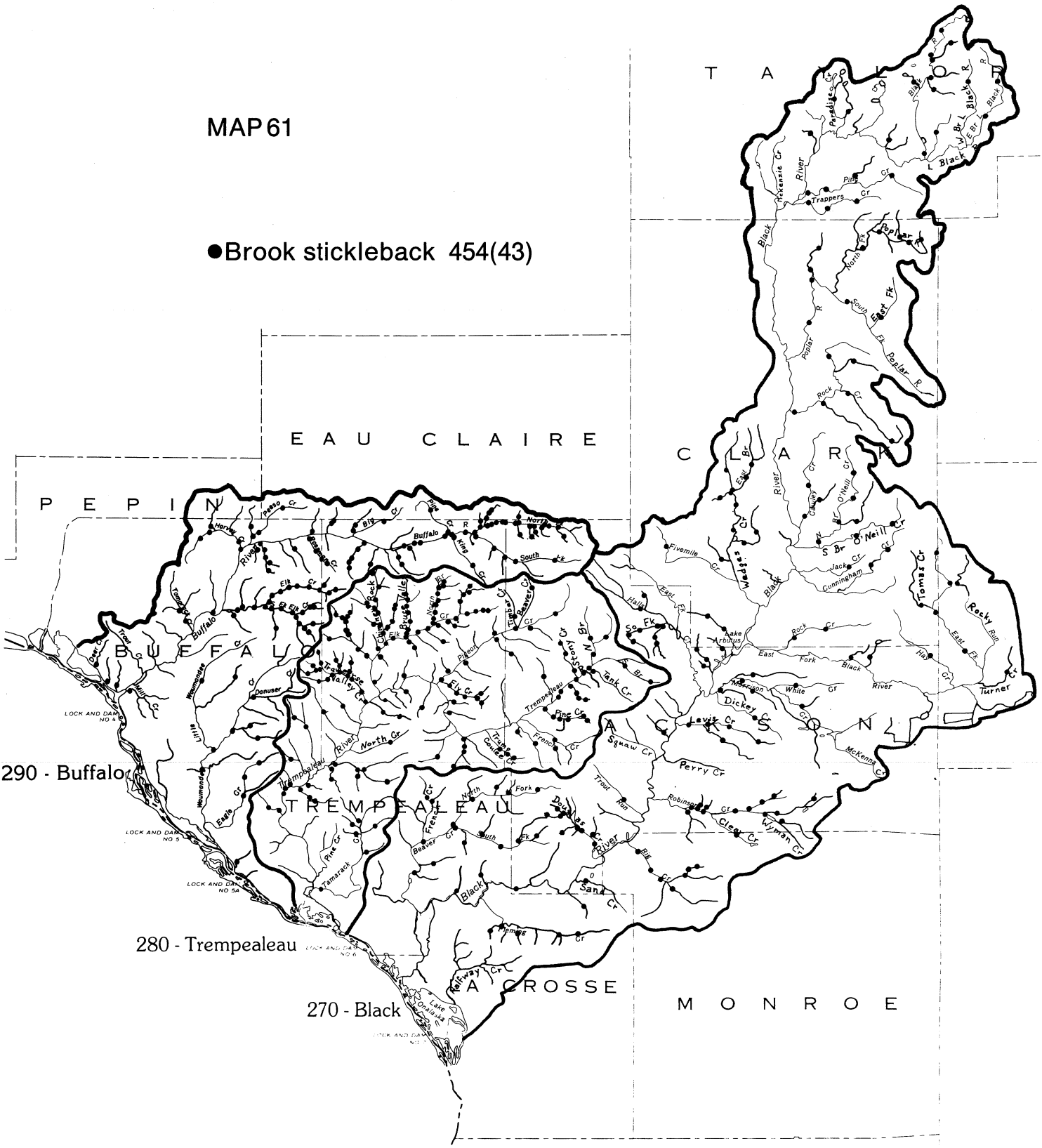

MAP 58
●Pirate perch 4(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E

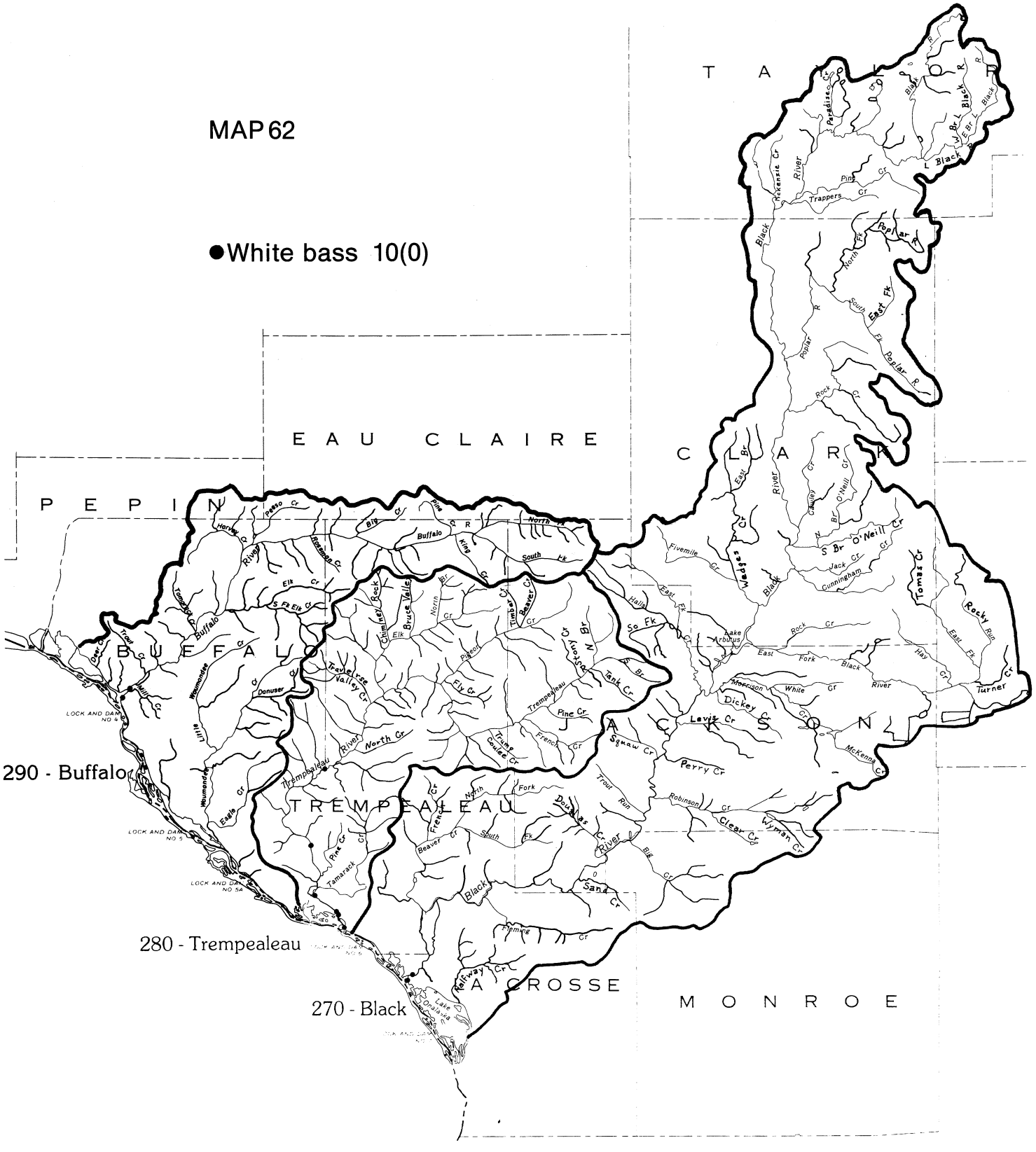
MAP 59

●Burbot 61(2)



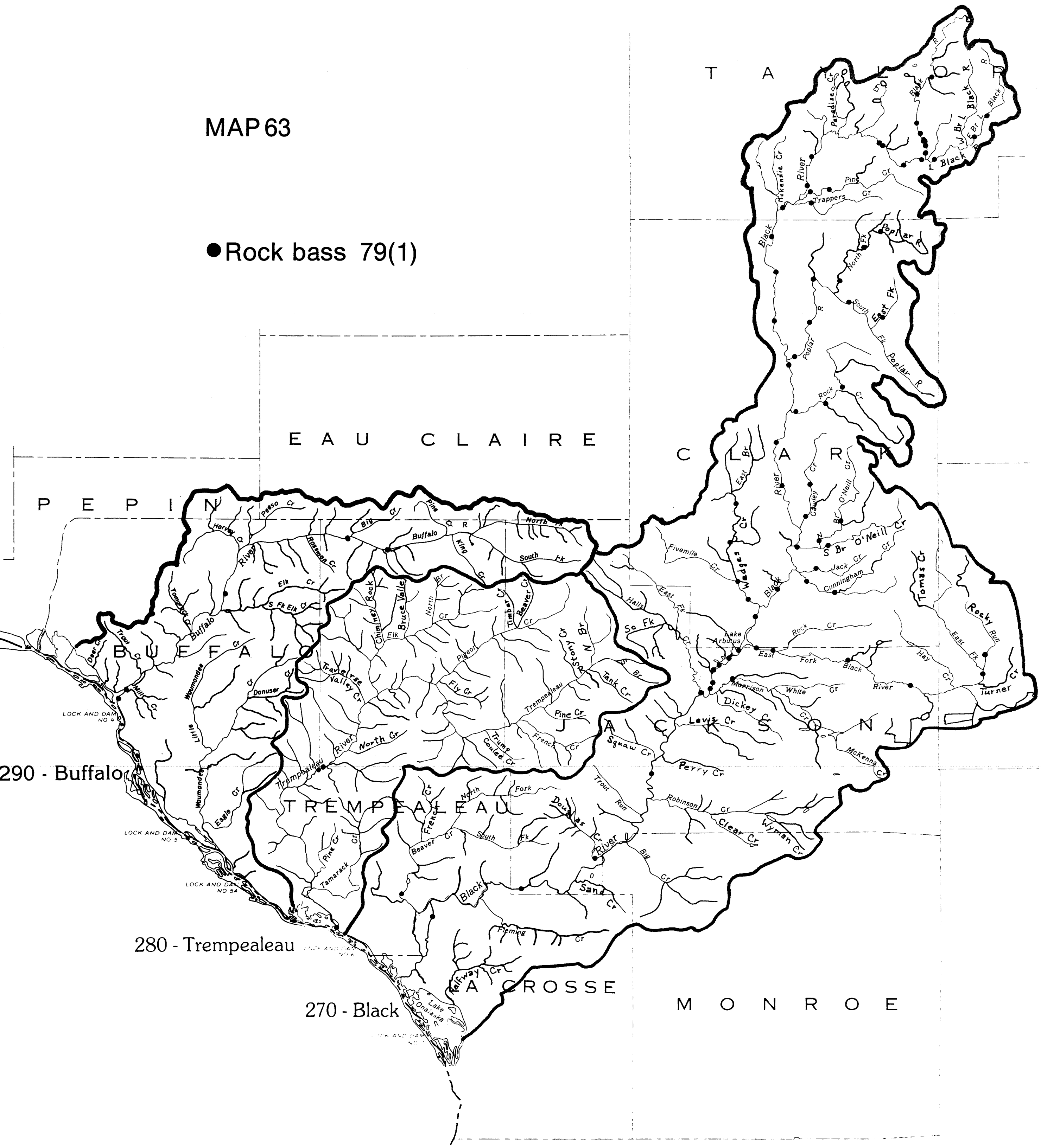

MAP 60
●Brook silverside 12(0)
▲Starhead topminnow 1(0)
T A Y L O R
CLARK
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
290 - Buffalo
280 - Trempealeau
270 - Black

