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MONTANA WATER RESOURCES BOARD

Terrestrial and Aquatic Life

The Yellowstone is free flowing over its entire length, making it unique among the large rivers of the continental United States. It has a total drainage area of approximately 70,400 square miles, 35,900 of which lie in Montana. Its length, from its headwaters in Wyoming to its confluence with the Missouri River in North Dakota, is approximately 678 miles, 550 of which are in Montana.

In Montana, the only major south-flowing tributary to the Yellowstone is the Shields River near Livingston. Major north-flowing tributaries to the Yellowstone in Montana include the Boulder, Stillwater, Clarks Fork of the Yellowstone, Bighorn, Tongue and Powder Rivers.

The Yellowstone is of great importance as a sport fishery and can be divided into three general zones as related to fish distribution. From its headwaters to its mouth, the river changes from an alpine, salmonid-type fishery to a diverse, warm-water aquatic ecosystem. A longitudinal profile of the Yellowstone is presented in Figure 1 (Peterman and Haddix, 1975)

The upper Yellowstone from Gardiner to Big Timber (103 miles) supports cold-water salmonid populations of national significance and has been classified as a Blue Ribbon Trout Stream by the Montana Fish and Game Commission. This area is characterized by large populations of a relatively small number of fish species characteristic of clear, cold water rivers.

Stream gradients calculated for the upper river from the mouth of Pine Creek to Big Timber show the average drop in elevation per river mile for this reach is 12.9 feet; however, individual gradients for short sections (2-6 miles long) within the reach varied from 10.0-18.2 feet per mile.

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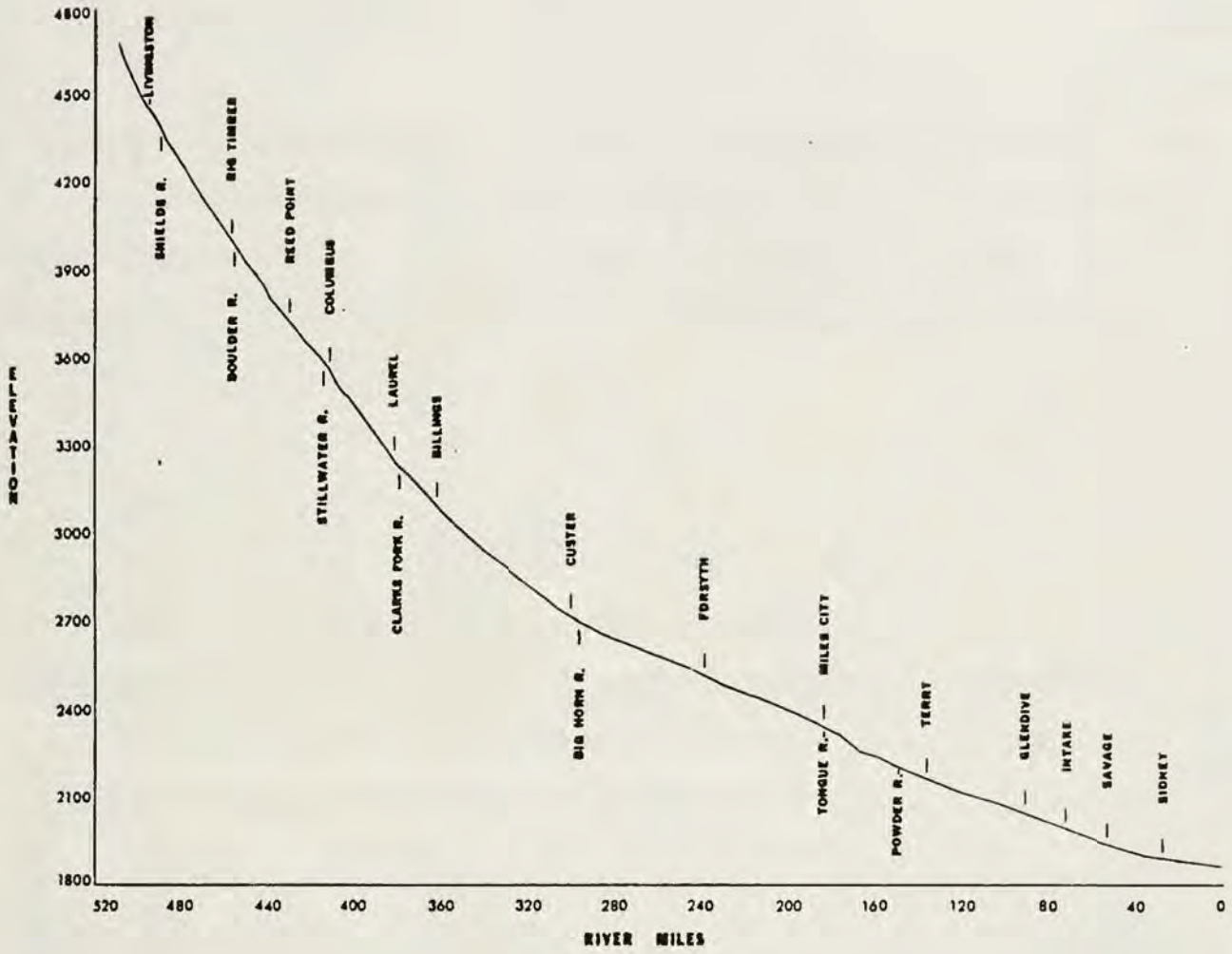

Figure 2. Longitudinal profile of the Yellowstone River from the mouth of Pine Creek to its confluence with the Missouri River.

The middle Yellowstone from Big Timber to the mouth of the Bighorn River (160 miles), contains the transition zone between the primarily cold water environment of the upper river and the warm water environment of the lower river. In this area, both cold and warm water fishes are present, but their distribution and population dynamics are poorly understood.

The average river gradient for the middle Yellowstone is 8.1 feet per mile. Gradients for individual sections within this area varied from 11.4-5.1 feet per mile.

The lower Yellowstone extends from the mouth of the Bighorn River to its confluence with the Missouri River and is approximately 295 miles long. This area supports a diverse aquatic ecosystem containing a wide variety of species commonly known as warm water fishes. Important sport species found in the lower Yellowstone include the paddlefish, shovelnose sturgeon, sauger, walleye, channel catfish, northern pike and burbot. In addition, large populations of nonsport species occur which represent a lightly utilized but potentially valuable resource.

The average river gradient for the lower river is 2.8 feet per mile. Gradients for individual sections within this area varied from 1.0 foot per mile near Sidney to 5.7 feet per mile near Miles City.

A total of 49 species representing 13 families of fish has been recorded for the Yellowstone River in Montana (Table 1). Fishery investigations in areas of the river not previously sampled will likely add new species to the list. The probable distribution of 33 of the 49 species is illustrated in Figure 2 (Peterman and Haddix, 1975)

There is an increase in species diversity progressing downstream on the Yellowstone. In Yellowstone National Park above Tower Junction, the cutthroat trout exists as the only trout species. Eleven species (five families) of fish have been recorded for the upper Yellowstone River in Montana; however, only six species (four families) are considered common or abundant. The middle river contains approximately 20 fish species representing eight families; however, sampling in this area has been very limited. The lower Yellowstone is the most diverse, with 45 species representing 12 families recorded (Peterman and Haddix, 1975).

Table 4. Fish species recorded for the Yellowstone River (family, scientific and common names) (Peterman and Haddix, 14

ACIPENSERIDAE (Sturgeon Family)	
Scaphirhynchus albus	Pallid sturgeon
Scaphirhynchus platorynchus	Shovelnose sturgeon
POLYODONTIDAE (Paddlefish family)	
Polyodon spathula	Paddlefish
HIODONTIDAE (Mooneye family)	
Hiodon alosoides	Goldeye
SALMONIDAE (Trout family)	
Prosopium williamsoni	Mountain whitefish
Salmo clarki	Cutthroat trout
Salmo gairdneri	Rainbow trout
Salmo trutta	Brown trout
Salvelinus fontinalis	Brook trout
ESOCIDAE (Pike family)	
Esox lucius	Northern pike
CYPRINIDAE (Minnow family)	
Cyprinus carpio	Carp
Carassius auratus	Goldfish
Notemigonus crysoleucas	Golden shiner
Semotilus margarita	Pearl dace
Semolitus atromaculatus	Creek chub
Hybopsis gracilis	Flathead chub
Hybopsis gelida	Sturgeon chub
Couesius plumbeus	Lake chub
Notropis atherinoides	Emerald shiner
Notropis stramineus	Sand shiner
Hybognathus hankinsoni	Brassy minnow
Hybognathus placitus	Plains minnow
Hybognathus nuchalis	Silvery minnow
Pimephales promelas	Fathead minnow
Rhinichthys cataractae	Longnose dace
CATOSTOMIDAE (Sucker Family)	
Carpoides carpio	River carpsucker
Cycleptus elongatus	Blue sucker
Ictiobus bubalus	Smallmouth buffalo
Ictiobus cyprinellus	Bigmouth buffalo
Moxostoma macrolepidotum	Shorthead redhorse
Catostomus catostomus	Longnose sucker
Catostomus commersoni	White sucker
Catostomus platyrhynchus	Mountain sucker
ICTALURIDAE (Catfish family)	
Ictalurus melas	Black bullhead
Ictalurus punctatus	Channel catfish
Noturus flavus	Stonecat
GADIDAE (Codfish family)	
Lota lota	Burbot
CENTRARCHIDAE (Sunfish family)	
Lepomis cyanellus	Green sunfish
Lepomis gibbosus	Pumpkinseed
Lepomis macrochirus	Bluegill
Micropterus dolomieui	Smallmouth bass
Micropterus salmoides	Largemouth bass
Pomoxis annularis	White crappie
Pomoxis nigromaculatus	Black crappie
PERCIDAE (Perch family)	
Perca flavescens	Yellow perch
Stizostedion canadense	Sauger
Stizostedion vitreum	Walleye
SCIAENIDAE (Drum family)	
Aplodinotus grunniens	Freshwater drum
COTTIDAE (Sculpin family)	
Cottus bairdi	Mottled sculpin

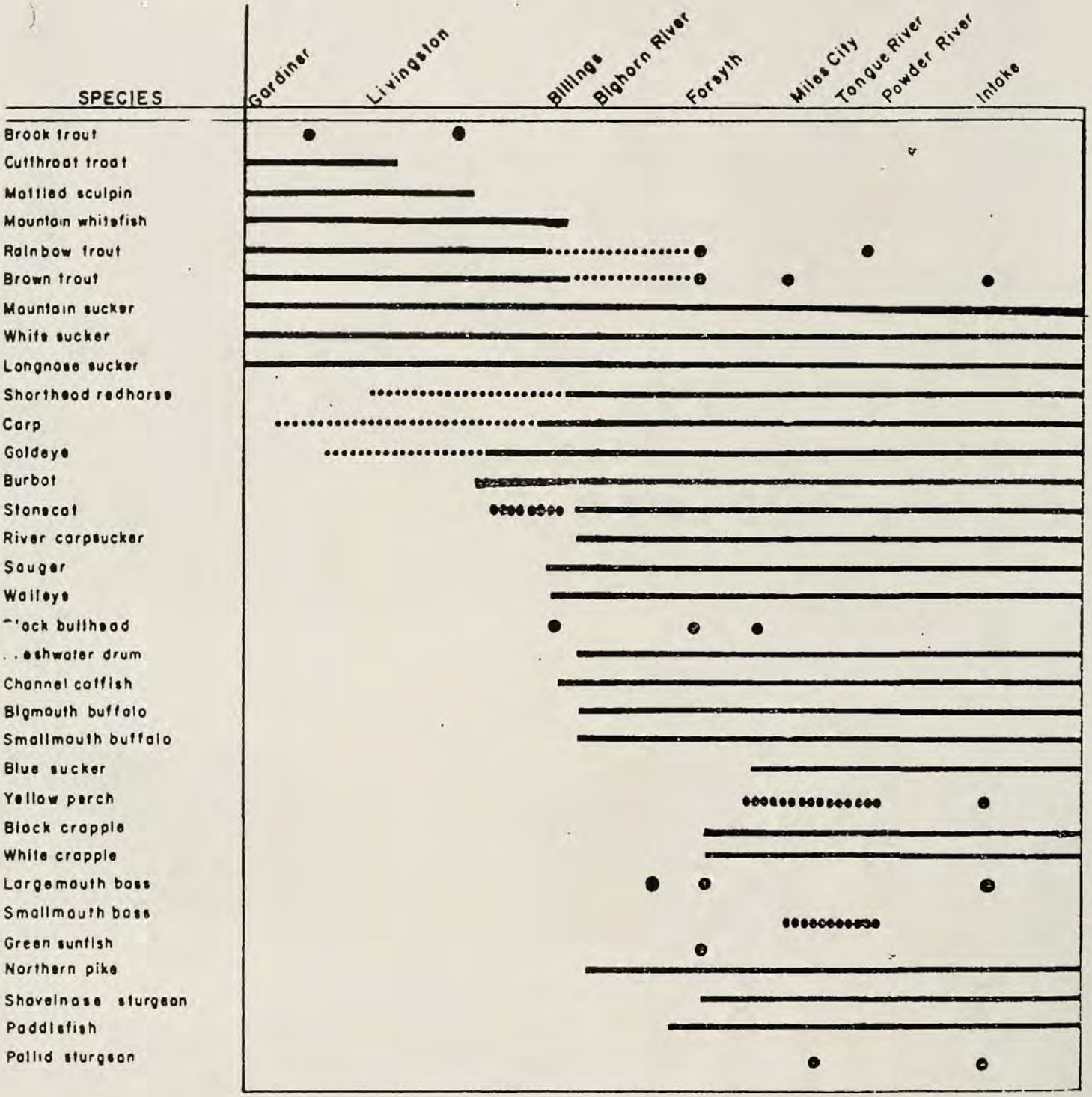

Figure 2. Longitudinal distributions of some fishes of the Yellowstone River of Montana (Peterman and Haddix, 1975).

Broken lines denote rare or occasional occurrence. Wide line indicates reproductive success in the area. Dots indicate occurrence of a single or a few individuals.

AQUATIC LIFE

Upper Yellowstone River (from Mont. Dept. Fish And Game, 1975)

The upper Yellowstone River from Yellowstone Park to Big Timber includes a major tributary, the Shields River. The Shields River originates in the Crazy Mountains and flows south, entering the Yellowstone River approximately 5 miles downstream from Livingston.

A total of 17 species representing 7 families of fish is known to occur in the upper Yellowstone-Shields River drainages in Montana above Springdale (Table 2). Only 10 species (4 families) are considered common or abundant. Cutthroat, rainbow, brown and brook trout and mountain whitefish are the common game fish. Common nongame fish species include longnose, white and mountain suckers, longnose dace and mottled sculpin. Occasional carp and shorthead redhorse also occur. Brown (1971) reports a goldeye taken on the Yellowstone River near Pine Creek and a lake chub near Livingston. Fishermen have taken burbot in the Yellowstone River near Springdale (Workman, 1975, pers. comm.)[1]. No particular longitudinal species distribution pattern was evident in game or nongame fish populations in the mainstem of the Yellowstone River between Gardiner and Springdale.

The upper Yellowstone supports a cold-water fishery of national significance. The blue ribbon stream reach from Gardiner to the mouth of the Boulder River at Big Timber represents the longest single reach (103 miles) of blue ribbon trout stream in Montana, and contains 23 percent of the state's 452 total miles of blue ribbon water. An excellent fishery exists in this area for rainbow, brown and Yellowstone cutthroat trout. The Yellowstone cutthroat trout is a unique species found only in the upper Yellowstone basin. Mountain whitefish are several times more abundant than trout and provide an important winter fishery.

[1] Personal communication to Rod K. Berg, Mont. Dept. Fish And Game, Livingston, MT.

Table 2. Fish species recorded for the Upper Yellowstone River drainage in Montana above Springdale (family, scientific and common name). (From Mont. Dept. Fish and Game, 1975).

HIODONTIDAE (Mooneye family)	
Hiodon alosoides	Goldeye*
SALMONIDAE (Trout family)	
Prosopium williamsoni	Mountain whitefish
Salmo clarki	Cutthroat trout
Salmo gairdneri	Rainbow trout
Salmo trutta	Brown trout
Salvelinus fontinalis	Brook trout
Oncorhynchus nerka	Kokanee**
CYPRINIDAE (Minnow family)	
Cyprinus carpio	Carp*
Couesius plumbeus	Lake chub*
Rhinichthys cataractae	Longnose dace
CATOSTOMIDAE (Sucker family)	
Moxostoma macrolepidotum	Shorthead redhorse*
Catostomus catostomus	Longnose sucker
Catostomus commersoni	White sucker
Catostomus platyrhynchus	Mountain sucker
GADIDAE (Codfish family)	
Lota lota	Burbot*
PERCIDAE (Perch family)	
Perca flavescens	Yellow perch**
COTTIDAE (Sculpin family)	
Cottus bairdi	Mottled sculpin

*Rare
**Limited to Dailey Lake

The upper Yellowstone is characterized by its clean, cold, highly productive water. Streambed materials are predominantly round cobble in riffle and run areas. This provides excellent substrate for primary and secondary producers. Interstices between the cobbles provide shelter for young trout and small forage fish such as sculpin. Adult fish security is composed mostly of instream cover provided by large rocks, debris, deep water and water surface roughness.

The Yellowstone River derives much of its water and bedload material from the mountain tributary streams. These creeks originating in high mountain areas, contribute cold, high quality water to the Yellowstone. They also support self-sustaining resident populations of rainbow, cutthroat, rainbow-cutthroat hybrid, brown and brook trout and mountain whitefish, which provide an important recreational fishery. The Tributary streams are generally high gradient with cobble and boulder channels. Fish cover is provided primarily by water surface roughness, streambank vegetation and instream boulders.

Tributaries arising in the Absaroka Mountains include Bear, Cedar, Sixmile, Emigrant, Mill, Pine, Deep, Suce and Mission Creeks. Tributaries arising in the Gallatin Range and flowing east to join the Yellowstone include Mol Heron, Tom Miner, Rock, Big, Fridley, Eightmile, Trail and Billman Creeks. Fleshman Creek originates in the southern end of the Bangtail Ridge and joins the Yellowstone at the city of Livingston.

Armstrong and Nelson Creeks are outstanding among several important spring-fed streams located in the study area. The spring creeks are characterized by fairly constant flows and temperature, and are rich in aquatic vegetation and insect life. They derive their high chemical fertility from the rich bottomlands of Paradise Valley, through which they flow. The high productivity of the spring creeks is reflected

in the excellent trout populations which they support (Elser and Marcoux 1971; Workman 1972, 1973). Brown trout and rainbow trout are the dominant species. Fish cover consists primarily of streambank vegetation, undercut banks, debris and instream vegetation.

The Shields River arises as a small, high gradient stream draining the west slope of the Crazy Mountains. Emerging from the headwaters basin, the stream increases in size flowing southward through the Shields Valley to its confluence with the Yellowstone River near Livingston. The river is 62.0 miles in length from its origin at Fawn Creek to its mouth.

In the Shields River headwaters, the watershed has been extensively logged, while in the lower reaches of the drainage, livestock grazing and other agricultural activities are the major land uses. Streamside vegetation changes from conifer to willow, cottonwood and shrubs progressing downstream (Johnson 1964).

Waters in the Shields River drainage offer sport fishing for cutthroat, rainbow, brown and brook trout and mountain whitefish. Cutthroat and brown trout and mountain whitefish form the backbone of the fishery. Brown trout and mountain whitefish are most abundant in the Shields River mainstem below the headwaters basin, while cutthroat trout are mainly found in the headwaters basin and in the tributary streams.

Rainbow and brown trout are the most sought-after species in the upper Yellowstone and provide excellent angling opportunities. Although not native to the study area, they now provide the bulk of the trout fishery and harvest. The Yellowstone cutthroat is a highly prized native species, but it is by far the least numerous of the three trout species present today.

Fish populations estimated by electrofishing between 1972 and 1974 in sections of the upper Yellowstone River are shown in Table 3.

In many waters, introduced rainbow have hybridized extensively with native cutthroat, resulting in contamination of the gene pool and a decline in the abundance of genetically pure cutthroat. Hybridization is common in resident populations of tributary streams in the upper Yellowstone drainage.

A segment of the cutthroat population in the mainstem of the Yellowstone River appears to be a pure strain of Yellowstone cutthroat. This segment of the population migrates from the mainstem of the Yellowstone River into tributary streams to spawn.

An element probably significant in the cutthroat's decline in the Yellowstone River is the complete diversion of most major tributaries to the Yellowstone River for irrigation purposes immediately after spring runoff, leaving only a few that are suitable for maintaining spawning runs. Cope (1957) suggested that Yellowstone cutthroat trout may have more than one genetic group within individual streams, and each group may select different areas for spawning. Historically, a number of distinct genetic groups of Yellowstone cutthroat may have existed in the Montana portion of the Yellowstone River, each one using a different tributary for spawning purposes. Many of these genetic groups may have been eliminated with the advent of complete dewatering of tributaries for irrigation.

Yellowstone cutthroat trout spawning runs were documented in 9 of 16 ~~potential~~ tributaries inventoried during the 3-year period. Streams with confirmed cutthroat runs include Cedar, Mol Heron, Tom Miner, Rock, Big, Mill, Emigrant Spring, McDonald Spring and Nelson Spring Creeks. No migratory cutthroat were found in Billman, Mission, Dry, Eightmile, Pine, Sixmile or Deep Creeks. Due to limited sampling

Table 3. Estimated fish populations for five sections of the Yellowstone River. Confidence intervals for total number, total biomass, and condition factor expressed at the 80 percent level are shown in parentheses. (Mont. Dept. Fish and Game, 1975)

Section, Length and Date	Fish Species	Length Range (in.)	Total No.	No. per 1000'	Total Lbs.	Lbs. per 1000'	Condition Factor (Fish ≥ 5")	Catchable Fish/ 1000'
Mallard Rest								
29,436 ft	LL[1/]	5.0 -24.0	7304	248	7128	242	37.0	214[2/]
11/08/72			(± 1511)		(± 1949)		(± 5.0)	
16,500 ft	LL	5.8 -19.9	1371	83	996	60	37.0	73
5/10/73			(± 320)		(± 205)		(± 7.6)	
	Rb	7.2 -21.2	1626	99	1822	110	36.9	99
			(± 397)		(± 475)		(± 4.5)	
	YCt	10.6 -21.8	69	4	73	4	40.3	4
			(± 20)		(± 21)		(± 3.4)	
7,524 ft	Wf	9.1 -22.0	17,326	2303	9015	1198	30.6	1039
3/20/73			(± 3589)		(± 1560)		(± 2.1)	
Emigrant								
4,686 ft	LL	5.5 -17.8	405	86	209	45	35.9	73
5/07/73			(± 88)		(± 43)		(± 5.5)	
	Rb	10.9 -17.6	63	13	57	12	37.7	13
			(± 22)		(± 20)		(± 4.9)	
	LnSu	13.7 -21.1	4735	1010	10,408	2221	41.7	-
			(± 1380)		(± 3034)		(± 5.5)	
3/30/73	Wf	7.0 -20.8	18,657	3981	7016	1497	29.5	776
			(± 2757)		(± 699)		(± 3.2)	
Sheep Mtn. Side Channel I	YCt	7.5 -15.7	16	3	12	2	40.6	3
			(± 5)		(± 4)		(± 3.1)	
5,775 ft	Rb	7.2 -19.1	186	32	162	28	40.7	32
4/16/74			(± 56)		(± 48)		(±10.9)	
	LL	7.0 -21.2	531	92	444	77	38.8	92
			(± 71)		(± 58)		(± 7.2)	

Table 3/2 continued. Estimated fish populations for five sections of the Yellowstone River. Confidence intervals for total number, total biomass, and condition factor expressed at the 80 percent level are shown in parentheses.

Section, Length and Date	Fish Species	Length Range (in.)	Total No.	No. per 1000'	Total Lbs.	Lbs. per 1000'	Condition Factor (Fish ≥ 5")	Catchable Fish/ 1000'
Sheep Mtn. Side Chnl. II 3,960 ft 4/18/74	Rb	8.4 -19.7	148 (± 53)	37	173 (± 63)	44	39.9 (± 4.6)	37
	LL	14.0 -22.7	85 (± 17)	21	143 (± 30)	36	36.8 (± 4.6)	21
Sheep Mtn. Main Channel 4,026 ft 4/17/73	Wf	9.0 -18.9	8448 (±1919)	2098	5532 (± 1170)	1374	29.5 (± 3.7)	1216
Springdale Side Chnls. 7,165 ft 11/11/74	Rb	10.0 -19.7	102 (± 23)	14	98 (± 20)	14	39.1 (± 4.4)	14
	LL	7.3 -23.8	690 (± 98)	96	507 (± 60)	71	37.5 (± 4.6)	96
4,240 ft 11/11/74	Wf	9.7 -20.1	788 (± 78)	186	645 (± 60)	152	30.0 (± 4.0)	166
	WSu	11.0 -18.1	252 (± 34)	59	262 (± 33)	62	41.2 (± 4.3)	-

1/ Abbreviations: Rb - rainbow trout, LL - brown trout, YCt - Yellowstone cutthroat trout, Wf - mountain whitefish, LnSu - longnose sucker, WSu - white sucker.

2/ Catchable trout ≥ 7" in total length; catchable whitefish ≥ 12" in total length.

conducted on the latter tributaries, it is not possible at this time to determine the presence or absence of a cutthroat spawning run.

The lower reaches of 13 Yellowstone River tributaries were investigated for brown trout spawning runs during the spawning season in the fall of 1974 and during the rainbow trout spawning season in the spring of 1975. Brown and rainbow trout spawning runs were found in 4 of the 13 tributaries. Migratory brown trout were taken in the tributaries from early November through early December 1974, and rainbow were found from early April through early May 1975.

Brown and rainbow trout selected only spring creek tributaries for spawning and were not found in any mountain streams. The four spring-fed streams which contained brown and rainbow trout spawning runs include Armstrong Spring, Nelson Spring, McDonald Spring and Emigrant Spring Creeks. These are the only major spring creeks found in the study area.

Tagging studies indicate that some fish migrate several miles in an upstream or downstream direction in the Yellowstone River to reach a spring creek, then ascend it to spawn.

The two native salmonid fish species, Yellowstone cutthroat trout and mountain whitefish, appear to be particularly dependent on the tributary streams for spawning.

Yellowstone cutthroat trout residing in the Yellowstone River mainstem move at least as far as 12-14 miles to utilize their natal streams for spawning purposes. There is no evidence that cutthroat spawn in the mainstem of the Yellowstone. Mountain whitefish also exhibit extensive movements in the mainstem of the Yellowstone to reach spawning tributaries. Rainbow and brown trout show similar but less extensive spawning movements into tributary streams.

Mountain whitefish spawning runs were documented and monitored in 6 of the 13 tributaries. These included Mol Heron, Tom Miner, Big, Eightmile, Fridley and Mission Creeks. No migratory whitefish were found in limited sampling conducted on Rock, Cedar, Billman, McDonald Spring, Nelson Spring, Emigrant Spring and Armstrong Spring Creeks. Migratory mountain whitefish were found spawning in the tributaries from October 15 to December 5, 1974. The runs peaked in early November. In most streams where migratory whitefish were found, a tremendous number of fish was involved in the run.

Cutthroat trout were the most widely distributed fish species, occurring in 13 of the 21 tributary systems surveyed. Cutthroat trout were most abundant in the headwater areas, but normally were distributed throughout the entire length of the drainages in which they occurred.

The Yellowstone strain of cutthroat trout is indigenous to the study area. The range of the native pure strain now appears to be very restricted. A segment of the cutthroat population in the mainstem of the Yellowstone is visually a pure strain of Yellowstone cutthroat. Pure strains could not be identified in resident populations of any tributary streams, but it is possible that pure stocks do inhabit some tributaries.

Shields River (Mont. Dept. Fish & Game 1975)

Fish populations were inventoried in 15 survey sections from the origin to the mouth of the Shields River during July, August and September 1974 to determine relative abundance and longitudinal distribution of fish species in the mainstem. A total of 11 fish species was taken on the Shields River mainstem during sampling. Their longitudinal distribution is illustrated in Figure 3.

