MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA

PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO: F-46-R-3

STUDY TITLE: SURVEY AND INVENTORY OF COOLWATER AND WARMWATER ECOSYSTEMS

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JOB TITLE: SOUTHCENTRAL MONTANA WARMWATER FISHERIES INVESTIGATIONS

PERIOD COVERED: April 1, 1988 through March 31, 1990

ABSTRACT

Water levels in Bighorn Lake were at record low elevations in the spring of 1989 due to drought. Water management in both 1988 and 1989 favored walleye spawning with rising water levels after mid-April. Walleye egg taking operations were conducted in Bighorn Lake during 1988 and 1989 with 7.1 and 10.7 million eggs collected. Late summer sampling in Bighorn Lake identified several differences in forage fish and small game fish production between 1988 and 1989. Spottail shiners were spreading down the lake; other forage appeared to be limited. Walleye catch rates in Bighorn Lake improved during 1988 and 1989.

Sixteen ponds were stocked with largemouth bass in 1988; seven were new ponds. Winterkill took a major toll on largemouth bass during the winter of 1988-1989. Twenty-three ponds received largemouth bass in 1989. Most were previously planted ponds that had been lost to winterkill.

Smallmouth bass were planted in the lower Bighorn River in 1989. Tiger muskie planted in Lebo Lake in 1988 and 1989 showed very good growth the first year.

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JOB OBJECTIVES AND DEGREE OF ATTAINMENT

1.) To provide optimum conditions for walleye forage production on Bighorn Lake by implementing water-level control guidelines in cooperation with the Bureau of Reclamation.

Discussed water level requirements with Bureau of Reclamation at annual spring meetings. Obtained rising water levels during the critical period in both 1988 and 1989 despite a record low water supply in the drainage in 1989.

2.) To optimize water-level conditions in area irrigation reservoirs in order to enhance production of warm and cool-water species by formalizing and adopting water-level controls prior to the irrigation season on Lake Elmo, and other waters (state funded).

Discussed water level management with Huntley Irrigation District and obtained water levels in Anita Reservoir that allowed planting and overwintering of largemouth bass.

3.) To improve habitat conditions for warm and cool-water species in area bass ponds by installing aritifical habitat and enhancing natural cover.

No progress was made during this report period.

4.) To at least maintain the existing flow conditions in the Musselshell River by analyzing instream flow needs, and participating in the reservation process and pursuing other options which may supplement existing flows.

Submitted an application for water reservations on three reaches of the Musselshell River and five tributary streams in June of 1989.

5.) To maintain streambanks and channels in their present or improved conditions by administering existing laws.

Projects affecting stream habitat were dealt with through the Montana Stream Protection Act of 1963 (SPA) and the Natural Streambed and Land Preservation Act of 1975 (310).

6.) To maintain water quality at or above current levels as measured at U.S. Geological Survey water quality monitoring stations.

No significant water quality problems arose during this report period.

7.) To develop at least 30 producing bass ponds in the region that are open to public use, supporting at least 15,000 man-days of angling per year by 1992.

Sixteen ponds were stocked with a total of 104,500 largemouth bass fry in 1988. Seven were new ponds not previously planted. Twenty-three ponds were stocked with 87,751 largemouth bass fingerlings in 1989. Most of these were ponds that had been lost to winterkill in 1988.

8.) To acquire two new access sites on the Yellowstone River downstream from Billings (state funded)

Three new sites were acquired. Development is proceeding.

9.) To develop plans for construction of at least two new public fishing ponds in the region by 1992 (state funded).

No progress was made during this report period.

10.) To intensify management of existing urban area pond fisheries (Lake Elmo, Josephine, Arapooish, Chief Joseph, Broadview) by developing artificial reef projects, fishing docks, etc. to maximize the productivity of these fisheries.

Plans are proceeding toward development of a fishing dock at Lake Elmo on the southeast shore behind the new headquarters. An aeration pump will be installed at Arapooish Pond through a cooperative effort between Bighorn County and MDFWP.

11.) To convert marginal trout fisheries such as Glaston and Lebo lakes into productive warm and cool-water fisheries, and diversify the existing trout fishery at Cooney Reservoir by developing a two-story fishery supporting both walleye and trout.

Approximately 1,200 and 1,900 tiger muskie were planted in Lebo Lake in 1988 and 1989, respectively. Approximately 2,800 tiger muskie were planted in Glaston Lake in 1989. Growth rates and survival were monitored. Cooney Reservoir is discussed in detail in report F-46-R-3-V-b.

12.) To broaden and diversify existing warm and cool-water fishing opportunities by developing a yellow perch fishery in the area and exploring potential for new species introductions (state funded).

Tiger muskie were planted in Lebo and Glaston Lakes to control sucker populations and eventually provide a trophy fishery.

13.) To monitor developing warm and cool-water fisheries and make recommendations to enhance the forage base where necessary.