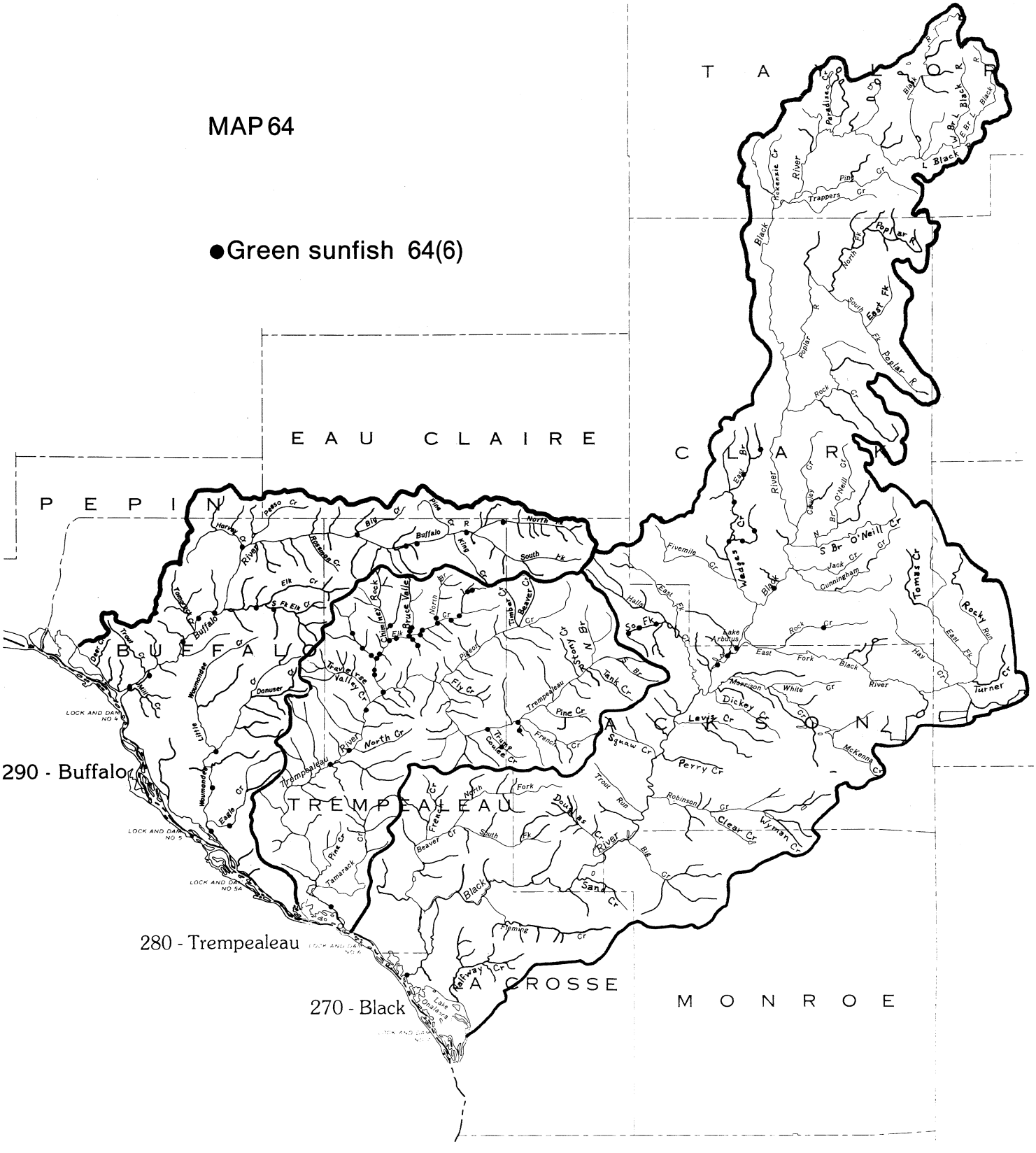

MAP 61
●Brook stickleback 454(43)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black


MAP 62
●White bass 10(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E

MAP 63

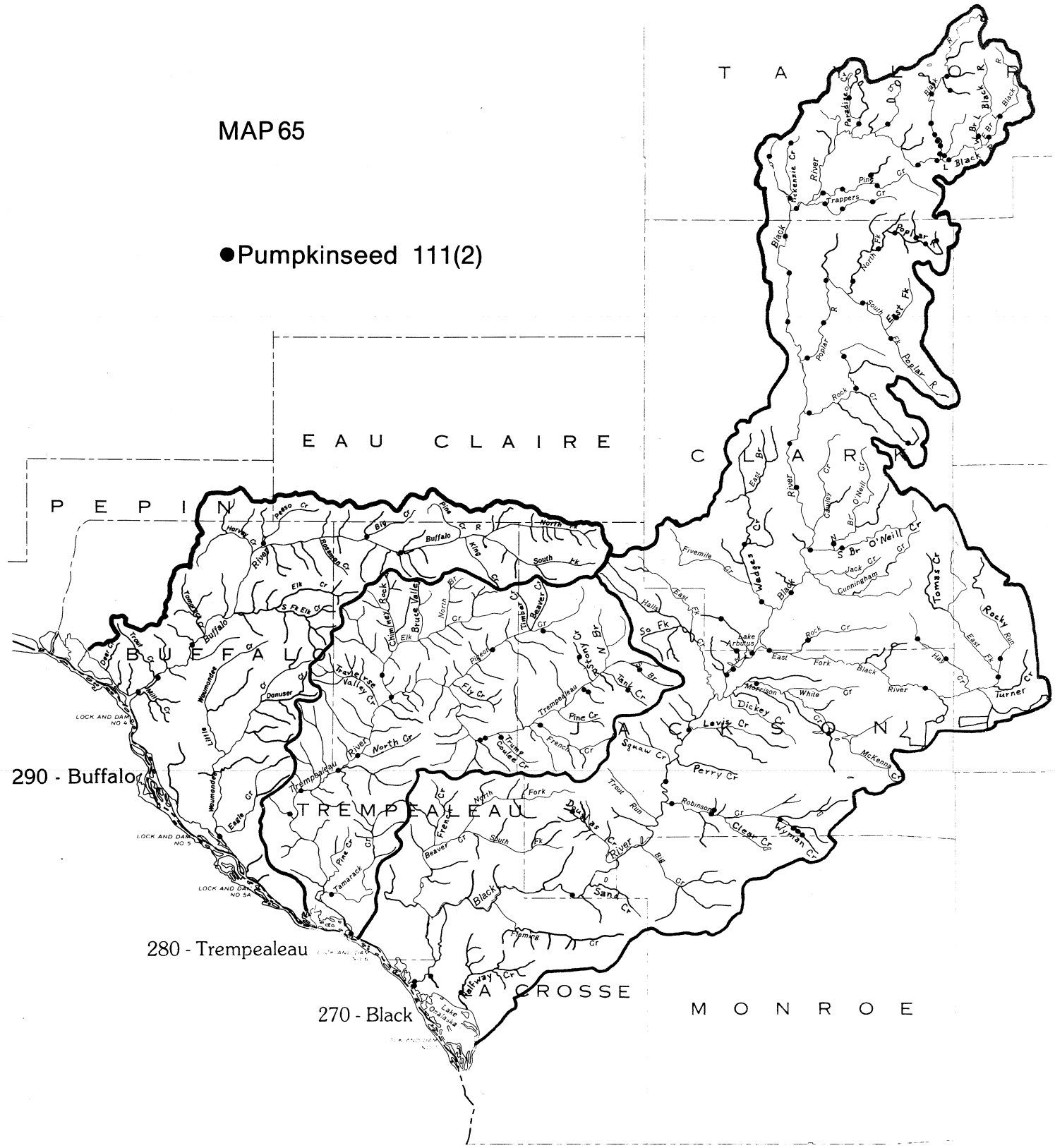
●Rock bass 79(1)




MAP 64
●Green sunfish 64(6)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
Lake Onalaska
Lake Arbutus

MAP 65

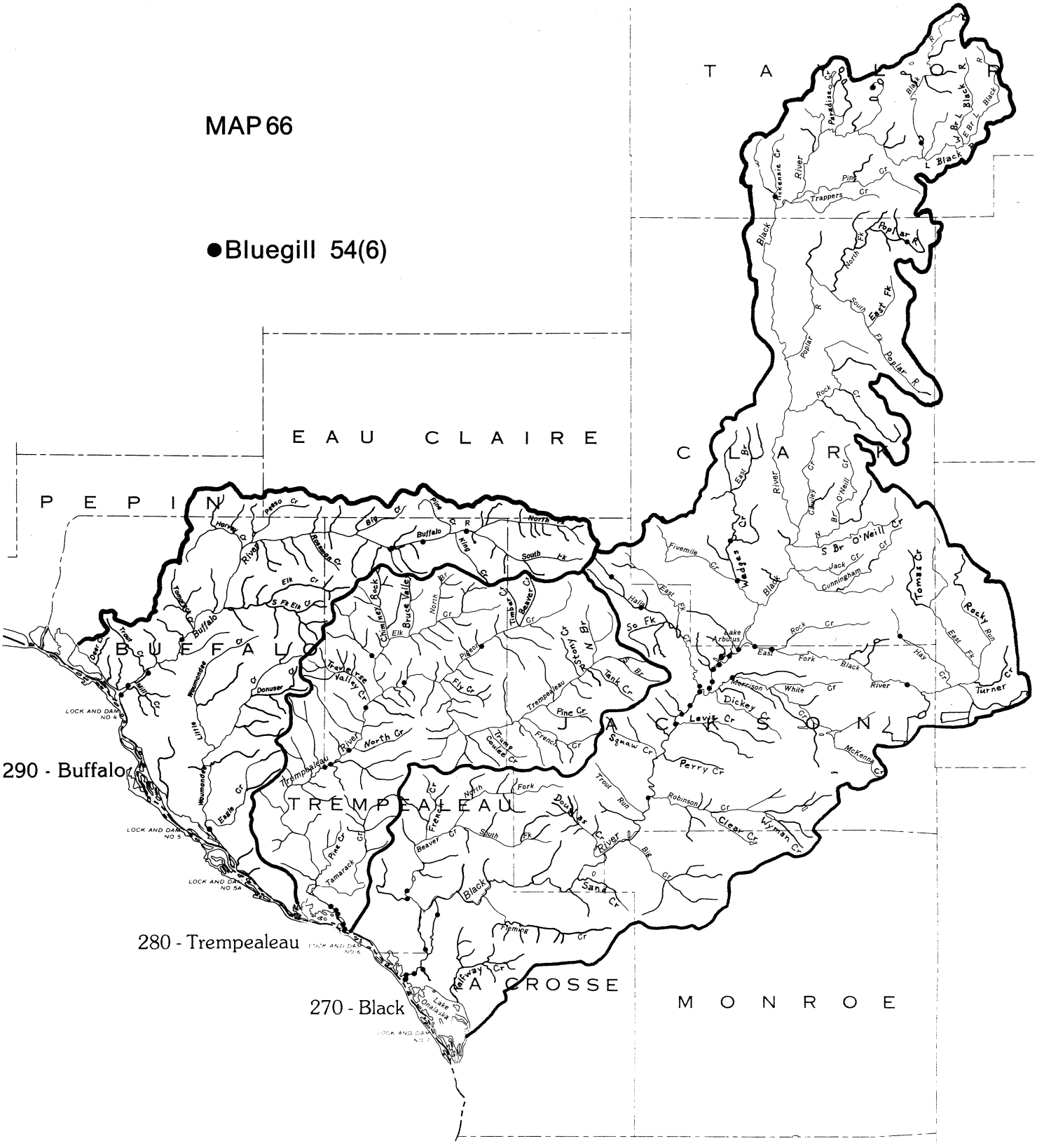
● Pumpkinseed 111(2)