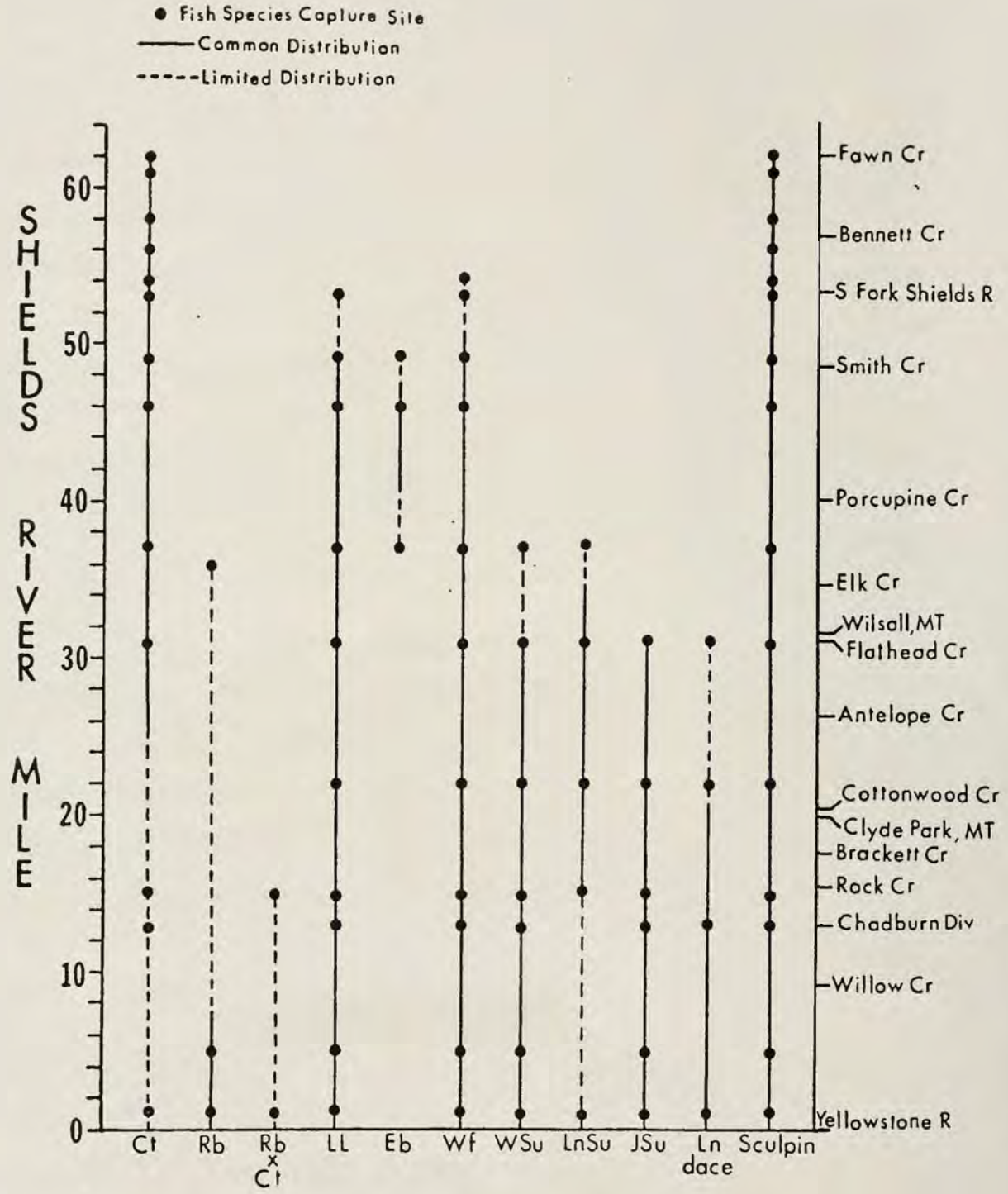

Figure 3A. Longitudinal distribution of fish species in the mainstem of the Shields River (Mont. Dept. Fish & Game 1975).

Cutthroat trout and mottled sculpin are the most cosmopolitan fish species found in the Shields River mainstem, each occurring throughout the entire 62-mile length of the stream. Cutthroat trout are the most abundant in the upper mainstem, with only an occasional specimen found on the lower 25 miles of the river. Mountain whitefish and brown trout are common in the Shields River below the confluence of the South Fork (Shields River mile 53). Brook trout distribution is limited to a 10-15 mile reach of the Shields River immediately upstream from Wilsall, Montana. This portion of the Shields River normally experiences severe dewatering during the irrigation season. Rainbow trout distribution is essentially limited to the lower 5-10 miles of the Shields River. Wipperman and Elser (1968) reported two rainbow were taken in a 9000-foot study section on the Shields River above Wilsall at about river mile 36 in 1967.

Macroinvertebrates

A total of 78 macroinvertebrate species representing 6 orders has been identified from 5 monthly samples taken on the Yellowstone River at Corwin Springs, Mallard Rest Fishing Access Site, Livingston and above the confluence of the Shields River (Newell 1975). Continuing investigations will probably add new species to the list. Fifty-eight of the 78 species identified to date are in the mayfly, stonefly and caddisfly orders. These species are primarily gill breathing forms indicative of clean, unpolluted water. High species diversity values confirm the presence of healthy macroinvertebrate communities in the upper Yellowstone River (Mont. Dept. Fish & Game, 1975).

Figure 4 shows longitudinal distribution of the three major orders of macroinvertebrates (stoneflies, mayflies and caddis flies) in the Yellowstone River. Table 4 gives location of corresponding

TABLE 4. Yellowstone River sampling stations. (from Newell, 1975)

No.	Location	County	Elevation	River Mile *
1	Corwin Springs	Park	5110 ft.	549
2	Mallard Rest Access	"	4620	515
3	above Livingston	"	4490	501
4	above Shields River	"	4380	497
5	Grey Bear access	Sweetgrass	4100	468
6	below Greycliff	"	3880	444
7	Columbus	Stillwater	3566	411
8	Laurel	Yellowstone	3294	391
9	Duck Creek Bridge	"	3140	360
10	Huntley	"	3110	349
11	Custer	"	2720	300
12	Bighorn River	Treasure	2700	296
13	Myers	"	2640	279
14	Forsyth	Rosebud	2490	234
15	Miles City	Custer	2335	184
16	Terry	Prairie	2190	138
17	Glendive	Dawson	2045	93
18	Intake	"	1998	71
19	Sidney	Richland	1892	30
20	Cartwright, N.D.	McKenzie	1850	9

* Mouth of the Yellowstone River is river mile 0.0 .

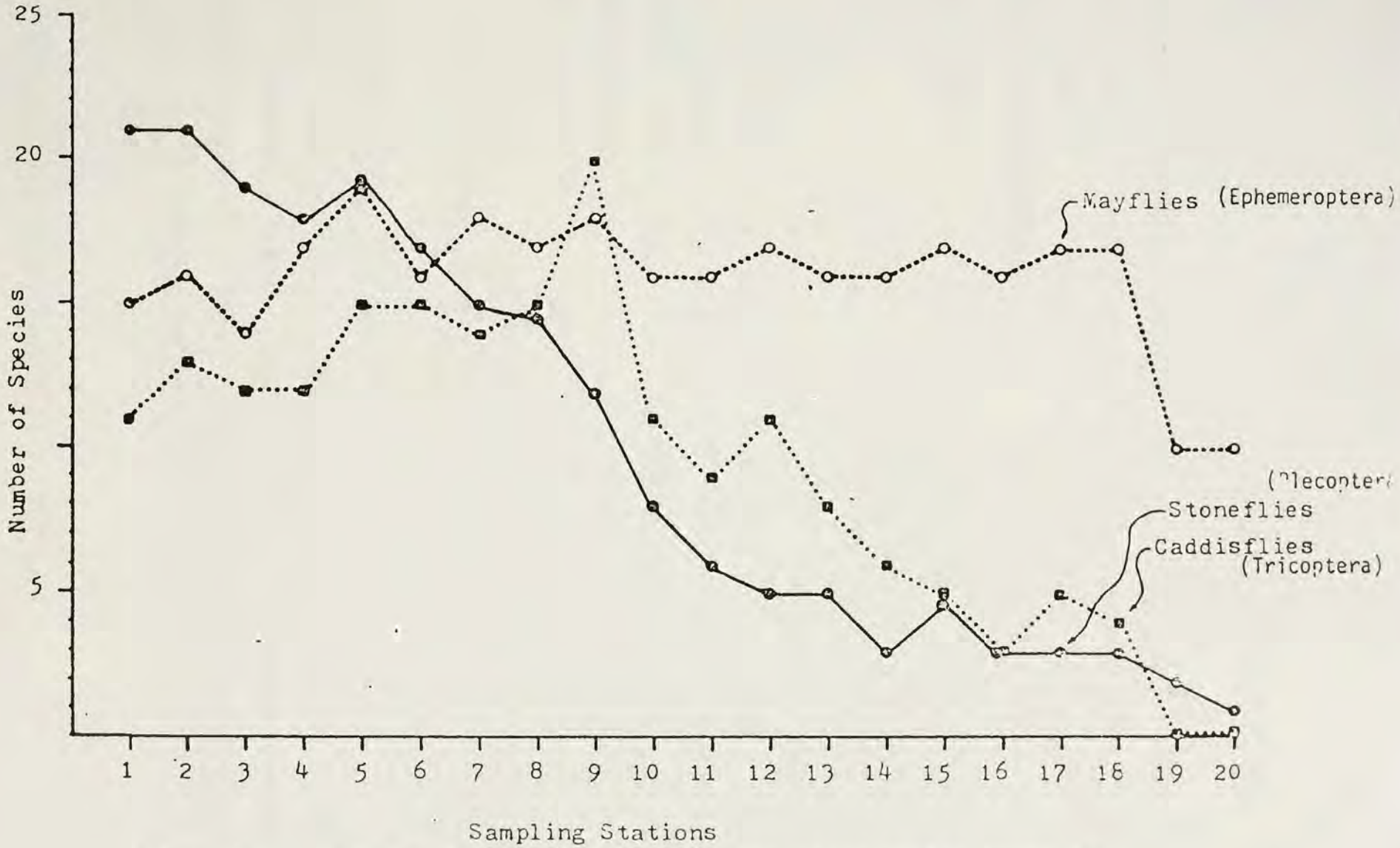

Figure 4. Number of species of the three major orders found at each sampling station in the Yellowstone River. (from Old West Regional Commission, 1974)

sample stations. ~~(DNRC [illegible] June 1976)~~

Species diversity is a measure of the health of an aquatic community. Species diversity indices for the Yellowstone River are given in Table 5.

A high (>3.0) Shannon-Weaver index generally means a healthy community while a low index (<1.0) generally means the community is under some type of stress (Wilhm 1970 abc). The data represent only 5 months of sampling, but it appears none of the sampling stations are currently under any excessive environmental stress.

Periphyton

Algae are probably responsible for the major share of primary production within the Yellowstone River ecosystem (Loren Bahls pers. comm.[2]). Based on preliminary observations, the cosmopolitan green algae *Cladophora* is the single most important genus in the river, at least during autumn when the analyzed samples were taken. *Cladophora* purify the water and serve as an attachment site for aquatic invertebrates and other algae. Diatoms are the most diverse and perhaps the most important group of Yellowstone algae. Diatoms are functionally important in purifying water and are grazed by aquatic macroinvertebrates. Dozens of diatom genera and over 100 species have been identified in preliminary investigations (Bahls 1975, cited in Mont. Dept. Fish and Game, 1975)

Middle Yellowstone River

The middle Yellowstone extends from Big Timber to the mouth of the Bighorn River. This portion of the river contains both cold and warm water species and represents the transition zone between the upper cold water and lower warm water environments. Sampling in the vicinity of Reed Point was done with 125-foot graduated mesh (3/4-2") experimental gill nets set for approximately 24 hours and by electrofishing with a mobile electrode unit (Peterman unpubl. data)[3].

2/ Pers. Comm. to Rod K. Berg, Mont. Dept. Fish + Game, Livingston, MT.

Table 5. Species Diversity Indices (from Newell, 1975)

Sta.	$\bar{d}$ (Max.)	Max. Theoretical Diversity Min.	Max.	Min. Theoretical Diversity Min.	Max.	Redundancy Min.	Max.	Evenness Min.	Max.	Equitability Min.	Max.	Richness Min.	Max.
1	2.39	3.82	4.82	0.19	0.42	0.15	0.55	0.48	0.85	0.21	0.36	1.65	2.84
2	3.11	3.22	4.33	0.11	0.54	0.25	0.35	0.66	0.81	0.26	0.39	2.17	2.74
3	2.70	3.24	3.89	0.08	0.42	0.19	0.45	0.56	0.81	0.20	0.37	1.96	2.33
4	2.72	3.52	3.67	0.16	0.61	0.24	0.47	0.57	0.76	0.26	0.33	1.82	2.43
5	3.19	3.37	4.56	0.25	0.49	0.19	0.32	0.69	0.85	0.32	0.40	2.42	2.84
6	2.97	3.61	4.48	0.22	0.50	0.36	0.44	0.57	0.69	0.27	0.34	2.09	2.66
7	3.60	3.29	4.72	0.39	0.73	0.23	0.29	0.75	0.76	0.36	0.43	2.28	3.19
8	3.84	2.85	4.28	0.78	0.98	0.12	0.24	0.79	0.87	0.43	0.53	1.94	3.34
9	3.12	3.58	4.55	0.42	0.84	0.35	0.40	0.66	0.70	0.33	0.39	2.10	2.76
10	3.20	2.83	4.25	0.17	1.13	0.13	0.82	0.22	0.82	0.09	0.31	0.77	2.69
11	2.21	3.74	4.47	0.18	0.53	0.45	0.62	0.41	0.60	0.18	0.29	1.64	1.95
12	2.74	3.13	4.12	0.30	1.00	0.33	0.36	0.66	0.70	0.30	0.42	2.01	2.43
13	1.53	4.44		0.13		0.67		0.34		0.14		1.39	
14	2.94	4.17		0.63		0.35		0.67		0.37		2.57	
15	1.75	4.01		0.28		0.60		0.44		0.20		1.56	
16	-	-		-		-		-		-		-	
17	1.90	2.82		0.39		0.38		0.68		0.28		1.62	
18	2.84	3.91		0.73		0.34		0.69		0.39		2.45	
19	2.41	2.97		0.66		0.24		0.76		0.39		2.02	
20	3.36	3.96		1.04		0.21		0.84		0.51		2.84	

Overnight gill net sets were used exclusively to sample the Yellowstone from Laurel to the mouth of the Bighorn River (Marcuson 1974 as cited in Mont. Dept. Nat. Res. and Cons., Energy Plan. DIO. 1974).

The six overnight gill net sets and limited electrofishing in the vicinity of Reed Point resulted in the capture of 11 species, including rainbow and brown trout, mountain whitefish, longnose, white and mountain suckers, stonecat, shorthead redhorse, burbot, longnose dace and mottled sculpin (Peterman unpubl. data)[4].

A total of 39 overnight gill net sets was made in the Yellowstone from Laurel downstream to the Bighorn River (Table 6). Six brown and two rainbow trout were captured in five nets in the river from the Highway 212 bridge at Laurel to the confluence of the Clarks Fork of the Yellowstone River. Between Clarks Fork and the east bridge in Billings ~~captured~~ were captured. Sampling 10 brown and 1 rainbow trout. Between the east bridge and the Huntley diversion dam to the mouth of the Bighorn River produced no trout, but 12 channel catfish and 16 sauger were taken in 12 net sets (Marcuson 1974 as cited in Mont. Dept. Nat. Res & Cons. 1974.)

No additional fisheries data are currently available on the middle Yellowstone River mainstem.

A major tributary, the Stillwater River, enters the middle Yellowstone at Columbus. The Stillwater is a cold water stream originating high in the Absaroka-Beartooth Mountain range. A fisheries and water quality ~~quality~~ inventory study was ~~recently~~ undertaken in (1971) in this drainage because anticipated extensive mining in the area seems likely in the near future (Stewart 1975). Chemical and biological data on waters draining the area were lacking. However, five years of inventory data have strengthened knowledge of these waters.

Water quality was generally good in the Stillwater region. Past mining activities have adversely affected portions of a few streams

[4] Peterman, Larry. Mont. Dept. Fish & Game, Miles City, MT.

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Table 10-64

Summary of Overnight Gill Net Sets for Four Areas of the Middle Yellowstone River 1970-1973
Expressed as Fish per Net Set
(Data from Marcuson 1974)

Species	Laurel to mouth of Clarks Fork 5 Nets	Mouth of Clarks Fork to Billings 16 Nets	Billings to Huntley 6 Nets	Huntley to Mouth of Bighorn River 12 Nets
Goldeye	4.40	6.31	1.83	17.50
Mountain whitefish	.40	.19	.17	
Rainbow trout	.40	.06		
Brown trout	1.20	.63	.83	
Carp		.13		.25
Flathead chub		2.63	1.17	.08
River carpsucker		.44		.33
Shorthead redhorse	.40	.56	.17	.83
Longnose sucker	2.20	1.19	.83	.25
White sucker	3.20	6.69	17.33	1.33
Black bullhead	.60	1.13		
Channel catfish				1.00
Stonecat				.17
Burbot	.80	.06		.17
Sauger		.06		1.33
Total	13.60	20.08	22.33	23.24

by lowering water quality. This lowered water quality has in turn reduced fish populations of those stream reaches.

Game fish populations are composed entirely of five salmonid species: ranibow, cutthroat, brown and brook trout and mountain whitefish. Rainbow-cutthroat hydrids also are found. Nongame species include longnose sucker, mountain sucker and longnose dace. In smaller tributaries fish populations are lacking, except near the mouth, in most small streams and in the upper reaches of nearly all streams (Stewart 1975). Fish populations are maintained almost entirely by natural reproduction despite the fact that hatchery fish are stocked in all of the larger streams. The Stillwater is a prime recreational area and its proximity to the city of Billings makes it especially important.

Aquatic macroinvertebrates

In addition to the distribution of the major aquatic macroinvertebrates species shown in Table 4 additional data for the middle Yellowstone has recently been reported by Schwehr, (1976). This study inventoried invertebrate populations at seven stations between Big Timber and Custer. A total of 136 species of invertebrate fauna were collected from the middle river (Table 7). Results of the study show the middle river to have a rich and diverse community of aquatic macroinvertebrates. In addition to determining species composition and distribution of the populations in the river reach, water velocity and depth measurements were made when bottom samples were taken. Regression analyses indicated that the number of genera and number of organisms are correlated with water velocity and depth. Velocity preferences were determined for the major insect species. The study concluded that reduced discharge could decrease abundance and richness of the communities present in the river.

Table 7. Checklist of the Aquatic Macroinvertebrates of the Middle Yellowstone River. (from Schuehr 1976)

Phylum Arthropoda
  Order Ephemeroptera
    Family Siphlonuridae
      Ameletus sp. (? oregonensis McDunnough)
    Family Baetidae
      Callibaetis sp. A
      Pseudocloeon sp. A
      Baetis insignificans McD.
      Baetis parvus Dodds
      Baetis tricaudatus Dodds
      Baetis bicaudatus Dodds
      Dactylobaetis cepheus Traver and Edmunds
    Family Heptageniidae
      Epeorus (Iron) albertae (McD.)
      Cinygmula sp. A
      Heptagenia elegantula (Eaton)
      Rhithrogena undulata (Banks)
      Stenonema terminatum (Walsh)
    Family Leptophlebiidae
      Choroterpes albiannulata McD.
      Leptophlebia gravastella Eaton
      Paraleptophlebia bicornuta (McD.)
      Paraleptophlebia heteronea (McD.)
      Traverella albertana (McD.)
    Family Ephemerellidae
      Ephemerella (Attenuatella) margarita Needham
      Ephemerella (Drunella) doddsi Needham
      Ephemerella (Drunella) grandis grandis Eaton
      Ephemerella (Ephemerella) inermis Eaton
      Ephemerella (Timpanoga) hecuba hecuba (Eaton)
    Family Tricorythidae
      Tricorythodes minutus Traver
      Tricorythodes sp. A
    Family Ephemeridae
      Ephemera sp. A
    Family Polymitarcidae
      Ephoron album (Say)
    Family Caenidae
      Brachycercus sp. (? prudens McD.)
      Caenis latipennis Banks

  Order Trichoptera
    Family Rhyacophilidae
      Rhyacophila bifila Banks
      Glossosoma velona Ross
    Family Psychomyiidae
      Polycentropus cinereus Hagen
      Psychomyia flavida Hagen

Table 7-Continued

Family Hydropsychidae
Arctopsyche grandis (Banks)
Potamyia flava (Hagen)
Hydropsyche oslari Banks
Hydropsyche cockerelli Banks
Hydropsyche occidentalis Banks
Cheumatopsyche enonis Ross
Cheumatopsyche analis (Banks)
Cheumatopsyche campyla Ross
Family Hydroptilidae
Agraylea multipunctata Curtis
Hydroptila sp. A
Neotrichia sp. A
Family Limnephilidae
Hesperophylax incisus Banks
Family Leptoceridae
Leptocella sp. A
Athripsodes sp. A
Oecetis avara (Banks)
Oecetis disjuncta (Banks)
Triaenodes frontalis Banks
Family Lepidostomatidae
Lepidostoma vel la Denning
Lepidostoma pluvialis Milne
Family Brachycentridae
Amiocentrus aspilus (Ross)
Brachycentrus americanus (Banks)
Brachycentrus occidentalis Banks
Family Helicopsychidae
Helicopsyche borealis (Hagen)*

Order Plecoptera
Family Taeniopterygidae
Brachyptera (*Taenionema*) *nigripennis* (Banks)*
Brachyptera (*Taenionema*) *pacifica* (Banks)
Brachyptera (*Taenionema*) *pallida* (Banks)
Family Nemouridae
Nemoura (*Prostoia*) *besametsa* Ricker
Nemoura (*Zapada*) *cinctipes* Banks
Family Capniidae
Capnia (*Capnia*) *confusa* Claassen*
Capnia (*Capnia*) *limata* Frison
Eucapnopsis vedderensis Ricker*
Isocapnia missouri Ricker
Isocapnia vedderensis Ricker*
Capnia (*Utacapnia*) *poda* Nebeker and Gaufin*
Family Pteronarcidae
Pteronarcella badia Hagen
Pteronarcys (*Pteronarcys*) *californica* Newport

Table 3-Continued

- Family Perlodidae
  - Isogenus (Cuitus) frostonus Ricker
  - Isogenus (Isogenoides) elongatus Hagen
  - Arcynopteryx (Skwala) parallela (Frison)
  - Isoperla fulva Claassen
  - Isoperla longiseta Banks
  - Isoperla mormona Banks
  - Isoperla patricia Frison
- Family Chloroperlidae
  - Alloperla (Alloperla) severa (Hagen)*
  - Alloperla (Suwallia) pallidula (Banks)
  - Alloperla (Sweltsa) coloradensis (Banks)
  - Alloperla (Triznaka) signata (Banks)
- Family Perlidae
  - Claassenia sabulosa (Banks)
  - Acroneuria (Hesperoperla) pacifica Banks

Order Diptera

- Family Chironomidae
  - Subfamily Tanypodinae
    - Ablabesmyia sp. A
  - Subfamily Chironominae
    - Chironomus sp. A
    - Cryptochironomus sp. A
    - Microtendipes sp. A
    - Paralauterborniella sp. A
    - Phaenopsectra sp. A
    - Rheotanytarsus sp. A
    - Stictochironomus sp. A
    - Tribelos sp. A
  - Subfamily Diamesinae
    - Diamesa sp. A
    - Pseudodiamesa sp. A
  - Subfamily Orthocladiinae
    - Brillia sp. A
    - Cardiocladius sp. A
    - Cricotopus sp. A
    - Eukiefferiella sp. A
    - Orthocladius sp. A
    - Trichocladius sp. A
- Family Tipulidae
  - Antocha sp. A
  - Dicranota sp. A
  - Hexatoma sp. A
  - Molorusia sp. A
  - Tipula sp. A
- Family Culicidae
  - Subfamily Culicinae
- Family Simuliidae
  - Simulium vittatum Zetterstedt

Table 3-Continued

Family Tanyderidae
Protoplasa fitchii Osten Sacken
Family Empididae
Hemerodromia sp. A
Family Muscidae
Limnophora sp. A
Family Rhagionidae
Atherix variegata Walker

Order Lepidoptera
Family Pyralidae
Cataclysta sp. A*

Order Hemiptera
Family Corixidae
Sigara alternata Say
Family Veliidae
Rhagovelia distincta Champion
Family Gerridae
Gerris remigis Say

Order Coleoptera
Family Dytiscidae
Agabus sp. A
Oreodytes sp. A
Family Dryopidae
Helichus striatus LeConte*
Family Elmidae
Dubiraphia sp. A
Microcylloepus pusillus (LeConte)
Optioservus divergens (LeConte)*
Optioservus quadrimaculatus (Horn)
Zaitzevia parvula (Horn)
Family Gyrinidae
Gyrinus sp. A

Order Odonata
Family Gomphidae
Ophiogomphus sp. A
Family Libellulidae
Miathyria sp. A
Tauriphila sp. A
Family Lestidae
Lestes congener Hagen
Family Coenagrionidae
Amphiagrion sp. A

Order Isopoda
Family Asellidae
Asellus racovitzai racovitzai Williams

Table 3-Continued

Order Acari
  Suborder Prostigmata (Hydracarina)

Order Amphipoda
  Family Gammaridae
    Gammarus lacustris Sars
  Family Talitridae
    Hyalella azteca (Saussure)

Phylum Platyhelminthes
  Order Tricladida
    Family Planariidae
      Phagocata sp. A

Phylum Annelida
  Order Oligochaeta

Phylum Mollusca
  Order Basommatophora
    Family Lymnaeidae
      Lymnaea sp. A
    Family Physidae
      Physa sp. A

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*These species were not collected during the study, but were reported by Stadnyk (1971), Gaufin et al. (1972), Thurston et al. (1975), or Newell, (1976).

Lower Yellowstone River (from DNR&C, 1974)

The lower Yellowstone, below the mouth of the Bighorn River contains a variety of fish commonly called warmwater species. Little was known about fish species composition and distribution until sampling was initiated in 1973. Due to the variety of habitats found in the river, a number of sampling techniques were tried, including 125-foot graduated mesh (3/4- to 2-inch) experimental gill nets, 300-foot graduated mesh (2½- to 4-inch) gill nets, hoop nets, seines, set lines, a mobile electrode unit and a boom-type electrofishing unit. The 125-foot experimental gill nets were used during both spring and fall sampling to inventory the species present and provide data on species distribution. These nets were usually set for a period of between 18 and 24 hours and limited to areas of relatively low current velocities. A 100-foot, ¼-inch mesh seine was used in selected areas.

Investigations into angler harvest, movements, and life history of the paddlefish in the lower river were initiated in 1964 by the Department of Fish and Game and are continuing (Elser, 1974a). General fisheries inventory work was begun on the lower river in the spring of 1973 in the vicinity of the MPC intake structure near the mouth of Armells Creek. The initial investigations were conducted during two periods, March 28-30 and May 2-4, 1973. Sampling was intense, but lacked extensiveness and seasonal coverage. Fisheries investigations were continued in August 1973 to assess the impacts of potential water withdrawals for Colstrip Units 3 and 4. These investigations were concentrated in the area between Hysham and Miles City, with limited sampling in the vicinity of Terry and Intake.

During the first sampling period in March of 1973, 31 overnight gill net sets produced 13 species with an average catch of 37.7 fish per net set. The second sampling, May 1973, produced 13 species from 10 net sets with an average catch rate of 67.9 fish per set. Goldeye were the dominant species in the catch during both sampling periods, contributing 29.4 and 57.5 fish per net, respectively (Table 8).