Worked with Wyoming Game and Fish to evaluate spottail shiner plants in Bighorn Lake. Monitoring continues on numerous other waters.

14.) To create a smallmouth bass fishery in the lower Bighorn River capable of supporting 10,000 angler days of use per year.

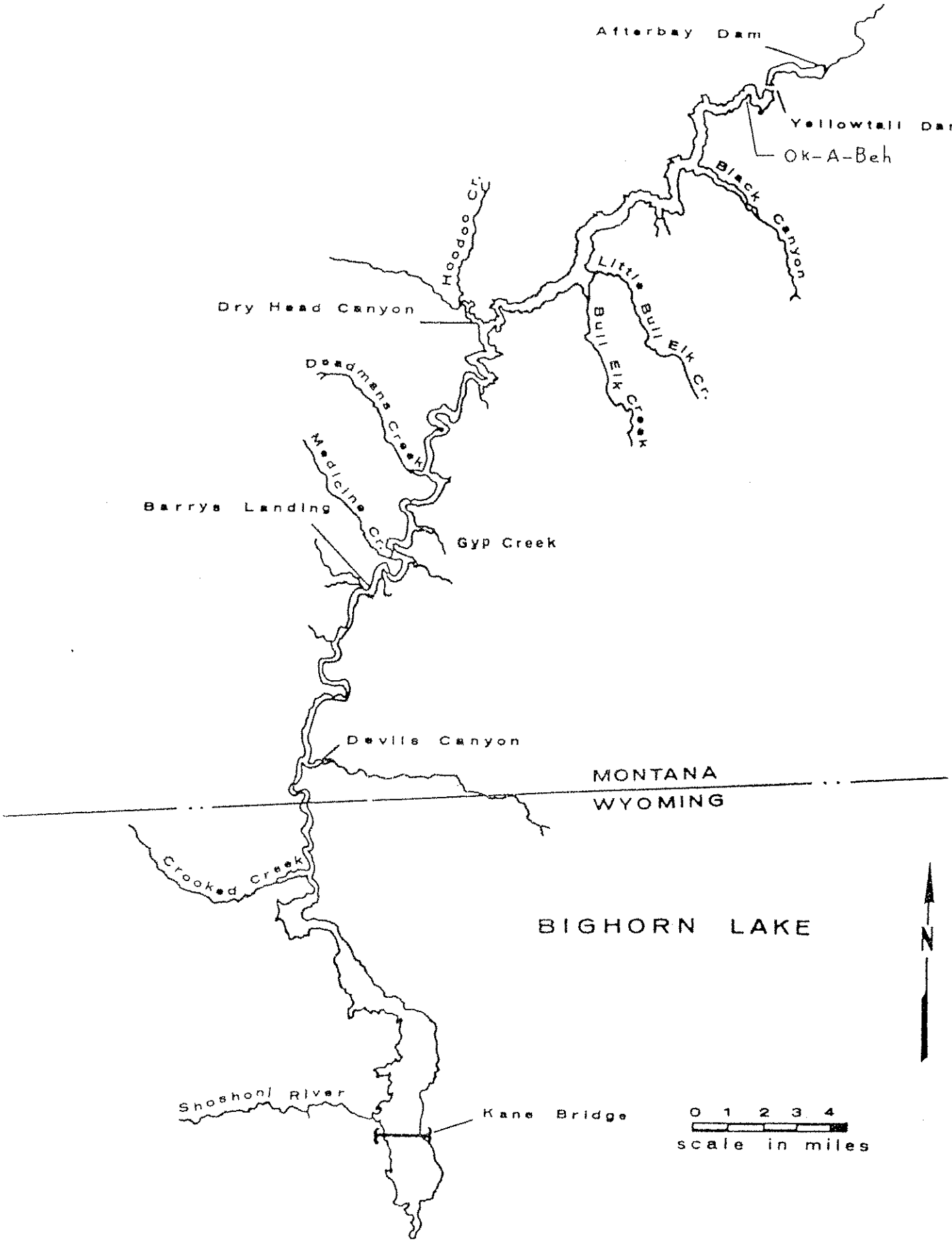

Figure 1. Map of Bighorn Lake.

Stocked 100,000 smallmouth bass fingerlings in the Bighorn River downstream from Hardin in 1989.

15.) To develop a walleye egg source in Bighorn Lake or Cooney Reservoir (state funded).

Collected 7.1 and 10.7 million walleye eggs from Bighorn Lake in 1988 and 1989, respectively.

16.) To develop contingency plans for walleye and bass fingerling production ponds in the region (state funded).

One pond pursued near the Bighorn River for walleye fingerling production proved unsuitable.

17.) To determine the amount of fishing effort expended and success rates for warm and cool-water species in the region's mixed-species fisheries by utilizing existing warden and parks division contacts in the field and supplementing with fisheries division follow-up where necessary (state funded).