290 - Buffalo

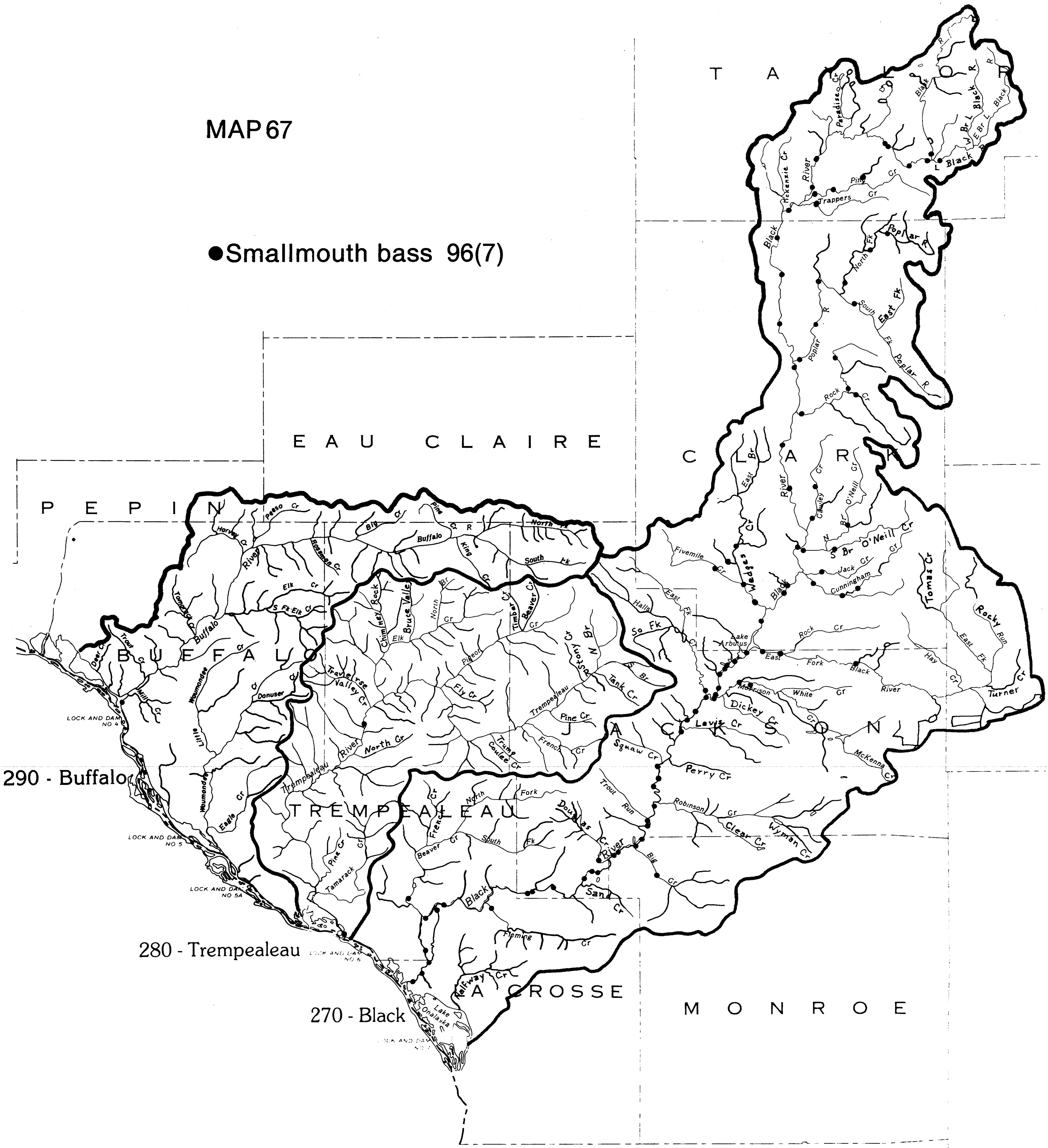
280 - Trempealeau

270 - Black


MAP 66
●Bluegill 54(6)
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
LOCK AND DAM NO 7
Lake Onalaska
Lake Arbutus
Perry Cr
Squaw Cr
Levis Cr
Dickey Cr
Tank Cr
Pine Cr
Fly Cr
Trempealeau River
North Cr
Eagle Cr
Tamarack Cr
Beaver Cr
Douglas Cr
Trout Run
Robinson Cr
Clear Cr
Wyman Cr
McKenna Cr
Sand Cr
Fleming Cr
Railway Cr
Black River
Trappers Cr
Pine Cr
Paradise Cr
Poplar R
North Fk
South Fk
Rock Cr
Fivemile Cr
Waubaus Cr
Cunningham
Jack Cr
S Br O'Neill Cr
N Br O'Neill Cr
Thomas Cr
Rocky Run
East Fk
Hay Cr
Turner Cr
Morrison
White
Halls
Timber Cr
Beaver Cr
Chimney Rock
Bruce Valley
Elk Cr
S Fk Elk Cr
Tamarack Cr
Buffalo River
Waumandee Cr
Danuser
Trane Coulee Cr
French Cr
Big Cr
Pesso Cr
Horse Cr
Beaver Cr
Buffalo
King Cr
Pine Cr
Trout Cr
Duck Cr
Mill Cr
Little Waumandee

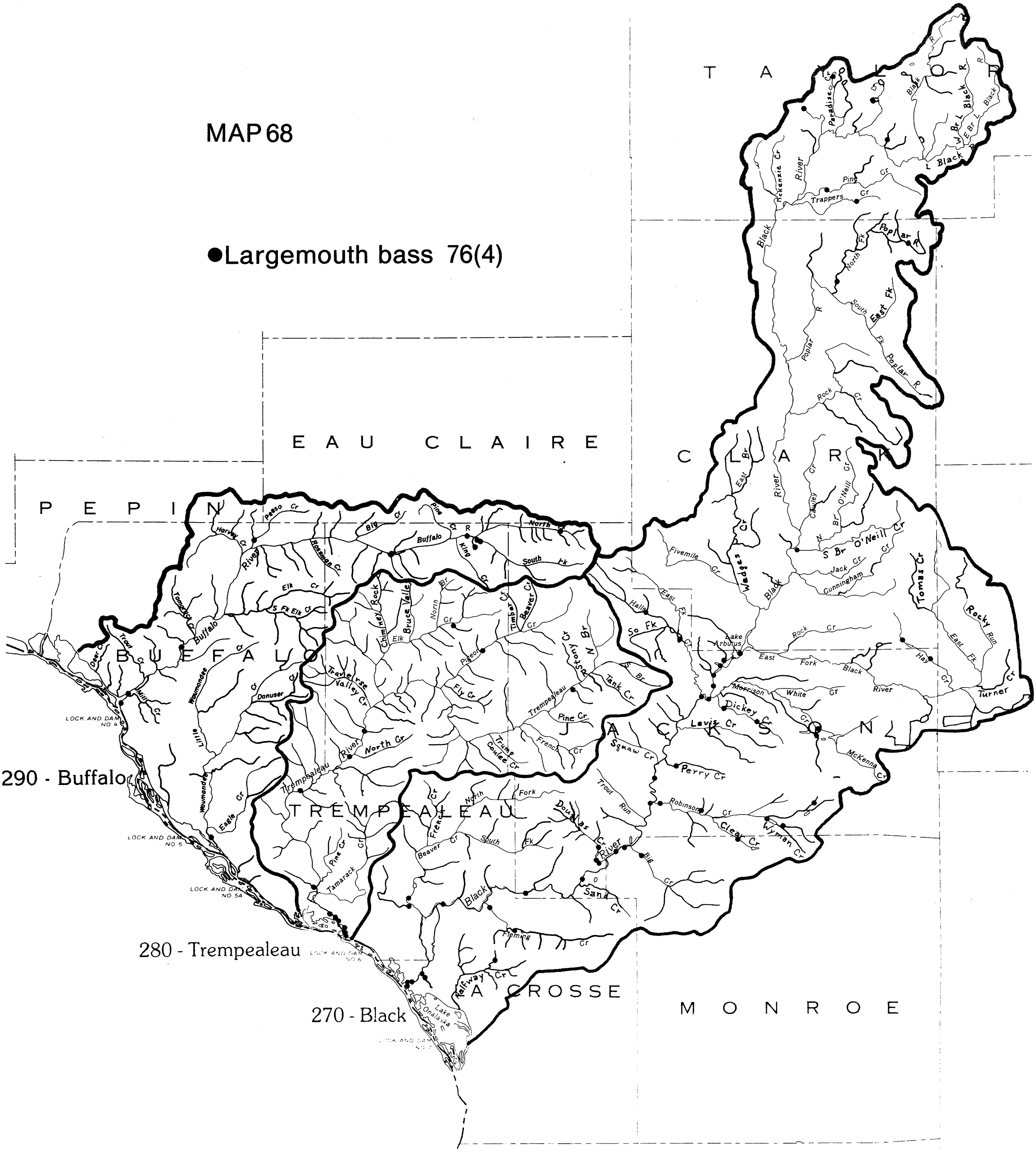
MAP 67

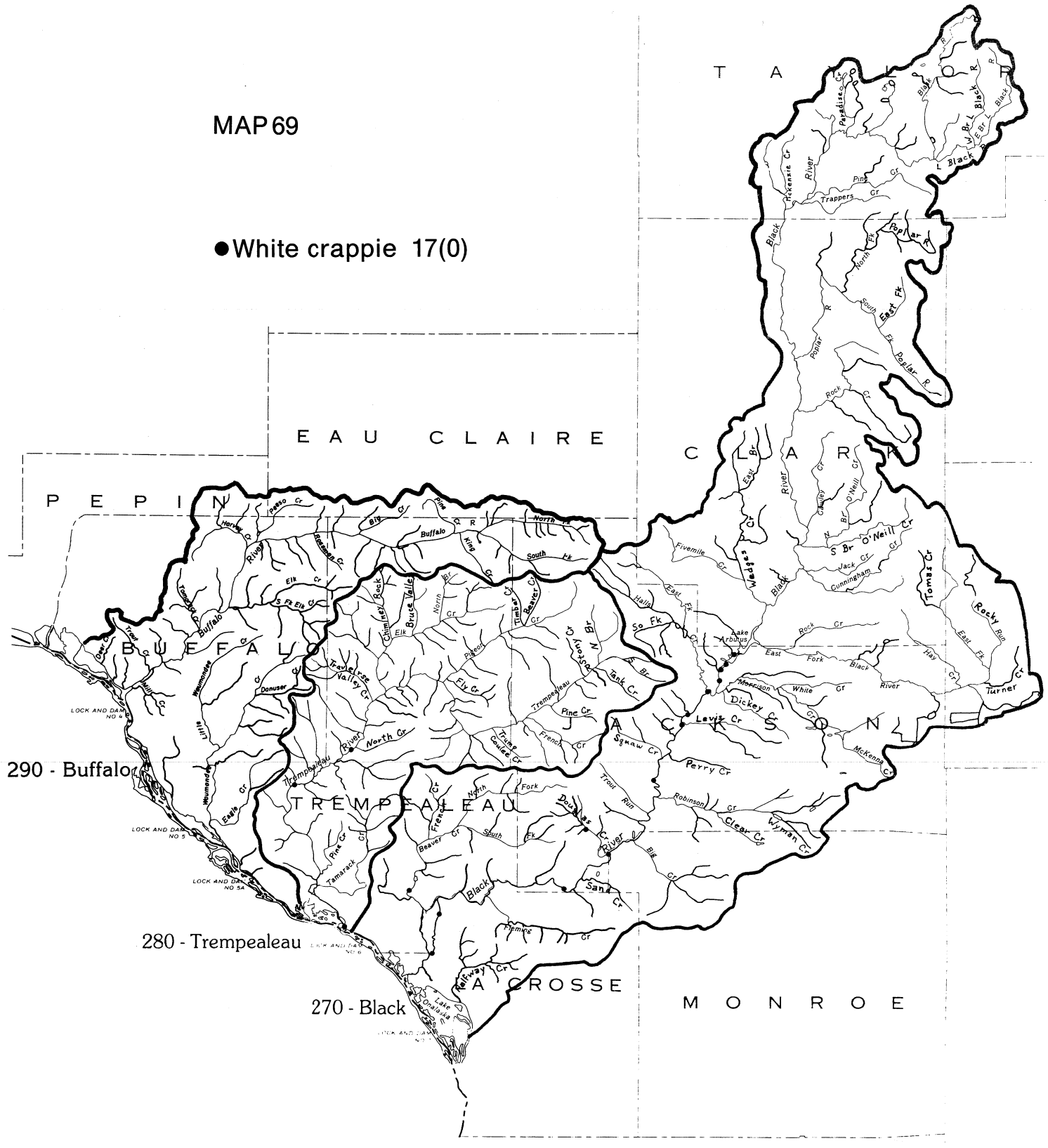
●Smallmouth bass 96(7)