During the fall of 1973, five areas of the lower Yellowstone were sampled with 89 gill net sets. The areas sampled were in the vicinities of Hysham, Forsyth, Miles City, Terry, and Intake with 15, 24, 33, 6 and 11 nets being set in each area respectively. Nets were set in a variety of river habitats including main channels, backwaters, creek mouths, and side channels, in quiet waters and in association with various current velocities.

A total of 3678 fish of 23 species was taken for all fall gill net samples, with an average catch rate of 41.33 fish per net set. Goldeye dominated the total catch, accounting for 69.5 percent, while channel catfish, river carpsucker, and sauger made up 10.4 percent, 6.7 percent and 4.7 percent of the total catch respectively (Table 9).

Electrofishing during spring of 1973 near Armells Creek produced the same species as did the gill nets; however, the relative abundance of species in the catch was different. Shorthead redhorse dominated the spring electrofishing catch, contributing 27.1 percent as compared to 2.1 percent for spring gill net catches.

Sampling in the spring of 1974 was conducted in an attempt to obtain estimates of population structure, numbers and biomass for as many species as possible in three 1-mile sections of river near Forsyth.

The total catch for all three sections was 4,698 fish of 19 species.

Table ~~10-65~~ 8

Summary of Gill Net Samples from the Yellowstone River near Armells Creek, 1973
Expressed as the Average Number of Fish per Net Set
(Elser 1974 as cited in DNR+C, 1974)

Species	March 28-30	May 2-4
Goldeye	29.38	57.50
Northern pike	0.05	
Carp	0.09	1.10
Flathead chub	0.09	0.60
River carpsucker	3.76	2.20
Smallmouth buffalo	1.05	0.70
Shorthead redhorse	0.80	1.40
Longnose sucker	0.14	
White sucker	0.19	0.50
Mountain sucker		0.10
Channel catfish	0.52	2.30
Stonecat	0.48	0.30
Burbot	0.24	0.30
Black crappie		0.10
Sauger	0.86	0.80
Total	37.65	67.90

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Table 15. Summary of gill net survey on the lower Yellowstone River in the fall of 1973, expressed as number of fish per net set.

Species	Hysham Section	Forsyth Section	Miles City Section	Terry Section	Intake Section
Shovelnose sturgeon	-	-	-	0.17	0.82
Goldeye	41.86	19.17	29.12	49.67	19.18
Rainbow trout	-	-	-	0.17	-
Northern pike	-	0.04	0.06	-	0.36
Carp	0.87	1.21	0.52	0.33	0.45
Goldfish	-	-	0.03	-	-
Flathead chub	0.07	0.62	0.24	0.17	0.09
River carpsucker	3.53	3.25	2.03	3.83	2.18
Smallmouth buffalo	0.33	0.38	0.06	-	-
Shorthead redhorse	1.67	2.08	0.48	0.50	-
Longnose sucker	0.53	0.50	0.33	0.17	0.09
White sucker	0.40	0.38	0.18	0.67	0.09
Black bullhead	-	0.04	-	-	-
Channel catfish	7.13	5.00	3.70	1.33	2.36
Stonecat	0.20	0.17	0.06	-	0.18
Burbot	-	0.04	-	-	0.09
Smallmouth bass	-	-	0.03	-	-
White crappie	0.13	-	0.09	0.33	-
Black crappie	-	0.25	-	0.17	-
Yellow perch	-	0.21	-	-	-
Sauger	1.13	2.04	1.45	3.83	3.09
Walleye	0.13	-	-	0.17	0.09
Freshwater drum	-	-	0.09	-	-
Total	57.98	35.38	38.47	61.51	29.07

Goldeye dominated the catch, accounting for 55.4 percent of the total. Carp, river carpsuckers, shorthead redhorse, and longnose sucker made up 17.9 percent, 17.2 percent, 3.9 percent, and 1.6 percent of the catch, respectively (Table 10). The sauger and walleye spawning run, which occurs at the Rosebud diversion, was monitored from April 5 to May 20, 1974. Other important sport fish were captured coincidental to sauger and walleye sampling and handled in the same manner. Four hundred thirty fish, including 301 sauger and 13 walleye, were tagged and released.

Nineteen of the sauger marked were recaptured, providing a 6.4 percent return of marked sauger.

It was estimated that 2024 sauger were present in the Section 4 during the sampling period. Confidence intervals (Chapman and Overton, 1966) at the 80 percent level were 1564 to 2867. While this estimate cannot be considered accurate, it is probably indicative of the magnitude of the sauger numbers present.

Sauger and walleye were apparently spawning in the section during the sampling period. The first ripe male sauger and ripe female walleye were taken during the last week of April. Ripe female sauger were not taken until the second week of May. A spent female sauger was taken on May 20, along with several spent female walleyes.

Eight (2.7 percent) of the tagged sauger were returned by anglers. Five fish were taken in the area where they were tagged, and three exhibited movement. Two fish, tagged on May 8 and 20, were caught at the Myers diversion on July 26, after an upstream movement of approximately 30 miles. Another sauger tagged April 17 was caught at the mouth of the Tongue River on April 22, having moved approximately 55 miles downstream in 5 days.

Table 10

Species Composition and Relative Abundance of Electrofishing Catch, near Forsyth, Spring 1974

Species	No. Fish	Percentage of Total
Shovelnose sturgeon	3	Tr[1]
Goldeye	2,604	55.4
Brown trout	1	Tr[1]
Northern pike	1	Tr[1]
Carp	843	17.9
River carpsucker	808	17.2
Blue sucker	1	Tr[1]
Smallmouth buffalo	29	Tr[1]
Bigmouth buffalo	28	Tr[1]
Shorthead redhorse	182	3.9
Longnose sucker	73	1.6
White sucker	46	1.0
Mountain sucker	1	Tr[1]
Channel catfish	22	Tr[1]
Burbot	17	Tr[1]
Green sunfish	1	Tr[1]
Sauger	29	Tr[1]
Walleye	6	Tr[1]
Freshwater drum	3	Tr[1]
Total	4,698	

[1] Trace

Other important sport fish species found in the lower river include burbot, channel catfish, shovelnose sturgeon, northern pike, paddlefish and goldeye.

Burbot are commonly fished for at night in the mouths of small creeks or below diversion structures. Angling at night during March and April is probably the most effective method for sampling burbot at present. Burbot have been taken from Reed Point downstream and are common in the lower river.

Channel catfish are sought by many anglers in the lower river, and, based on warden creel checks, make up about 25 percent of the fishermen's catch. Channel catfish are abundant in the lower river below the Huntley project diversion near Billings.

Shovelnose sturgeon are common in the lower Yellowstone and found at least as far upstream as the Rosebud diversion structure at Forsyth. They are commonly taken by fishermen at the mouths of the Tongue and Powder Rivers and below the Intake diversion.

Northern pike are frequently caught by anglers in the lower river, usually in the mouths of tributaries or below diversion structures. Interviews with anglers indicate the species is commonly taken at the mouths of Big Porcupine and Rosebud Creeks, below the Rosebud diversion structure near Forsyth, in the mouth of the Tongue River, below the Intake diversion near Glendive, and at the mouth of Hay Creek near Sidney.

Paddlefish, probably the most popular sport fish in the lower river, occur only seasonally. Large numbers are taken by snaggers each year at the Intake diversion dam just downstream from Glendive. In some years they are also caught below the Rosebud diversion at Forsyth and at the mouths of the Tongue and Powder Rivers. Reports indicate that

at times they move upstream as far as the mouth of the Bighorn River.

Investigations of paddlefish spawning runs at Intake have yielded considerable data relating to numbers of fish in the run, structure of the population, and angler harvest. A total of 2,928 paddlefish has been tagged at Intake since 1964. To date, at least 10.1 percent of these tagged fish have been recaptured and reported. The majority (91.9 percent) of those recaptured were taken in the same area where they were tagged, but 24 fish tagged at Intake were caught in other areas. Twelve tagged fish were recaptured in Garrison Reservoir, approximately 200 miles downstream in North Dakota. Tagged fish have also been caught near Terry, at the mouth of the Tongue River, at Forsyth, and in the dredge cuts below Fort Peck Dam on the Missouri River (Elser 1974b).

Little is known about the spawning habits of paddlefish. A literature review indicates they apparently spawn over gravel in swift water at depths of 20 feet during high water in May to June (Purkett 1961). Spawning sites in the Yellowstone River are still unknown.

Goldeye are abundant in the lower Yellowstone from Billings downstream and have been taken as far upstream as Pine Creek above Livingston (Brown 1971a).

An estimate of goldeye populations was computed in 1973 for a section of river below Armells Creek. The population was estimated at 9,170 fish per mile of stream. This estimate is not completely reliable due to problems in recovering marked fish, but it is indicative of the large numbers of goldeye which inhabit the river.

Interest has recently been shown in the commercial harvest of goldeye from the lower river. A market is presently available for

Montana goldeye in Canada, and commercial utilization of this species from the Yellowstone in the near future is probable, since the current wholesale price for this species is approximately 20 cents per pound.

Other nongame fish are apparently abundant in the lower Yellowstone and are readily caught, but not actively sought by anglers. Although they are not important as a sport fishery, they do represent a valuable resource. Based on current population estimates for the United States, the demand for edible fish will reach 2.5 billion pounds per year by 1980 as compared to 1.9 billion pounds for 1960 (Barth 1969). With future increases in world population, utilization of these available protein sources may be necessary.

The most relevant point to be emphasized concerning these species at this time is that this abundant biomass is a clear indication of the great productivity of this natural river system.

Lower Yellowstone Tributaries

The three major tributaries of the lower Yellowstone, the Bighorn, Tongue and Powder Rivers, are under serious consideration for future water development projects related to industrial water uses. These tributaries must be considered important to the entire river system as sources of added flows and as important spawning and rearing areas for certain fish species which move into them from the Yellowstone. Many smaller tributaries may also be important spawning and rearing areas.

Bighorn River

With present water releases from Bighorn Reservoir (Yellowtail Dam), a substantial cold water fishery has developed in the portion of the river from the Afterbay Dam to St. Xavier. From St. Xavier

to the mouth, a diverse warm water fishery exists. The important species in the upper portion are brown and rainbow trout, while walleye, burbot and channel catfish are important in the lower reaches.

Electrofishing samples were taken in two 5-mile sections of the Bighorn River in October 1973. The upstream section started near the mouth of Soap Creek, and the downstream section began 17 miles below Hardin.

The eight species taken in the upper section were rainbow trout, brown trout, carp, longnose sucker, mountain sucker, shorthead redhorse, flathead chub and burbot.

Twelve species (Goldeye, carp, longnose sucker, mountain sucker, white sucker, shorthead redhorse, river carpsucker, flathead chub, stonecat, channel catfish, burbot and sauger) were taken in the lower section. The electrofishing catch was dominated by longnose sucker at 30.1 percent of the total catch, followed by carp, which made up 26.3 percent. Burbot, channel catfish and sauger accounted for 9 percent of the total.

Tongue River

At present the Tongue River provides one of the most diverse sport fisheries in the state. Popular sport fish in the Tongue include rainbow trout, brown trout, smallmouth bass, northern pike, rockbass, sauger, walleye, channel catfish and shovelnose sturgeon.

Three sections were electrofished on the Tongue River prior to spring runoff in 1973 to determine species composition and distribution. The sections are described as follows: National Fish Hatchery Section (I), 1.5 miles above the mouth; Viall Section (II), 60 miles above the mouth; and Birney Section (III), 92 miles above the mouth (Elser 1974*).

~~The electrofishing catch is summarized in Table 10-80~~. Sixteen species were taken in the three sections; Sections I and II had 12 species each, and Section III had 11 species. Longnose suckers predominated the catch in Section I, followed by goldeye and flathead chubs. The catch in Section II was dominated by flathead chubs, shorthead redhorse, and stonecats, and in Section III by shorthead redhorse and stonecats (Elser 1974a).

Goldeye were taken only in Section I, suggesting that the T and Y diversion dam located 12 miles upstream from the mouth is acting as an effective barrier to upstream movement. Smallmouth bass were taken only in Section III, while sauger were taken in all three sections. Young-of-the-year smallmouth and sauger in the samples indicate both species are reproducing successfully in the Tongue River (Elser 1974a).

Four seine hauls immediately downstream from the Tongue River Dam in April 1973 produced 488 fish. Longnose suckers and shorthead redhorse dominated the sample. However, 10 trout (6 rainbow and 4 brown) and 1 northern pike were taken and tagged. Rainbow trout are planted below the dam. Brown trout are not planted but have limited natural reproduction (Elser 1974a).

Sampling in the lower Tongue during the spring of 1974 provided data which indicate the Tongue may be important as a spawning area for several species of fish moving into it from the Yellowstone. Electrofishing runs in the National Fish Hatchery section from late April through May 1974 produced 155 sauger. Many males were ripe and apparently ready to spawn.

Shovelnose sturgeon were also found seasonally in large numbers in the lower Tongue below the T and Y diversion dam. Four hundred and eleven shovelnose sturgeon were taken during the period from April 24

to June 11, 1974 by drifting large mesh gill nets (2.5-4.0" mesh) in the National Fish Hatchery Section. These fish apparently migrated into the Tongue River from the Yellowstone to spawn. Many shovelnose sturgeon taken from the Tongue River were larger than any previously reported. Blue suckers were also present in large numbers and in spawning condition during this period (Peterman 1974).

Powder River

Due to the extremely turbid nature and seasonally low water conditions of the Powder River, only a limited sport fishery is provided. Shovelnose sturgeon are taken by anglers as far upstream as Broadus and channel catfish are also commonly caught along most of its length. Landowners along the Powder report having snagged paddlefish near Locate (Elser 1974, personal communication).[1]

Seining six locations in the Powder during the summer of 1973 produced seven species, including flathead chub, sturgeon chub, channel catfish, goldeye, river carpsucker, carp and stonecat.

Reservoirs

Sport fishing in southeastern Montana is supported primarily by a large number of ranch and farm ponds. These ponds vary in size from less than 1 acre to over 100 acres, but are generally between 5 and 20 acres. The primary consideration in pond construction is livestock watering, with sport fishing a secondary benefit.

Most of these ponds are managed for warm water species, usually northern pike, walleye, and largemouth bass. Some ponds are suitable for rainbow trout and are planted on a regular basis (Elser 1974).

The physical nature of these ponds and their fish populations are constantly changing; therefore, they are under intense management to provide quality fishing.

[1] Elser, Allen A. Mont. Dept. Fish + Game, Miles City, MT.

One large impoundment, the Tongue River Reservoir (3,500 surface acres), is located near the Montana-Wyoming border and provides a variety of warm water fishing for walleye, northern pike, smallmouth bass and crappie.

Table 12 lists the algae species which were collected at two locations (Custer and Myers) in the lower Yellowstone River in 1974. The most abundant algae by volume was *Cladophora*, a common sessile green algae. However, as a group, the diatoms were the most abundant and diverse. A total of 75 varieties and 23 genera of diatoms, six genera of green algae, two genera of bluegreen algae and one genus of red algae was identified. One species, *Fragilaria crotonensis*, is truly planktonic. All other taxa are either sessile or quasi-planktonic (Bahls 1974).

Further downstream plankton samples were collected near Armells Creek in 1973. Species composition is given in Table 13. The samples produced 39 species of algae (37 diatoms species and two species of green algae). Zooplankton also occurred in small numbers.

In the lower portion of the Yellowstone River, the plankton consist of sessile algae and bottom fauna dislodged from the substrate. They, therefore, are not true plankton, and their area of production is primarily the riffle areas where a suitable clean substrate exists. The lack of true plankton is a common characteristic of cool, fast-flowing rivers (Hynes 1970). Within such rivers, the periphyton is the primary producer and is no less important than true phytoplankton.

Aquatic Vertebrates other than Fish →

Information on vertebrates other than fish was obtained incidental to fisheries work. Turtles were collected while sampling fish, and

Table ~~10~~ 12-79

Algae Collected in Two Plankton Samples
from the Yellowstone River at Myers and Custer, Spring 1974
(Data from Bahls 1974)

DIATOMS (CHRYSOPHYTA)

Achnanthes deflexa
Achnanthes lanceolata
Achnanthes minutissima
Amphora ovalis var. *pediculus*
Biddulphia laevis
Caloneis amphisbaena
Cocconeis pediculus
Cocconeis placentula var. *euglypta*
Cyclotella glomerata
Cymatopleura solea
Cymbella affinis
Cymbella microcephala
Cymbella prostrata
Cymbella sinuata
Cymbella turgida
Cymbella ventricosa
Diatoma anceps
Diatoma tenue
Diatoma vulgare
Diatoma vulgare var. *breve*
Epithemia sorex
Epithemia zebra var. *saxonica*
Fragilaria construens
Fragilaria construens var. *venter*
Fragilaria crotonensis
Fragilaria vaucheriae
Fragilaria vaucheriae var. *novium*
Fragilaria sp.
Gomphoneis herculeana
Gomphoneis sp.
Gomphonema bohemicum
Gomphonema olivaceum
Gomphonema olivaceum var. *calcarea*
Gomphonema parvulum
Gomphonema parvulum var. *micropus*
Gyrosigma obtusatum
Gyrosigma sp.
Hannaea arcus
Mastogloia sp.
Meridion circulare
Navicula anglica var. *subsalsa*
Navicula arvensis
Navicula cryptocephala
Navicula cryptocephala var. *veneta*
Navicula grimmei
Navicula heufleri var. *leptocephala*
Navicula luzonensis
Navicula minima
Navicula muralis
Navicula pelliculosa
Navicula pupula
Navicula tripunctata
Navicula viridula
Navicula viridula var. *avenacea*
Navicula viridula var. *linearis*
Navicula sp.
Nitzschia acuta
Nitzschia capitellata
Nitzschia dissipata
Nitzschia epiphytica
Nitzschia fonticola
Nitzschia frustulum
Nitzschia hungarica
Nitzschia hybrida
Nitzschia kutzingiana
Nitzschia palea
Nitzschia romana
Nitzschia sigmoidea
Nitzschia sublinearis
Nitzschia sp.
Pinnularia subcapitata var. *paucistriata*
Rhoicosphenia curvata
Surirella ovata
Synedra acus
Synedra ulna var. *contracta*

GREEN ALGAE (CHLOROPHYTA)

Cladophora
Microspora
Mougeotia
Oedogonium
Spirogyra
Ulothrix

BLUE-GREEN ALGAE (CYANOPHYTA)

Oscillatoria
Spirulina

RED ALGAE (RHODOPHYTA)

Audouinella

Table 10-78

Flora and Fauna Collected in Plankton Samples
from the Yellowstone River near Armells Creek, Spring 1973

DIATOMS (CHRYSOPHYTA)

Navicula viridula
Navicula tripunctata
Navicula symmetrica
Navicula cryptocephala
Navicula cryptocephala var. *veneta*
Navicula salinarum var. *intermedia*
Navicula radiosa var. *tenella*
Navicula lanceolata
Nitzschia amphibia
Nitzschia capitellata
Nitzschia sp.
Nitzschia sublinearis
Nitzschia dissipata
Nitzschia acicularis
Cymbella sinuata
Cymbella ventricosa
Cymbella naviculiformes
Cymbella turgida
Cyclotella sp.
Cocconeis placentula var. *euglypta*
Achnanthes minutissima
Achnanthes lanceolata var. *dubia*
Amphora ovalis var. *pediculus*
Diatoma vulgare
Diatoma tenue
Fragilaria vaucheriae
Fragilaria virescens
Gomphonema constrictum
Gomphonema olivaceum
Hannaea arcus
Stauroneis smithii
Stephanodiscus sp.
Surirella ovalis
Surirella ovata var. *innata*
Surirella ovata var. *pinnata*
Pinnularia brevissonii
Rhoicosphenia curvata

GREEN ALGAE (CHLOROPHYTA)

Scenedesmus sp.
Chlorella sp. (Green coccoids)

MACROINVERTEBRATES

Cinygma sp.
Ameletus sp.
Acanthometropus sp.
Diamesa sp.
Simulud sp.
Isoperla sp.
Hydropsuche sp.
Chaetogaster sp.
Nematoda

ROTIFERS

Keratella cochlearis
Brachionis canciflora
Notholca accuminata

COPEPODS

Copepodids

PROTOZOA

Centropyxis sp.

observations were made of some amphibians. Three species of turtle were collected in the lower Yellowstone, including the common snapping turtle *(Chelydra serpentina)*, the western spiny soft-shelled turtle *(Trionyx spiniferus hartwegi)*, and the western painted turtle *(Chrysemys picta aelli)*. The three amphibians observed in or near the Yellowstone River were the toad *(Bufo* spp.*)*, the tiger salamander *(Ambystoma tigrinum)*, and the leopard frog *(Rana pipiens)*.

Macroinvertebrates

Distribution of macroinvertebrates in the Yellowstone River has been reported by Newell (1975). Further clarification of their distribution is given in the quarterly report of the Old West Regional Commission (1976). Tables 14 and 15 show the currently known distribution of macro invertebrates along the entire Yellowstone River (refer to Table 4 for sample station descriptions).

Studies on the Tongue River show that invertebrate fauna are similar to Yellowstone fauna in many respects, but there are several differences. The stonefly *(Acroneuria abnormis)*, the elmid beetle and *(Stenelmis* sp*)* and the mussel *(Lampsilis)* are abundant in the Tongue but rare in the Yellowstone. Odonates (dragonflies) are more abundant and diverse in the Tongue River.

14

TABLE 8. Ephemeroptera of the Yellowstone River. [illegible] & West Regional Commission 197[illegible]

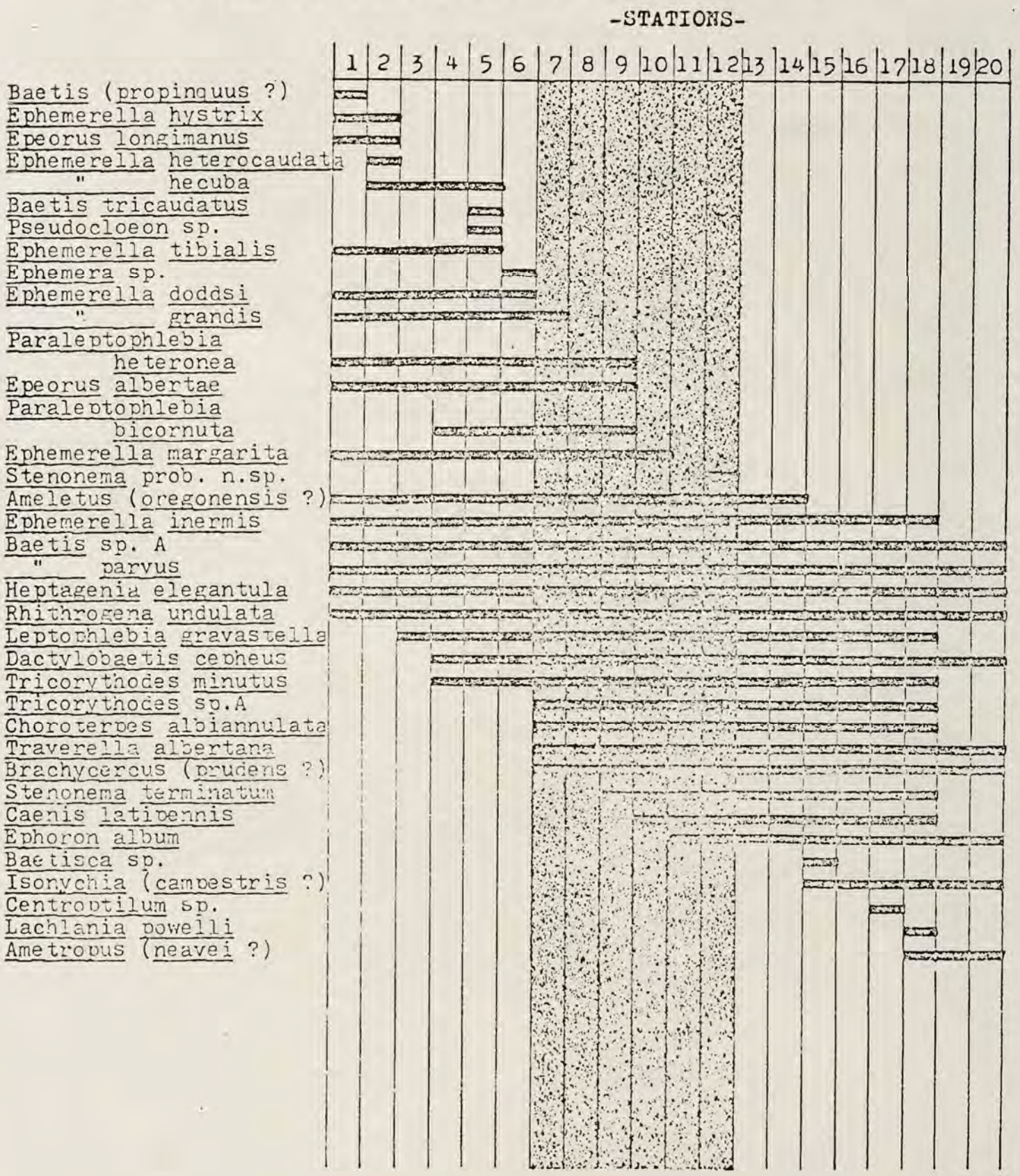
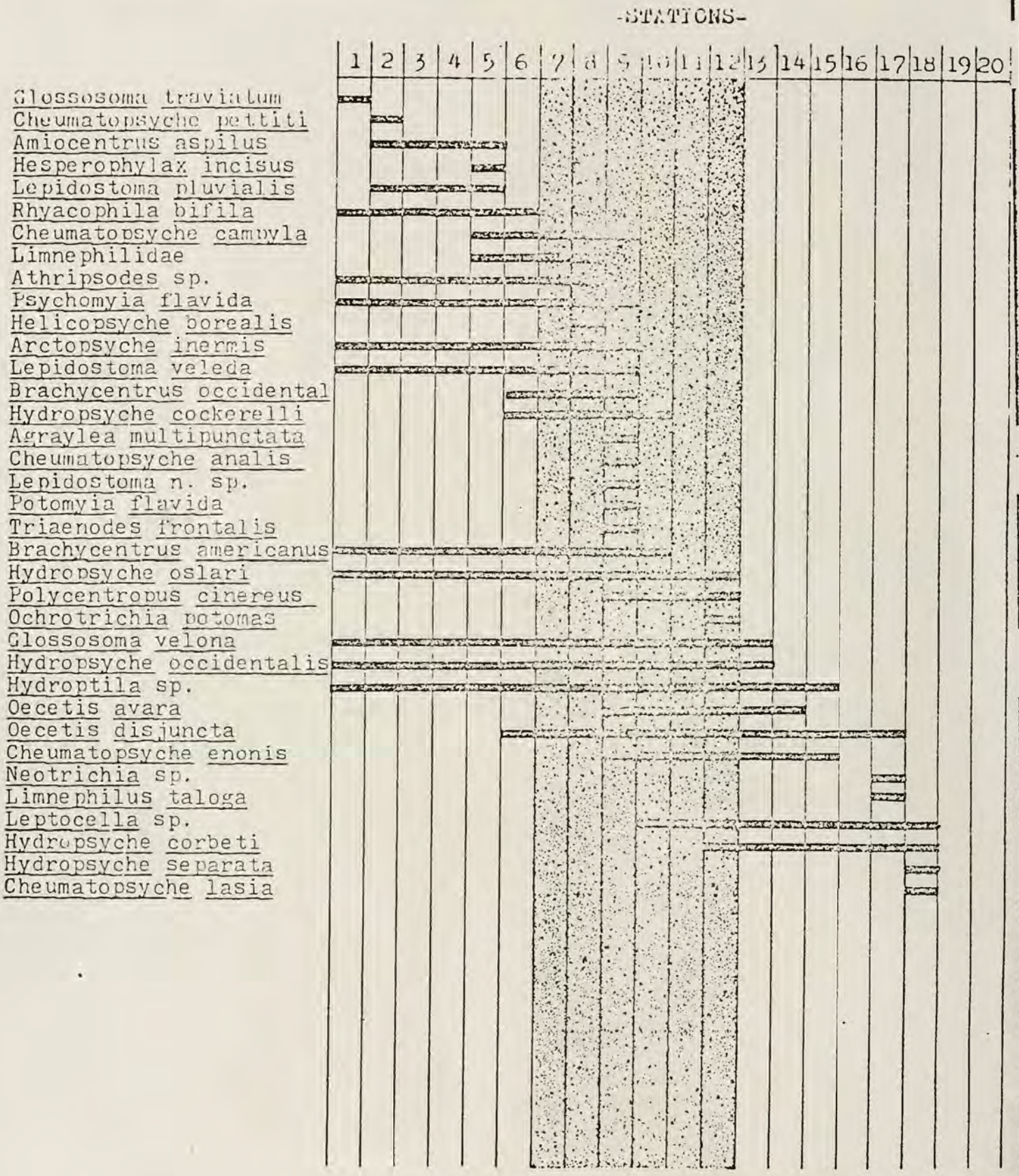


TABLE 4. Plecoptera of the Yellowstone River.