Worked with the National Park Service on a limited creel census on Bighorn Lake. Summary of data presented. Additional work is needed on smaller ponds and reservoirs.

18.) To increase public awareness of the availability of warm and cool-water fishing opportunity and the resource that provides them (state funded).

A bass pond database was established and used in directing the public to planted ponds.

PROCEDURES

Spring electrofishing in 1988 was conducted using a fixed-boom electrofishing boat powered by an outboard jet engine. Due to low water levels in 1989, a smaller aluminum drift boat with fixed-booms and powered by a 15 horsepower outboard was used. A 220 volt generator connected to a Coffelt VVP-15 was used in both boats. DC current was pulsed at 250 to 300 volts and 10 to 12 amps. All shocking was conducted at night. The large jet powered boat was used for late summer shocking, again at night.

Seines (100 ft and 30 ft) with 1/4 in mesh, 100 x 6 ft monofilament gill nets with 1/2 in mesh and 1/2 in mesh frame traps were used at various locations throughout Bighorn Lake (Figure 1) to sample for forage fish and small gamefish. Trap and gill nets were set overnight.

Smaller ponds and lakes were sampled with a combination of seining, gillnetting, trapnetting, electrofishing, and/or angling.

RESULTS AND DISCUSSION

Bighorn Lake

Water Levels

Drought conditions in Wyoming in 1988 had a major impact on water elevations in Bighorn Lake, especially in 1989. Spring water levelS in 1988 were similar to those normally occurring in recent years. Drought conditions resulted in record low water levels in the spring of 1989. Average monthly reservoir levels for April and May were 33.9 and 26.7 feet lower in 1989 than in 1988. The low water levels exposed completely different habitat areas than were normally available for walleye spawning. The low water levels also affected boat access in the spring of 1989.

Even though water elevations were different, spring reservoir patterns during both years should have been favorable for walleye spawning. During 1988, reservoir levels reached their lowest elevation on April 16. In 1989, the lowest elevation occurred on April 14. During both years, water levels were on the rise during the period from mid-April through May which corresponds to the walleye spawning and incubation period. Rising water levels assured that any eggs deposited would remain wetted.

A strong year class of crappie, noted throughout the reservoir in 1989, may have resulted from the large rise in spring water levels after April of 1989. Fredenberg (1988) noted a similar benefit to forage fish in 1986 after low water levels experienced in 1985. Areas where vegetation encroaches onto exposed shoreline become flooded structure and ideal forage fish habitat during good water years.

Creel Census

National Park Service personnel continued to conduct an annual creel census on Bighorn Lake during 1988 and 1989. A total of 454 anglers fishing 1,284 hours were contacted in the Montana portion of the reservoir during 1988, and 365 anglers fishing 1,840 hours were contacted in 1989. The trend of declining walleye catch rates reported for the past four years (Fredenberg 1988) was reversed in 1988. Walleye catch rates more than doubled between 1987 and 1988 to 0.26 fish per hour which was above the informal management goal of 0.25 fish per hour established for Bighorn lake. Walleye catch rates declined to 0.21 fish per hour in 1989. The average size of walleye kept increased to 17.4 inches for both 1988 and 1989, more than an inch larger than in 1987.

The overall catch rate for all fish increased from 0.17 fish per hour in 1987 to 0.36 and 0.39 fish per hour in 1988 and 1989, respectively. The improvement in the 1988 catch rate was due almost entirely to the improvement in the walleye catch rate. There was a major decline in the crappie catch rate with only 5 crappie recorded in 1988. In 1989, the total recorded crappie

catch improved to 203, the highest number recorded since 1984. Catch rates were also up for rainbow and brown trout, channel catfish, and ling in 1989.

Wyoming fishermen constituted 13.6% and 30.1% of the licensed anglers censused in Montana in 1988 and 1989,respectively. In comparison, Montana anglers constituted 11.0% (1988) and 4.7% (1989) of the licensed anglers contacted in Wyoming.

Walleye catch rates also improved considerably during 1988 in the Wyoming end of the reservoir. A total of 151 anglers caught 188 walleye in 719 hours for a catch rate of 0.26 fish per hour. The catch rate declined to 0.13 walleye per hour in 1989, but was still well above the catch rate of 0.03 walleye per hour reported in 1987 (Fredenberg 1988).

As in the past, the average length of walleye from the Wyoming end was greater than from the Montana end. Walleye kept in Wyoming in 1988 and 1989 averaged 18.4 and 18.7 inches, respectively. Catch rates for catfish and ling were up slightly, and the sauger catch rate was up significantly in the Wyoming end of Bighorn Lake during 1989.

Walleye Electrofishing and Egg Take

Major walleye electrofishing efforts on Bighorn Lake were concentrated on spring egg taking operations during 1988 and 1989. Efforts to sample small walleye later in the year using nets and electrofishing were of limited success.