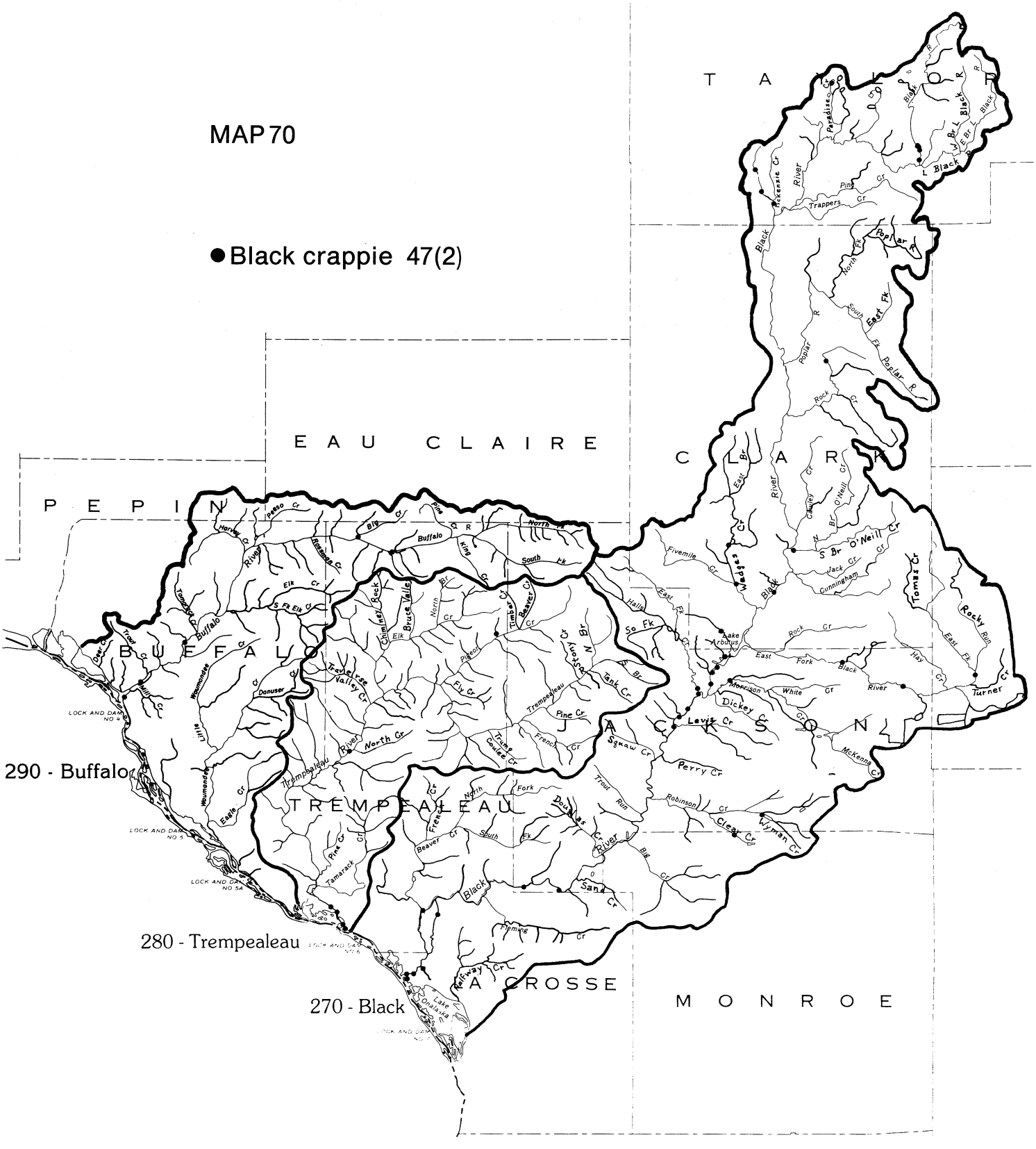


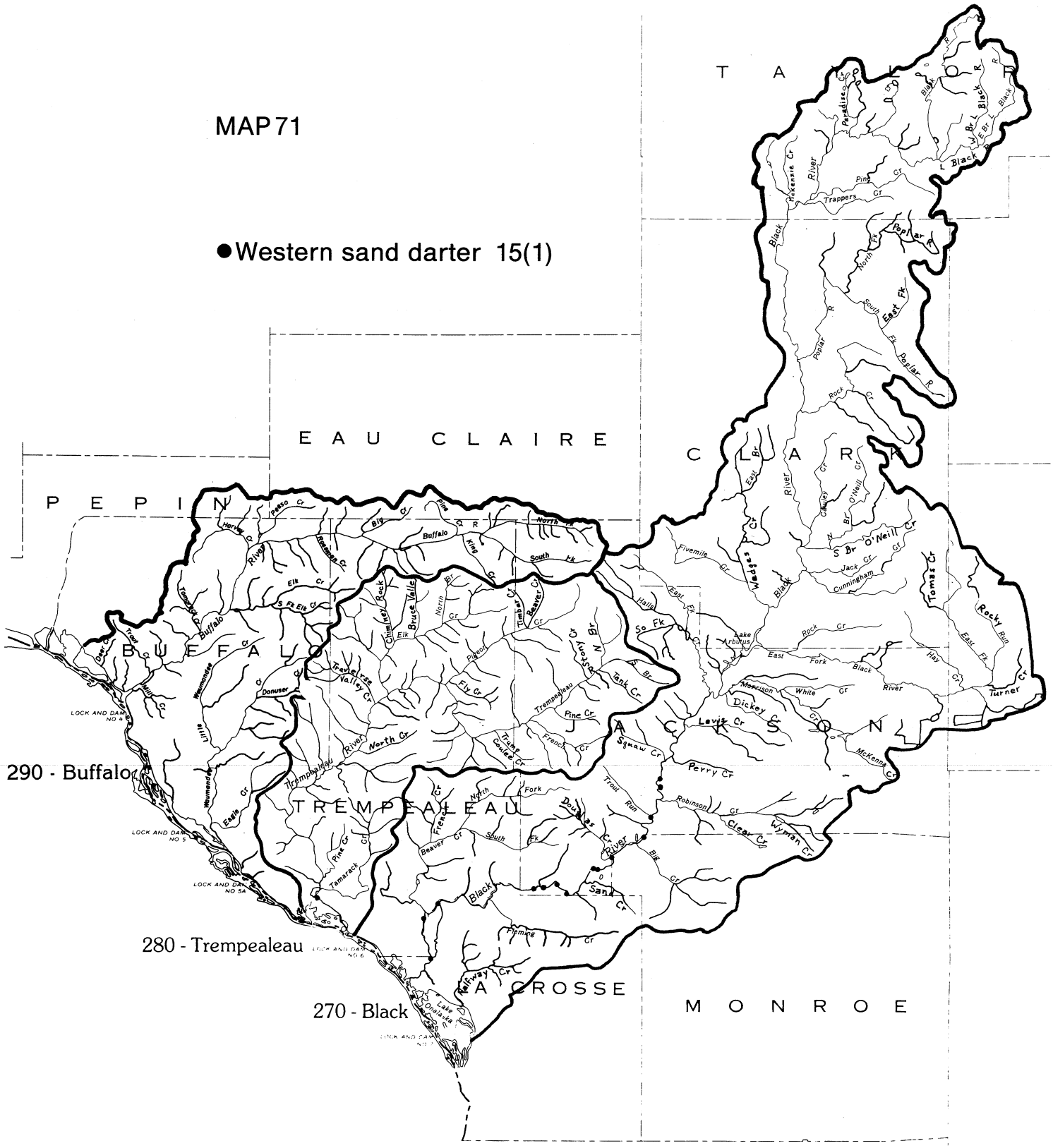
MAP 68

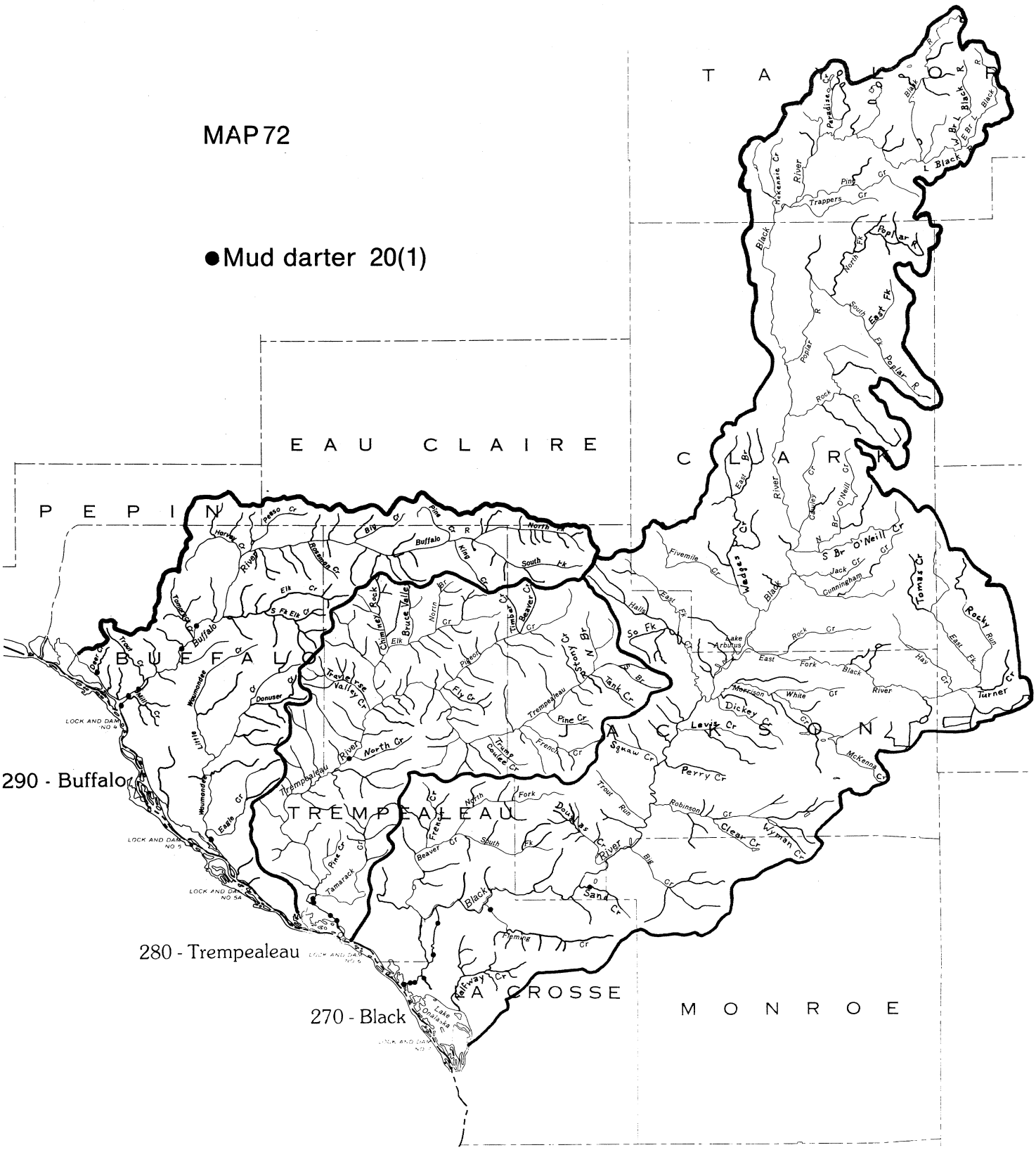
●Largemouth bass 76(4)




MAP 69
● White crappie 17(0)
290 - Buffalo
280 - Trempealeau
270 - Black
TAYLOR
EAU CLAIRE
CLARK
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
LA CROSSE
MONROE
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6

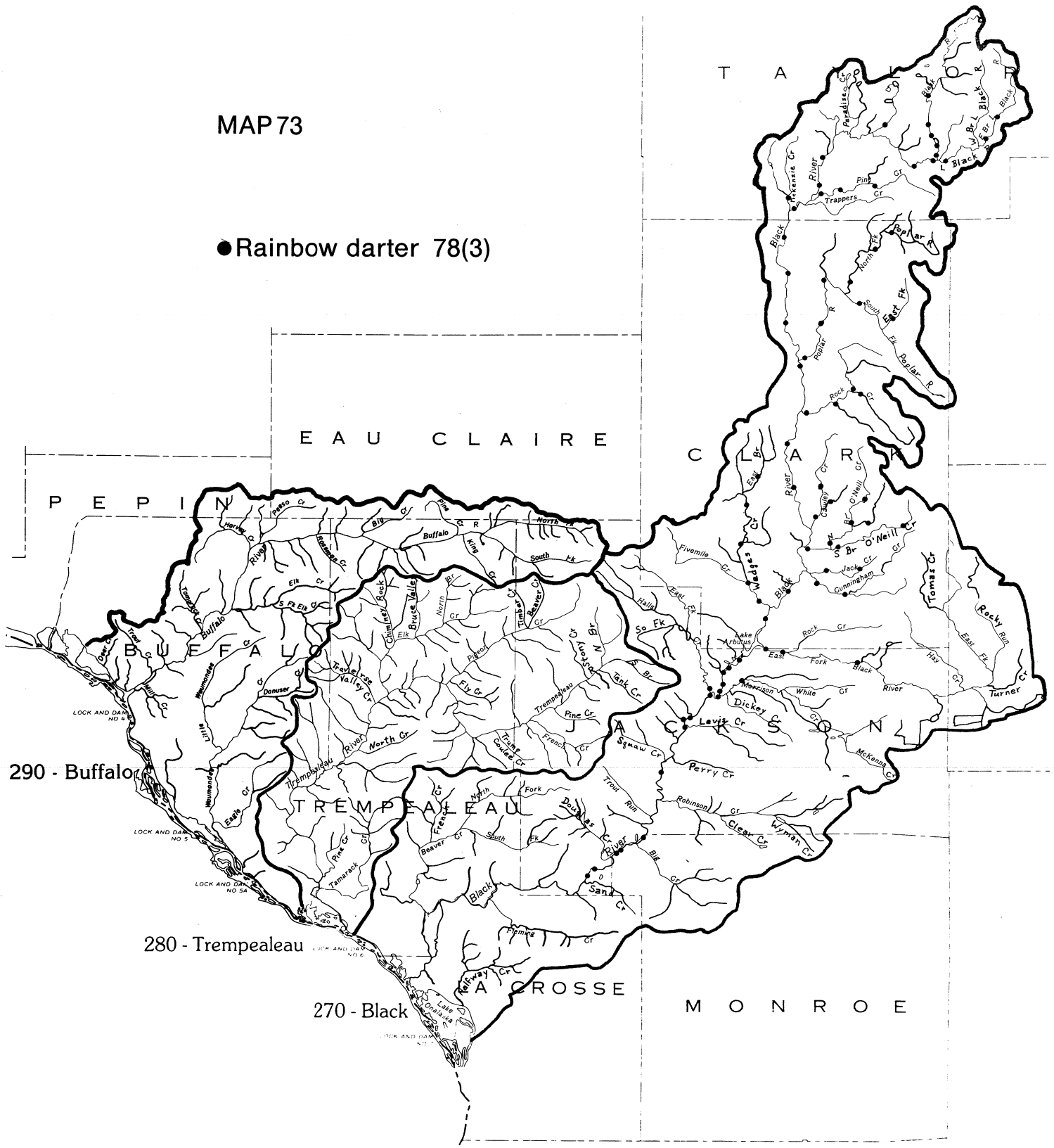

MAP 70
● Black crappie 47(2)
290 - Buffalo
280 - Trempealeau
270 - Black
EAU CLAIRE
PEPIN
BUFFALO
TREMPEALEAU
JACKSON
CLARK
LA CROSSE
MONROE
TAYLOR
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
Lake Onalaska
Lake Arbutus