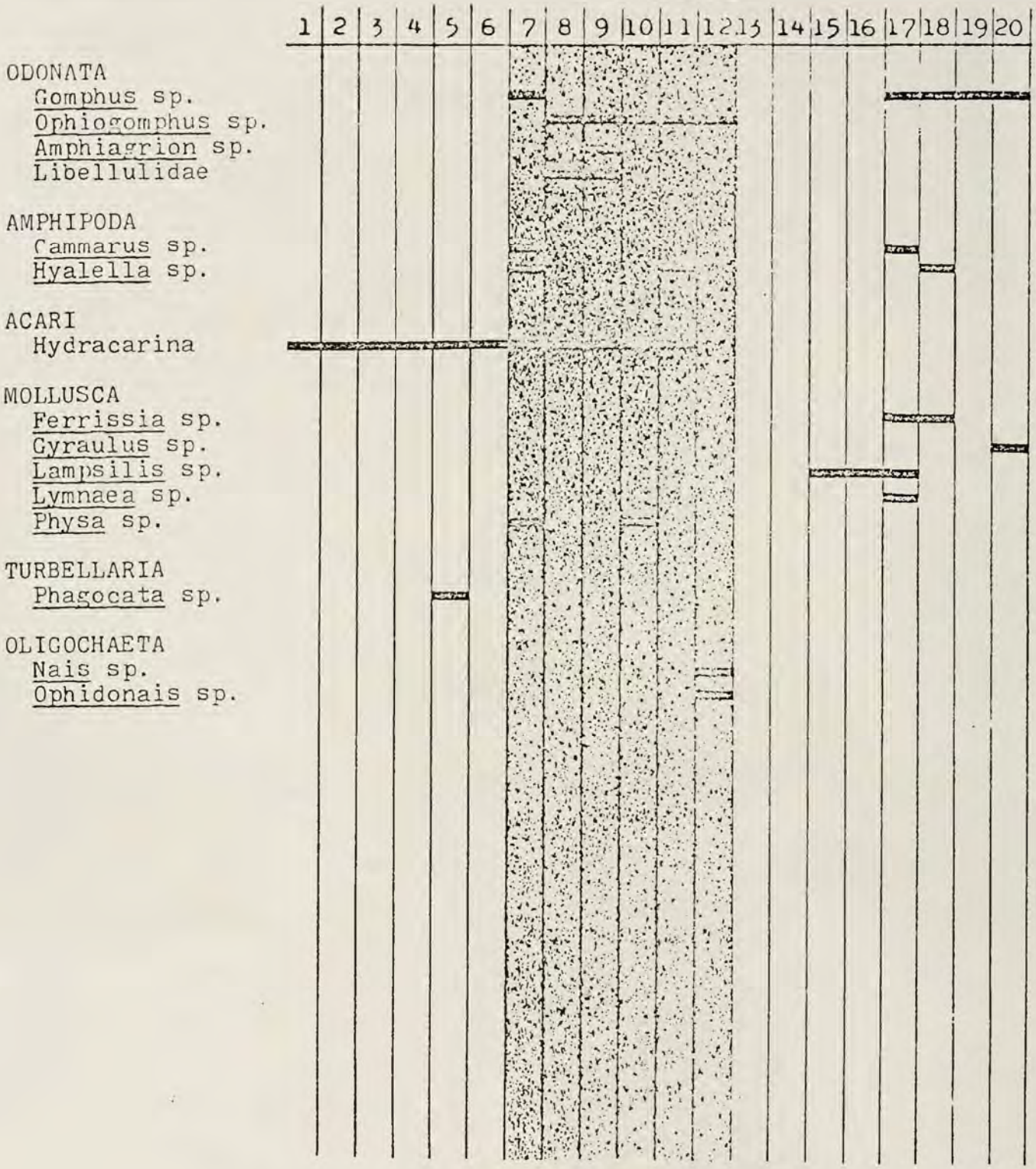
TABLE ~~5~~ 14. Trichoptera of the Yellowstone River.



15 other

TABLE 6. Aquatic invertebrates of the Yellowstone River.

TABLE 15. (continued).



Upper Yellowstone River (from Mont. Dept. Fish + Game, 1975)

Big Game

The upper Yellowstone and Shields River drainages support an outstanding big game population and provide yearlong habitat for large numbers of elk *(Cervus canadensis)*, mule deer *(Odocoileus hemionus)*, white-tailed deer *(Odocoileus virginianus)*, antelope *(Antilocapra americana)*, moose *(Alces alces)*, mountain goats *(Oreamnos americanus)* bighorn sheep *(Ovis canadensis)* and black bear *(Ursus americanus)*. A few grizzly bear *(Ursus horribilis)* also inhabit the area. There are over 1500 wintering resident elk (elk that do not migrate into or out of Yellowstone National Park) and 3000 wintering migratory elk from Yellowstone National Park which utilize winter range in this area.

Elk and mule deer in the study area generally summer at high elevations and then migrate to lower elevations in winter. White-tailed deer live yearlong in the riverbottoms with the major concentration along the Shields River. Antelope usually remain yearlong in the foothills with major concentrations in the Shields River drainage and along the Yellowstone River from Livingston to Springdale. The main concentration of mountain goats occurs in the high peaks of the Crazy Mountains and the Absaroka Range. Mountain sheep are primarily located adjacent to Yellowstone National Park, along the Yellowstone-Gallatin divide and in the heads of Slough, Buffalo Fork and Hellroaring Creeks. Black bears are scattered throughout the study area and grizzly bears are found primarily adjacent to Yellowstone National Park, with a few occurring farther north.

Wilsall and in a few remnant areas in the lower half of the drainage.

Sharp-tailed grouse *(Pedioecetes phasianellus)* distribution is limited to the Shields River drainage and to a lesser extent the Yellowstone River drainage downstream from Livingston. They are primarily found associated with a grassland habitat type on the benchlands east and west of the Shields River and north of the Absaroka Mountains.

The blue grouse *(Dendragapus obscurus)* is the major upland game bird found in the upper Yellowstone area. They are fairly abundant and found in all the coniferous regions of the area. As in other parts of the state, the blue grouse demonstrates an altitudinal migration pattern. They occur at lower foothill areas in the spring for breeding purposes. Females and young remain at these lower elevations for brood rearing while males begin their upward migration in late summer. Fall finds the birds at intermediate elevations in the forest, with the birds wintering on higher ridges. Breeding blue grouse have been found in all the mountain ranges in the area.

Ruffed grouse *(Bonasa umbellus)* are not very abundant in the upper Yellowstone area, but they are found in huntable numbers throughout the area where suitable habitat exists. This species is found in the Crazy, Bridger, Gallatin and Absaroka Mountain ranges where they are limited to the aspen parks and deciduous drainage bottoms. They are also found in the brushy areas along the main Shields River and in the cottonwood-willow bottoms and islands along the Yellowstone River. Apparently these birds were once fairly abundant along the major river bottoms, but increased agricultural use of these areas through brush removal and heavy livestock use has resulted in the deterioration of these habitats.

Franklin's grouse has been reported in the area, and a harvest as high as 271 birds projected for Park County. None of these reports has been confirmed, and the existence of this species is doubtful. The harvest figures are felt to be the result of misidentification.

The pheasant *(Phasianus colchicus)* has a limited distribution in the area and is restricted to the bottom lands of the Yellowstone and Shields River drainages. In the Yellowstone drainage they are found associated with the riverbottom and adjacent agricultural vegetation types from Pine Creek to Springdale. Pheasants have been reported in the Emigrant area along the Yellowstone River. However, their numbers and distribution in this area appear to be very limited. Pheasants are also found associated with the brushy bottoms of the Shields River from its mouth north to Wilsall and up several of the major tributaries in the Wilsall area. The highest population density and best pheasant habitat in the project area is along the Shields River from Clyde Park to its mouth, and to a lesser extent along the Yellowstone River from the mouth of the Shields to Springdale. The pheasant population in the project area can best be described as marginal. The population trend for pheasants has apparently been downward for a number of years and will probably continue as agricultural and other development activities on these bottomlands itensify and expand.

The Hungarian partridge *(Perdix perdix)* is found throughout the nonforested portions of the project area. This species is distributed from the Yellowstone National Park boundary to the sagebrush-grasslands north of Wilsall. It is locally abundant on the agricultural benchlands east and west of the Shields River and the agricultural areas south of Livingston along the Yellowstone River. The expansion of

small grain agriculture on the benchlands and conversion of sagebrush-grasslands to small grain production may benefit this species in the Shields drainage.

Merriam's turkey *(Meleagris gallopavo)* is known to inhabit five drainages in the project area. A plant of 20 wild turkeys was made by the Montana Department of Fish and Game on the Miles Ranch in Billman Creek in 1968. An additional release of 14 birds was made in 1972. The number of wintering turkeys observed in this area was 17 in 1973, 22 in 1974 and 19 in 1975. These birds spend most of the winter in the immediate vicinity of the ranch site where they make extensive use of unbaled stacks of a barley-hay mixture. The birds disperse to the surrounding foothill areas during the rest of the year with observations being reported by fall deer hunters. Breeding males have been observed in open parks along the Trail, Miner and Billman Creek divides. Other turkey populations in the project area have resulted through private release of commercial game farm birds.

- Figures — Through — illustrate distribution of upland game in the basin.

Park County is located on the eastern edge of the Pacific Flyway. Because of its geographic position, it does not receive as great a use by migratory waterfowl as other parts of the state. However, it does receive seasonal use by 21 species of waterfowl and late fall concentrations on the Yellowstone River do provide good hunting opportunities for both river and field shooting. Species found using the area include pintails, shovelers, canvasbacks, redheads, mallards, gadwalls, baldpates, lesser scaup, whistling swans, common mergansers, red-breasted mergansers, common goldeneyes, Barrows goldeneyes, buffleheads, ruddy ducks, blue-wing teal, green-wing teal, cinnamon teal, coots, ringneck ducks and Canada geese. Of all the Canada goose

observations made on the Yellowstone River between 1973-1975, 91 percent were associated with islands. The remainder were associated with straight, single-channel sections of the river.

Figures ___ through ___ illustrate the distribution of [redacted] waterfowl in the Yellowstone drainage.

Nongame Birds

Sixteen species of raptors have been reported for the project area. Of these, the bald eagle *(Haliaeetus leucocephalus)* is one which probably receives more attention and consideration by man than any other. The bald eagle is commonly found wintering along the entire length of the Yellowstone River in the project area, and occasionally observed along the Shields River. This species makes extensive use of the cottonwood riverbottom type as perching and roosting sites, particularly in those areas adjacent to the river. Ground observations made on February 27 and 28, 1975 recorded 19 bald eagles along the Yellowstone River from Gardiner to Springdale. Thirteen bald eagles were observed on March 15, 1974 during an aerial waterfowl survey along the same reach of river. Both these figures are considered to be minimum estimates of the bald eagle wintering population. Bald eagles are also known to nest in Yellowstone National Park.

The golden eagle *(Aquila chrysaetos)* is another of the major raptors known to occur in the area. Golden eagles are known to make extensive use of the sagebrush-grassland in the upper Shields drainage in late summer as hunting areas, with frequent observations of immature birds being made.

~~Terrestrial Life~~

Game animals found in the basin between Big Timber and the Bighorn River are similar to those found in the upper Yellowstone basin. Elk, mule and whitetail deer, black and grizzly bear, Rocky Mountain goats, and bighorn sheep occupy the area. In addition antelope populations begin to increase due to the change in habitat from mountainous to prairie types. Distribution of these species ~~in shown in~~ See figures _____ to _____. for

Mule and whitetail deer are fairly widespread over the area in their respective habitats. An exception is the Crow Indian Reservation where overhunting has decimated deer populations (USDA, 1974). Elk are less abundant due to changes from mountainous habitat to prairie habitat. In the Stillwater River basin, a middle Yellowstone tributary, Stoneberg (1975) has made specific studies of elk and deer which may be threatened by mining development. He found elk summer range to be centered on the Breakneck Plateau, Trail Creek and North Fork Hawley Creek. Some elk ranged as far north as Placer Basin. Mule and whitetail deer were found along the Stillwater River (Stoneberg, 1974). Bighorn sheep and mountain goats occupy the ~~nine~~ more rugged portions of the mountain ranges. Moose were also observed in the Stillwater basin and other areas of the Beartooth Mountains.

In the Wind-Bighorn-Clarks Fork River sub-basin, both mule and whitetail deer are common. Elk are found in the Beartooth and Pryor mountain ranges. Moose, bighorn sheep and mountain goats are confined to their specialized habitats in the mountainous portions of this sub-basin (~~USDA, 1974~~). Black bear populations are low and their range more or less coincides with the mountainous portions of the area. Grizzly bears occupy a portion of the southwest portion of the Bear-

tooth Plateau. Mountain lions are found in the basin and are most common in the timbered, mountainous regions (USDA, 1974)

In the remainder of the middle Yellowstone basin antelope are widely dispersed. Mule deer are the most abundant and widely distributed game animal, whereas whitetails are confined to bottomlands along most streams. Elk occupy a small area southwest of the town of Custer (DNR&C, 1974).

Furbearing mammals in the middle Yellowstone include beaver, muskrat, marten, coyote, fox, bobcat and lynx. Mink, beaver and muskrat are the major fur animals of the region.

Upland game birds include Merriam's turkey, ringnecked pheasant, sage grouse, sharptailed grouse, Hungarian partridge and three species of mountain grouse (blue, ruffed and Franklin's). Populations of these birds fluctuate due to natural conditions. Sage grouse and sharptailed grouse are found mostly in prairie regions whereas mountain grouse species are confined to higher elevations. Pheasants are found along river bottoms in areas associated with agriculture. Only small populations of Hungarian partridge occur in the basin. Huns are usually taken incidentally by hunters pursuing sharptails or pheasants (MT F&G, 1971). Chuckars are even less widely distributed, being limited to areas south of Billings, in dry, rugged terrain between the Clarks Fork of the Yellowstone and the Bighorn River drainages (MT F&G, 1971). Turkey populations are sparse and limited to small areas around Billings and portions of Stillwater and Carbon counties. See figures — through — for distribution of these species.

Waterfowl species are found along the Yellowstone River where they winter as well as nest in the spring. Lowland lakes, streams, irrigation canals and drains, stock ponds and marshes are important waterfowl habitats. Each year as stock ponds are constructed on private lands more areas suitable for waterfowl become available.

Waterfowl production in the prairie is dependent on the amount of precipitation that occurs in winter and spring. Stock ponds and natural depressions which receive adequate spring moisture are frequented by more birds (USDA, 1974). Canada geese migrate through the area in spring and fall. Goose nesting occurs along the Yellowstone River. Islands are preferred nesting sites. The year-round open water of the Bighorn River below Yellowtail Dam is an important Canada geese wintering area (NGPRP, 1974).

Threatened wildlife species include the grizzly bear which, as previously pointed out, is limited to small regions of the Beartooth Mountains. The blackfooted ferret is also a threatened species and no recent sightings have occurred in Montana. The blacktailed prairie dog and western burrowing owl are rarely seen. Their status in relation to extinction are unknown. The ferruginous hawk and American osprey occur in the basin but their status is presently classified as undetermined by the U. S. Fish and Wildlife Service. Bald eagles are known to nest along the Bighorn and Yellowstone Rivers (NGPRP, 1974).

Numerous other nongame species comprise the ecosystems of the middle Yellowstone including snakes, reptiles, lizards and turtles. Although it may seem strange to classify these creatures as part of the existing environment, they do play a vital role in maintaining the precarious balance of nature (USDA, 1974).

The golden eagle is widespread in the region. Whistling swans migrate through the easternmost portion of the basin as do sandhill cranes (NGPRP, 1974).

The badger and racoon are other nongame mammals in the area. Badgers inhabit the prairie and sagebrush steppe, while racoons are found in the bottomlands along stream courses. Both are trapped for their fur (NGPRP, 1974).

Lower Yellowstone River (from DNRC, 1974)

Big Game

Important game mammals located in the lower Yellowstone area include mule deer, white-tailed deer, antelope and a small number of bighorn sheep.

Mule deer are found throughout the area. The 100-square mile area between Armells and Rosebud Creeks and the Sarpy Creek drainage appear to have excellent mule deer populations, with both density and productivity above average.

In southeastern Montana, deer are generally nonmigratory. There is a seasonal change of habitat types due to changes in weather and food habits. The specific vegetation types deer appear to frequent most often during summer months are the pine forest, juniper, agricultural land and the skunkbush sumac-grassland hillsides. The pine forest and juniper appear to supply food and shelter, the agricultural land is a good source of food and the skunkbush sumac-grassland hillsides supply an important summer browse species, skunkbush sumac.

Numbers of mule deer harvested in Fish and Game Region 7 can be seen in Table 16. The number of hunters has been rising. Harvest of deer has varied with hunter success, weather and available places to hunt, but regionwide has been increasing. One-third (27,855) of all mule deer harvested in the state in 1973 came from southeastern Montana. This amounts to slightly over one deer harvested for every square mile.

Since the 1940's, white-tailed deer have gradually extended their range over most of the state of Montana. East of the continental divide, whitetails have become common along bottomlands and most major rivers and streams. They are usually associated with deciduous

Table 16

Mule Deer Harvest Data
for Region 7, 1969 to 1973 1/

	District 721 1/	District 722 2/	Region 7 1/
1972			
Total Mule Deer Harvested	555	657	27,855
Mule Deer Harvest per sq. mi.	0.54	0.48	1.1
Total Hunters	1,322	1,309	45,735
1973			
Total Mule Deer Harvested	668	946	24,078
Mule Deer Harvest per sq. mi.	0.65	0.70	0.94
Total Hunters	1,212	1,781	37,685
1971			
Total Mule Deer Harvested	621	1,134	20,698
Mule Deer Harvest per sq. mi.	0.61	0.84	0.81
Total Hunters	983	1,720	30,807
1970			
Total Mule Deer Harvested	411	858	15,795
Mule Deer Harvest per sq. mi.	0.40	0.63	0.62
Total Hunters	430	928	19,102
1969			
Total Mule Deer Harvested	288	643	15,499
Mule Deer Harvest per sq. mi.	0.28	0.47	0.70
Total Hunters	339	676	19,739

1/ Hunting District 721 is bounded by Rosebud Creek, the Tongue and Yellowstone Rivers, and the Northern Cheyenne Indian Reservation.

2/ District 722 is bounded by Rosebud and Sarpy Creeks, the Yellowstone River, and the Northern Cheyenne Indian Reservation.

1/ Region 7 includes Treasure, Rosebud, Garfield, Prairie, Custer, Powder River, Dawson, Wibaux, Fallon, and Carter Counties.

vegetation along drainages, often close to agricultural areas. Vegetation on these bottoms generally includes a combination of green ash, boxelder, cottonwood, willow and associated shrubs, forbs and grasses.

The Yellowstone, Tongue and Bighorn River bottoms support major populations of whitetails. Rosebud Creek has a substantial population, and smaller populations may exist along Armells and Sarpy Creeks.

Whitetail productivity is rated as excellent in southeastern Montana, and it has been improving steadily for the last several years. The fawn-to-adult ratio has increased from 55 fawns per 100 adults in 1969 to 122 fawns per 100 adults in 1973 (Eustace 1974).

Whitetails account for almost 20 percent of the total deer harvest in Fish and Game Region 7 (Table 17).

Antelope are widespread in the lower Yellowstone drainge, particularly north of the Yellowstone River, and south of the Yellowstone between the Tongue River and the North Dakota state line. Antelope are less widespread south of the Yellowstone River between the Bighorn and Tongue Rivers; however, a number of areas in this region are considered to be important antelope habitat. There are seasonal changes in antelope distribution. ~~During winter months antelope are more concentrated on winter ranges.~~

Antelope Harvest data for Region 7 are shown in Table 18. Harvest of antelope may vary considerably in any one hunting district, fluctuating with the antelope population, number of permits granted and hunter success. In Region 7, hunter demand and harvest have been steadily rising. In 1968 about 4,000 antelope were harvested, whereas in 1972 over 9,000 were taken. Harvest dropped in 1973, mainly because

Table 17

White-tailed Deer Harvest in Region 7, 1969 to 1973 1/

	District 721[1]	District 722[2]	Region 7
1973			
White-tail harvest	85	16	6,925
Percent of total deer harvested	12	2	19
1972			
White-tail harvest	43	46	4,688
Percent of total deer harvested	6	5	16
1971			
White-tail harvest	31	56	4,255
Percent of total deer harvested	5	5	17
1970			
White-tail harvest	22	81	3,164
Percent of total deer harvested	5	9	16
1969			
White-tail harvest	10	18	4,214
Percent of total deer harvested	3	3	21

1/ Hunting District 721 is bounded by Rosebud Creek, the Tongue and Yellowstone Rivers, and the Northern Cheyenne Indian Reservation.

2/ District 722 is bounded by Rosebud and Sarpy Creeks, the Yellowstone River, and the Northern Cheyenne Indian Reservation.

1/ 2/ Region 7 includes Treasure, Rosebud, Garfield, Prairie, Custer, Powder River, Dawson, Wibaux, Fallon and Carter Counties.

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TABLE ~~10-51~~

Antelope Harvest Data for ~~Hunting Districts 721 and 722 and~~ Region 7, 1969 to 1973 1/

	District 721	District 722	~~Region 7~~
1973			
Air count	-	-	-
Permits issued	300	200	12,713
Harvest	192	94	8,074
Percent Success	79	65	73
Hunters	242	144	11,079
1972			
Air count	646	611	---
Permits issued	409	260	15,051
Harvest	243	132	9,247
Percent Success	73	59	7 72
Hunters	332	223	12,820
1971			
Air count	-	-	---
Permits issued	201	197	13,131
Harvest	116	112	8,176
Percent Success	70	69	72
Hunters	164	164	11,312
1970			
Air count	-	-	---
Permits issued	200	200	10,127
Harvest	160	138	7,105
Percent Success	84	72	80
Hunters	189	192	8,924
1969			
Air count	607	503	
Permit issued	194	198	9,935
Harvest	103	110	6,303
Percent Success	67	68	75
Hunters	153	161	8,402

1/ See footnote on Table 17

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the Department of Fish and Game reduced the number of permits in accordance with field observations of antelope populations.

There is a small bighorn sheep population east of Miles City, the result of a transplant of 11 sheep into the area in 1958. The only information available about this herd is that a huntable population, estimated at 75 to 100 sheep, does exist, and permits for 2 animals are issued each year. In the period from 1969 to 1973, a total of 10 permits was issued and 5 rams were killed, for a hunter success of 50 percent. See figures — through — for distribution of big game species in the basin.

Furbearers and/or Predators (from DNR&C, 1974)

The major furbearers/predators in the study area are beaver *(Castor canadensis)*, muskrat *(Ondatra zibethicus)*, mink *(Mustela vison)*, raccoon *(procyon lotor)*, fox *(vules vulpes)*, bobcat *(Lynx rufus)*, coyote *(Canis latrans)*, long-tailed weasel *(Mustela frenata)*, skunk *(Mephitis mephitis)* and badger *(Taxidea taxus)*.

Beavers and muskrats are vegetarians and are associated with waterways. Mink are found near water, but are not restricted to it. Raccoons are found throughout the study area in association with major waterways, and foxes are generally associated with brushy areas along drainages. Coyotes and bobcats are found throughout the study area, as are skunks, badgers and weasels.

Small Mammals (from DNR&C, 1974)

Small mammals found throughout the study area include white-tailed jack rabbit *(Lepus townsendi)*, cottontail *(Sylvilagus* spp*)*, thirteen-lined ground squirrel*(Citellus tridecemlineatus)*, black-tailed prairie dog *(Cynomys ludivocianus)*, and porcupine *(Erethizon dorsatum)*. Yellow bellied marmot *(Marmota flaviventris)* and red squirrel*(Tamiasciurus hudonicus)* are found in localized areas. Additionally, a large

variety of smaller rodents is located in varied habitat types throughout the area.

Upland Game Birds (from DNR&C 1974)

Major upland game birds located in the study area include Merriam's turkey, sage grouse, sharp-tailed grouse, pheasants and gray partridge.

Turkeys are one of the more exotic, if not numerous, game birds found within the lower Yellowstone area. The major concentrations are east of Miles City, south of Forsyth, Sarpy Basin and the Custer National Forest between the Tongue and Powder Rivers. Turkeys have been most successful in forests such as those found in the Long Pines division of Custer National Forest. In 1973, 21 turkeys were harvested from Rosebud County. Powder River and Carter Counties had the highest harvests in the area surveyed with 101 and 143 birds, respectively.

Within the lower Yellowstone area, sage grouse are abundant only within the rolling sagebrush-grassland plains of Powder River, Custer and Rosebud Counties north of the Yellowstone River. Although sage grouse are not considered migratory, they may move considerable distances in fall to areas of dense and abundant sagebrush which they use almost exclusively for food and cover. This association apparently begins in late August or early September (Wallestad 1971) and continues at least until the peak of breeding in early April. Breeding males continue to use dense stands of sagebrush until early May (Schladweiler 1969). Thus, dense stands of sagebrush may be selectively used by sage grouse for 7-8 months of the year (Eng and Schladweiler 1972).

In 1973, sage grouse accounted for 16 percent of the upland game bird harvest in southeastern Montana, or 7,636 birds. Rosebud County ranked second among the counties of southeastern Montana with a harvest of 1,219 birds.

Sharp-tailed grouse, found throughout the area, are the most abundant game birds in southeastern Montana. The Great Plains sharptail remains seasonally abundant in the more moist upland areas where mixed-prairie rangelands have been maintained in reasonably good condition (Brown 1971b). There are two important elements of the native prairie necessary for sharptail existence. The first is standing grasses, left over from fall to spring, which are required for shelter, protection from predators, night roosting and spring nesting activities. Dense cover, consisting of trees and shrubs, is the other essential, necessary for food, rest, escape cover and winter survival (Brown 1971b). Southeastern Montana provides these requirements in abundance.

In 1973, an estimated 29,113 sharptails were harvested in southeastern Montana. This is 61 percent of all game birds harvested in the area. Rosebud County contributed 5 percent of the sharptail harvest or about 1,456 birds, which was exceeded only in Dawson and Custer Counties.

Pheasants are present along most of the drainage bottoms throughout the study area. Prime pheasant habitat consists of cultivated lands, along with an abundance of weeds, shrubs and trees for cover.

Pheasant populations in southeastern Montana were high in the early 1960's, but declined drastically following the severe winter of 1964-65. Since that time, pheasant populations appear to have slowly increased and are again approaching the levels of the early 1960's (Wallestad 1974).

Pheasants accounted for 18 percent of the 1973 game bird harvest in southeastern Montana, which amounted to 8,600 birds. The estimated pheasant harvest in Rosebud County was 1,546 birds, the third highest harvest among southeastern Montana counties.

(hungarian)

Gray partridge are found throughout southeastern Montana, but not in abundance. Optimum conditions for a flourishing population are a cool, moderately dry climate and a mixture of cultivated and noncultivated land. Partridge populations have responded favorably to the increase in grain growing since 1940, with waste grain providing one of their staple fall and winter foods.