Past work found that most ripe walleye were concentrated in the Ok-A-Beh area of the reservoir in the spring (Fredenberg 1987). Egg taking efforts were concentrated in this area during 1988 and 1989. In 1988, egg-taking operations started on April 18 when water temperatures in the Ok-A-Beh area reached 45-46^{0} F. During three nights of electrofishing, 101 ripe male walleye, 88 females, and 16 immature walleye were collected. The first night, 29% of the 35 females collected were ripe and 6% were spent. On April 19, 33% were ripe and 13% were spent. By the third night (April 21), 35% were ripe and 35% were spent, indicating that spawning was probably approaching a peak.

Eggs were collected from 48 females during 2 days of spawning. A total of 7.1 million eggs were collected, or roughly 150,000 eggs per female on average. The average length of 88 mature females was 23.3 in, ranging from 16.0 to 31.4 in. The largest female weighed 13.3 pounds before spawning. The 101 males collected averaged 17.9 in long. One 6.0 inch yearling walleye was collected. The remaining 15 immature walleye averaged 15.7 in long and ranged from 12.4 to 20.3 in and probably included both males and females.

All eggs were sent to Miles City Hatchery for hatching. A total of 4.7 million walleye fry from various sources were planted back into Bighorn Lake in 1988.

Egg-taking efforts were expanded in 1989. All efforts were again concentrated in the Ok-A-Beh, Box Canyon area. Reservoir water levels were extremely low in 1989 making it impossible to launch a large shocking boat. All electrofishing was conducted using a small aluminum drift boat powered by a 15 hp outboard motor, limiting the area of the reservoir that could be covered.

Sampling began the night of April 18 as daytime water temperatures were reaching 45 to 46^{0} F. Electrofishing was conducted for five consecutive nights. The first night 41 females were collected with 17% ripe and 15% spent. The second night, 43% of 37 females were ripe and 24% were spent. By the fourth night, no ripe females were collected and 61% of the 18 females were spent. The fifth night of electrofishing only produced 11 females; two were ripe and seven spent. Several females that had been spawned by the egg taking crew at the Ok-A-Beh dock were also captured out by the dam. It appeared that most of the females available in the area had probably been handled, so electrofishing was discontinued.

Approximately 82 females were spawned with a total take of 10.7 million eggs, roughly 130,000 eggs per female (down slightly from 1988). The average length of 55 females measured was 22.6 in, similar to 1988. The largest female collected was 29.2 in long and weighed 11.0 lbs. Over 200 ripe males were collected during 1989, but not weighed or measured due to limited manpower. No yearling walleye from the 1988 plant were seen during the spring shocking.

Miles City again hatched all the eggs, and 5 million fry from various sources were planted back into Bighorn Lake on May 13, 1989. Fry were planted in the Ok-A-Beh, Black Canyon, and Slide (up-reservoir from Bull Elk Creek) areas of the reservoir. Fifty foot vertical plankton tows were made at each location before the fry were planted. These samples were not analyzed but were used to get a rough idea of the food available for the fry before they were planted. Zooplankton populations primarily Daphnia sp., looked good at all three stocking locations.

A million fry were hauled up the reservoir to Barry's Landing to be planted. A plume of warm muddy water was encountered several miles downstream of Barry's. A plankton tow was made before stocking indicated no zooplankton were present. As a result, these fry where taken back down the reservoir and planted in the Slide area.

Forage fish sampling

A week was spent sampling Bighorn Lake in cooperation with Wyoming Game and Fish during late August, 1988 and 1989. Sampling efforts started near Horseshoe Bend (up reservoir from Crooked Creek) in the Wyoming end and progressed downstream to Yellowtail Dam. A combination of nets, seines, and night electrofishing were used to sample for forage fish and small gamefish. In 1988, sampling was conducted in the Horseshoe Bend, Barry's Landing, Big

Bull Elk, Black Canyon, and Ok-A-Beh areas of the reservoir. In 1989, limited netting was also conducted in the mid-section of the reservoir near Dry Head, Hoodoo, and Deadmans Creeks.

Sampling results from both years indicated forage is limited in Bighorn Lake (Tables 1 and 2). Seining, usually the most productive method of sampling small fish in most warmwater lakes and reservoirs, is not practical in most areas of Bighorn Lake due to steep banks and limited littoral areas. Sampling limitations may be partially responsible for the small numbers of forage fish captured, but the extensive effort with gill nets, trap, and electrofishing would have collected more forage fish if they were abundant. The majority of the forage fish was concentrated in the upper end of the reservoir from about Barry's Landing upstream. The greatest concentrations were in the very upper end around Horseshoe Bend and Crooked Creek.