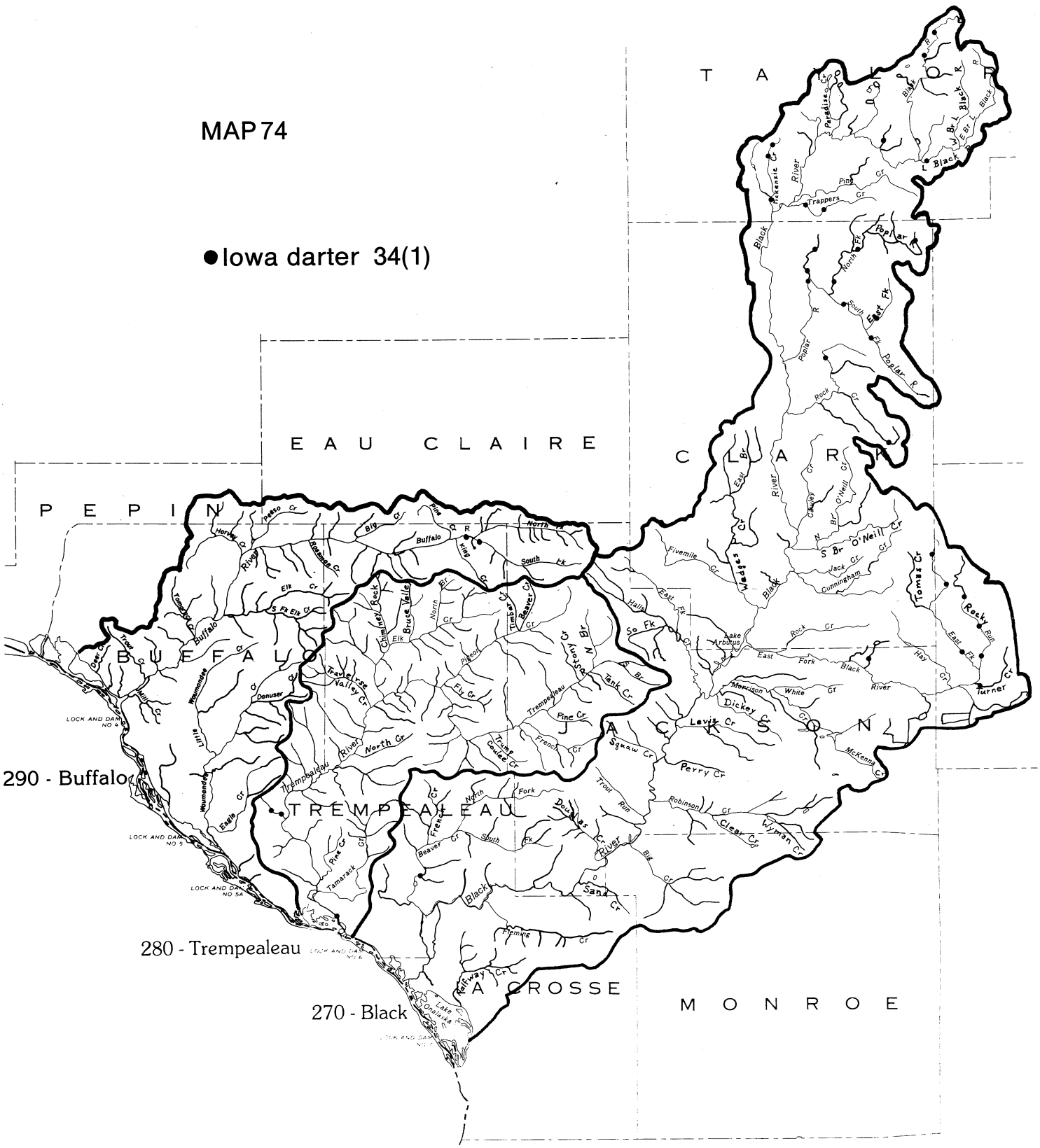

MAP 71
● Western sand darter 15(1)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6

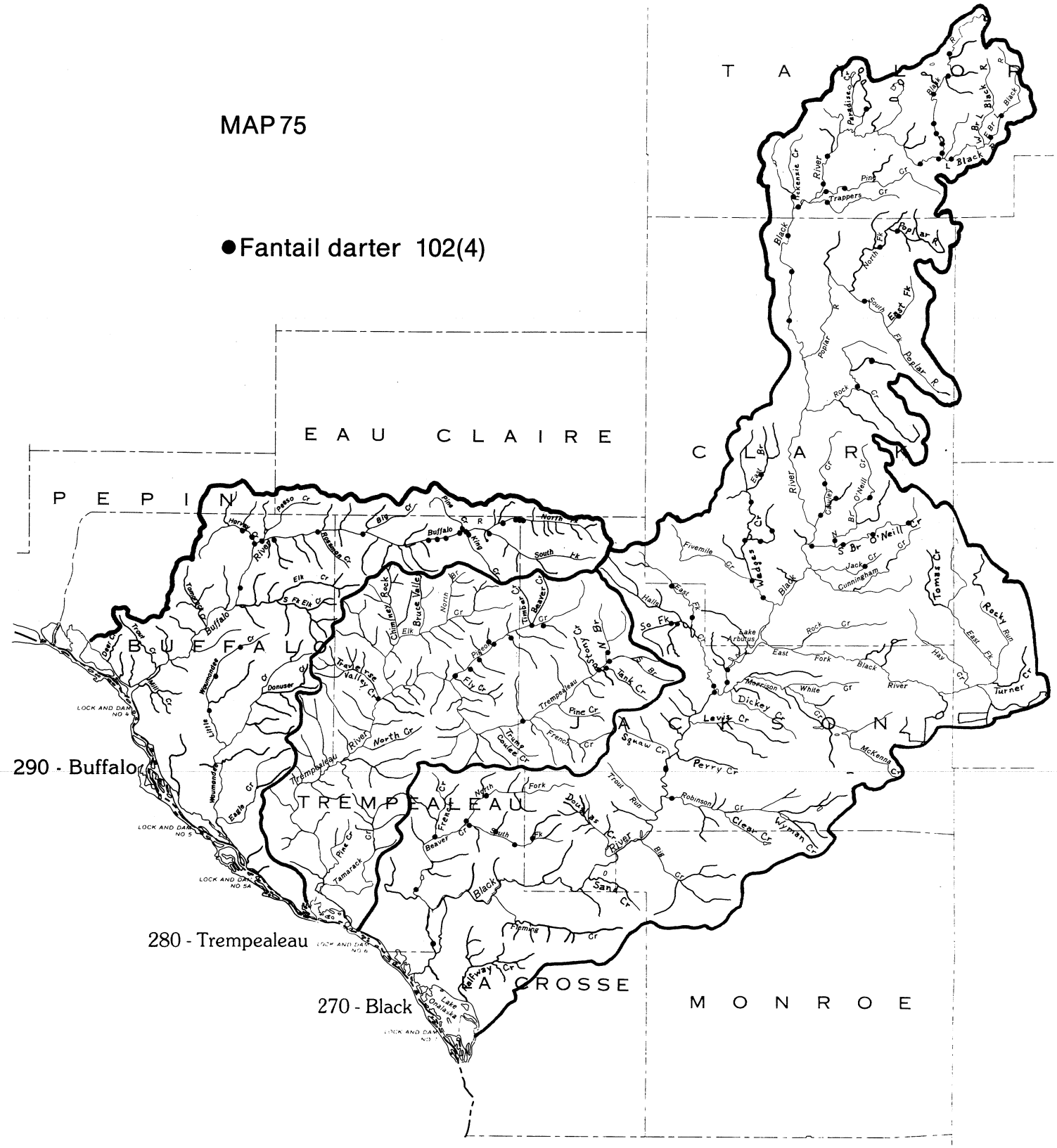

MAP 72
● Mud darter 20(1)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
Lake Onalaska
Lake Arbutus