Coveys are usually interspersed through sharp-tailed grouse and pheasant habitat. Over the last 5 years the juvenile/adult ratio, as determined from hunter-harvested birds, has been three juveniles per adult. In 1973, gray partridge made up 4 percent (1,909 birds) of the total bird harvest for southeastern Montana. Dawson County had the highest gray partridge harvest (889), and Rosebud County was second with 178 birds. See figures — through — for distribution of upland game species in the basin.

Waterfowl (from DNRC, 1974)

Counts of breeding pairs of Canada geese along the Yellowstone River and its major tributaries during 1967 and 1974 indicate a build-up of breeding populations (Table 19) which is probably due to the pioneering of nest sites on many islands not previously used for nesting (Hinz 1974). The large discrepancy between the 1967 and 1974 breeding pair counts along the Bighorn, Tongue and Powder Rivers is probably partially due to a true increase in the breeding populations, although the 1967 counts were not as intensive.

Geese along the Yellowstone River prefer to nest on islands (Hinz 1974). This preference has also been reported by numerous other workers studying Canada geese on North American rivers (Dimmick 1968, Geis 1956 and Hanson and Eberhardt 1971). Based on an estimated 70 percent nesting success (Geis 1956) and 4.5 young fledged per successful nest (Craighead and Craighead 1949), production for the Yellowstone

River each year may be about 2,300 young. These young are brooded in the early summer in backwaters of the river, riverside meadows and hayfields.

In addition to an estimated breeding population of over 800 pairs within the river system, the Yellowstone River has also become a stopover for large numbers of spring migrants. An aerial census from Sidney to the Bighorn River on March 11, 1974 revealed a total of nearly 9,600 geese.

By late summer, exposed gravel islands and bars, sandbars, and silt banks of the river serve as resting sites for resident geese and also for nonbreeders, which are believed to return to the Yellowstone by this time. The security afforded by the river and associated islands, as well as the attractiveness of nearby grainfields for field feeding, also draw large numbers of geese migrating through the Yellowstone valley in the fall (Hinz 1974).

Goose numbers along the Yellowstone River and its larger tributaries grow through the fall. The largest increase usually follows a cold weather system moving down from the north, which normally occurs between the end of October and mid-November. The number of geese stopping in the lower Yellowstone valley in recent years appears to be increasing, although the dates of earlier fall counts probably did not coincide with periods when peak goose numbers were present (Table 19). The higher use of the Yellowstone and its tributaries by geese in the fall is believed to be related to an increase in acreage of irrigated grain along the rivers, coupled with a possible increase of goose numbers in the Central Flyway.

Interest in goose hunting along the Yellowstone River is increasing, particularly in southeastern Montana. Goose hunters in counties

TABLE ~~10~~ 19

Peak Counts of Canada Geese in the Lower Yellowstone Valley from the Mouth of the Bighorn River to the Vicinity of Glendive.

Date	Count[1]
November 3, 1959	194
November 28, 1960	380
October 3, 1961	436
October 16, 1962	538
November 24 and December 5, 1968	3,631
November 17, 1969	4,894
November 3,5 and 23, 1970	2,061
November 9, 1971	6,160
November 9, 1972	6,808
November 12, 1973	10,006

[1] Counts made by Montana Fish and Game personnel (except 1973); peak counts on all sections not obtained on same day (1968, 1970).

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adjacent to the Yellowstone River harvested an estimated 450 to 1,800 geese annually from 1963 to 1971. Most of these geese were taken along the lower Yellowstone where fall populations are the highest. Between 5 and 14 percent of all geese harvested in Montana from 1963 to 1972 were taken in counties along the Yellowstone River (particularly in southeastern Montana), with an erratic yearly increase being evident during that period.

When the Yellowstone River freezes over most of its length, most geese leave the river for the winter. However, limited numbers remain in isolated open stretches. For example, on January 9, 1974, 65 geese were counted from Yankee Jim Canyon to Big Timber. Similar January surveys in other years have encountered geese as far downstream as below Miles City. See figures — Through — for distribution of geese in the basin.

Other Water Birds (from DNRC, 1974)

Many species of water birds, including most species of ducks occurring in Montana, are observed along the Yellowstone River during spring migration, though information is limited as to which species nest there. Known nesters include mallards *(Anas platyrhynchos)*, blue-winged teal *(Anas discors)*, wood ducks *(Aix sponsa)* and mergansers *(Mergus* spp.*)*. In addition, double-crested cormorants *(Phalacrocorax auritus)* and eared grebes *(Podiceps caspicus)* are also believed to nest along the Yellowstone.

Summer use of the Yellowstone River by ducks, particularly mallards, closely parallels that by Canada geese, with heavy use of open islands and bars of the river once the molt is completed. Small field-feeding flights of resident ducks begin to assemble after corn is harvested in late summer.

By fall, many large flocks of ducks concentrate on resting areas

on the Yellowstone and its largest tributaries, with ultimate numbers reaching an estimated 60,000 ducks on the lower Yellowstone alone. Field-feeding ducks which commonly frequent riverside cornfields along the lower Yellowstone have been estimated to number up to 15,000 in a single flock. Each year about 10 percent of Montana's duck hunters hunt in counties bordering the Yellowstone River, and a nearly proportionate percentage of the annual duck harvest occurs in these same counties. As with goose hunting, interest in duck hunting in recent years appears to be on the increase, at least in southeastern Montana. See figures — Through — for distribution of ducks in the basin

In winter the mallard is still a common species along the Yellowstone River, and counts of common goldeneyes, Barrow's goldeneyes and mergansers sometimes outnumber the mallards.

Great blue herons *(Ardea herodias)* are the most common large wading birds of the Yellowstone River during warm periods of the year, particularly near their rookeries, which are typically located in streamside cottonwood trees and support as many as 20 or more nests.

Spring arrival of herons along the Yellowstone River occurs near the first of April. At present, nine rookeries are known on the stretch of river from Livingston to Miles City, although more are probably present.

On September 5, 1961, 86 herons were counted from Miles City to Forsyth. Although recent counts are not complete, they also indicate a high number of herons using the Yellowstone River until mid-fall. Herons have also been observed on the Bighorn, Tongue and Powder Rivers, although the numbers of herons using these rivers are not as large.

White pelicans *(Pelecanus erythrorhynchos)* are also present along

the Yellowstone River, notably in spring and early summer, and occasionally in the fall. One flock of from 40 to 80 pelicans has been observed for several months each spring between Glendive and Sidney. Small flocks of between 10 and 20 pelicans have been sighted in the Armells Creek area of the Yellowstone in spring, and similar-sized flocks occasionally use the Yellowstone near the mouth of the Powder River.

Raptors (from DNRC, 1974)

Raptorial birds known to breed in the area include the marsh hawk *(Circus cyaneus)*, red-tailed hawk *(Buteo jamaicensis)*, golden eagle *(Aquila chrysaetos)*, prairie falcon *(Falco mexicanus)*, American kestrel *(Falco sparverius)*, ferruginous hawk *(Buteo regalis)* and great horned owl *(Bubo virginianus)*. All of these nesting species, except the prairie falcon, are common throughout the study area.

Other species which are commonly observed during spring and fall migration periods, and sometimes in summer, include the rough-legged hawk *(Buteo lagopus)*, Swainson's hawk *(Buteo swainsoni)*, bald eagle, and members of the Accipiter group, and short-eared owls *(Asio flammeus)*. Several of these species may also breed within the area.

Bald eagles concentrate along the Yellowstone River during spring migration. The highest count on record along the Yellowstone was made on March 11, 12, 14 and 15, 1974 when 298 eagles were counted from Yankee Jim Canyon to Sidney. None of these birds are believed to breed along the lower Yellowstone River, although some may nest along the upper reaches.

Although no eagles are present on the lower Yellowstone in summer and early fall, numbers of eagles begin to build when waterfowl move into the area in large numbers. On December 6, 1973, 110 bald eagles were counted from the mouth of the Bighorn River, to Cabin Creek near

Glendive, the majority of which (69) were counted from Forsyth to the mouth of the Bighorn.

Eagle distribution along the Yellowstone River in winter seems to coincide with areas of open water where waterfowl congregate. Winter censuses on record include one on January 5, 1970, when 13 bald eagles were counted from Bighorn to Miles City and another on January 8, 1969 when 16 eagles were counted from Reedpoint to Bighorn.

Small Birds (from DNR+C, 1974)

Since the lower Yellowstone includes virtually all habitat types common in the Northern Great Plains region, all of the small birds indigenous to this region could be expected to occur in the study area. Additionally, a large variety of migratory small birds pass through.

Endangered Wildlife (from DNR+C, 1974)

Of the endangered wildlife included in the 1973 "Red Book" published by the Department of Interior, only two taxa may regularly occur in the study area. Although peregrine falcons *(Falco peregrinus)* are not known to breed in the study area, they are occasionally observed and can be expected to occur throughout. The last unconfirmed sightings of black-footed ferret *(Mustela nigripes)* in Montana was in 1970, and the last confirmed report of a ferret in the study area was a road kill that was collected near Ingomar, Rosebud County, in 1952 (Snow 1972). It is not known whether ferrets presently occur in this area.

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DRAFT

RECREATION

Developed recreation sites in the Yellowstone River Basin are managed by State, Federal, local governments, and private agencies. Designated sites require a nominal fee and provide the basics such as sanitary facilities, garbage collection, water, and are accessable by good roads. Montana Fish and Game Department provide Fishing Access Sites (F.A.S.) along rivers and impoundments as well as campgrounds that focus on water related recreation.

The National Forest Wilderness and Primitive Areas provide dispersed recreation limited to non-motorized activities. Nature trails, scenic areas, and interpretive displays are found on the three national forests in the Yellowstone Basin. The Bureau of Land Management, Bureau of Indian Affairs, and National Parks Service have camp sites or picnic units within the study area.

Private recreation areas contribute commercial facilities such as dude ranches, resorts, campgrounds, hunting and fishing lodges.

Towns encourage travelers to use their local parks and rest areas for their convenience while stopping in the area.

Much of the recreation in the study area is focused towards water activities. The Yellowstone River and its tributaries provide visual diversity with its riffles, pools, canyon walls and overstory cottonwood vegetation that put boating, fishing or camping in demand. The middle and lower Yellowstone River lend itself to motor boating, floating, and canoeing, with deep channels, slow moving current and accessability. Big Horn National Recreation Area and state Water Board irrigation impoundments permit a wide variety of water sports and camping.

Passive activities such as sight seeing, driving for pleasure, sunbathing, or just relaxing ranked high on Montana Fish and Game Statewide Outdoor Recreation Plan (1972). Basic terrain variety, geologic features variety, water features, vegetative patterns variety and cultured land use effects provide an interesting and enjoyable experience that can be observed in a passive manner by automobile while traveling through the Basin.

Residents and non-residents participate in seasonal activities that can place areas under heavy use depending upon the time of year. Mountainous forested areas come alive with hunters during the fall of the year when big game season starts. Ski slopes fall victim to recreationists sliding down snow corses. Highways and campground clog up with recreational vehicles in the summer months. The enormous area of the Yellowstone Basin provides adequate room for the varied types of recreation by the residents.

RECREATION SITES IN YELLOWSTONE
BASIN BY AGENCY

	Name	Administrator	Picnic Units	Camp Units	Other Recreation	County
I	FEDERAL OWNERSHIP					
1	Battle Ridge	FS,Gallatin	7	10		Gallatin
2	Chief Joseph	FS,Gallatin	0	6		Park
3	Colter	FS,Gallatin	0	23		Park
4	Fairy Lake	FS,Gallatin	7	8	F	Gallatin
5	Falls Creek	FS,Gallatin	11	0	F	Park
6	Hicks Park	FS,Gallatin	7	23	F	Park
7	LaDuke Springs	FS,Gallatin	4	0	F	Park
8	Pine Creek	FS,Gallatin	5	21	F	Park
9	Snowbank	FS,Gallatin	4	12	F	Park
10	Soda Butte	FS,Gallatin	0	21	F	Park
11	Tom Miner	FS,Gallatin	0	12		Gallatin
12	After Bay	NPS	5	10	F,B	Big Horn
13	Aspen	FS,Gallatin	0	1	F	Sweetgrass
14	Aspen Grove	FS,Gallatin	0	11	F	Carbon
15	Barry's Landing	NPS	5	10	F,B	Carbon
16	Basin	FS,Custer	0	28	F	Carbon
17	Big Ice Cave	FS,Custer	7	0		Big Horn
18	Crow Agency	BIA	5	10	F	Big Horn
19	Cascade	FS,Custer	0	30	F	Carbon
20	Chippy Park	FS,Gallatin	0	4	F	Sweetgrass
21	East Boulder	FS,Gallatin	4	0	F	Sweetgrass
22	East Rosebud Lake	FS,Custer	0	12	F,B	Carbon
23	Emerald Lake	FS,Custer	11	21	F	Stillwater
24	Greenough Lake	FS,Custer	0	17	F	Carbon
25	Half Moon	FS,Gallatin	0	9	F	Sweetgrass
26	Hell's Canyon	FS,Gallatin	0	11	F	Sweetgrass
27	Initial Creek	FS,Custer	0	4	F	Stillwater
28	Jimmy Joe	FS,Custer	0	10	F	Carbon
29	Limber Pine	FS,Custer	0	13	F	Carbon
30	Little Rocky	FS,Custer	0	6	F	Stillwater
31	M-K	FS,Custer	0	10	F	Carbon
32	Palisades	FS,Custer	0	7	F	Carbon
33	Parkside	FS,Custer	4	15	F	Carbon
34	Pine Grove	FS,Custer	0	46	F	Stillwater
35	Ratine	FS,Custer	1	4	F	Carbon
36	Sage Creek	FS,Custer	0	12	F	Carbon
37	Sand Dunes Picnic Ground	FS,Custer	10	0	F	Carbon
38	Sheridan	FS,Custer	0	8	F	Carbon
39	Ok-A-Beh	BIA	5	10	F,B	Big Horn
40	Wild Bill's Lake	FS,Custer	6	0	F	Carbon
41	Woodbine	FS,Custer	3	43	F	Stillwater
42	Clark Campground	BLM	0	5	F	Prairie
43	Cow Creek	FS,Custer	3	5	F	Powder River
44	Holiday Springs	FS,Custer	3	0		Powder River
45	Lame Deer	BIA	3	5		Rosebud
46	Poker Jim Butte	FS,Custer	3	0		Rosebud
47	Red Shale	FS,Custer	3	13		Powder River
48	Crazy Head Springs	BIA	3	5	S,F	Rosebud

RECREATION SITES IN YELLOWSTONE
BASIN BY AGENCY (continued)

	Name	Admin-istrator	Picnic Units	Camp Units	Other Recreation	County
II	STATE OWNERSHIP					
1	Clyde Park Rest Area	HD	5	0	F	Park
2	Corwin Springs F.A.S.	FG	0	0	F	Park
3	Dailey Lake F.A.S.	FG	10	20	F,B	Park
4	Emigrant F.A.S.	FG	5	0	F	Park
5	Lock Leven	FG	10	20	F,B	Park
6	Mallard's Rest F.A.S.	FG	5	5	F	Park
7	Paradise F.A.S.	FG	5	0	F	Park
8	Queen of the Waters F.A.S.	FG	5	0	F	Park
9	Absarokee	FG	0	0	F	Stillwater
10	Arapooish	FG	0	0	F	Stillwater
11	Beaver Lodge F.A.S.	FG	0	0	F	Carbon
12	Big Horn River F.A.S.	FG	0	0	F	Big Horn
13	Big Rock F.A.S.	FG	0	0	F	Sweetgrass
14	Bluewater F.A.S.	FG	6	0	F	Carbon
15	Bratten F.A.S.	FG	0	0	F	Sweetgrass
16	Buffalo Jump F.A.S.	FG	5	0	F	Stillwater
17	Bull Springs F.A.S.	FG	4	0	F	Carbon
18	Castle Rock F.A.S.	FG	12	0	F	Stillwater
19	Chief Plenty Coups S.M.	FG	38	0	F	Stillwater
20	Cliff Swallow F.A.S.	FG	4	0	F	Stillwater
21	Columbus Rest Area	HD	5	0	W	Stillwater
22	Cooney Reservoir R.A.	FG	60	0	S,F,B	Carbon
23	Fireman's Point F.A.S.	FG	8	0	F	Stillwater
24	Greycliff Rest Area	HD	5	0	W	Sweetgrass
25	Grey Bear F.A.S.	FG	36	15	F	Sweetgrass
26	Hardin Rest Area	HD	5	0	W	Big Horn
27	Horse Thief Station F.A.S.	FG	11	0	F	Carbon
28	Indian Fort F.A.S.	FG	23	12	F	Stillwater
29	Itch-Kep-Pe F.A.S.	FG	11	14	F	Stillwater
30	Moraine F.A.S.	FG	0	0	F	Stillwater
31	Natural Bridge F.A.S.	FG	4	0	F	Sweetgrass
32	Pictograph Cave S.M.	FG	3	0	I	Stillwater
33	Rosebud Isle F.A.S.	FG	1	0	F	Stillwater
34	Swinging Bridge F.A.S.	FG	0	0	F	Stillwater
35	Two Leggins F.A.S.	FG	0	0	F	Stillwater
36	Water Birch F.A.S.	FG	21	6	F	Carbon
37	Whitebird F.A.S.	FG	5	17	F	Stillwater
38	Tongue River Reservoir	DNR	4	0	F,B,WS	Big Horn
39	Tongue River F.A.S.	FG	2	0	F	Big Horn
40	Gartside Dam F.A.S.	FG	0	0	F	Richland
41	Intake Dam F.A.S.	FG	8	0	S,F,B	Dawson
42	Johnson Reservoir F.A.S.	FG	0	0	F	Dawson
43	Makoshika S.P.	FG	30	0	I	Dawson
44	Highway Rest Area	HD	5	0		Dawson
45	Branum Lake F.A.S.	FG	6	0	F	Custer
46	Locate Rest Area	HD	5	0		Custer
47	Hysham Rest Area	HD	5	0		Treasure

RECREATION SITES IN YELLOWSTONE
BASIN BY AGENCY (continued)

	Name	Administrator	Picnic Units	Camp Units	Other Recreation	County
II	STATE OWNERSHIP (continued)					
48	Isaac Homestead F.A.S.	FG	0	0	F	Treasure
49	South Sandstone S.R.A.	FG	22	0	F,B,S,WS	Fallon
50	Medicine Rocks S.P.	FG	30	9		Carter
51	Rosebud S.R.A.	FG	10	21	S,F,B	Rosebud
52	Rush Hall Reservoir F.A.S.	FG	0	0	F	Fallon
53	Sportman's Pond F.A.S.	FG	0	0	F,B	Fallon
54	Twelve Mice Dam F.A.S.	FG	0	0	F	Custer
III	PRIVATE AND NON-PROFIT					
1	Chico Hot Springs	P	X	0	F,HR,H,S	Park
2	Livingston KOA	KOA	0	X	F	Park
3	Big Sky Overnighter	P	X			Yellowstone
4	Big Timber KOA	KOA	X	X	S,F	Sweetgrass
5	Billings KOA	KOA	0	20	S,F	Yellowstone
6	Caravan Trailer Court	P	0	10		Yellowstone
7	Ellis Faw KOA	KOA	X	X	F,HR H,SS,T	Sweetgrass
8	Chief Trailer Court	P	X			Yellowstone
9	Hardin KOA	KOA	X	X		Big Horn
10	KOA All Trails	KOA	X	X	F,H	Yellowstone
11	Lewis and Clark KOA	KOA	0	50	S,F,H	Sweetgrass
12	Little Big Horn Camp	P	X	X	F	Big Horn
13	Bar O.J. Campground	P	0	18	H,S,F	Carbon
14	Town and Country Trailer Park	P	0	9		Yellowstone
15	4-H Roadside Park	P	0	X		Big Horn
16	Maxine Ruppel Ranch	P	0	X	F,H	Stillwater
17	Perry's Camper Park	P	0	30	S,F	Carbon
18	Robert Jarrett Ranch	P	0	X	FT,HR,F,SS	Sweetgrass
19	Spring Creek Camp & Trailer Park	P	0	50	H,S,F	Sweetgrass
20	Kniepkamp Guest Ranch	P	0	5	F,H,SS,HR, T,BH	Dawson
21	Wagon Wheel	P	0	5		Rosebud
22	Wayside Park	P	0	25	H,T,W,BH	Powder River
23	McGill Guest Ranch	P	0	5	F,SS,HR,T	Powder River
24	McRae Guest Ranch	P	0	5	F,SS,HR,H	Custer
IV	LOCAL GOVERNMENT OWNERSHIP					
1	Big Timber City Campground	City	0	13	H,S,F	Sweetgrass
2	Riverside Park	City	0	50	F,B	Yellowstone
3	Richland County Park	County	0	20		Richland
4	Highway 10 Picnic Area	County	10	0		Prairie

Ownership/Administrator -

I Federal:

BIA - Bureau of Indian Affairs
BLM - Bureau of Land Management
FS - Forest Service
NPS - National Park Service

II State:

FG - Department of Fish and Game
HD - Department of Highways

III Private & Non-Profit:

KOA - Campgrounds of America
P - Other private or non-profit

Facilities/Activities - Other -

B - boating facilities
F - fishing
H - hiking trail
I - information or interpretive exhibits
S - swimming area
T - trailer/camper hookups
W - waste disposal station
BH - bathhouse
FT - float trips
HR - horseback riding
SS - snow sports
WS - water skiing

Picnic Unit - Each unit ordinarily consists of a table with access to a stove or fireplace, garbage can, toilet and drinking water and will accommodate an average of 5 persons or one family.

Camp Unit - Each unit ordinarily consists of a table,parking spur, tent pad and stove or fireplace with access to a garbage can, toilet and drinking water and will accommodate an average of 5 persons or one family.

DRAFT

SIGNIFICANT ARCHAELOGICAL HISTORIC SITES

CUSTER BATTLEFIELD - In terms of national priority this is the more important of all the sites in the Yellowstone River Basin. The annihilation of Lt. Col. George Custer and his troops by the Sioux and Cheyenne Indians occurred on June 25-26, 1876. The battle was precipitated by shrinkage of Indian land and a federal government ultimatum that Indians be on reservations by January 31, 1876. Instead they rallied around Sioux leader Sitting Bull and killed Custer and his command of about 225 men.

POMPEY'S PILLAR - 30 MILES S. E. OF BILLINGS A MASSIVE SANDSTONE BLOCK ABOUT 150' HIGH. It is a well known landmark of the Lewis & Clark expedition. In 1806, Clark named the rock for Sacajawea's baby son. He also carved his signature which still remains today.

PICTOGRAPH CAVE - One of major archaelogical sites used to determine the sequence of prehistoric occupation in the Northwestern Plains. 2000 BC.

HAGEN SITE - A late prehistoric earth lodge village believed to represent a settlement of Crow Indians before they became nomadic bison hunters. In 1938 partial excavations of the site revealed a midden area of more than 10 acres. Storage pits, implements and human bones have been found on this farming site.

ARCHAEOLOGIC - HISTORIC INVENTORY

1.	I	Flathead Pass
2.	X T	Bridger Pass
3.	M	Camp Thoroughman
4.	R S	Hunter's Hot Springs
5.	A	Crow Agency I
6.	T	Benson's Landing
7.	A T	Livingston Railroad Depot
	A P	Park County Courthouse
	S	St. Andrew's Espiscopal Church
8.	T	Cokedale
	I	Main Boulder Indian Caves
9.	T	Mill Creek
10.	T	Emigrant Gulch Historic District
11.	T	Independence
12.	P T	Cinnabar
13.	T	Cooke City Historic District
14.	A S	St. Marie's Espiscopal Church
15.	S	Madison House
16.	S	Hoppe-Countryman Trading Post
17.	X	Thomas Party Massacre
18.	T	Nye City
19.	I	Keogh Buffalo Jump
20.	I T	Crow Agency II
?	A	Jacobi Residence
. .	M	Canyon Creek Fight Site
23.	X	Clark's Dugouts Construction Site
24.	R	Hillsboro Cedarvale
25.	I R S	Barry's Landing Historic District
26.	I	Demijohn Flat District
27.	X T	Shriver Post Office
	I	Petroglyph Canyon
28.	M S T	Liver-Eating' Johnson Cabin
29.	I	Pryor Mountains Historic District
30.	I	Pryor Gap
31.	A	James (Will) Ranch
32.	I S	Chief Plenty Coups Memorial
33.	I	Big Horn Canyon
34.	I M T	Fort C.F. Smith
	M	Hayfield Fight Site
35.	T	Bighorn Canal Headgate
	I	Grapevine Buffalo Jumps
	I	Pretty Creek Site
	A	Sorenson Ranch
36.	S	Trinity Tree
37.	M	Crow's Nest
38.	M	Custer's Last Campsite
39.	I	Petroglyph Rock
	M	Battle of the Rosebud Site
	I	Slim Kobold Buffalo Jump
	I	Tongue River Agency I
40.	T	Coulson, S Coulson "Boothill",
	T	Josephine Park
40.	A T	Moss (P.B.) Mansion
	A	O'Donnell (I.D.) House
41.	M	Baker's Fight on the Yellowstone
42.	T	Jones and Immel Ambush Site
	I	Sacrifice Cliff
43.	I	Pictograph Cave State Monument
44.	X	Pompey's Pillar
45.	T	Junction City
46.	M	Terry's Landing
47.	T	Far West Island
48.	M S	Fort Custer
49.	E S	St. Xavier Mission
50.	M	Yellowstone Expedition Fights
51.	I S T	Brow Agnecy III
	T	Fox, Livingston & Company Post
	I S	Sword Bearer Incident
52.	M	Custer Battlefield National Monument
	A	Superintendent's Lodge
53.	M	Seventh Calavary Fight at the Mouth of the Bighorn
54.		Big Horn River Mouth Distoric Dist.
55	M	Baldwin's Fight on the Porcupine
56.	T	Fort Sarpy II
57.	T	Fort Alexander
58.	T	Cold Spring Ranch State Station
59.	T	Fort Sarpy I
60.	T	Fort Van Buren
61.	A E	Old Library Building
62.	M	Terry-Custer Expedition Campsite
63.	T	Colstrip
64.	M	Custer Expedition Campsite
65.	M	Camp Merritt
66.	I S	Headchief-Youngmule Fight
. .	E I S	Tongue River Agency
	M	Lame Deer Fight
67.	E S	St. Labre Mission
68.	I X	Indian Birney Historic District
69.	M	Fort Howes
70.	M	Miles' Fight on the Tongue River
71.	T	Miles City Historic District
	M	Seventh Calavary Fight on the Yellowstone
72.	M	Fort Keogh
	T	Fort Keogh-Fort Buford Road
	T	Fort Keogh-Fort Lincoln State Route
	M	Tongue River Cantonment
73.	T	Buffalo Rapids
74.	T	Signal Butte
75.	S	Fritz Ambush Site
76.	I	Bowers-Yonkee Bison Trap
	M	Reynold's Fight on the Powder River

ARCHAEOLOGIC - HISTORIC INVENTORY (continued)

77.	M	Cole's Fight of Sept. 10, 1865
78.	M	Cole's Fight of Sept. 8, 1865
79.	M	Cole's Skirmish of Sept. 4, 1865
80.	M	Cole's Fight of Sept. 5, 1965
81.	I	Medicine Rocks State Park
82.	T	Wibaux (Pierre) Home & Office Bldg.
83.	T	W-Bar Ranch
84.	T	Fort Gilbert
85.	A T	O'Brien's State Station
86.	T	Brazeau Houses
87.	M T	Camp Canby
88.	M T.	Stanley's Stockade
89.	I	Hagen Site
90.	M	Miles' Fight With Sitting Bull
91.	M	Terry's Supply Camp
92.	I M P S	Desmet-Sioux 1868 Treaty Site