Several differences were observed between 1988 and 1989. The spottail shiner, first introduced into the Wyoming end of the reservoir in June of 1988, appeared to be spreading down the reservoir (although their numbers were still low). In August of 1988, they were found as far down the reservoir as Medicine Creek, just below Barry's Landing. In 1989, four spottail were captured in a trap net in Big Bull Elk Creek approximately 17 miles downstream of Medicine Creek. A strong year class of carp was produced in the upper end of the reservoir in 1988. One to two inch carp were the most numerous fish species seen during August sampling. Numerous 2 to 4 in crappie (mostly black) were observed in Medicine Creek in 1988, but crappie were very rare throughout the rest of the reservoir. In 1989 only 5 small carp were collected, but 1 to 2 1/2 in black crappie were very numerous in the ends of almost every bay sampled from Crooked Creek downstream as far as Cabin Creek, 7 miles above the dam. There was also a strong year class of river carpsuckers produced in the Wyoming end of the reservoir in 1989. Yellow perch and green sunfish were the most common forage species found downstream of Barry's Landing both years, but their numbers were small.

A number of baited crayfish traps were set overnight each year. In 1988 122 crayfish were captured in the Barry's Landing area. In 1989 only one crayfish was captured. Crayfish populations appear to fluctuate as much as other forage populations.

Besides the strong year class of crappie observed in 1989, the only other game fish to show population trends were channel catfish. In 1988 a strong year class of 1 to 2 inch catfish was noted in the Horseshoe Bend and Crooked Creek area. However, in 1989 only 3 channel catfish of any size were captured, indicating poor survival of the 1988 fish. Some small largemouth bass were collected both years, indicating some reproduction was occurring.

The August sampling has proven to be of limited success for sampling small walleye or sauger as a means of monitoring natural

Table 1. Summary of fish species collected by various sampling methods from Bighorn Lake during August 1988.

Species	Number	Size Range (inches)	Comments
Walleye	52	5.9-8.5 (3 > 16.0)	
Sauger	179	5.5-8.6 (4 > 11.0)	
Largemouth Bass	119	2.6-5.6 (+ 14.5)	
Black Crappie	1000's	2-4 (+7.9, 8.0, 8.4)	Mostly in Medicine Creek
Rainbow Trout	25	13.2-18.6	Black Canyon & Big Bull Elk
Brown Trout	10	8.2-20.1	
Ling	3	8.9-9.5	
Channel Catfish	1542	1-2	Horseshoe Bend & Crooked Creek
Yellow Perch	210	2.7-8.2	Barry's Landing downstream
Green Sunfish	1000's	--	Black Canyon
Spottail Shiner	69	2-4	Horseshoe Bend to Medicine Creek
Fathead Minnow	79	--	
Flathead Chub	1	--	
Hybognathus sp.	81	--	
Carp	1000's	1-2	Upper end
Longnose Dace	60	--	
White Sucker	3	--	
Shorthead Redhorse	2	--	
Longnose Sucker	2	--	
River Carpsucker	722	1-2	Upper end

Table 2. Summary of fish species collected by various sampling methods from Bighorn Lake during August 1989.

Species	Number	Size Range (inches)	Comments
Walleye	18	4.8-29.4 (6 > 8.0)	
Sauger	43	4.1-23.3 (2 > 8.0)	
Largemouth Bass	45	1.7-13.8	
Black Crappie	1000's	0.9-2.3 (+ 10.1)	Crooked Creek to Cabin Creek
Rainbow Trout	6	15.9-19.3	Cabin Creek to Black Canyon
Brown Trout	6	15.2-20.2	
Ling	2	18.5-19.2	
Channel Catfish	3	1.4-3.5	
Yellow Perch	226	2.2-9.5	Big Bull Elk and Downstream
Green Sunfish	7	2.4-3.2	Cabin Creek and Downstream
Spottail Shiner	50	2.1-4.6	Crooked Creek to Big Bull Elk
Fathead Minnow	1		
Flathead Chub	20		
Hybognathus sp.	107		
Carp	19		
Longnose Dace	1		
White Sucker	20		
Shorthead Redhorse	52		
Longnose Sucker	3		
River Carpsucker	1000's		Upper end

production and/or stocking success. In 1988, 49 walleye between 4.9 and 8.5 inches total length and 3 walleye greater than 16 in long were collected by all sampling methods. Most were collected in the Horseshoe Bend area or around Barry's Landing. No small walleye were collected in the lower end of the reservoir where most spawning appears to occur. One hundred and seventy-five sauger between 5.5 and 8.6 in and 4 larger sauger were also captured in 1988. Almost all of these were caught in the Horseshoe Bend area.

Sampling success for walleye and sauger was even lower in 1989. Only 18 walleye and 43 sauger were captured; of these, only 6 walleye and 2 sauger were less than 8 in long. The few small walleye caught were collected in the central part of the reservoir and could have been from the 1988 Montana plant. More work is needed to develop a reliable technique for sampling the smaller walleye in Bighorn Lake.