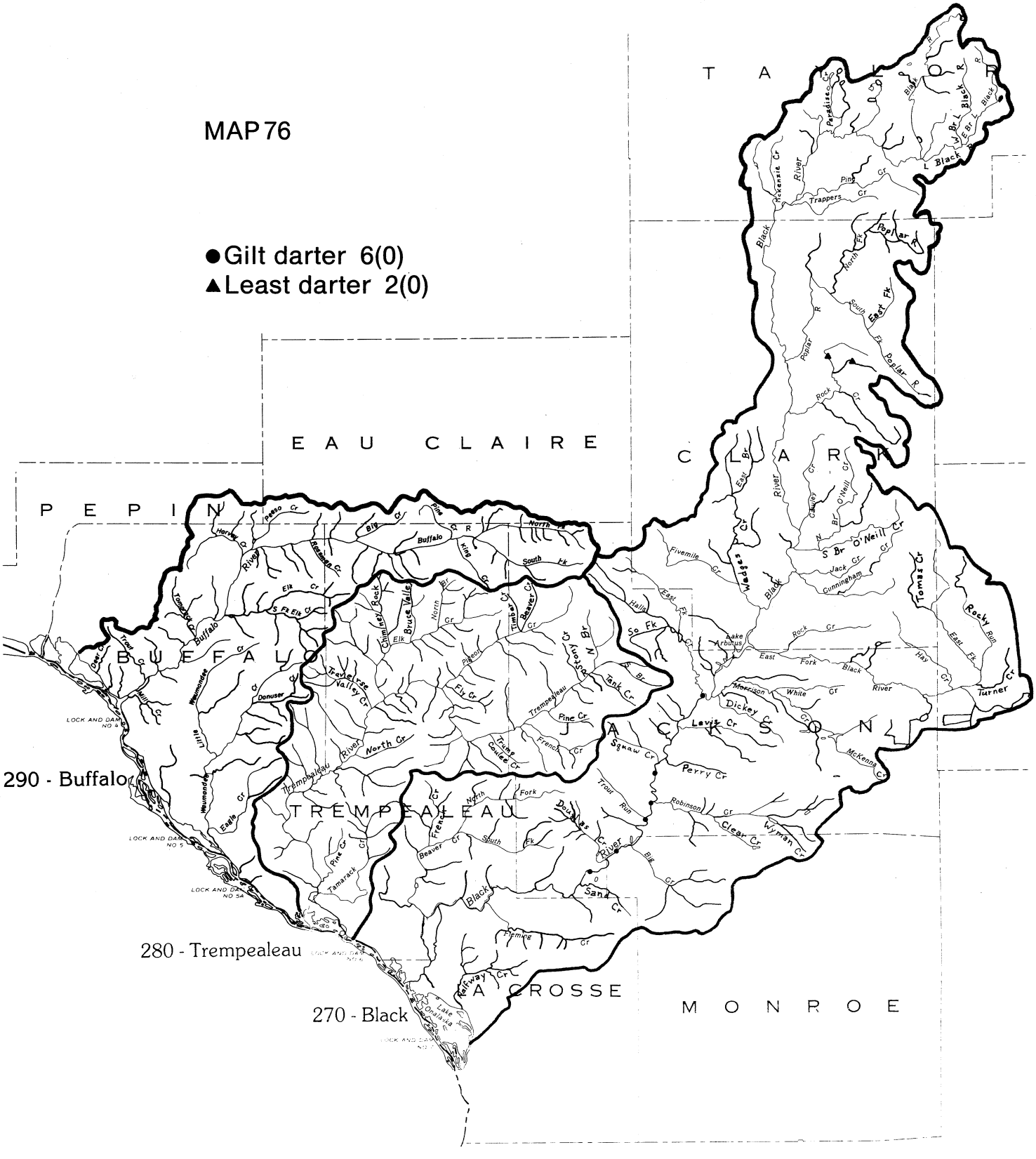
MAP 73

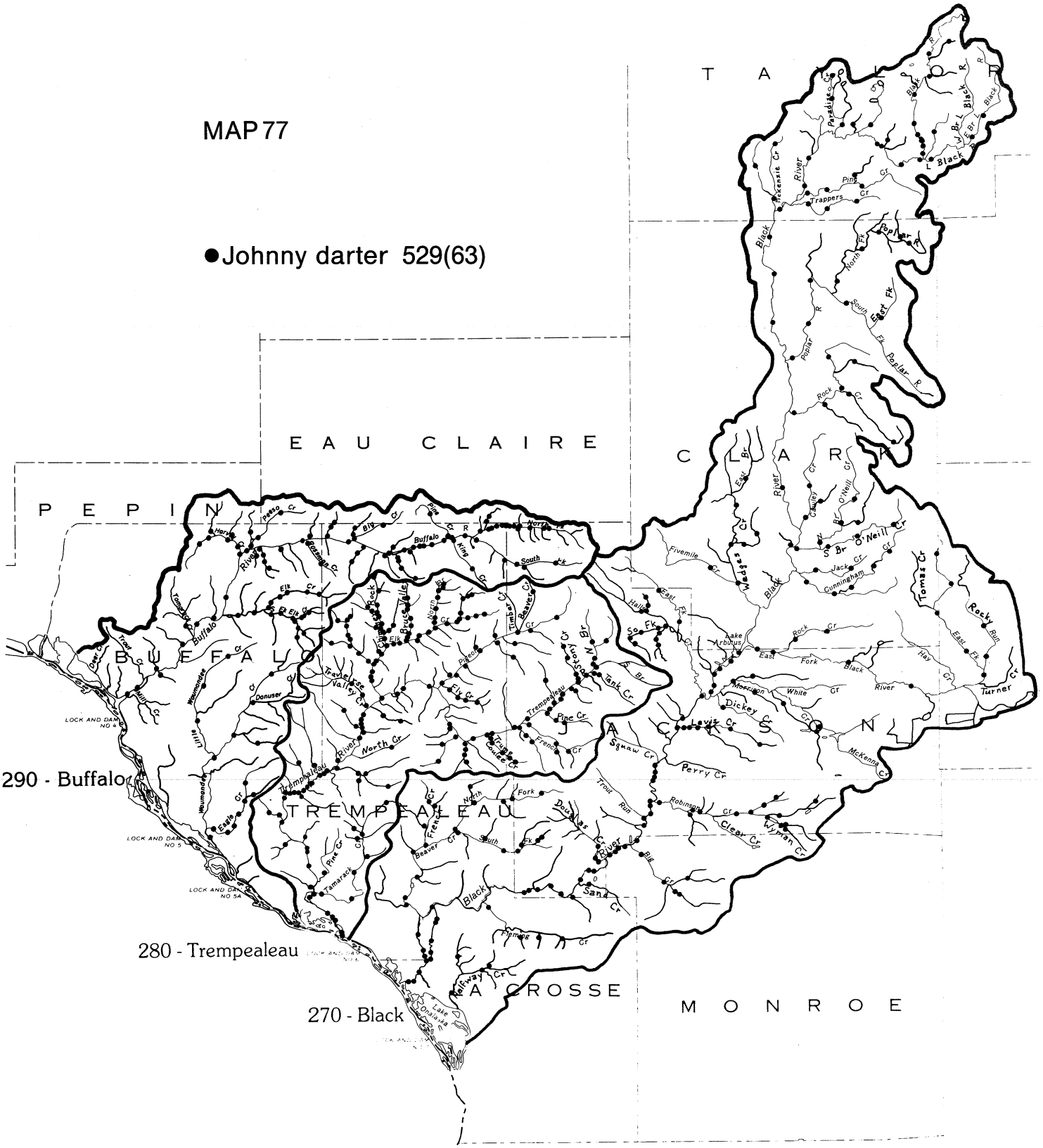
● Rainbow darter 78(3)

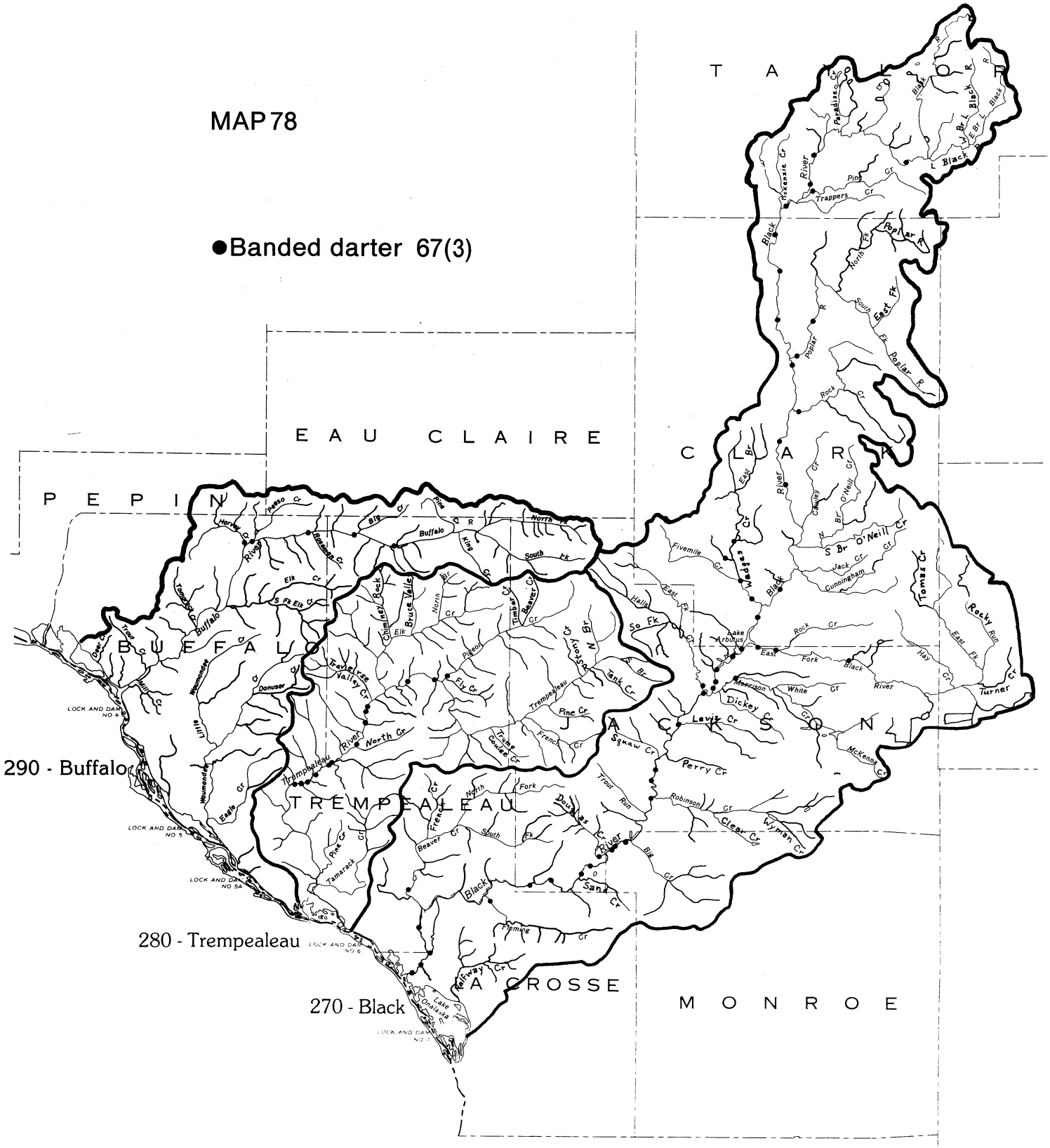



MAP 74
● Iowa darter 34(1)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E


MAP 75
● Fantail darter 102(4)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
LOCK AND DAM NO 7

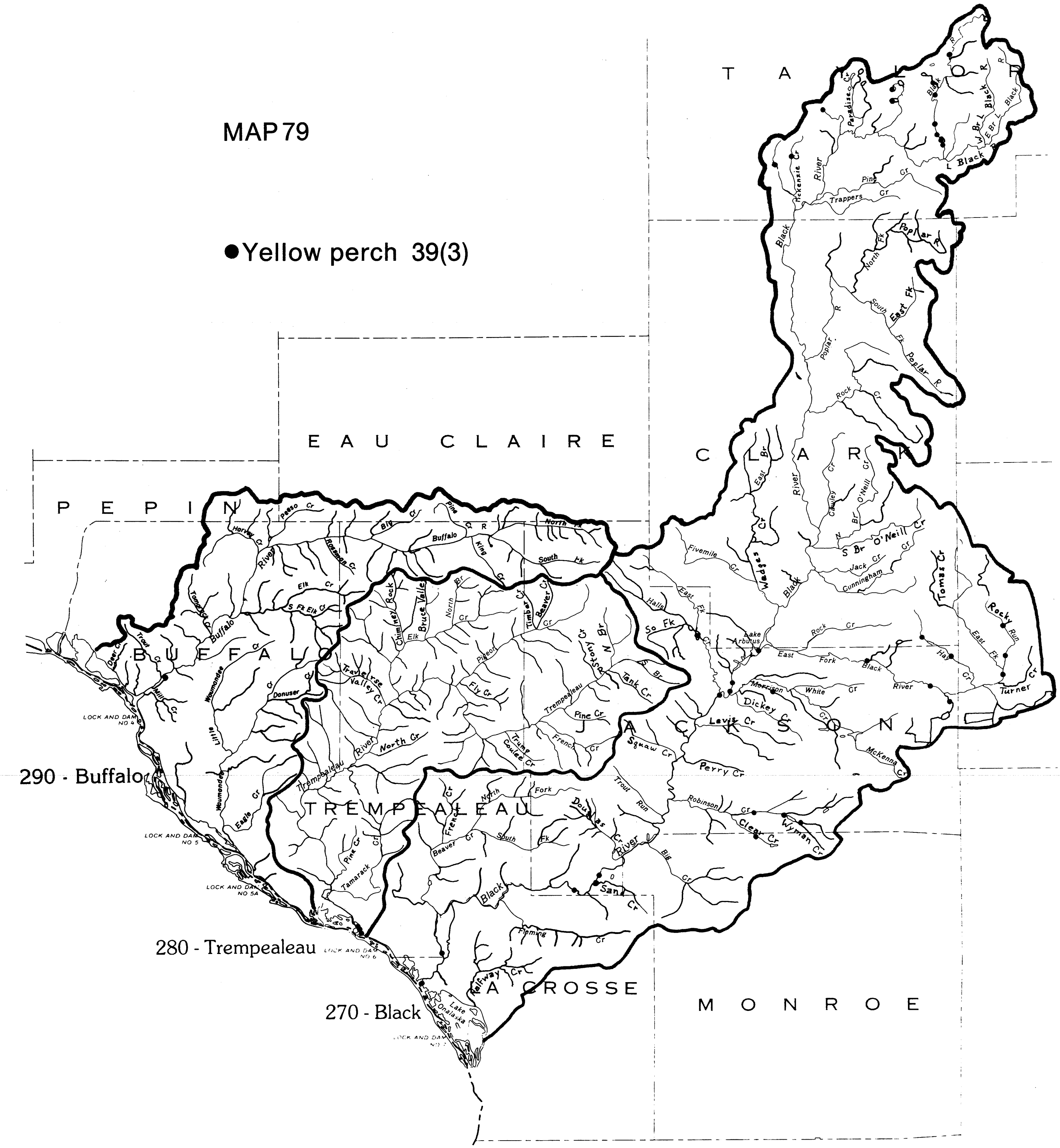

MAP 76
●Gilt darter 6(0)
▲Least darter 2(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A


MAP 77
●Johnny darter 529(63)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A


MAP 78
●Banded darter 67(3)
290 - Buffalo
280 - Trempealeau
270 - Black
T A
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
M O N R O E
LOCK AND DAM NO 6
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 7
Lake Onalaska
Lake Arbutus