ARCHAEOLOGIC- HISTORIC INVENTORY

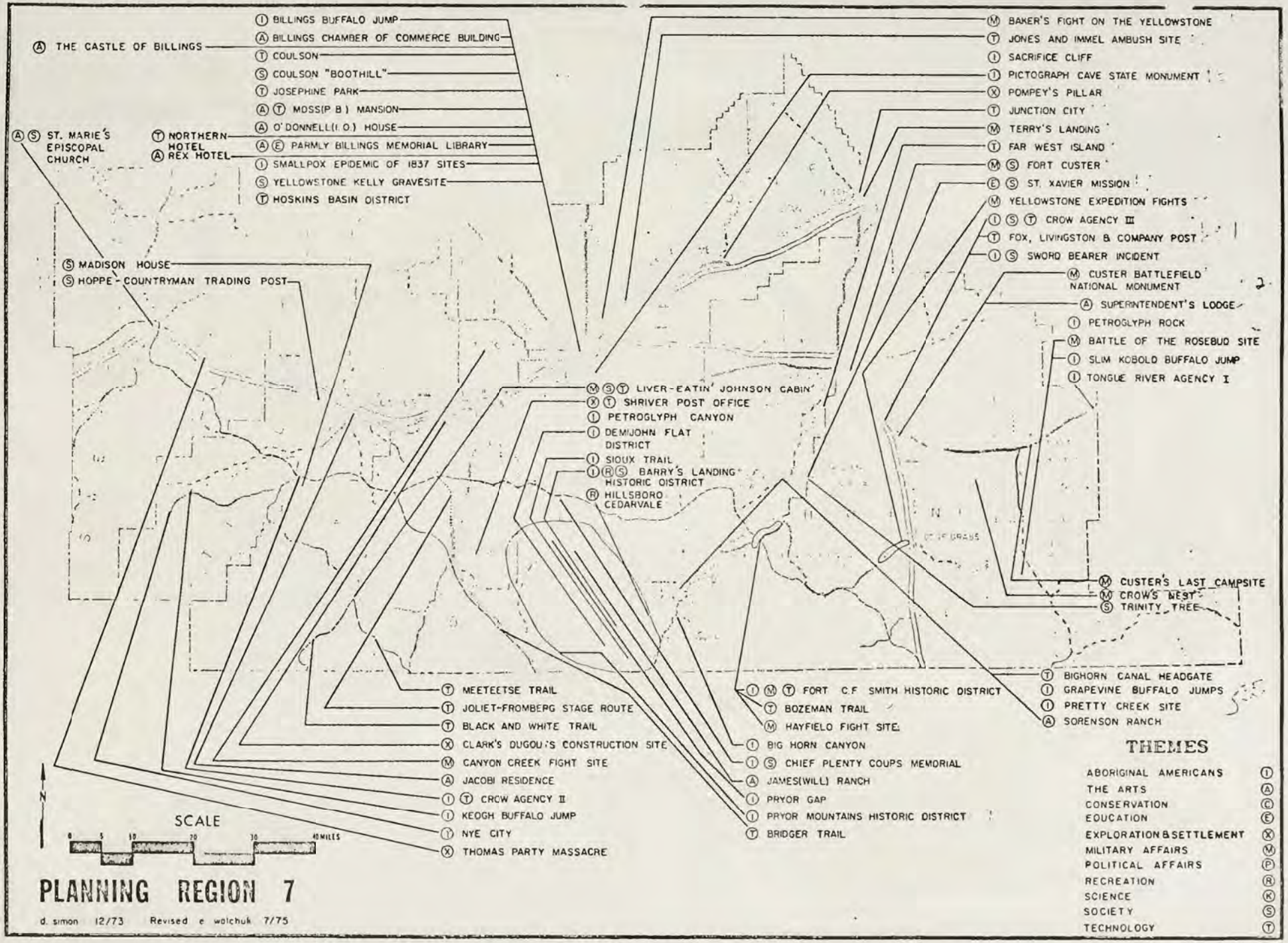
PLANNING REGION 9

Ⓜ CAMP BAKER(I)
Ⓐ Ⓜ FORT LOGAN AND BLOCKHOUSE (CAMP BAKER II)
Ⓐ THE CASTLE
Ⓐ AVANT COURIER BUILDING
Ⓐ BOZEMAN HOTEL
Ⓐ BURLINGTON NORTHERN PASSENGER DEPOT
Ⓐ FIRST METHODIST CHURCH
Ⓐ LEHRKIND MANSION
Ⓐ MARTIN(JULIA) RESIDENCE
Ⓐ Ⓔ MONTANA HALL
Ⓐ NEVITT BUILDING
Ⓐ ST. JAMES EPISCOPAL CHURCH
Ⓣ GALLATIN CITY
Ⓧ THREE FORKS OF THE MISSOURI
Ⓜ CROWS AND COLTER BATTLE BLACKFEET SITE
Ⓣ HENRY'S FORT (THREE FORKS POST)
Ⓧ INITIAL POINT
Ⓘ MADISON BUFFALO JUMP STATE MONUMENT
Ⓐ Ⓔ BOZEMAN CARNIGIE LIBRARY
Ⓜ FORT ELLIS
Ⓣ CHESTNUT
Ⓧ Ⓣ BOZEMAN TRAIL
Ⓘ EMIGRANT BUFFALO JUMPS
Ⓘ CARBELLA
Ⓘ RIGLER BLUFFS
Ⓣ GRAYLING HOMESTEAD/ POST OFFICE
Ⓜ BIGHORN GUN
Ⓣ FORT BENTON-CONFEDERATE GULCH(AND HELENA) ROAD
Ⓣ COPPEROPOLIS
Ⓣ CARROLL ROAD
Ⓣ CASTLE
Ⓜ FORT HOWIE
Ⓜ Ⓣ FORT ELLIS-FORT SHAW MILITARY ROAD
Ⓘ FLATHEAD PASS
Ⓧ Ⓣ BRIDGER PASS
Ⓘ KING SITE
Ⓘ MAIDEN ROCK
Ⓜ CAMP ELIZABETH MEAGHER
Ⓜ CAMP THOROUGHMAN
Ⓡ Ⓢ HUNTER'S HOT SPRINGS
Ⓐ CROW AGENCY I
Ⓣ BENSON'S LANDING
Ⓐ Ⓣ LIVINGSTON RAILROAD DEPOT
Ⓐ Ⓟ PARK COUNTY COURTHOUSE
Ⓢ ST. ANDREW'S EPISCOPAL CHURCH
Ⓣ COKEDALE
Ⓘ MAIN BOULDER INDIAN CAVES
Ⓣ MILL CREEK
Ⓣ EMIGRANT GULCH HISTORIC DISTRICT
Ⓣ INDEPENDENCE
Ⓟ Ⓣ CINNABAR
Ⓣ COOKE CITY HISTORIC DISTRICT

THEMES

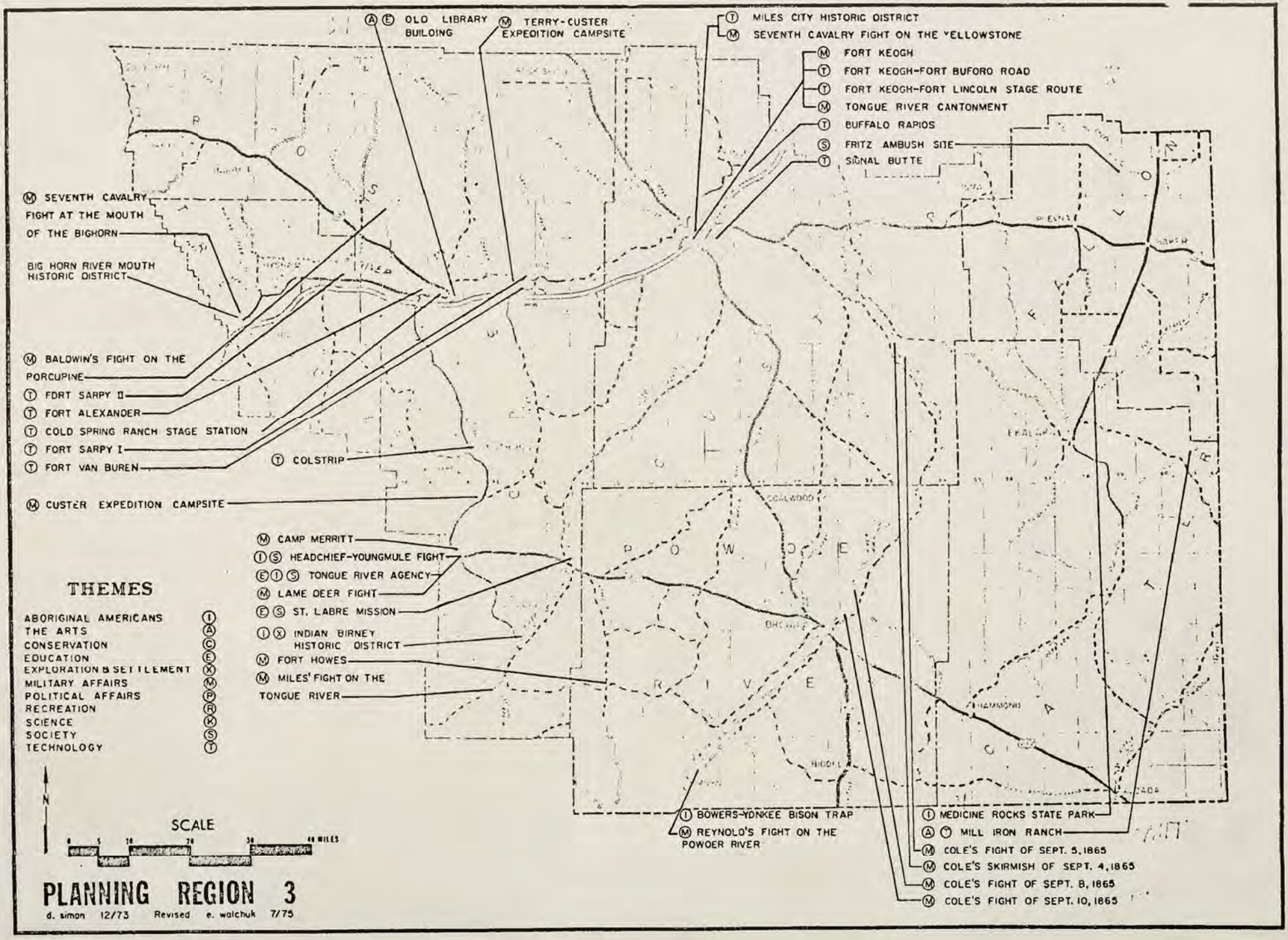
ABORIGINAL AMERICANS	Ⓘ
THE ARTS	Ⓐ
CONSERVATION	Ⓒ
EDUCATION	Ⓔ
EXPLORATION & SETTLEMENT	Ⓧ
MILITARY AFFAIRS	Ⓜ
POLITICAL AFFAIRS	Ⓟ
RECREATION	Ⓡ
SCIENCE	Ⓚ
SOCIETY	Ⓢ
TECHNOLOGY	Ⓣ

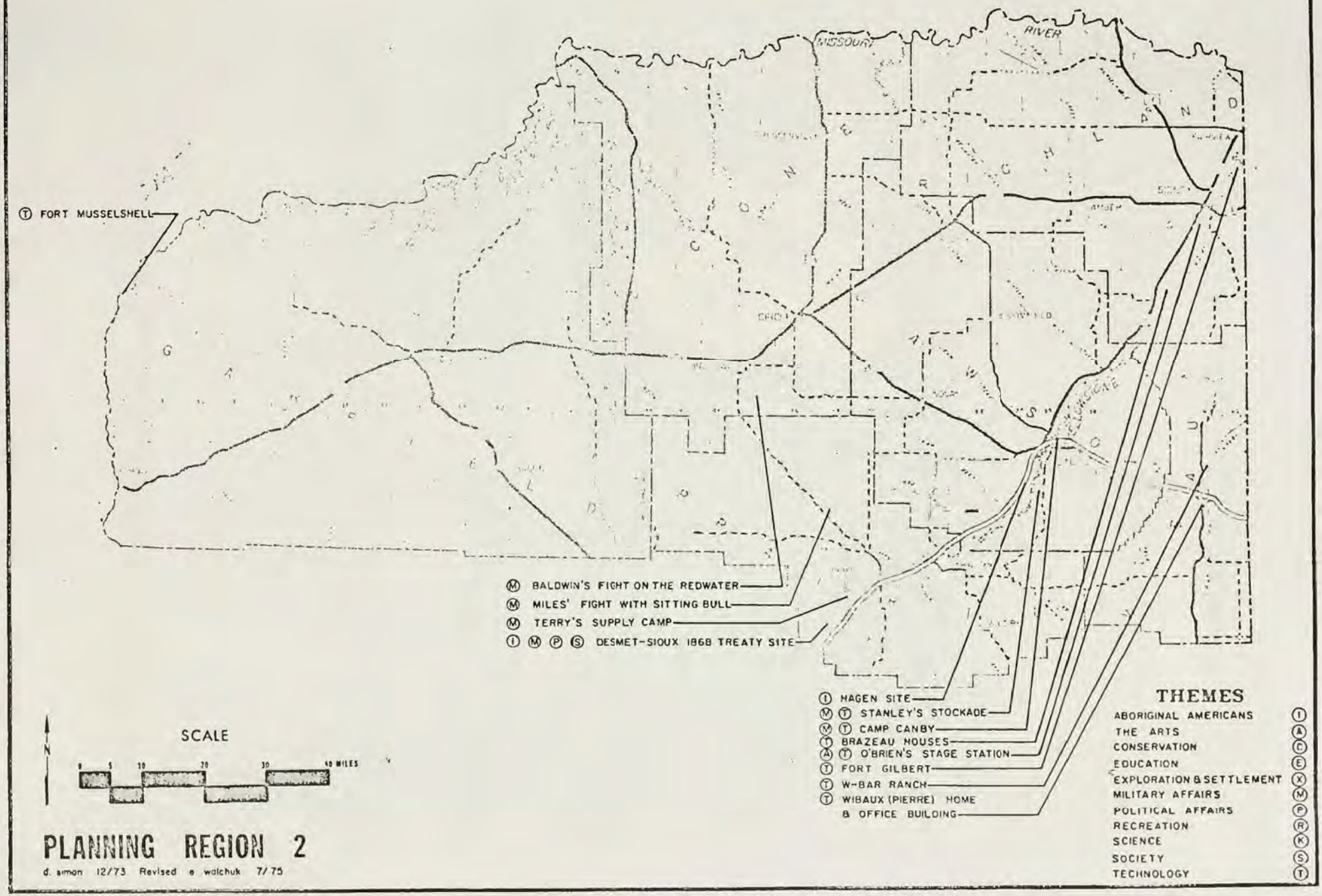
d. simon 12/73 Revised a wolchuk 7/75



PLANNING REGION 7

d. simon 12/73 Revised e. wolchuk 7/75


(A)(E) OLD LIBRARY BUILDING
(M) TERRY-CUSTER EXPEDITION CAMPSITE
(T) MILES CITY HISTORIC DISTRICT
(M) SEVENTH CAVALRY FIGHT ON THE YELLOWSTONE
(M) FORT KEOGH
(T) FORT KEOGH-FORT BUFORD ROAD
(T) FORT KEOGH-FORT LINCOLN STAGE ROUTE
(M) TONGUE RIVER CANTONMENT
(T) BUFFALO RAPIDS
(S) FRITZ AMBUSH SITE
(T) SIGNAL BUTTE
(M) SEVENTH CAVALRY FIGHT AT THE MOUTH OF THE BIGHORN
BIG HORN RIVER MOUTH HISTORIC DISTRICT
(M) BALDWIN'S FIGHT ON THE PORCUPINE
(T) FORT SARPY II
(T) FORT ALEXANDER
(T) COLD SPRING RANCH STAGE STATION
(T) FORT SARPY I
(T) FORT VAN BUREN
(T) COLSTRIP
(M) CUSTER EXPEDITION CAMPSITE
(M) CAMP MERRITT
(I)(S) HEADCHIEF-YOUNGMULE FIGHT
(E)(I)(S) TONGUE RIVER AGENCY
(M) LAME DEER FIGHT
(E)(S) ST. LABRE MISSION
(I)(X) INDIAN BIRNEY HISTORIC DISTRICT
(M) FORT HOWES
(M) MILES' FIGHT ON THE TONGUE RIVER
(I) BOWERS-YONKEE BISON TRAP
(M) REYNOLD'S FIGHT ON THE POWDER RIVER
(I) MEDICINE ROCKS STATE PARK
(A)(T) MILL IRON RANCH
(M) COLE'S FIGHT OF SEPT. 5, 1865
(M) COLE'S SKIRMISH OF SEPT. 4, 1865
(M) COLE'S FIGHT OF SEPT. 8, 1865
(M) COLE'S FIGHT OF SEPT. 10, 1865
THEMES
ABORIGINAL AMERICANS (I)
THE ARTS (A)
CONSERVATION (C)
EDUCATION (E)
EXPLORATION & SETTLEMENT (X)
MILITARY AFFAIRS (M)
POLITICAL AFFAIRS (P)
RECREATION (R)
SCIENCE (K)
SOCIETY (S)
TECHNOLOGY (T)
N
SCALE
0 5 10 20 30 40 MILES
PLANNING REGION 3
d. simon 12/73 Revised e. walchuk 7/75



PLANNING REGION 2

d. simon 12/73 Revised e walchuk 7/75

EXISTING ENVIRONMENT

ECONOMIC -- EMPLOYMENT

Employment in the Yellowstone Basin was 80,147 persons (full & part time workers) in 1972, an increase of 14.2% from 70,205 persons in 1959.1/ Significantly, employment rose 4,000 from 1972 to 1973, with the substantial portion of the increase occuring in Yellowstone County. Yellowstone County, as indicated on Chart held a similar employment growth rate as the remainder of the basin through 1971, when it began to widen the gap. Employment grew at a faster rate than population for the basin from 1970 to 1973, although Yellowstone County increased at a greater rate than the basin.2/

The largest employer of private wage and salary personal for Yellowstone County is wholesale and retail trade, followed by service industry, manufacturing and wholesale and retail trade (Major 4 -- see Chart). Because of its status as a regional trade center for eastern and central Montana, employment is high for trade and services, which also partially explains the increasing employment and population ratio for the county.3/

Wholesale and retail trade and scervices are hightest for private wage and salary employment in the remainder of the basin, although they constitute quite smaller shares than in Yellowstone County. Transportation, communication and public utilities and manufacturing likewise are of less significance to the remainder of the basin as a basis of employment.

The base employment for the basin (not including Yellowstone County) is agriculture, comprising slightly less than 23% of total employment in 1973, as opposed to just 3.9% for Yellowstone County (Chart). Not surprisingly, government employment comprises around 16% of total employment for the whole basin. As a percentage it is constant between Yellowstone County and the rest of the basin.

Non farm proprietors are higher in the rest of the basin than Yellowstone County, due to the smaller nature of business in rural areas. For description these are the "Mom and Pop" stores Vs. large firms serving a regional basis and hense having fewer proprietors for the wage and salary personal.

Employment data substantiate what one intuitively would expect i.e., that agricultural employment is high throughout the basin (excluding Yellowstone Co.) followed in importance by government. Wholesale and retail trade and services are important to sustaining the urban populations in the basin, serving the agricultural areas.

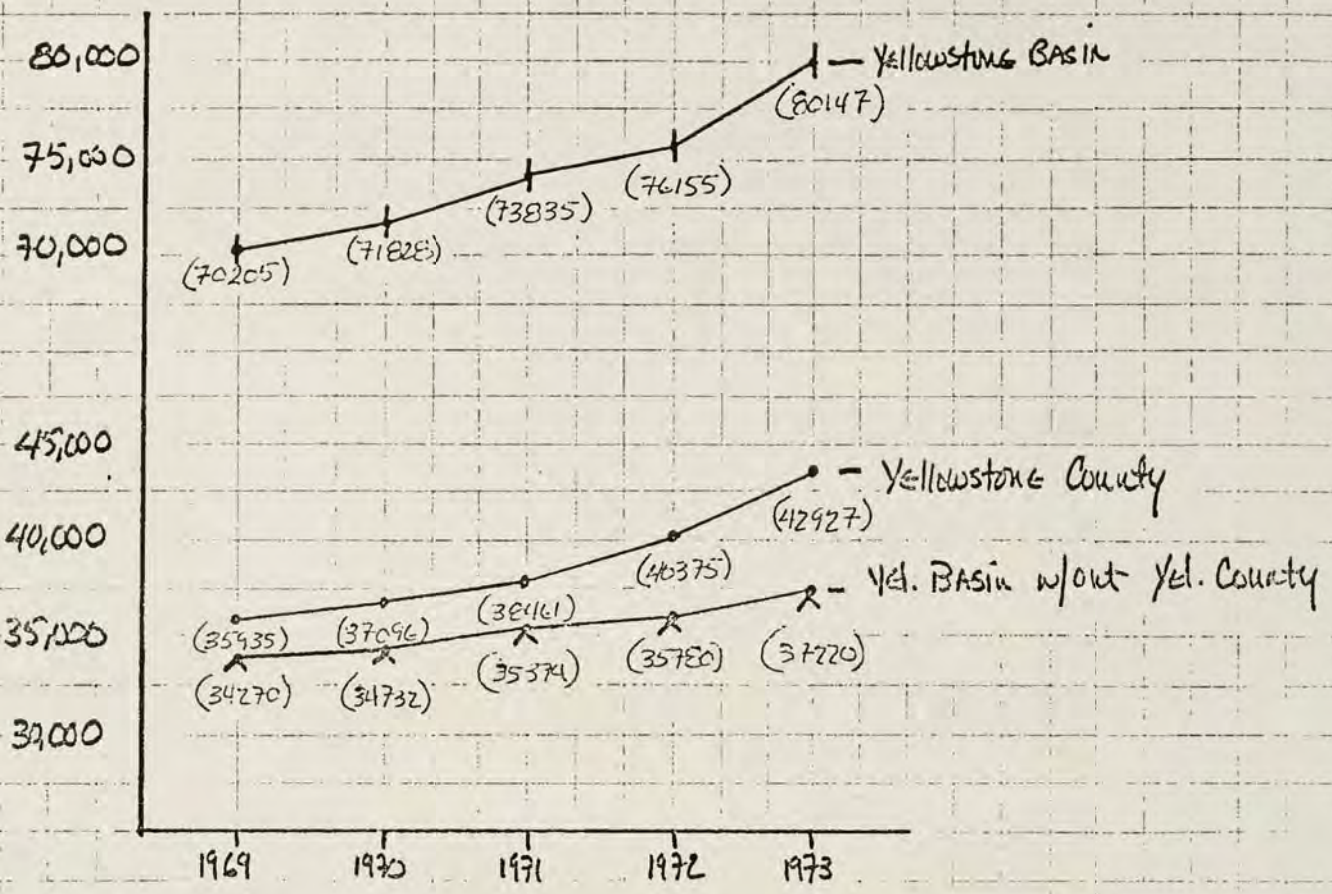
1/ See Chart , Source Reis Data, DCA, Helena, Montana.

2/ See Table

3/ This is partially explained by the less family oriented work force of Yellowstone County, Vs. the remainder of the basin.

Yellowsotne County draws heavily on trade, services, and government to fulfill its role as a regional trade center. It's influence in commerce is strong throughout the Yellowstone Basin.

EMPLOYMENT, YELLOWSTONE BASIN, YELLOWSTONE BASIN w/out YELLOWSTONE COUNTY & YELLOWSTONE COUNTY, 1969-1973 (COUNTY DATA)



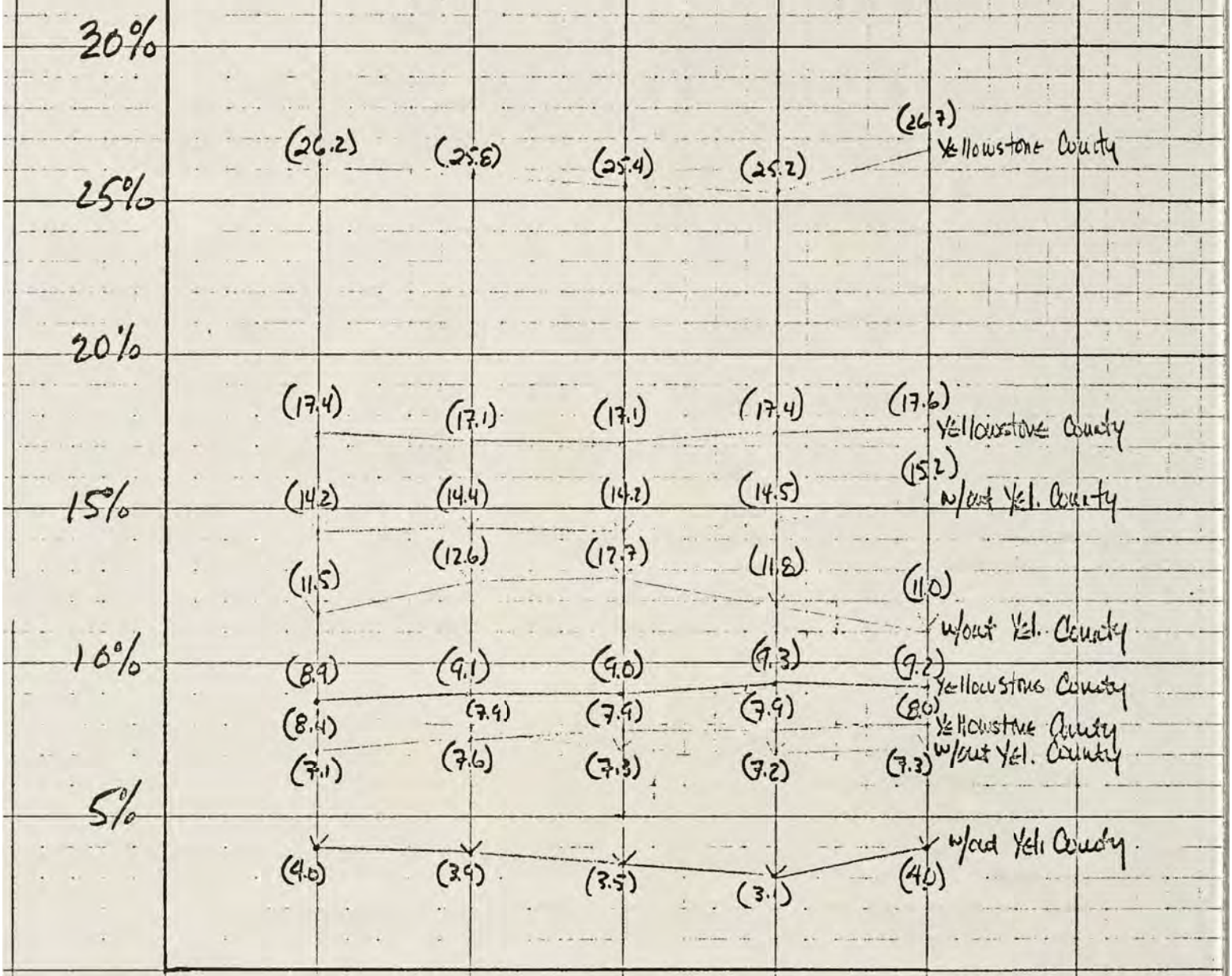
SOURCE: U.S. Dept. of Commerce, REGIONAL ECONOMIC INFORMATION SYSTEM, BUREAU OF ECONOMIC ANALYSIS, WASH. D.C. 1975, FROM RESEARCH & INFORMATION SYSTEMS DIVISION, MT. DEPT. OF COMMUNITY AFFAIRS, HELENA.