Largemouth Bass Ponds

Sixteen ponds were stocked with largemouth bass fry in 1988. Seven were new ponds being planted for the first time. The rest were previously planted ponds, most receiving a second plant. The largest plants were made in two public ponds, Lake Elmo and Broadview Reservoir, which received 50,000 and 19,500 fry, respectively (780 & 2,400 fish per acre). The remaining privately owned ponds received plants of 400 to 10,000 fry. Lake Elmo, Broadview Reservoir, and two private ponds received transplants of 2.5-4.5 inch largemouth bass from Arapooish pond.

Sixteen previously planted ponds were sampled in 1988; bass were captured in 12 of these. Four public ponds (Broadview, Lake Elmo, Lake Josephine, and Arapooish) contained viable bass populations in 1988. These ponds are discussed in more detail in the following section.

Drought conditions in 1988 resulted in very low water levels in most ponds and reservoirs in the region going into the severe winter of 1988-89. Winterkill took a major toll on regional bass ponds during 1989. Of 12 ponds sampled during the spring and summer of 1989, only 4 were found to contain bass. Conversations with private pond owners indicated that many other small ponds previously planted with bass had also winterkilled.

By the spring of 1989, the Miles City fish hatchery was operating enough to be able to raise bass in ponds before release. They also produced largemouth bass from their own brood stock. Twenty-three ponds were stocked with 1 1/2 to 2 in largemouth in 1989. One plant was in a pond that had last been stocked in 1972. Six ponds open to unrestricted public access (Anita Reservoir, Arapooish Pond, Broadview Reservoir, Chief Joseph Pond, Lake Elmo, and Lake Josephine) received largemouth plants in 1989. Three of these had overwintered bass during 1988-89. The remaining ponds were privately owned ponds that had winterkilled and were being reseeded. Stocking rates for 1989 were between 125 and 1,000 bass

per acre. The largest plants again went into the ponds open to unrestricted public access. Stocking rates were dependent on the pond's condition, fishery potential, and species assemblage already present.

Winterkill will continue to be a problem with the Region 5 largemouth bass program. Due to the limited availability of high quality ponds and reservoirs in the area, many of the ponds being stocked are of marginal depth and size. These ponds all have the potential of developing self-sustaining bass fisheries which could provide considerable recreation over a long period if conditions remain favorable. However, given conditions like those experienced in 1988 and 1989 when a bad winter follows a very poor water year, many of these ponds are subject to winterkill.

Public interest and demand for warmwater fisheries continue to increase in Montana. Considering the relatively small expense involved in establishing a productive bass pond and the potential recreation it can provide, the stocking of these marginal ponds is justified. Efforts need to be increased to locate new ponds on both public and private ground that can be stocked with bass. The more bass ponds that can be established, the better the odds are that some of these fisheries will survive during poor years. More effort is also needed to improve the public bass fisheries available in the region by working with local sportsman clubs on habitat enhancement projects, and by striving for a better balance between largemouth bass and other fish species present in these waters.

If water conditions cooperate, the regional goal of at least 30 producing bass ponds by 1992 can be achieved.

Public Ponds

Lake Elmo

Lake Elmo was sampled during both 1988 and 1989 using various nets and night electrofishing (Table 3). Yellow perch were very numerous, but appear to be stunted. Lake Elmo contained some nice black crappie, but the lack of smaller crappie indicated reproduction was limited. Heavy predation by large numbers of small perch may be a major problem. In September of 1989, 369 6 in crappie were transplanted to Lake Elmo from Lake Josephine to supplement natural production.

Table 3. Numbers and size ranges of fish species collected by various sampling methods from Lake Elmo in 1988 and 1989.

Species	1988 No.	1988 Length Range (in)	1989 No.	1989 Length Range (in)
Black Crappie	10	9.8-12.6 (+26 YOY)	19	9.6-13.2
Channel Catfish	-		1	6.7
Largemouth Bass	41	2.9-8.9	26	3.4-8.1
Ling	2	24.2-24.8	1	25.0
Yellow Perch	450+	YOY-7.9	234	3.3-8.3

Largemouth bass up to 8.9 inches long were sampled, indicating bass were overwintering in the lake. Large bass are very difficult to sample, especially in a large open lake like Lake Elmo that lacks shoreline cover to concentrate fish. It is likely that there is a good population of bigger largemouth bass in Lake Elmo. Bass and other species would benefit from structural enhancement in this lake where fluctuating water levels inhibit natural inshore vegetation.

One small channel catfish was collected in 1989, probably from the catfish plant made in 1988. If a catfish fishery can be developed in Lake Elmo, it would provide an opportunity for bank fishermen fishing with bait to catch a large, tasty fish.