MAP 79

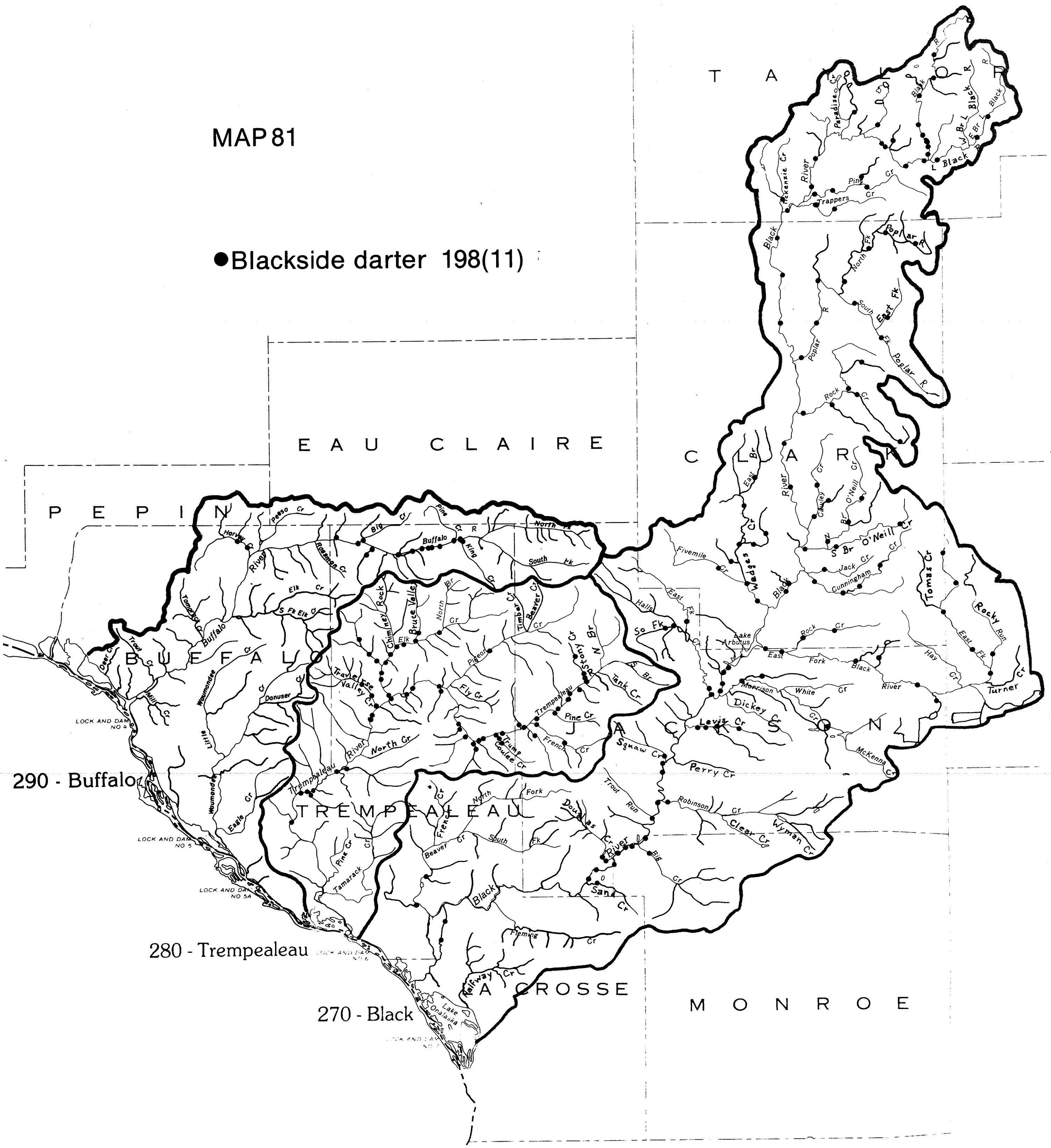
●Yellow perch 39(3)




MAP 80
● Logperch 40(4)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E
Black River
Trempealeau River
North Cr
Fivemile Cr
Lake Arbutus
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6
LOCK AND DAM NO 7

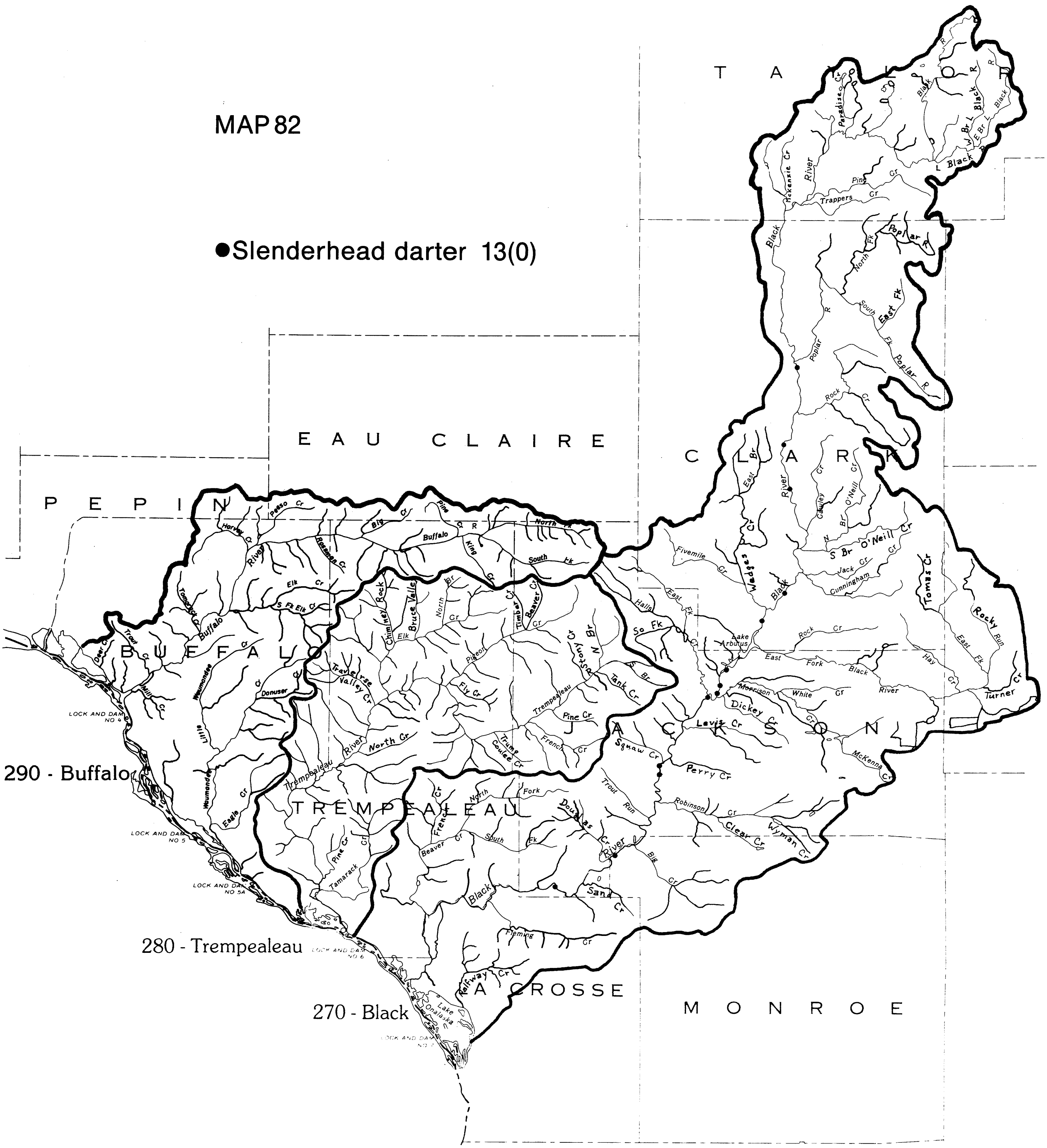
MAP 81

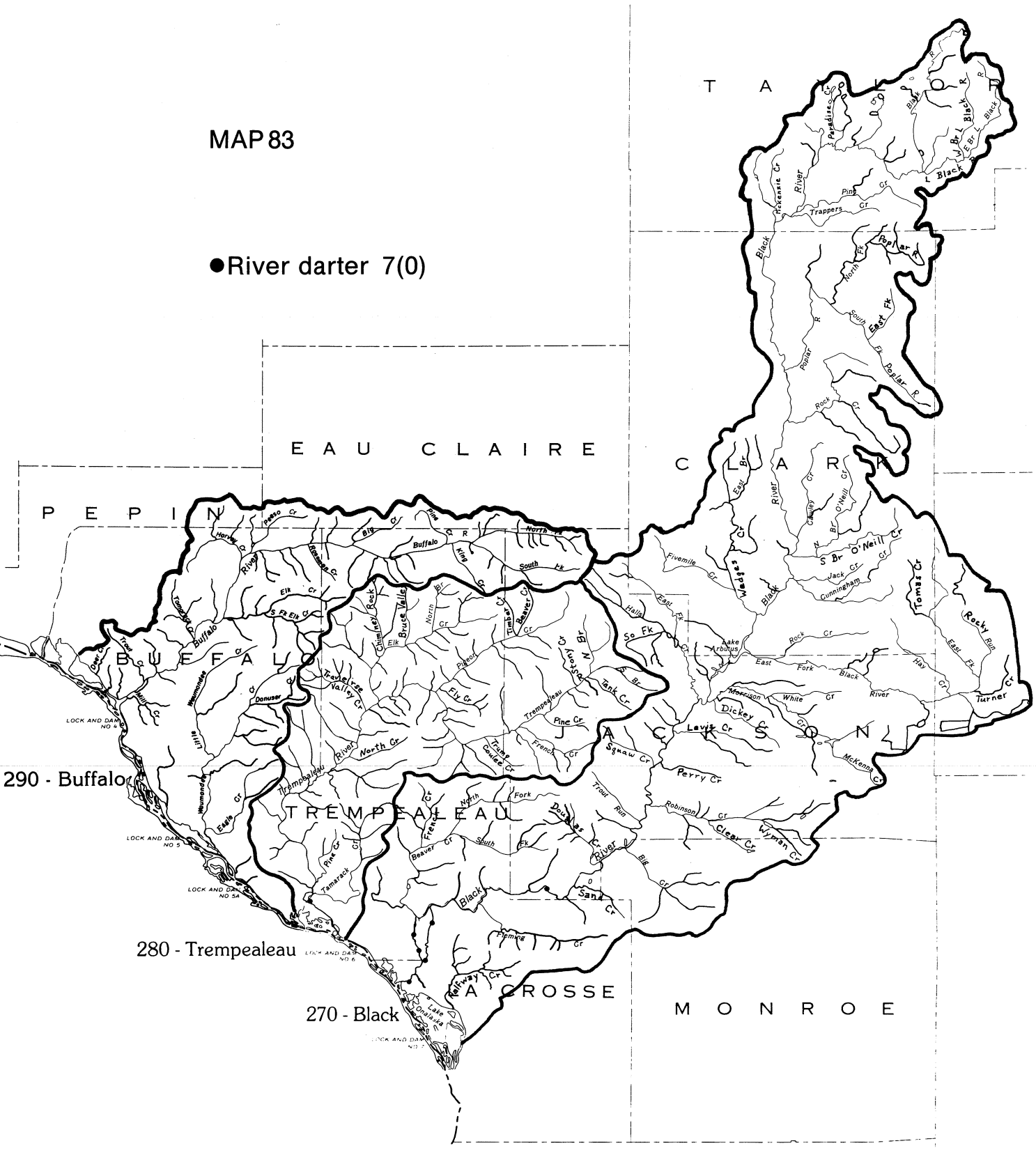
●Blackside darter 198(11)

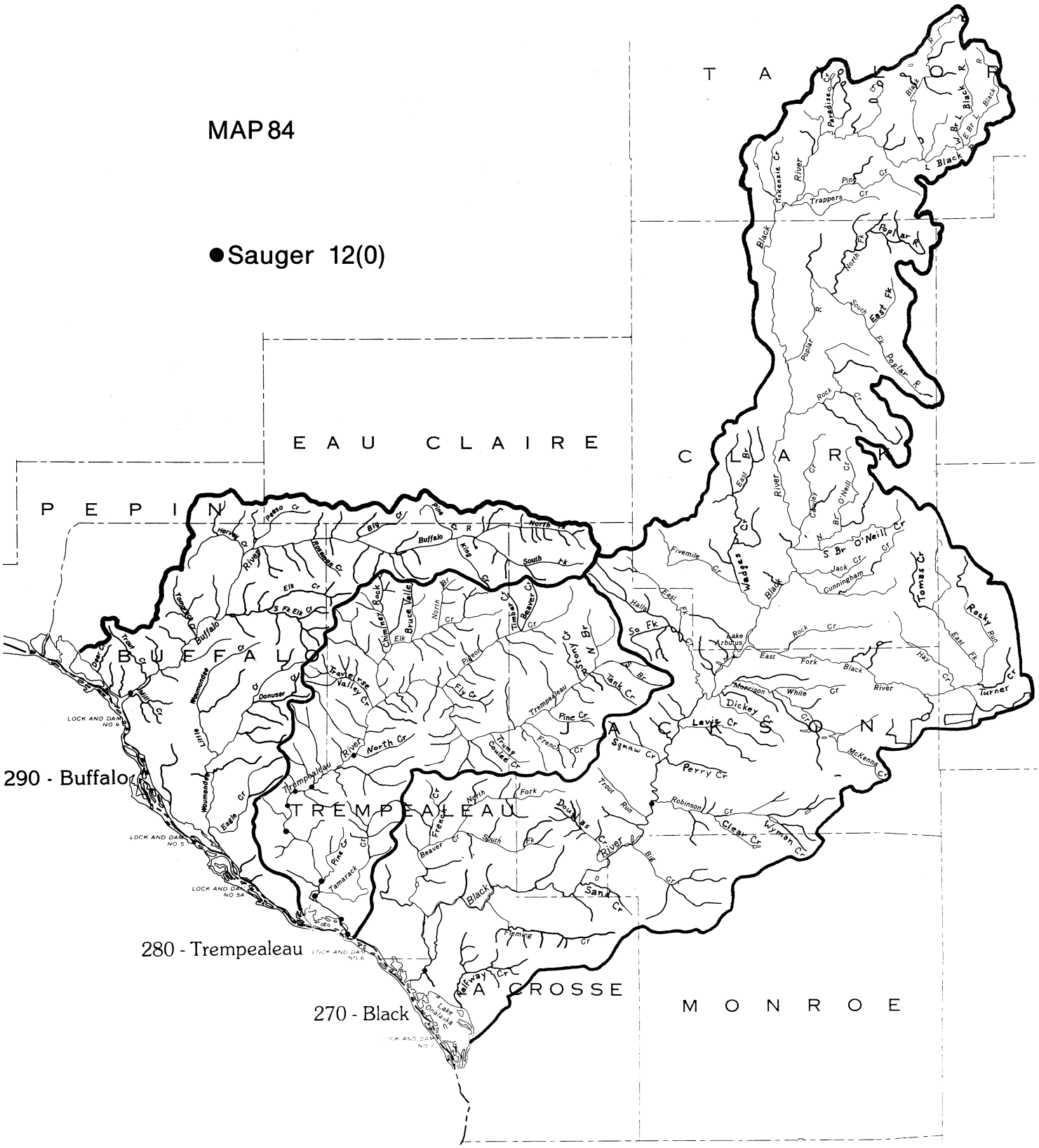


MAP 82

●Slenderhead darter 13(0)