EMPLOYMENT AS A PERCENTAGE OF POPULATION, 1970-73, YELLOWSTONE BASIN, YELLOWSTONE COUNTY & YELLOWSTONE BASIN W/OUT YELLOWSTONE COUNTY

	1970	1971	1972	1973
YELLOWSTONE COUNTY	42.5%	42.8%	44.4%	46.1%
YELLOWSTONE BASIN	42.3%	42.7%	43.6%	45.2%
YELLOWSTONE BASIN W/OUT YEL. CO.	42.1%	42.6%	42.9%	44.3%

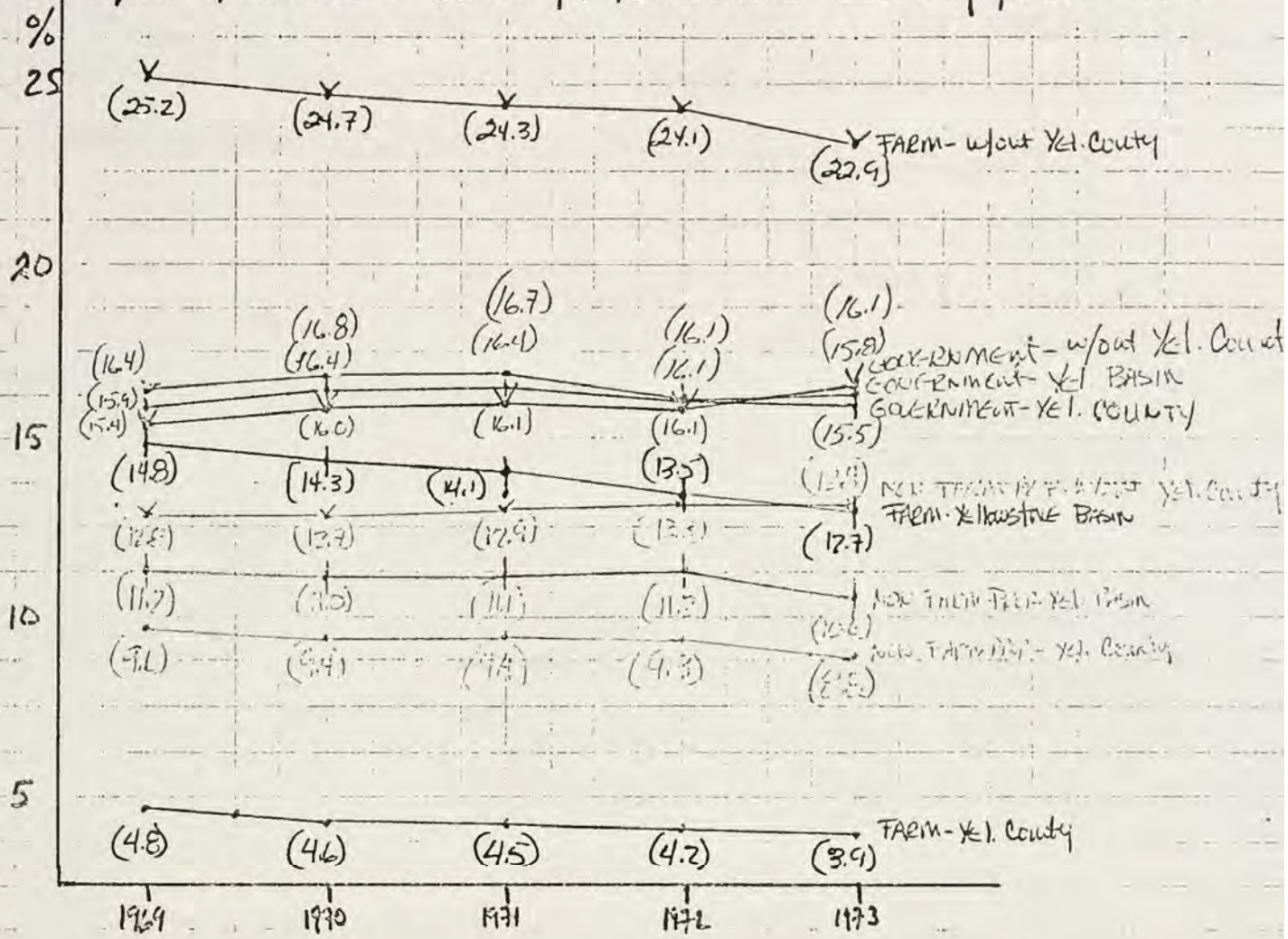
SOURCE; U.S. Dept. of COMMERCE, REGIONAL ECONOMIC INFORMATION SYSTEM, BUREAU of ECONOMIC ANALYSIS, WASH. D.C., 1975; FROM RESEARCH & INFORMATION SYSTEMS DIVISION, MT. DEPT. OF COMMUNITY AFFAIRS, HELENA, & ESTIMATES OF THE POPULATION OF MONTANA, JULY, 1971, 1972, 1973 & 1974, BUREAU OF BUSINESS & ECONOMIC RESEARCH, UNIVERSITY OF MONTANA, MISSOULA.

EMPLOYMENT OF PRIVATE NONFARM, MAJOR 4 INDUSTRIES, 1969-1973, YELLOWSTONE BASIN w/out YELLOWSTONE COUNTY & YELLOWSTONE COUNTY



SOURCE: U.S. Dept. of COMMERCE, REGIONAL ECONOMIC INFORMATION SYSTEM, BUREAU of ECONOMIC ANALYSIS, WASH. D.C., 1975; FROM RESEARCH & INFORMATION SYSTEMS DIVISION, MT. DEPT. OF COMMUNITY AFFAIRS, HELENA

Employment of FARM, NON-FARM PROPRIETORS & GOVERNMENT (BY % of TOTAL) FOR Yellowstone BASIN, Yellowstone BASIN w/out Yellowstone County & Yellowstone County, 1969-1973



SOURCE: U.S. Dept. of Commerce, REGIONAL ECONOMIC INFORMATION SYSTEM, BUREAU OF ECONOMIC ANALYSIS, USA, D.C., 1975, FROM RESEARCH & INFORMATION SYSTEMS DIVISION, Mt. Dept. of COMMUNITY AFFAIRS, Helena.

EXISTING ENVIRONMENT

ECONOMIC -- UNEMPLOYMENT

Unemployment statistics have a high degree of variability due to their sensitiveness to ecomomic conditions, and therefore one can manipulate to some degree the results from the data presented. To gain an understanding of employment in the basin, state labor market areas (LMA) were analyzed, using May as the indicator month. Census data for 1969 were altered to approximate the LMA classification.

In May, 1976, Hardin-Redlodge LMA had the highest unemployment rate at 6.1% of civilian labor force, followed by Miles City LMA (5.6%), Billings SMSA (4.7%) and Glendive LMA (3.9%). Montana as a state had an unemployment rate of (6.8%), higher than the Yellowstone Basin. As seen from Chart unemployment is variable for the concerned area.

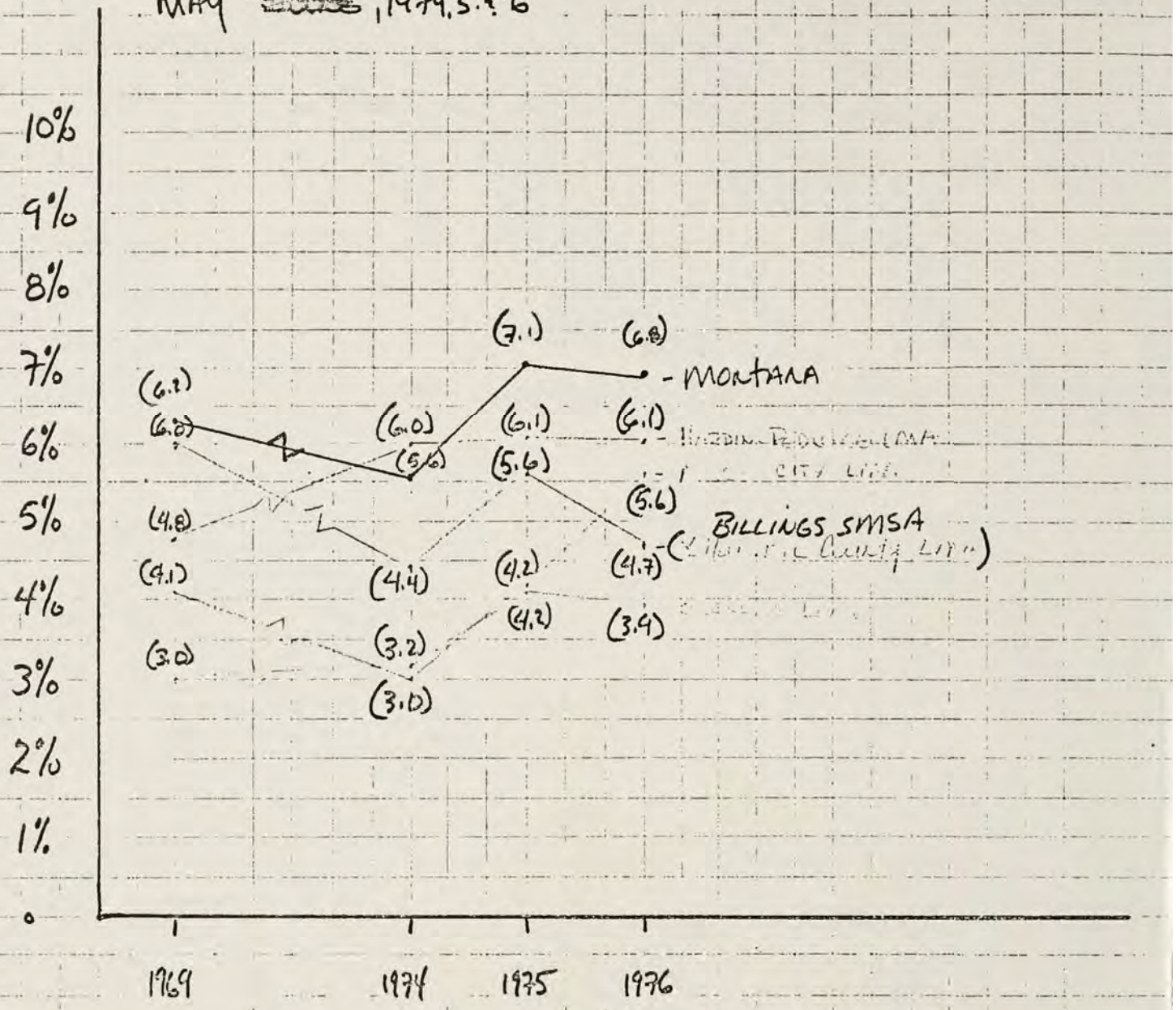
Data from the 1970 census found Montana's unemployment higher than the Basin, particularily Glendive LMA, which historically has a low unemployment rate. Its difficult to stratify the precise reason for unemployment in a region, but the basin's basic reliance on agriculture, government, and secondary industries of trade and services contribute to stabilize the economy, more than the logging industry in the western portion of the state.

According to the 1970 census of population there were two distinct last occupations of the experienced unemployed in the Yellowstone Basin. Experienced unemployed males were predominately craftsmen, foremen or kindred workers, or operators (including transport). For the four LMA's, with the exception of the Miles City LMA which had service workers, including private household as the second highest previous occupation.1/

1/ Source: U.S. Dept. of Commerce, Bureau of Census, 1970 Census of Population, Vol. I, Characteristics of Population, #28, pp. 28-216 - 28-220.

Last occupations of unemployed women in the basin was also predominately in two categories, service workers, except private household, and clerical and kindred workers, with sales workers also high in Hardin-Redlodge LMA's.

Unemployment, For Basin, By ~~LMA~~'s (Labor Market Areas), 1969, 1974, 1975, 1976
May ~~[illegible]~~, 1974, 5 & 6



SOURCE: U.S. Dept. of Commerce, Bureau of Census, 1970 Census of Pop., Vol. I Characteristics of Pop., #28; & Montana Department of Labor & Industry, Employment Security Division, Montana Employment & Labor Force, June, 1975, June 1976, Helena.

NOTE: Hardin-Redlodge LMA includes Sweetgrass, Stillwater, Carbon & Bighorn Counties
Miles City LMA includes Treasure, Rosebud, Custer, Powder River, Carter & Fallon Counties
Billings SMSA includes Yellowstone County
Glendive LMA includes Garfield, McCone, Prarie, Dawson, Wibaux & Richland Counties

EXISTING ENVIRONMENT

ECONOMIC -- INCOME

Using per capita income as an indicator of the relative economic condition of an area, the Basin on the whole comes out quite well. Chart indicates the Basin's personal per capita income (PPCI) for 1970-74, compared with the state. For the five year period the basin was higher, although the presence of Yellowstone County is strong. Yellowstone county averaged approximately $200 per year higher PPCI, strongly upward biasing the results.

A large disparity exists in the Basin between PPCI's, resulting in an over $2,400 gap in 1973 for example. Big Horn County is distinctly lower, probably due to poverty level income upon the Crow Reservation, while Treasure County recorded the highest PPCI except for 1974, when it dropped considerably.

Income figures for the Basin in 1974 indicate that wholesale and retail trade is the sector with the highest personal income, followed by government, services, farming, and transportation, communication and public utilities (Table). For 1972 and 1973 farming was highest, due to high market conditions and good crops, but down in 1974 due to poor cattle prices. This sector is the most suseptable to fluxuations, due to its ties to the open market.

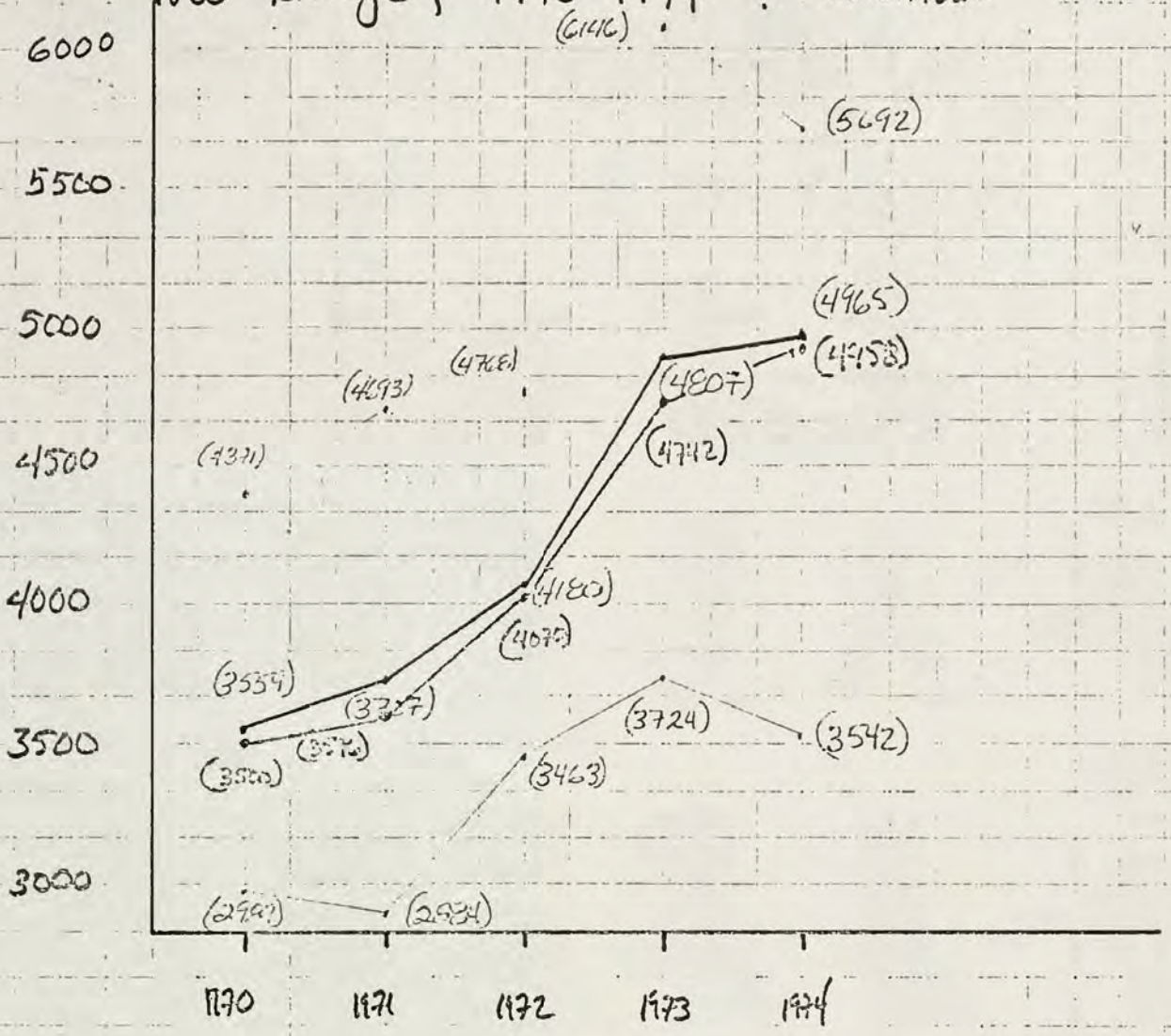
Analysis of the data after it is broken out between Yellowstone County and the remainder of the Basin presents a slightly different picture. (Table). Farming is small in Yellowstone County, whereas it is of major importance for the remainder of the basin, underscoring its importance to economic stability and survival of the Basin. Government expenditures are substantial for both.

Again two distinctions become clear;

1) The importance of agriculture to the economic base of the basin.

2) Billings position as a regional trade center.

Per Capita Income; Yellowstone Basin, Average & High Low Range, 1970-1974 & Montana



NOTE: SHADDED AREA HIGH & LOW PERCAPITA INCOMES FOR INDIVIDUAL COUNTY IN BASIN, AVERAGE IS WEIGHTED AVERAGE OF INCOME & POPULATION FOR BASIN

SOURCE: U.S. Dept. of Commerce, Regional Economic Information System, Bureau of Economic Analysis, Wash. D.C., 1975, FROM RESEARCH & INFORMATION SYSTEMS DIVISION, Mt. Dept. of Community Affairs, Helena.

(Yellowstone Basin)

INCOME BY SECTOR, Yellowstone County & Yellowstone Basin not including Yellowstone Basin, 1970 - 1974, FOR MAJOR 5 INDUSTRIES

	1970	1971	1972	1973	1974
Yellowstone Basin					
FARM	82487	71022	115,221	141,346	90,885
W.&R.TRADE	91723	99024	104,726	123,599	141,057
TRANS. COMM. PUBLIC	54735	61223	59,652	78,227	84.021
SERVICES	60,963	64414	68,420	86,068	96,413
GOVERNMENT	74.019	83,486	91,898	102,753	115,364
Yellowstone County					
FARM	16,954	16,559	24,803	23,714	16,318
W. & R. TRADE	64,348	69,612	74,629	87,937	101,128
TRANS. COMM. PUBLIC.	28,287	34,106	38,250	44,163	47,583
SERVICES	42,699	45,235	49,507	57,797	65,206
GOV'T	41,268	46,296	51,076	57,470	64,102
Yellowstone Basin w/out Yel. County					
FARM	65,533	54,463	90,418	117,632	74,567
W&R TRADE	27,375	29,382	30,097	35,662	39,929
TRANS. COMM. PUBLIC.	26,448	27,117	21,402	34,064	36,438
SERVICES	18,264	19,179	18,913	28,598	31,207
GOV'T	32,751	37,190	40,822	45,283	51,262

Source: BEA DATA, DCA, Helena

EXISTING ENVIRONMENT

ECONOMIC -- AGRICULTURE

According to the 1969 census of agriculture there were 6468 farms in the Yellowstone Basin, a decrease of 236 farms from 1964. During the same time period, the average size of farms decreased slightly, due for the most in a change in size in Prairie County from an average of 5588.5 to 2860.4 acres. Yellowstone County had the largest number of farms in 1969 at 1139 averaging 1415.3 acres, with Treasure containing only 121 farms averaging 5261.4 acres. Nine of the counties had an increased acreage size of farms while five had declines, probably due to subdivision and resource development (Table).

The predominant cash commodity of harvestable crops was wheat in the Basin for 1473, as 599,700 acres were harvested (Table). Barley followed at 247,600 acres, oats on 85,700 acres, corn on 65,800, sugar beets on 41,920 and potatoes 420 acres. As Table shows, acreage decreased for wheat, corn, oats and potatoes, while barley, hay and sugar beets increased from 1948 information. Dawson and Richland Counties were first and second in oats, wheat and barley production; Yellowstone was first in corn production, Big Horn and Sweetgrass were the highest hay producers, while sugar beet production was highest in Richland and Yellowstone Counties. Recent years have seen the closing of the beet processing plant in Hardin and full capacity operation at the Billings and Sidney plants.

Cattle and pig populations for the Basin increased from 1948 to 1963 with cattle making a considerable increase (Table). Sheep populations, however, dropped by over half their size in 1948, which has been a phenomenon occuring throughout the Western United States. Cattle populations at present are probably lower than 1973, although are on the increase due to upturns in the cattle market.

More irrigated small grains, corn and hay acreages have been occuring throughout the basin, as irrigation becomes more accepted and feasible.

Not only are higher yields possible, but the availability of more feed through the winter makes irrigation appealing to ranchers and farmers.

TOTAL # OF FARMS, AVERAGE SIZE & PERCENTAGE OF LAND IN FARMS

	TOTAL # OF FARMS		AVERAGE SIZE OF FARMS		% OF LAND IN FARMS	
	1964	1969	1964	1969	1964	69
BIG HORN	588	540	4095.7	5216.6	74.7	87.6
CARBON	749	674	898.5	973.3	50.7	49.6
CUSTER	358	386	6892.3	↓ 5957.1	102.3	95.7
DAWSON	572	552	2469.3	2548	93.5	92.7
PARK	425	397	2073.2	2160.9	52.4	51.0
POWDER RIVER	340	364	4530.9	4655.3	73.2	80.5
PRAIRIE	228	229	5528.5	↓ 2860.4	115.2	59.2
RICHLAND	766	720	1584.6	1740.9	91.8	94.2
ROSEBUD	382	390	7916.4	↓ 7597.5	93.9	91.9
STILLWATER	489	453	1833	1993.7	77.9	78.7
SWEET GRASS	286	292	3183.1	↓ 2909.4	77.0	72.2
TREASURE	129	121	4993.8	5261.4	102.2	101.0
WIBAUX	215	211	2352.2	2476.5	88.8	91.7
YELLOWSTONE	1177	1139	1442.6	↓ 1415.3	100.6	96.3
	6704	6468	49654.1/	47766.3/		
			3561.0	3411.9		

SOURCE: U.S. BUREAU of CENSUS, 1969 CENSUS of AGRICULTURE, VOL. 1, PT. 28, MONTANA, WASHINGTON, D.C.

ACRES HARVESTED BY CROP & LIVESTOCK PRODUCTION, YELLOWSTONE BASIN, 1948 & 1973.

	1948	1973
WHEAT	899,800	599,700
CORN	94,100	65,800
OATS	86,900	85,700
BARLEY	155,100	247,600
HAY	573,300	603,300
SUGAR BEETS	40,050	41,920
POTATOES	2070	420
CATTLE	614,200	1,024,400
SHEEP	496,800	231,800
PIGS	62,200	68,800

SOURCE:

MONTANA AGRICULTURAL STATISTICS, VOL. III & XV, DECEMBER, 1950 & DECEMBER, 1974, MONTANA DEPT. OF AGRICULTURE, & U.S.D.A. STATISTICAL REPORTING SERVICE, HELENA.

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EXISTING ENVIRONMENT

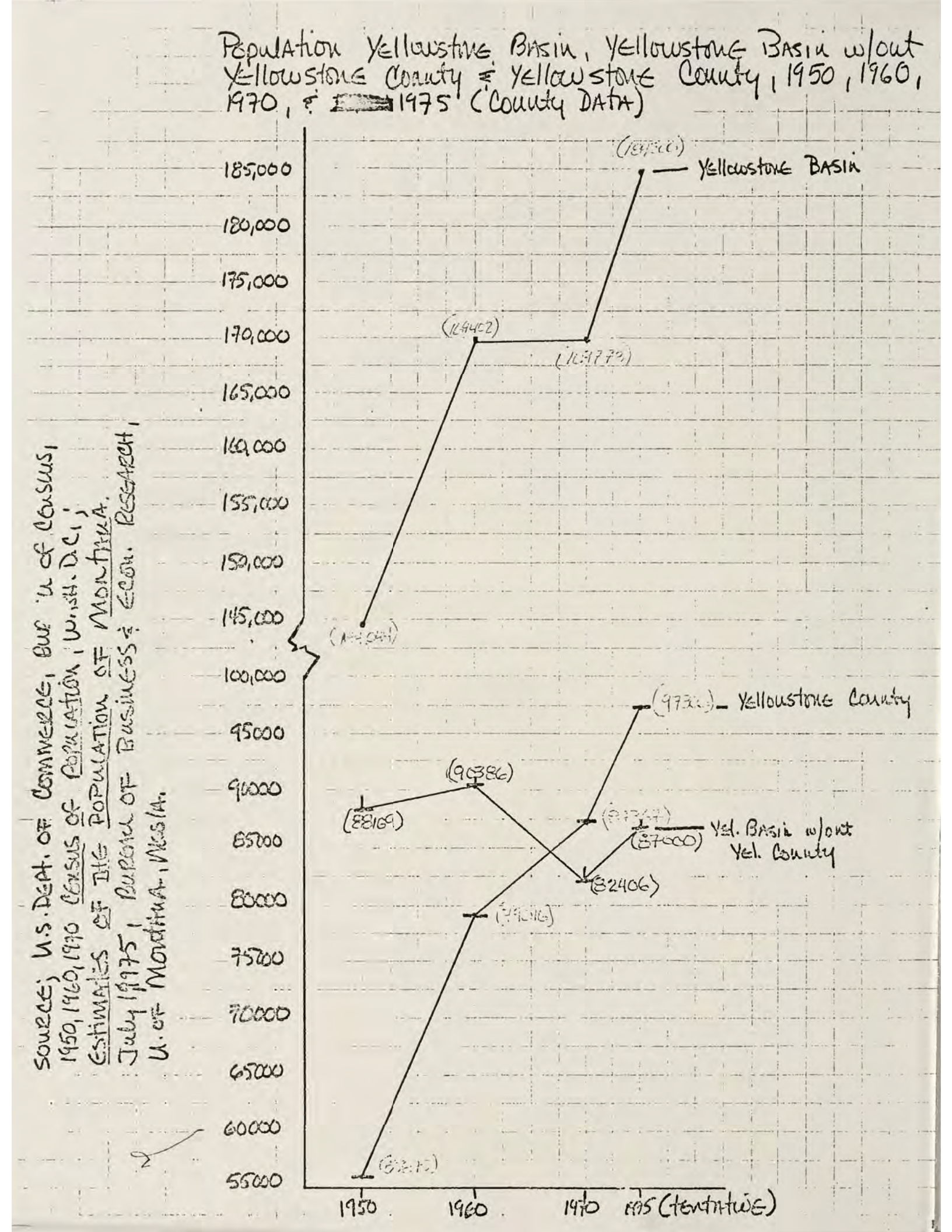
SOCIAL -- POPULATION

From 1950 to 1975 the population of the Basin grew from 144,044 to 184,300 persons, or an increase of 28 percent from 1950 (Chart). But the population growth of the Basin must be qualified because of the influence of Yellowstone County.

Yellowstone Basin experienced large growth from 1950 to 1960, followed by the 60's when the Basin gained only 371 residents. Five years has been meet with new surges of population into the later 1970's. Yellowstone County experienced a strikingly similar growth in the 1950's and 1970's, as it also grew, but at a slower rate, in the 60's. The first half of the 1970's witnessed an increase of almost 10,000 residents in Yellowstone County.

Conversely, the remainder of the Basin has had a decline in population from 1950 to 1975. Slight increases in the 1950's were followed by an exodus in the 1960's, as almost 8,000 persons left the Basin. There has been an upturn in population in the 1970's, due to increased mining and associated activities in the Basin.

Population Yellowstone Basin, Yellowstone Basin w/out Yellowstone County & Yellowstone County, 1950, 1960, 1970, & [redacted] 1975 (County Data)



Sources: U.S. Dept. of Commerce, Bur. of Census, 1950, 1960, 1970 Census of Population, Wash. D.C.; Estimates of the Population of Montana, July 1, 1975, Bureau of Business & Econ. Research, U. of Montana, Missoula.