Lake Josephine

During one night of electrofishing in Lake Josephine in 1988, 42 largemouth bass (ranging from 1.8 to 15.3 in long) and 4 black bullheads (8.0-9.5 in) were captured. Most of the largemouth ranged between 4.0 and 8.5 in; two were less than 3.0 in, and five were greater than 10.0 in. The largest bass caught was 15.3 in long and weighed 1.84 lbs.

Lake Josephine was sampled with trap nets, gill nets, and seines in 1989. Major species captured and size ranges were: 600+ black crappie (3.6-6.9 in), 11 largemouth bass (2.4-6.6 in), 56 pumpkinseed sunfish (3.2-4.4 in) and 6 yellow perch (4.9-5.8 in). Approximately 370 black crappie were transplanted to Lake Elmo. Large schools of largemouth bass fry were observed along the shoreline in late June. Survival of these small bass is probably limited by the many small predators present and the limited food supply available to get them in good condition for their first winter. Vertical plankton tows from the bottom, and surface tows

in the middle of the lake failed to collect any zooplankton in late June in 1989. Large populations of small fish may be preventing a good plankton bloom from occurring in the lake. Lack of plankton may explain the stunting in crappie and poor survival of naturally produced bass fry.

Broadview Reservoir

Broadview Reservoir was sampled with a seine and by electrofishing in 1988. Over 300 stunted black crappie (ranging from 3.6 to 6.5 in) and 8 largemouth bass were collected in one 100 ft seine haul. Two white crappie (6.9 and 7.0 in) and one 4 in lake chub were also captured. Sixteen additional largemouth bass (2.1 to 6.4 in) were captured by electrofishing. Due to the high conductivity of the water, electrofishing was not very effective. Many bass and carp were observed swimming right past the electrodes.

Broadview Reservoir continues to receive small plants of catchable trout which provide some recreational opportunity. It is also scheduled to receive tiger muskie in 1990. These muskie should provide some predation on the numerous carp and stunted crappie in the pond, and should also provide an additional trophy fishery in the reservoir.

Arapooish Pond

Arapooish Pond provided the best largemouth bass fishery in the region in 1988. Largemouth were stocked in Arapooish in 1986 after it was rehabilitated in 1985. By 1988, the pond was providing an excellent and popular bass fishery for largemouth up to 13 in long. A mark-recapture run conducted by electrofishing in August of 1988 estimated a population of over 2,000 age 1 and 2 bass in the pond. Young-of-year (YOY) bass were also abundant. Six seine hauls at the end of August caught almost 10,000 2.5 to 4.5 in YOY bass, which were transplanted to other ponds in the region.

The biggest largemouth bass collected while electrofishing was 13.4 in long and weighed 1.44 lbs. The average condition factor for all bass 7.5 in and longer was an excellent 62.9.

The entire bass population in Arapooish was lost during the winter of 1988-1989 due to winterkill. In July of 1989, Arapooish was restocked with 10,000 1.8 in largemouth bass, but they apparently did not survive the winter of 1989. In the fall of 1989, Bighorn County attempted to deepen several areas of Arapooish Pond using a large drag line, but were unable to dig into the hard clay bottom. Currently the Montana Department of Fish, Wildlife and Parks is working with the Big Horn County Parks Board to install an aeration system in Arapooish to help it overwinter fish. Largemouth bass will again be planted in 1990.

Other Ponds

Two other ponds with unrestricted public access were stocked with largemouth bass in 1989. Anita Reservoir is an irrigation reservoir owned and managed by the Huntley Irrigation Project. This reservoir was planted with largemouth bass in 1981 and provided several years of good fishing until it was drained to allow work on the dam. It had not been stocked since. The state has no control over water levels, and the reservoir could be dewatered at any time to meet irrigation demands. Because it is a larger reservoir with open public access, however, it was restocked. Future management will involve working with the irrigation district to get the best water levels possible without interfering with their irrigation needs. This reservoir is subject to severe water level fluctuations and would benefit greatly from habitat enhancement work to provide permanent cover in deeper areas of the lake.

Chief Joseph Pond is located in a city park in Harlowton. It has been managed as a put-and-take trout fishery in the past and receives considerable use. Largemouth bass planted in 1986 and 1987 to provide an additional fishery apparently did not survive. A final attempt was made in 1989 to establish a bass population. Future plans call for planting channel catfish in this pond to provide an additional fishery.

Lebo Lake

Lebo Lake is a large, privately owned lake managed primarily for trout in the past. It was treated in 1963 to kill stunted crappie and bluegill and a large population of suckers, and replanted with trout. In recent years, tremendous sucker populations have again developed. Tiger muskie were planted in Lebo Lake in 1988 and 1989 to control the suckers and provide an additional trophy gamefish in the lake.