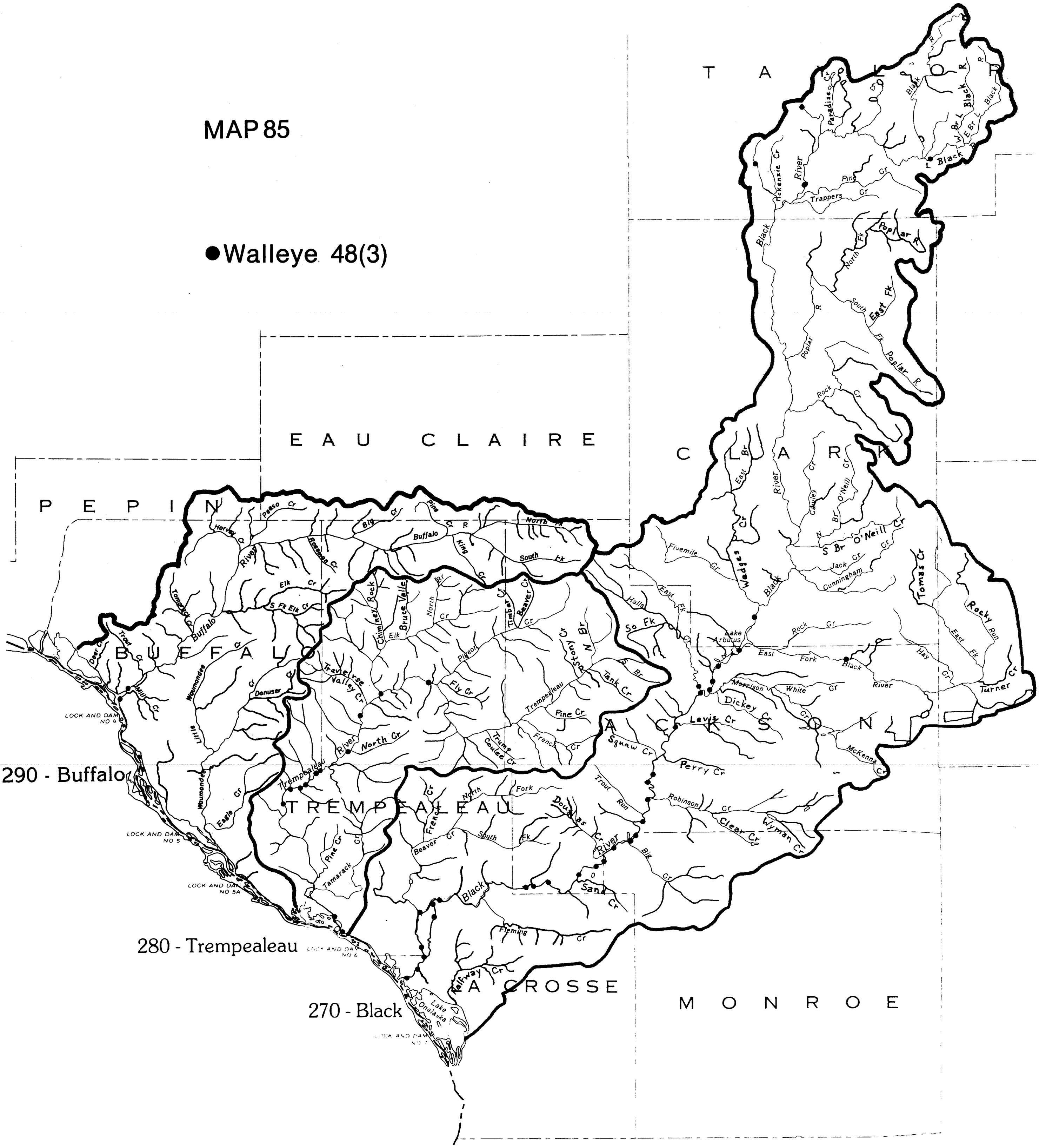


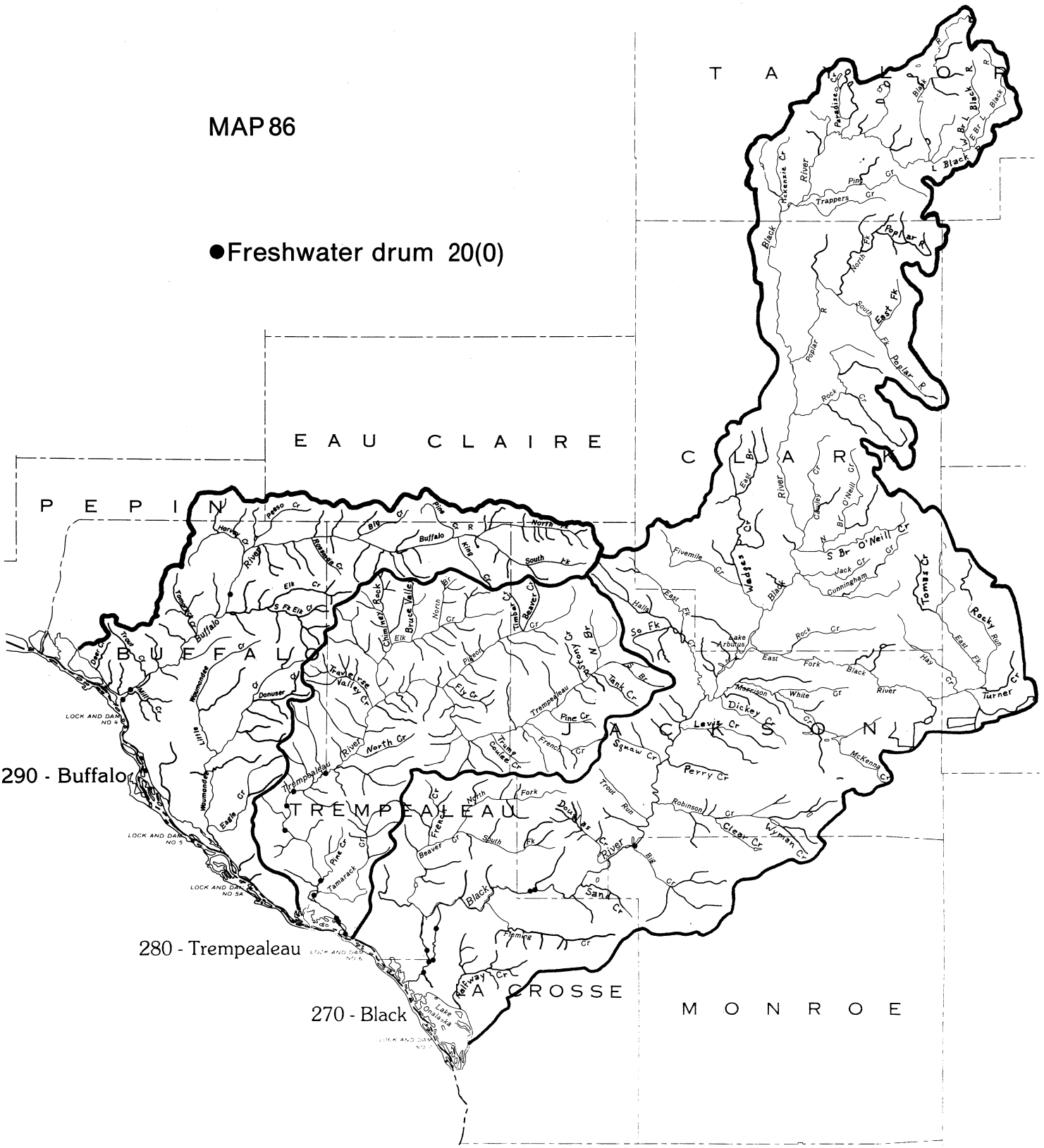

MAP 83
●River darter 7(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
L A C R O S S E
M O N R O E


MAP 84
● Sauger 12(0)
T A
EAU CLAIRE
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
LA CROSSE
M O N R O E
290 - Buffalo
280 - Trempealeau
270 - Black

MAP 85

● Walleye 48(3)




MAP 86
●Freshwater drum 20(0)
290 - Buffalo
280 - Trempealeau
270 - Black
T A Y L O R
E A U C L A I R E
C L A R K
P E P I N
B U F F A L O
T R E M P E A L E A U
J A C K S O N
A C R O S S E
M O N R O E
Black River
Trempealeau River
North Cr
Perry Cr
Levis Cr
Dickey Cr
Fivemile Cr
Rocky Run
Turner Cr
Tomas Cr
Douglas Cr
Sand Cr
Railway Cr
Lake Onalaska
LOCK AND DAM NO 4
LOCK AND DAM NO 5
LOCK AND DAM NO 5A
LOCK AND DAM NO 6

INDEX TO MAPS

METRIC-ENGLISH AND ENGLISH-METRIC CONVERSIONS

1 km = 0.6214 mile
1 km^2 = 0.3861 $miles^2$
1 ha = 2.47 acres
1 cm = 0.3937 inches (0.0328 ft)
1 m^3 = 35.21 ft^3

1 ft = 30.48 cm
1 mile = 1.609 km
1 acre = 0.4047 ha

ACKNOWLEDGMENTS

The study of the dis[tribution of fish] in the Black, Trempealeau, ... river basins spans nearly a ... and represents the efforts and co-operation of a number of people.

Our ... special thanks ... David Siegler for his work throughout the study, particularly in heading a field sampling crew, in coding of the raw data for entry into the computer, in drafting the base maps, and in proofing the tables and figures. Another is Dale Becker for his work as principal fish taxonomist and as a member of the sampling crew. Keith Otis was also a member of the crew, and replaced Mr. Becker as principal taxonomist in July 1978. Three other individuals, Fred Hagstrom, Ken Kahler, and Jim Kreitlow are recognized for their work in the field as crew leaders and in the laboratory. Credit is given to Kurt Osterby, who along with Mr. Siegler, prepared the 86 species maps and to Al Kaas for his help in preparing the tables. Summer employes who helped

s ... are ... F... George ... skills in ... of this st... collections ... made. Cred... Managemen... by sending ... and lake sur... reports.

The follow... viewed this ma... son and Anne... were taken by t... listed. Permissio[n] of the speckled ch... darter, and gilt da[rter] ... Illinois" by Philip

...tribution of fish ... and Dal... co- ... with the strenuous field work were Ken Britt, Roger Cahn, Henry Har-... and Paul Johnson, Al Kaas, Douglas Lescdisin, Mike Meyers, Tom Meyer, John Nichols, Kurt Osterby, Eric Palm, Tom Rosin, Don Samuelson, Peter Segerson, Paul Sims, Rich... Tollerson, and Kurt Welke.

I am particularly indebted to Dr. ...e Becker who shared not only his ... fish taxonomy with members ...tudy, but also data from fish ...s that he and his students had ...dit is given to District Fish ...t personnel who assisted ...us fish from their stream ...rveys and copies of their

...ving persons critically re-...anuscript: Lyle Christen-... e Forbes. Photographs ... the author except where ...n to use the drawings ...ub, pirate perch, mud ...arter from "Fishes of ... Smith was kindly granted by the University of Illinois Press (© 1979 by the Board of Trustees of the University of Illinois), and permission to use the drawing of the redside dace from "Freshwater Fishes of Canada" by W.B. Scott and E.J. Crossman was kindly granted by the Bull. Fish. Res. Bd. Can.

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