EXISTING ENVIRONMENT

SOCIAL -- POPULATION DISTRIBUTION

A measure of population distribution can be gained from census classifications as to urban, rural farm or rural non-farm residence. Obviously, urban residences increased from 57.6% to 62.2% from 1960 to 1970, while rural farm dropped from 16.8% to 13.1%. Rural non-farm also decreased, although not much, from 25.6% to 24.7%. The rural non-farm classification incorporates both small towns in the basin such as Columbus, Big Timber, Red Lodge, Hysham, Forsyth, Broadus, Terry and Wibaux (due to their size at the time of the 70 census) and bedroom communities, particularily around Billings. Unfortunatly, no current information is available on rural non-farm, but it is evident from population figures that Yellowstone County, Carbon, Stillwater and Rosebud County are experiencing growth into the county and what were pretty much predominately rural farm areas.

URBAN & RURAL CLASSIFICATION, 1960 & 1970

	URBAN		RURAL FARM		RURAL NON-FARM	
	1960	1970	1960	1970	1960	1970
PARK	8229	6883	1736	1320	3195	2815
SWEETGRASS	-0-	-0-	1380	1014	1910	1966
STILLWATER	-0-	-0-	2021	1466	3505	3166
CARBON	-0-	-0-	2285	2007	5432	5073
YELLOWSTONE	65313	75651	4750	3458	8953	8245
BIGHORN	2789	2733	3243	2756	3975	4584
TREASURE	-0-	-0-	764	460	581	473
ROSEBUD	-0-	-0-	1559	1572	4628	4520
CUSTER	9665	9023	1747	1315	1815	1860
POWDER RIVER	-0-	-0-	1565	1278	920	1584
PRAIRIE	-0-	-0-	864	753	1454	1005
WIBAUX	-0-	-0-	844	704	854	776
DAWSON	7058	6305	2079	1463	3177	3194
RICHLAND	4564	4543	3005	2721	2935	2468
	97,618	105,132	28,442	22227	43,334	41,729

T. P. 1960 → 169,394 1970 → 169,094

SOURCE: U.S. BUREAU OF THE CENSUS, U.S. Census of Population: 1960 & 1970, Vol. I, CHARACTERISTICS OF THE Population, PART 22, MONTANA.

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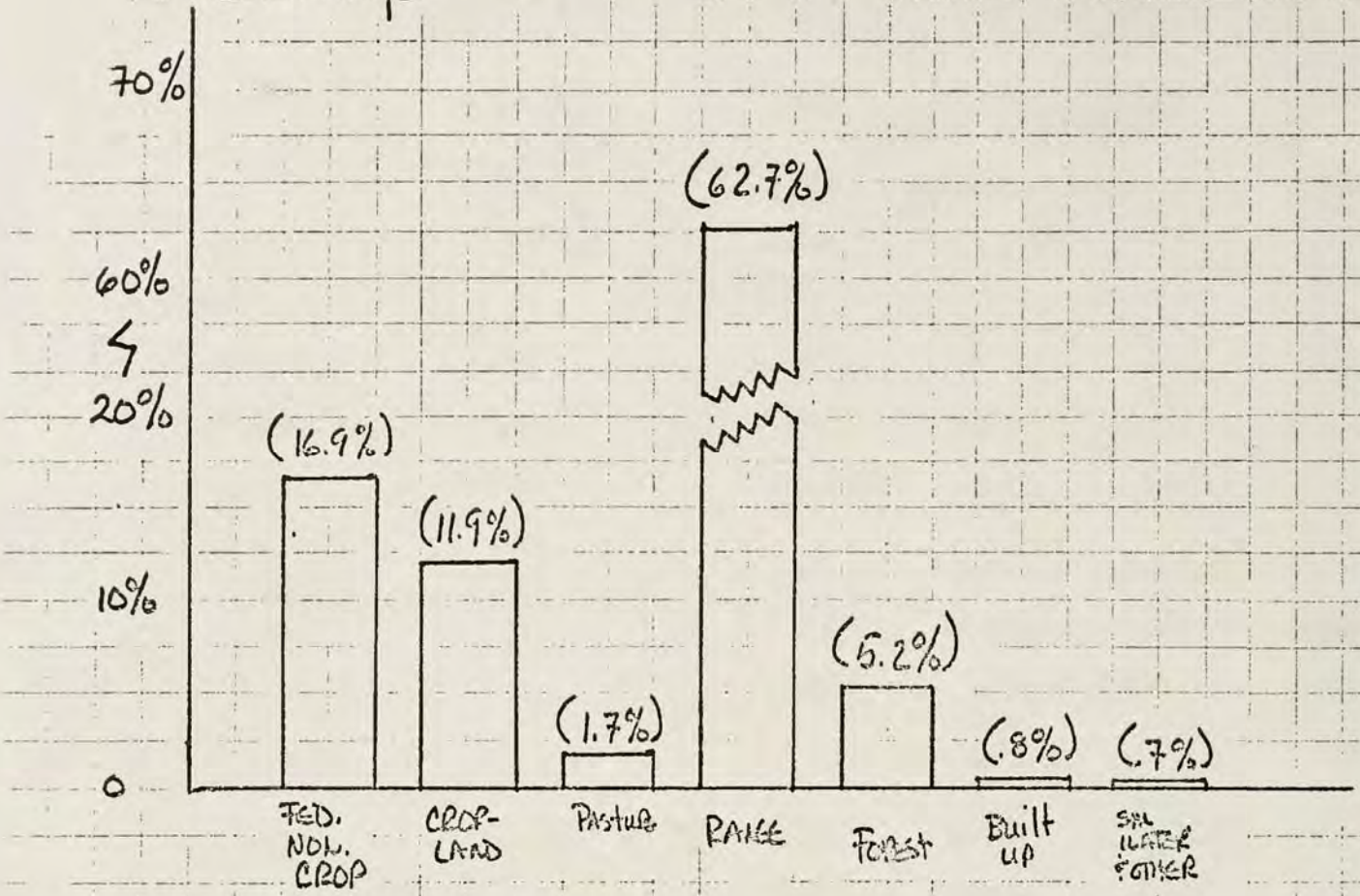
SOCIAL -- LAND USE

The Yellowstone Basin contained 23,108,826 acres in 1969, ranging from 568,960 acres in Wibaux County to 3,220,480 acres in Big Horn County.1/ Predominant use was range land, comprising 62.7% of the land area (14,482,095 acres), with 16.9% federal non-crop land (3,913,318 acres). Built-up (urban) area was only 8/10 of 1% of region, as most of the land is in agricultural production (see Chart). Only 5.2% is in forest classification, as the Basin is predominately plains,cropland,pasture and range. The federal non-crop land would be forest lands contained in Gallatin National Forest. Custer National Forest, and Bureau of Land Management holdings in the Basin. (Historical comparison forthcomming).

1/ U.S. Department of Agriculture, SCS, and Montana State Conservation Needs Committee; Montana Soil and Water Conservation Needs Inventory, 1970.

LAND USE, YELLOWSTONE BASIN, 1969, BY CATEGORY AND PERCENTAGE



SOURCE: U.S. Dept. of Agriculture, SCS, & Mt. State Conservation Needs Committee, Mt. Soil & Water Conservation Needs Inventory, 1970

EXISTING ENVIRONMENT

SOCIAL -- TRANSPORTATION

Just as the Yellowstone Basin is bisected by the Yellowstone River, it is likewise by Interstate 94, which goes from Livingston in the west to Wibaux on the North Dakota line. Numerous other two lane roads cross the Basin, linking up county seats with I94, and adjoining states. Interstate 90 heads south east from Billings to Sheridan, Wyoming; both interstates are intermittent, as highway construction continues on the routes.

The region is serviced by Burlington Northern Railroad and Amtrack and by airports in Billings, Miles City and Glendive with commercial air sercice. Frontier and Northwest airlines serve the area with most county seats having a small air strip for local use. The major bus and rail route is following the Yellowstone River, with some bus traffic to county seats, such as Hardin, Broadus, Sidney.

EXISTING ENVIRONMENT

SOCIAL -- EDUCATION

In school year 1975-76 there were 42,210 students in grades 1-12 in the Yellowstone Basin, with a staff of 2.445 persons (Table). The pupil and staff ratio for the basin was 17.3 pupils per staff member and 14.8 pupils per staff for the remainder of the basin (minus Yellowstone County). The state average for the same year was 16.6, or slightly lower. Yellowstone County was quite higher than the average, with a school enrollment of 22,240 pupils and a pupil to staff ratio of 20.3.

Billings has a vocational-Technical Center with an cummulative enrollment of 766 in fiscal year 1976, along with Eastern Montana College with an enrollment of 3337 students in fall 1975. Dawson College in Glendive, a 2 year institution had a full and part time enrollment of 511 in fall 1975, as miles Community College in Miles City enrolled 735 full and part time students in fall 1975. There is also one private college in the basin at Billings, Rocky Mountain College with an enrollment of 445 in fall 1975.

PUBLIC EDUCATIONAL ENROLLMENT, STAFF AND PUPILS/STAFF, 1975-76 SCHOOL YEAR, GRADES 1-12

	STAFF	ENROLLMENT	PUPILS/STAFF
PARK	167.0	2521	15.1
SWEETGRASS	46.2	646	14.0
STILLWATER	84.3	1160	13.8
CARBON	132.8	1689	12.7
YELLOWSTONE	1094.2	22,240	20.3
BIG HORN	191.1	2572	13.5
TREASURE	19.0	276	14.5
ROSEBUD	135.1	2117	15.7
CUSTER	156.2	2588	16.6
POWDER RIVER	51.0	640	12.5
PRAIRIE	25.0	368	14.7
WIBAUX	23.0	364	15.8
DAWSON	163.2	2704	16.6
RICHLAND	160.7	2325	14.5
YELLOWSTONE BASIN	2444.9	42,210	17.3 /STAFF
MINUS YEL. COUNTY	1350.7	19,970	14.8 /STAFF
STATE WIDE	10,347.8	171,833	16.6 /STAFF

SOURCE:
SUPERINTENDENT OF PUBLIC INSTRUCTION, 1975-76 MONTANA EDUCATION DIRECTORY, HELENA

EXISTING ENVIRONMENT

SOCIAL -- LAW ENFORCEMENT

Each county has at the minimum a sheriffs department which works with the Highway Patrol and enforcement officials in the towns of the Basin. Rural areas typically encounter few major offences, although the urban areas in the Basin appear to be receiving increased crime activity. The Basin's crime rate for major offences 1/ increased from 4404.6/100,000 population to 4973.8 offences/100,000 population from 1973 to 1975, as compared to the states increase from 3409.3/100,000 to 4434.9/100,000 population for the same respective years. Yellowstone County is considerably above the average, at 7010.5 in 1975, as the remainder of the Basin had a major crime rate of 2739.4/100,000 population in 1975. Statistics don't convey the whole picture, as some areas in the Basin witnessed decreases in crime rates, while others felt the pains of coal development (Rosebud, Custer Counties for example).

1/ The seven major index crimes are; murder, rape, robbery, aggravated assult, burgulary, larceny/theft and motor vechicle theft. Source: Unpublished information, State Crime Control Board, Montana Department of Justice, Helena.

Population, 7 Major Crimes Committed and Rate per 100,000 Population, 1973 – 1975

	1973			1974			1975		
	Pop	Total	Rate	Pop	Total	Rate	Pop	Total	Rate
Big Horn	9776	93	951.3	11,327	84	741.6	10680	148	13858
Carbon	7482	147	1964.7	7959	202	2538	8035	174	2165.5
Custer	11871	384	32348	11531	398	3451.6	12510	558	4460.4
Dawson	10974	373	3398.9	11,123	342	3074.7	11087	397	3580.8
Park	11694	416	3557.4	12041	414	3683.4	11730	479	4083.5
Prairie	1696	39	2299.5	2041	29	1420.9	1933	45	2328.0
Richland	9600	110	1146.8	9898	104	1050.7	10069	146	1450
Rosebud	7500	155	2066.7	6735	200	2969.6	7832	245	3128.2
Stillwater	4928	37	751.3	4918	47	959.6	5289	56	1058.8
Sweetgrass	3172	134	4198	3061	100	3266.9	3200	119	3718.8
Treasure	1197	5	417.7	1122	8	713	1400	21	1500
Wibaux	1297	2	154.4	1429	4	279.9	1424	-0-	-0-
Yellowstone	91978	5829	6337.4	94187	6437	6834.3	95913	6724	7010.5
Powder River	2594	21	809.6	2143	6	280	2238	7	312.8
— Basin Totals	175859	7745	4404.6				183340	9119	4973.8
— State	721,000	24581	3409.3	735,000	24327	3990.1	748,000	33173	4434.9
— Basin w/out Yel. Co.	83881	1916	2284.7				87427	2395	2739.4

RATE = TOTAL MAJOR OFFENSES PER 100,000 POPULATION
TOTAL = TOTAL 7-MAJOR OFFENSES

SOURCE: Unpublished information, State Crime Control Board, Montana Department of Justice, Helena.

SOCIAL -- SOCIAL SERVICES

There is a social services, or welfare office in each of the counties in the basin, situated in the county seats. For the three major services offered in the Basin, $862,312 was spent in May of 1976; $209,809 for aid to dependent childern, $573,642 for medical assistance, and $78,761 for general assistance and county medical care. As a basis of comparison, ADC was $169,505 and medical assistance was $282,343 in May of 1971. Food stamp recipients were received by 5806 persons in the Basin in May, 1976, with 2953 in Yellowstone County. Most of the welfare offices are open on a partial, several times a month basis, as their case load is relatively small. However, the offices in the larger cities, Billings, Livingston, Hardin, Forsyth, Miles City, Glendive and Sidney receive considerable use. Rosebud County, for example, has a very high use of food stamps, no doubt due to coal related activity in the area.

TOTAL EXPENDITURES FOR PUBLIC ASSISTANCE & MEDICAL CARE, MAY, 1976 & 71

	Aid to Dep. Child 1976	Aid to Dep. Child 1971	Medical Assistance 1976	Medical Assistance 1971	Gen Assist & Co. Medical 1976	Foodstamps 1976 (in [illegible])
[illegible]	$168.[illegible] (61) $136.2	118.69 (16) 1899	31,628 (300)	13,879 (205)	12,365.45	407
[illegible]	164.36 (11) 1808	154.67 (9) 1392	6918 (60)	2873 (35)	—	48
[illegible]	163.55 (22) 3598	143.44 (18) 2532	23,134 (87)	6677 (56)	152.53	78
[illegible]	$178.03 (35) 6231	$128.[illegible] (29) 3737	21,121 (187)	18,285 (176)	1493.43	314
[illegible]	163.53 (780) 127,163	145.40 (772) 112249	321,472 (2288)	158,681 (1738)	21,430.23	2953
[illegible]	$121.24 (143) 17337	104.39 (108) 11274	$33,826 (160)	$11,732 (142)	3002.[illegible]	271
[illegible]	109 (3) 327	76.25 (4) 305	1465 (7)	328 (9)	[illegible]	128
[illegible]	145.58 (106) 15431	102.82 (130) 13367	21,169 ([illegible])	7642 (96)	[illegible]	648
[illegible]	141.44 (53) 7072	137.17 (52) 7133	49,837 (292)	12,910 (182)	229.[illegible]	405
[illegible]	$134.67 (3) 554	$117.50 (4) 470	482 (5)	8592 (9)	2000	24
[illegible]	$140.75 (4) 563	$79.[illegible] (5) 395	4545 (35)	4372 (38)	[illegible]	20
[illegible]	113 (2) 226	162.67 (6) 976	3080 (22)	261 (16)	741.75	31
[illegible]	$147.81 (48) 7095	137 (40) 5480	27,553 (158)	[illegible]103 (125)	25,[illegible]	222
[illegible]	$144.[illegible] (61) 8792	121.24 (68) 8246	27,412 (216)	14,608 ([illegible])	10,2[illegible]	257
	209809 (1349)	169505 (1261)	573642 (3913)	232343 (3023)	$78,861.11	5806

SOURCE: Wi. Dept. of Social & Rehabilitation Services, Statistical Report, May, 1976, Vol. 38, #5

EXISTING ENVIRONMENT

SOCIAL -- HEALTH SERVICES

As of March 23, 1976, there were 240 physicians in the Yellowstone Basin; 166 in Yellowstone County and 74 in the REMAINDER of the Basin. All Counties had at least 1 physican, except Treasure which had none (Table). The reader will note that Yellowstone and Custer County's had significantly higher physician per 1000 population ratios than the remainder of the Bssin. This is due to their status of trade and commerce centers, as folks will drive to Billings or Miles City to receive medical care.

Likewise the largest hospitals are located in Billings (2) and Miles City (1) (Table). All hospitals are operating at below capacity except St. Vincents in Billings, with average percent occupancy slightly over 50% Three counties have no hospital facilities, Treasure, Powder River and Dawson Counties, which must use facilities of other counties.

NUMBER OF PHYSICIANS, POPULATION & PHYSICIANS PER 1000 POPULATION, 1976.

	# PHYSICIANS	July, 75 Pop.	PHYSICIAN / 1000 pop
PARK	11	12,000	.92
SWEETGRASS	1	2,900	.34
STILLWATER	2	5,300	.38
CARBON	5	7,700	.65
YELLOWSTONE	166	97,300	1.71
BIG HORN	7	10,900	.64
TREASURE	-0-	1,200	-0-
ROSEBUD	7	9,300	.75
CUSTER	23	12,000	1.92
POWDER RIVER	1	2,300	.43
PRAIRIE	2	1,900	1.05
WIBAUX	1	1,500	.67
DAWSON	8	10,300	.78
RICHLAND	6	9,700	.62
BASIN	240	184,300	1.30/1000 pop.
w/out Yel. Co.	74	87,000	.85/1000 pop

SOURCE:

Health Planning & Resource Development Division, Mt. Dept. of Health & Environmental Sciences, Helena / U.S. Bureau of Census, Current Population Reports for Montana.

LICENSED HOSPITALS IN BASIN, MAY 1976
NUMBER OF BEDS & OCCUPANCY

	# BEDS	% OCCUPANCY
PARK COUNTY		
LIVINGSTON MEMORIAL	54	50%
SWEETGRASS COUNTY		
SWEETGRASS COMMUNITY (BIGTIMBER)	17	18%
STILLWATER COUNTY		
STILLWATER COMMUNITY (COLUMBUS)	27	35%
CARBON COUNTY		
COUNTY MEMORIAL (RED LODGE)	28	52%
YELLOWSTONE COUNTY		
BILLINGS DEACONES	197	69%
ST. VINCENTS (BILLINGS)	191	106%
BIG HORN COUNTY		
COUNTY MEMORIAL (HARDIN)	16	44%
TREASURE COUNTY - NO HOSPITAL		
ROSEBUD COUNTY		
COUNTY COMMUNITY (FORSYTH)	26	32%
CUSTER COUNTY		
HOLY ROSARY (MILES CITY)	120	51%
POWDER RIVER - NO HOSPITAL		
PRAIRIE COUNTY		
PRAIRIE COMMUNITY (TERRY)	8	29%
WIBAUX COUNTY - NO HOSPITAL		
DAWSON COUNTY		
GLENDIVE COMMUNITY (GLENDIVE)	46	61%
RICHLAND COUNTY		
COMMUNITY MEMORIAL (SIDNEY)	55	72%

SOURCE: HEALTH PLANNING & RESOURCE DEVELOPMENT DIVISION, MT. DEPT. OF HEALTH & ENVIRONMENTAL SCIENCES, HELENA, UNPUBLISHED DATA.

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EXISTING ENVIRONMENT

SOCIAL -- POLITICAL

In the presidential elections of 1968 and 1972, republicans received almost twice as many votes as the democratic candidates. This conservatism was not as prevalant in the 1968 governatoral election, with the democrats receiving approximately 450 votes more than the republicans (of a total vote of almost 68,000). In that election, Yellowstone county went republican, with the remaining basin democrat unlike the 1972 governatoral election which saw the reversal of party for the basin and Yellowstone County. Yellowstone County appears to be becomming more liberal with their political votes, as they were very strongly democratic in the 1972 governatoral race.

House and senate races in 1971 were won predominately by republicans, winning 21 republicans and 6 democrats in house races, and 8 republicans and 4 democrats for the senate races. This mood of the basin changed considerably to the 1975 elections, when 14 democrats and 11 republicans were elected in the house and 7 democrats and 5 republicans were voted into the senate. 1/ The eastern portion of the basin is still quite conservative, voting in one democrat for 7 seats east of Custer County.

1/ Source: Secretary of States Office, Helena, Montana.

EXISTING ENVIRONMENT

SOCIAL -- AGRICULTURAL GROUPS

Given the agricultural nature of the Yellowstone Basin, membership in agricultural organizations is quite important. There are two predominant groups in the Basin, Montana Farmers Union and the Montana Farm Bureau. Suprisingly, membership is quite close for both, with Montana Farmers Union having 2280 members and Farm Bureau with 2160 members, both in 1975. 1/ Membership is well distributed throughout the basin with the largest memberships occuring in the Yellowstone and Big Horn Counties. These groups supply an important task of bringing any interests together to deal with various problems and as a forum for political activism.

The Conservation Districts are very important in the basin, as they serve as the liaison between the ranchers and farmers and the state and federal governments. All counties in the basin have Conservation Districts except Prairie County (which is in the process of setting one up), and all are actively working with the state on the question of water reservations. They are concerned, and hense are relying on the Conservation District, that their water options could be effectively foreclosed without immediate action.

1/ Montana Farm Bureau Federation, Bozeman, Montana, and Montana Farmers Union, Great Falls, Montana, Unpublished information.

EXISTING ENVIRONMENT

SOCIAL -- LIFESTYLES

There are two distinct social groups in the Yellowstone Basin; Billings and surrounding area, and the remainder of the basin. Quite comprehensive social research has been done in the Custer, Rosebud and Treasure County areas and in the Carbon, Sweet Grass, Stillwater area. These studies were done in conjunction with anticipated mineral development and hence form an excellent information base. Unfortunately, there has been no comprehensive social analysis done in the Billings area proper, although some conclusions can be drawn from work in the region.

The major basic criteria by which the regional culture operates (excluding Billings) is through several facts;

- protestant ethic of hard work, and
- rural independence.

These combine to create a populace which is very kin-oriented, taking care of their relatives and neighbors, there is a mistrust and proudness which causes them to take care of each other, avoiding help from government if they can and at all help it. This is a very pervasive feeling for the urban and rural populations as they believe in the ability to muddle through problems, surviving through hard work and perseverance.

Many in the towns are retired ranchers and farmers, and hense have close ties with the country side. Thus the towns have an anti-government flavor which is also strong with ranchers and farmers. For example, more and more of these folks are seeing the need for planning growth and development, but they are afraid of government controls. This inherent desire for independence and self rule is evident in water problems, where controls are demanded to protect

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water rights, but to also have minimum affect on the individual.

In the last few years the water question has become critically important, as demands by industrial groups and other states is very threatening. They are concerned that their rights will be foreclosed, and hense are pressing to gain control of these waters. In this example, they are attempting to preclude such events through cooperation with state agencies with the Water Reservation Process.

Historically, their pasts have involved little contact with industrial concerns, some of which have proven to be beneficial, oldtimers memories of coal development in Red Lodge for example. To an increasing extent, they are becoming quite wary of the corporation developments in the area, as the kinship originally available to business has changed from getting burned. Business is viewed as predatory and out to do them in through development, changing their very essence and lifestyles in the process. This situation has occured because of their lifestyle which takes a person for their word, and when they have been taken advantage of enough, they strike back. This faith has been taken advantage of often, to the point where big business interests are now not trusted.

Due to the growth of Billings as a regional trade center, the towns of the region are witnessing gradual decreases in business. They have expressed a feeling that a little growth (25-50 families) would be beneficial to them. The problem as they see it is that up to now they have been powerless to controling growth. The Forsyth area is an excellent example, where as growth continued expanding, those initially for the development began to change their minds about such development.

This sense of powerlessness is felt in their relationships with outsiders (government and business people). They realize they have a very different and unique lifestyle and feel that others want to pray on them and take it away.

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It is those who haven't been in the area as long, or who are not tied directly or indirectly to the laws who are in favor of development. Their lifestyle is more defined to middle class america, and hense they see the money from development as worth the changes involved.

To an extent this situation has occured in Billings, where growth money has accured without drastic changes in lifestyles. Billings is growing quickly and the "boom town" cliche' would very aptly apply. There is some response to this bursting at the seams with developments occuring in the outlaying areas, as people move from the city to country side. This urban exodus can be interpetated as the seeking of space from a city getting to large. Billings had the same ethnic base as the remainder of the basin, although growth has undoubtedly changed peoples attitudes and responses to the world and each other.

Throughout the basin, a dominant social force is the schools. From Billings to small towns, school activities play an important portion of the culture, for example, athletics is particularily valuable in the winter months, offering a forum for interaction for farm and city folks. Any threats upon the schools, as was felt in Colstrip, are meet with real anger and fighting.

Churches are important to them, as an expression again of their protestant ethnic, as is their recreation. They want things as they are, and they want to be left alone, to handle things in their own way. It is this independence and at the same time want to trust people at their word which makes them and the region very vulnerable to growth developments.

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YELLOWSTONE RIVER COMPACT

The Yellowstone River Compact, executed by Montana, Wyoming, and North Dakota, and ratified by the United States Congress in 1950, was designed to allocate water of the Clarks Fork Yellowstone, Bighorn, Tongue, and Powder Rivers. The compact recognizes water rights prior to 1950, those rights needed to supplement water supply on land irrigated prior to 1950, and water rights for irrigation projects started before 1950. Sufficient water was also pre-empted, although not quantified, to supply the future irrigation requirements of Indian lands. The Little Bighorn River was exempted from the compact. The compact divides the remaining water, as measured at the gaging station closest to the mouth, as follows:

FIGURE _____ DIVISION OF WATERS UNDER THE YELLOWSTONE RIVER COMPACT

Tributary	Wyoming	Montana
Clarks Fork Yellowstone	60%	40%
Bighorn	80%	20%
Tongue	40%	60%
Powder	42%	58%

Article X of the compact prohibits diversion of water out of the Yellowstone Basin without the unanimous consent of the signatory states. This provision has recently been challenged by Intake Water Company on the grounds that it violates Interstate Commerce.

Wyoming's State Engineer has published estimates of the quantities each state would be allocated based on the compact percentages as shown in Table _____. Montana does not necessarily agree and intends to independently calculate its share.

TABLE _____ WYOMING'S YELLOWSTONE RIVER COMPACT ESTIMATES
(Acre-Feet/Year)

Tributary	Wyoming	Montana
Clarks Fork Yellowstone	429,000	285,000
Bighorn	1,800,000	400,000
Tongue	96,400	144,700
Powder	120,700	166,600
TOTAL	2,446,100	996,300

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~~August 6, 1976~~

~~Yellowstone River Reservations EIS~~

FEDERAL RESERVED RIGHTS

Indian reserved water rights were first clearly established in Winters v. United States, 207 U.S. 564 (1908), and the reserved water right doctrine was subsequently extended to lands held by the federal government such as national parks and forests, Arizona v. California, 373 U.S. 546 (1963). Reserved water rights attach, expressly or by necessary implication, to lands which are reserved or withdrawn from the public domain. The permissable uses and extent of the reserved right is determined by the purpose of the reservation of land as for a national forest or for a homeplace for an Indian tribe. Reserved water rights, whether Indian or federal, are not created by or dependent upon state law, but rather are derived from the treaty, executive order or federal statute establishing the reservation. State courts may, however, adjudicate federal reserved rights and non-federal reserved rights held in trust by the federal government. United States v. Akin, (U.S. Supreme Court, March 24, 1976).

There are currently three pending lawsuits in federal District Court in Billings concerning reserved water rights in the Yellowstone River Drainage for federal lands such as the Custer National Forest, and for the Crow and Northern Cheyenne Indian Tribes. Two of the actions were brought by the United States in its own behalf and as trustee for the Tribes, and the third was brought by the Cheyenne Tribe itself. The reserved rights are claimed in the Tongue and Bighorn Rivers, Rosebud Creek and several other smaller adjacent drainages. There are several thousand persons claiming water rights under state law named as defendants, along with the State of Montana. The major question presently before the Court is whether these water right claims should be determined in federal court, or whether they should be determined in state court proceedings pursuant to the Montana Water Use Act. Until this and other procedural questions are resolved, there will be no final determination of the extent of the reserved water rights claimed.