Approximately 1,200 two-in tiger muskie were stocked near the end of May in 1988. Sampling in mid-October with trap and gill nets captured six tiger muskie, averaging 15.9 in and ranging from 15.6 to 16.1 in, for a growth rate of almost 0.10 in per day. During spring of 1989, two tiger muskie (15.4 and 16.5 in) were captured. Very little growth occurred during the winter. In May of 1989, 1,900 1.2 in tiger muskie were planted into Lebo Lake. No fish from the spring plant were captured during fall 1989 sampling. One fish from the 1988 plant was in a net but escaped before it could be brought into the boat. This tiger muskie was estimated to be about 24 in long.

Smallmouth Bass in Streams

The smallmouth bass population in the Musselshell River was not sampled during 1988 or 1989. Reports from anglers indicate

that reproduction is occurring and that some larger fish are being caught.

Smallmouth bass were first stocked in the lower Bighorn River in 1986, when 62,000 were planted downstream of Two Leggins Access. This plant was supposed to be the first of several years of stocking to try and establish a self-sustaining smallmouth fishery in the lower river. No additional smallmouth were available between 1986 and 1989. In 1989, the smallmouth bass brood stock at the Miles City Hatchery did produce, and 100,000 smallmouth fingerlings were again planted in the lower Bighorn River.

Survey electrofishing was conducted in the lower Bighorn in 1988 and 1989 to evaluate the success of the 1986 plant. In 1988, 12 smallmouth bass were captured downstream of Manning Dam during one day of electrofishing. These fish averaged 8.9 in and ranged from 7.2 to 11.4 in. No smallmouth were captured upstream of Manning Dam. Nine smallmouth bass were collected during survey shocking in 1989. Three captured between Hardin and Grant Marsh averaged 11.7 in; the largest was 12.2 in and weighed 1.06 lbs. Six smallmouth were captured downstream of Manning Dam. These fish averaged 10.4 in and ranged from 9.5 to 11.0 in. Based on size, most of these fish should be able to spawn in the spring of 1990.

MANAGEMENT RECOMMENDATIONS

Bighorn Lake

1. Increase spring electrofishing to try and locate additional concentrations of ripe walleye in other parts of the reservoir. Expand egg taking operations to utilize the additional fish if they are located.

2. Continue planting walleye fry in Bighorn Lake each spring. As Miles City Hatchery becomes fully operational, request walleye fingerlings to supplement fry plants.

3. Monitor success of walleye stocking in the Montana end of the reservoir with expanded spring electrofishing and joint summer sampling with Wyoming Game and Fish.

4. Continue to monitor the expansion of spottail shiners in the reservoir. Develop an EA for the introduction of emerald shiners into Bighorn Lake.

5. Continue annual spring meetings with Wyoming Game and Fish, the Bureau of Reclamation, and the National Park Service to discuss water levels and management options. Obtain the best water levels possible for the fishery that can still meet the requirements of the other agencies involved.

Warmwater Ponds and Reservoirs

1. Expand efforts to locate additional ponds and obtain permission to stock them with largemouth bass.

2. Increase management efforts on public warmwater ponds in the region to obtain the maximum fisheries potential possible. Work with Bighorn County to find a solution to the winterkill problem at Arapooish Pond. Explore stocking another large predator (eg channel catfish) in Lake Josephine to control populations of stunted crappie and sunfish.

3. Future management for Lake Josephine needs to look at ways of thinning out the populations of small crappie and sunfish, and should look at the possibility of stocking another large predator like channel catfish to help keep these populations in balance. Lake Josephine is an extremely popular urban fishery and need more intensive management to bring it to it's full potential.

4. Lebo Lake is scheduled to receive one more plant of tiger muskie. Plans are to try and hold them through the summer in the hatchery and release them in the fall at a larger size. This should increase survival of the planted fish.

5. Work with local sportsman groups to develop habitat enhancement projects for several warmwater ponds, especially Lake Elmo and Anita Reservoir.

6. Continue to monitor the tiger muskie program and expand to Broadview Reservoir. Explore holding tiger muskie in the hatchery until fall. Planting larger fish should improve survival.

Smallmouth Bass in Streams

1. Expand sampling efforts on the lower Bighorn River to monitor the developing smallmouth bass fishery.

2. Evaluate new methods for sampling smallmouth bass in the Musselshell River.

LITERATURE CITED

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Waters referred to:

5-22-7154	Anita Reservoir
5-22-7169	Arapooish Pond
5-22-9835	Bighorn Lake
5-22-0490	Bighorn River, Sec. 1
5-22-7343	Broadview Reservoir
5-18-7410	Chief Joseph Pond
5-22-7777	Lake Elmo
5-22-8334	Lake Josephine
5-18-8230	Lebo Lake
5-22-8554	Lower Glaston Lake
5-18-4320	Musselshell River, Sec. 1

Key words or fish species:

Black crappie
Channel catfish
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Largemouth bass
Smallmouth bass
Spottail shiner
Tiger muskie
Walleye
Yellow perch
Reservoir levels
Habitat enhancement
Spawning
Egg taking